RELEASE NOTES FOR MERLIC 4.8

Here you can read the release notes for MVTec MERLIC 4.8, as released in June 2021.

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SUPPORTED OPERATING SYSTEMS

WINDOWS

MERLIC 4.8.0 is still available for Windows 7 and Windows 10 (64-bit operating system). However, in future MERLIC versions only Windows 10 will be supported.

During the installation, the environment variable `MERLIC4EXAMPLES` is set to `C:\Users\Public\Documents\MVTec\MERLIC 4` by default. It contains the path to the directory in which additional files such as example applications or images are installed.

Please refer to the "Readme" in the MERLIC manual for more information about the system requirements.

LINUX

MERLIC 4.8.0 is available for selected Linux ARM 64-bit platforms. This edition requires a specific license that needs to be activated on the ARM device. Please contact MVTec to get more information about how to obtain this license. After the license activation, the ARM device also functions as a

license dongle for the PC version of MERLIC 4.8.0, however, with some limitations.

Please refer to the "Help → About" dialog in the MERLIC Backend for the respective limitations.

MAJOR NEW FEATURES

NEW GUI FOR EASY CONFIGURATION OF COMMUNICATOR PLUG-INS

With MERLIC 4.8, both provided and self-developed Communicator plug-ins can be configured clearly and easily via a GUI. In the MERLIC PI Setup there is a new graphical user interface for this purpose, in which plug-in instances can be added, removed, started and stopped, and the parameters can be adjusted. In the context of easy-to-use, this simplifies and speeds up the configuration, as the editing is done directly in MERLIC. Additionally, the configuration of Communicator plug-ins can be done locally and remotely. The remote configuration greatly improves the user experience in situations where MERLIC is used on an embedded device or across physically distant computers (remote systems).

EXPANDED INTEGRABILITY WITH MQTT PLUG-IN

With MQTT, a new standard plug-in for IoT communication is available in MERLIC 4.8. The MQTT plug-in significantly increases the number of systems with which MERLIC can communicate out-of-the-box, whether directly via MQTT-enabled controllers or indirectly via the gateways between MQTT and various other languages and protocols. This can significantly reduce integration time and complexity. For mobile applications, free mobile clients for iOS and Android are available.

COMPATIBILITY

Since the last MERLIC version we have been working hard to improve MERLIC in every way. This has, however, resulted in a few of incompatibilities. We apologize for the inconvenience.

- **Process Integration**
  - The command "merlic.exe --pi" is now deprecated and will no longer be available in the next major version of MERLIC. More information.
- **Communicator**
  - The behavior of the "--plugin" flag has been slightly altered. It will no longer read plug-in configurations from the default

configuration directory but implicitly create a new (default) configuration in a temporary location. To force reading an existing configuration, specify the configuration directory explicitly.

The "--plugin" option is only supported for compatibility reasons. It is recommended to use the new "Communication" tab of the MERLIC PI Setup program to manage plug-in configurations and choose which plug-ins to run. More information.

IMAGE SOURCE MANAGER

- **Enhancements**
    - The Image Source Manager has been improved for the use of a multi-camera setup. Now, the images from all configured "Image Sources" are grabbed simultaneously.
    - The behavior of loading ISM sources in the MERLIC Backend has been improved. Previously, when starting the MERLIC Backend, an image from all configured image sources in ISM was acquired. In case of hardware triggered cameras, loading the MERLIC Backend was blocked until a trigger was sent or a timeout occurred. Now, MERLIC does not acquire an image from hardware triggered cameras when starting the MERLIC Backend.
    - The behavior when stopping an MVApp via the MERLIC Backend or MERLIC Frontend has been improved. Previously, MERLIC waited until the Image Source Manager finished the image acquisition before the MVApp was stopped. Thus, in the case of hardware triggered cameras, the MVApp was not stopped before either the acquisition timed out or the cameras were triggered. Now, MERLIC aborts a currently running image acquisition and stops after the current execution of the tool flow has finished.

PROCESS INTEGRATION

- **New Features**
    - The MERLIC Process Integration Setup (MERLIC PI Setup) has been extended. It now provides a new tab "Communication" for the configuration of Communicator plug-ins. The "Communication" tab enables the user to add instances of Communicator plug-ins. These can then be configured individually in the GUI. Changes at the plug-in parameters are validated automatically as implemented for the respective Communicator plug-in. In addition, the plug-in instances can also be started and stopped in the new

"Communication" tab.

The MERLIC PI Setup has also been extended by the ability to connect to a remote system. This enables the user to configure available configuration services on those systems, i.e., to configure Communicator plug-ins on the system. When starting the MERLIC PI Setup the user can choose between the local system and a remote system. If the MERLIC PI Setup is opened from the MERLIC Backend, it is automatically connected to the local system. It is also possible to switch to a different system from the MERLIC PI Setup. In case of the local system, all tabs of the MERLIC PI Setup ("Recipe Manager", "Hardware Setup", and "Communication") are available for configuration. In case of a connection to a remote system, only the "Communication" tab can be accessed, provided that a Communicator is already running on the remote system.

- The executable of the MERLIC PI Setup "merlic_pi_setup.exe" has been extended by the command line argument "--host". It can be used to specify the system which is ought to be configured already when starting the program.

- MERLIC now provides a new startup option for the MERLIC process integration. It can now be started via the executable "merlic_rte" which substitutes the command "merlic.exe --pi". In addition, the MERLIC process integration can still be started via the Windows start menu but with the new start menu entry "MERLIC RTE". Note that this change affects the compatibility. [Read more.](#)

- **Enhancements**
  - The behavior on calling "Stop", "Reset", or "Halt" while running a "SingleJob" or "ContinuousJob" in MERLIC process integration has been improved. Previously, MERLIC waited until the Image Source Manager finished the image acquisition before the running job was finished. Thus, in case of hardware triggered cameras, the current job was not finished before either the acquisition timed out or the cameras were triggered. Now, MERLIC aborts a currently running image acquisition and then leaves the state "SingleExecution" or "ContinuousExecution", respectively, as fast as possible after performing the necessary cleanup. If MERLIC already started to process the acquired images when "Stop", "Reset", or "Halt" is requested, MERLIC still awaits until the execution of the tool flow has finished before leaving the job state.
  - The configuration of the ports for the Communicator and the MERLIC process integration has been improved. Previously, the ports could only be set via the command line options "--

command_port" and "--event_port". Now, it is possible to also set the ports in the .ini file. They can be defined in the section [Communicator] with the parameters "CommandPort" and "EventPort".

- MERLIC now provides dedicated log files for the process integration mode and the MERLIC PI Setup. They can be found in the directory "%localappdata%\MVTec\MERLIC" with the prefix "merlic_rte_" and "merlic_pi_setup_", respectively.

- **Fixed Problems**
  - If "Reset" or "Halt" was triggered while a "SingleJob" or "ContinuousJob" was running, MERLIC first changed to the "Initialized" state while the currently prepared recipe was being unprepared and then changed to the "Preoperational" or "Halted" state, respectively. Thus, the behavior was not compliant with the "OPC UA Companion Specification Vision - Part 1" on which the framework of the internal MERLIC states is based. This problem has been fixed. MERLIC now unprepares the recipe while residing in the "SingleExecution" or "ContinuousExecution" state, respectively, and then directly changes to the "Preoperational" or "Halted" state, respectively.
  - MERLIC leaked memory in the process integration mode if a recipe change was triggered while a Frontend with an "Image Display" widget was being connected. This problem has been fixed.
  - If the help for the executable "merlic_pi_setup.exe" was requested via the command line option "--help", no help text was displayed. This problem has been fixed.
  - MERLIC process integration crashed if the configuration for the process integration mode contained a MERLIC recipe path with certain non-native multibyte characters such as Chinese characters on English systems. This problem has been fixed.

COMMUNICATOR

- **New Features**
  - The Communicator now provides dedicated log files. They can be found in the directory "%localappdata%\MVTec\MERLIC" with the prefix "communicator_". In addition, the Communicator now supports the usage of its own default .ini file called "Communicator.ini". This .ini file must be created manually in a predefined directory to ensure that it is used by default. You can define logging options for the Communicator and some additional options such as the ports, plug-in and configuration directory, and a timeout for commands.

- The Communicator now automatically reloads plug-in instances and their associated configurations from the specified (or implied) configuration directory. It also restarts those plug-ins which were running when the Communicator was last executed on the configuration directory. In this new mode of operation, it is no longer necessary to specify any plug-ins on the command line using the "--plugin" flag, and it is recommended to use the new "Communication" tab of the MERLIC PI Setup program instead. Note that this change affects the compatibility. Read more.

- **Enhancements**
    - The start-up options for the MERLIC Communicator have been improved. Previously, the Communicator could only be started with a plug-in. Now, it is possible to start the Communicator without a plug-in. In the course of this, the Windows start menu entry "MERLIC Communicator OPC UA" has been replaced with "MERLIC Communicator" which now starts the Communicator without a plug-in. In addition, it is also possible to start the Communicator together with MERLIC process integration in one step from the command line using the new executable for the process integration with a command line option "--communicator", i.e., with the command "merlic_rte --communicator".
    The Communicator plug-ins can now be started in the new "Communication" tab of the MERLIC PI Setup which enables the user to add new instances of a plug-in, to start and stop these instances, and to change the configuration of the plug-in instances.

- **Fixed Problems**
    - The Communicator failed to start up altogether if any of the specified plug-ins failed to start. This problem has been fixed. If the Communicator is now started from the command line with one or multiple plug-ins and one of these plug-ins fails to start, the Communicator will continue to run and to load the other specified plug-ins. In addition, the failing plug-in will return an error that it could not be started.

INTERFACES FOR PROCESS INTEGRATION

- **New Features**
    - MERLIC now provides a new Communicator plug-in for the communication over MQTT. It can be used to retrieve various information of MERLIC and the current application by publishing this information on the corresponding MQTT topics. This way, information about the current status of MERLIC

process integration can be retrieved, e.g., its current state, the currently prepared recipe, and the currently running job. In addition, also detailed information on the available recipes, including their input and output parameters, as well as the results from completed MVApp executions can be retrieved. The "MQTT" plug-in can also be used to control MERLIC process integration as it subscribes to a dedicated MQTT topic in order to be able to publish on that topic to trigger actions. The plug-in offers a variety of configuration options via the new GUI for the plug-in configuration, i.e., the new "Communication" tab in the MERLIC PI Setup, to customize its behavior, including options to switch between preferred message formats (JSON or Plaintext), and to control the Quality of Service (QoS) settings.

- The simulated PLC has been extended by a new program "ContinuousJobs". During this program, the simulated PLC repeatedly runs continuous jobs for a certain amount of time. It can also be configured to alternate the recipe after a certain number of executed jobs. In addition to the new program, all parameters for the configuration of the simulated PLC in the MERLIC PI Setup have been revised.

- The protocols for the data exchange when using a Hilscher PCI card for the MERLIC process integration have been extended by new command codes for "SelectModeAutomatic", "StartContinuous", "Stop", "Abort", "Reset", and "Halt". The new command codes can be used to trigger the associated actions when MERLIC runs in process integration mode.

- The OPC UA server plug-in now supports recipes as objects in the address space. They can be accessed via the "Recipes" folder in the "RecipeManagement" object. In addition, the transition from the "Preoperational" state to "Initialized" has been fixed to be set correctly on the "StateChanged" event.

- **Enhancements**
  - The configuration of the simulated PLC has been improved. Previously, it was required to set a default recipe to use the simulated PLC with MERLIC process integration. Now, the simulated PLC can also be used without a default recipe. In this case, the first recipe that has been selected for the parameter "RecipeList" is used. If "RecipeList" is empty, the recipe with ID=0 is used.
  - The OPC UA server plug-in now takes advantage of the configuration validation feature. When configuring the parameters in the new "Communication" tab of the MERLIC PI Setup, the changes will be validated after saving. It will be

checked if certain parameters need to be conditionally disabled depending on other parameter values. In addition, validation messages will be displayed in case of errors or warnings concerning the currently configured state.

- **Fixed Problems**
  - If the OPC UA server plug-in was used for the process integration, the server reported error messages when entering and leaving the "FrontendAccessMode". This problem has been fixed. The "FrontendAccessMode" is now handled by a new sub-state machine that was added to the "VisionStateMachine".
  - The OPC UA server plug-in could previously be started with the control-only access level even though the plug-in cannot be operated in a sensible manner without access to events from MERLIC. This problem has been fixed. The OPC UA server plug-in cannot be started anymore with the control-only access level, neither via the new "Communication" tab in the MERLIC PI Setup nor via the command line. If the user tries to start the plug-in from the command line with an additional flag for the access level set to "control", an error message is returned.
  - The example Communicator plug-in "action-sender" did not accept TCP connections if the plug-in was started for a second time after being stopped. This problem has been fixed. The code of the example and the deployed plug-in binary have been adjusted. Note that this problem could not be observed in the previous version because of the startup behavior of the Communicator and the plug-ins. However, it occurs when using the "action-sender" plug-in of MERLIC 4.7.0 in combination with the new Communicator of version 4.8.0.

BACKEND

- **New Features**
  - The MERLIC Backend now provides a new option that enables the user to visualize the tools in the Tool Flow panel and in the workspace depending on their executed state. With this option, it is easier to recognize which tools have been executed when using a "Branch on Condition" tool. It can be enabled and disabled in the MERLIC Preferences dialog at the option "Display Option > Visualize skipped tools".
- **Improved Usability**
  - The MERLIC Backend now provides a new zooming feature in the Tool Flow panel that enables the user to zoom in and out in the Tool Flow to get a better overview, especially in large MVApps.

- The MERLIC Backend now provides a new menu bar button that enables the user to easily give feedback on MERLIC at the MVTec website.
- **Fixed Problems**
  - If an additional installation of MERLIC was used and the MVApp example directory was opened via the MERLIC Backend menu "File > Open Examples", the example directory of the main installation was opened instead of the directory of the additional installation. This problem has been fixed.
  - If the MERLIC language was set to Japanese, the font of the headings in the quick info help texts was too large. This problem has been fixed.
  - In rare cases, MERLIC crashed if a new tool was added to an empty Tool Flow. This problem has been fxed.
  - If more Frontends were connected to the MERLIC server than allowed, either due to license restrictions or due to the configuration in the .ini file, the MERLIC Backend did not unlock anymore after all Frontend have been closed again. In addition, the Backend still showed the message that the Frontend is connected. This problem has been fixed.
  - The tooltips for the MERLIC tools in the Tool Library were not displayed anymore. This problem has been fixed.

DESIGNER

- **Fixed Problems**
  - If a new MVApp was saved in the MERLIC Designer first instead of the MERLIC Backend, the MVApp was not added to the list of recently used files. This problem has been fixed.
  - If a property of a Designer widget was misconfigured, e.g. if no tool and no parameter was selected for the "Image Display" widget, the respective property value was no longer highlighted in the property panel of the Designer. This problem has been fixed.

FRONTEND

- **Fixed Problems**
  - In rare cases, the MERLIC Frontend crashed when loading the Frontend of a new MVApp due to a recipe change in MERLIC process integration. This problem has been fixed.

TOOLS

- **Enhancements**
  - The tool "Image Source" has been improved. Previously, images have been displayed only after MERLIC was executed.

Now, images are instantly displayed when an image source has been selected.

DOCUMENTATION

- **New Features**
    - MERLIC now supports context-sensitive help for the following basic GUI components:
        - MERLIC Backend
        - Preferences Dialog in the MERLIC Backend
        - MERLIC Designer
        - MERLIC Frontend
        - MERLIC Process Integration Setup (MERLIC PI Setup)

        Pressing "F1" directly opens the corresponding topic in the MERLIC manual.

- **Enhancements**
    - In the MERLIC manual, the recommendation to use only up to two cameras with MERLIC was added to some further topics to improve visibility.
    - The documentation of the different trigger and grabbing modes for the image acquisition in MERLIC was improved. The MERLIC manual now contains a new topic "Image Acquisition Basics" that provides general information on the image acquisition in MERLIC with triggers. In addition, the topic "Image Source Manager" has been extended to provide more specific information on how to configure a camera for hardware trigger.
    - The Communicator manual has been extended by a new topic "Getting Started to Develop Communicator Plug-ins". It provides information about the first steps to develop plug-ins and how to proceed to customize the plug-in.
    - The Communicator API is now available in the new version 2.0.1. It has been extended by three return codes and associated error codes in the header "mv_error_def.h":
        - `MV_CODE_PLUGIN_RUNNING_STATE` / `MV_ERR_COMM_PLUGIN_RUNNING_STATE`: A plug-in API function could not be called because it is only applicable when the plug-in is either currently running or not yet running.
        - `MV_CODE_INV_PLUGIN_ID` / `MV_ERR_COMM_INV_PLUGIN_ID`: A plug-in could either not be registered or accessed by the plug-in manager because its ID is invalid.
        - `MV_CODE_PLUGIN_INSTANTIATION` / `MV_ERR_PLUGIN_INSTANTIATION`: A plug-in could not be instantiated.

Additionally, the reference documentation for the existing API has been improved. In particular, it now lists the expected return codes for all functions returning `MVCode_t`.

- The MERLIC manual has been extended by the new topic "Introduction" which gives an overview of all components of MERLIC and their use.
- The tool reference of the tools "Acquire Image from File" and "Image Source" has been improved. They now also provide information on the accepted file formats.

- **Improved Usability**
  - The quick info of the tools "Evaluate Expression" and "Branch on Condition" has been improved. They now provide examples of various expressions for easier usability of the tools.

- **Fixed Problems**
  - The tool references of the tools "Acquire Image from Camera" and "Image Source" contained outdated information about the system requirements for the image acquisition interfaces. It stated for all interfaces that the GenICam version 3.0.2 is required. In addition, the requirements for GigEVision2 interfaces stated that at least the version v2.1.8.0 of the GigEVision filter driver is required. However, starting with MERLIC 4.7.0 all interfaces require the GenICam version 3.3 and for GigEVision2 interfaces, at least the version v2.2.8.4 of the GigEVision filter driver is required. This problem has been fixed.

LICENSING

- **Fixed Problems**
  - The CodeMeter runtime bundled with MERLIC had a potential denial-of-service vulnerability. This problem has been fixed with an update to version 7.21a of the CodeMeter runtime.

RELEASE NOTES FOR MERLIC 4.7.0

This document provides the release notes for MVTec MERLIC 4.7.0, as released in March 2021.

CONTENTS

SUPPORTED OPERATING SYSTEMS

WINDOWS

MERLIC 4.7.0 is available for Windows 7 and Windows 10 (64-bit operating system).

During the installation, the environment variable `MERLIC4EXAMPLES` is set to `C:\Users\Public\Documents\MVTec\MERLIC 4` by default. It contains the path to the directory in which additional files such as example applications or images are installed.

Please refer to the "Readme" in the MERLIC manual for more information about the system requirements.

LINUX

MERLIC 4.7.0 is available for selected Linux ARM 64-bit platforms. This edition requires a specific license that needs to be activated on the ARM device. Please contact MVTec to get more information about how to obtain this license. After the license activation, the ARM device also functions as a license dongle for the PC version of MERLIC 4.7.0, however, with some limitations.

Please refer to the "Help → About" dialog in the MERLIC Backend for the respective limitations.

MAJOR NEW FEATURES

CONNECTIVITY

A highlight of MERLIC 4.7.0 is the improved connectivity. New standard interfaces have been added, such as the integrated OPC UA server, socket communication as well as a communicator plug-in interface (API), which will enable customers to develop their own communication interfaces. MERLIC can thus be seamlessly integrated into almost any machine.

CAMERA HANDLING

In MERLIC 4.7.0 the first version of the Image Source Manager (ISM) will be available. This detaches the image acquisition source from the tool flow and allows MVApps to be easily copied and executed between different systems without adjustments to the camera settings. MERLIC also supports the hardware trigger of cameras as well as the "continuous execution" mode in addition to the "single execution" mode.

GENERAL IMPROVEMENTS

Beginning with this release, MERLIC is built on HALCON Progress, thus laying the foundation to offer the latest image processing features in upcoming MERLIC releases. These include, for example, deep-learning-based tools or the reading of new data code types.

Other improvements include the significantly accelerated startup time of MERLIC, which has a particularly strong impact on lower performant systems. In addition, the execution time for each tool can now be measured. This allows tracking down the most time-consuming tools in an MVApp.

COMPATIBILITY

Since the last MERLIC version we have been working hard to improve MERLIC in every way. This has, however, resulted in a few of incompatibilities. We apologize for the inconvenience.

- **Image Source Manager**
  - The acquisition of images in "free-running" mode as well as from hardware-triggered cameras via the new Image Source Manager (ISM) has been revised. Therefore, it is recommended to check the implemented control flow of systems that integrate MERLIC versions 4.6.x in process integration mode in combination with "free-running" mode or hardware-triggered cameras by using the ISM. More information.

- **Communicator**
  - The Communicator API version has been increased to 2.0.0. Plug-ins implementing version 1.x.y of the API are no longer compatible and have to be adapted and recompiled.
    The following changes must be made to the plug-in code:
    - The API header include must be changed from "mvtec/plugin/mv_plugin_api_v1.h" to "mvtec/plugin/mv_plugin_api_v2.h".
    - The function `MVInit_V1(MVClass_V1_t* MVClass)` must be replaced with `MVInit_V2(MVClass_V2_t* MVClass)`.
    - The struct `MVClass_V2_t` has been extended with two optional function pointers, `MVExpose` and `MVValidate`, pointing to the respective implementation in the plug-in or the default NULL if no implementation is provided.
    - The function `MV_PluginConfig_GetParameter()` has been moved from the header "mv_plugin_control.h" to the new header "mv_plugin_config.h". Plug-ins using the function must now additionally include "mv_plugin_config.h".
    - The used error and return code definitions in a plug-in need to be checked and adapted to use the codes of the new version in the header "mv_error_def.h".

    More information.

- **Tools**
  - MERLIC Vision Apps that use the tools "Read Atzec Code", "Read Data Matrix ECC 200", "Read PDF417", or "Read QR Code" are not compatible anymore due to the update of the underlying HALCON version. Some parameters of the tools have changed or have been removed. Therefore, MERLIC Vision Apps that contain these tools must be manually adjusted to the new version. More information.
  - MERLIC Vision Apps of previous versions should be checked for changes at the results due to the new default settings for activated operator parallelization of MERLIC tools. The new settings might lead to slightly different results especially for tools with matching. To disable the automatic operator parallelization and restore the old behavior, the .ini file property "HalconParallelizeOperators" in the section "General" can be set to "false". More information.
  - Due to changes at the internal load and save mechanism of some MERLIC tools, it might be required to check MERLIC Vision Apps of previous versions for a respective error message in the log file. To update these MERLIC Vision Apps

to the new version, the application just needs to be saved again.

- **Miscellaneous**
    - Custom tools might not be compatible anymore due to the update of the underlying HALCON version. Therefore, the functionality of custom tools should be checked for required changes. [More information.](#)

IMAGE SOURCE MANAGER

- **New Features**
    - MERLIC now supports the automatic creation of camera configuration files (.pers files) with persistent camera parameters when using the Image Source Manager (ISM) for the image acquisition. If the specified key "CameraConfigurationFile" in the image source configuration file (.json) points to a valid but non-existent .pers file path, the file will be automatically created based on the current camera parameters when starting the MERLIC Backend.
    - It is now possible to create MVApp-specific image source configurations when using the Image Source Manager (ISM). If an MVApp is loaded in the MERLIC Backend, the respective image source configuration is loaded and activated automatically, provided it exists. If the MVApp is started by MERLIC in the process integration mode, the default configuration is loaded instead of the MVApp specific configuration.
- **Enhancements**
    - The error handling of the Image Source Manager has been improved. Previously, the startup of MERLIC in process integration mode was interrupted and MERLIC was shut down without any notice if an error occurred while loading the default configuration of the image source. Now, an error message is displayed in a pop-up dialog to inform the user about the reason for the problem.
    - The behavior of the image acquisition when the new Image Source Manager (ISM) especially in combination with hardware-triggered cameras or "free-running" cameras has been revised. MERLIC now processes only images that are exposed during the execution of a MERLIC Vision App. When MERLIC is started in process integration mode, only those images are processed that are exposed while MERLIC resides in the states "SingleExecution" or "ContinuousExecution" but not before the "JobStarted" event was fired. Note that this change affects the compatibility. [Read more.](#)

- The settings of the camera connection when using the new Image Source Manager (ISM) have been improved. After connecting to the camera, its parameter "[Stream]GevStreamAbortCheckPeriod" is now automatically set to a value of 500 microseconds to decrease the image acquisition time.

- **Fixed Problems**
  - In MERLIC 4.6.1, software triggering of image acquisition devices was not possible if the specified camera configuration file could not be loaded, e.g., if an invalid value has been defined for a camera parameter or if an invalid file or path has been defined for the "CameraConfigurationFile" setting in the image source configuration. This problem has been fixed.

PROCESS INTEGRATION

- **New Features**
  - Based on the specification "OPC UA for Machine Vision", the state machine of the MERLIC process integration has been extended by a new state "ContinuousExecution". As per standard, it can only be entered from the "Ready" state by calling "StartContinuous" and it can only be left for "Ready" by calling "Stop". During the "ContinuousExecution", MERLIC will continuously acquire and evaluate images according to the configured image sources of the new MERLIC Image Source Manager (ISM) and the prepared recipe.
  Currently, calling "StartContinuous" or "Stop" is only possible through plug-ins of the MERLIC Communicator. However, the results of the continuous execution are also available to Digital I/O devices, cameras with GenICam compliant Digital I/O lines, and Hilscher PCI cards that are used with the MERLIC process integration. In addition, clients connected with the Hilscher PCI card are also informed about the new state "ContinuousExecution".

- **Enhancements**
  - The behavior of state changes when starting MERLIC in process integration mode has been improved. In the previous MERLIC version, the first visible state change was the automatic transition from "Preoperational" to "Initialized". Now, the "StateChanged" event is emitted when first entering "Preoperational" as well. The new transition can be used by Communicator plug-ins to detect when MERLIC has been (re-)started and the automatic reconnect to the Communicator succeeded.

- **Fixed Problems**

- In case the recipe configuration was invalid, it was possible that MERLIC crashed during the startup of MERLIC in the process integration mode. This problem has been fixed.
- When a recipe was unprepared in MERLIC 4.6 by either "UnprepareRecipe", "Reset", or "Halt", the event "RecipeUnprepared" was only emitted after the MERLIC Vision App had finished unloading. This problem has been fixed. The event is now emitted as soon as the MERLIC Vision app starts to unload because the corresponding recipe is deemed unprepared from the moment when it is no longer prepared.
- If the MERLIC Process Integration Setup (PI Setup) was opened via the MERLIC Backend and the Backend was closed afterward, the TCP port used for the connection of the MERLIC Frontend was not closed properly and references to log files were not released correctly as long the PI Setup was still running. This prevented log files from being cleaned up correctly and it also prevented new instances of MERLIC to reopen the affected TCP ports again. This problem has been fixed.
  Now, all TCP ports and file handles that are used by MERLIC are correctly released as soon as the MERLIC executable is shut down independent of whether the PI Setup is still running or not.

COMMUNICATOR

- **New Features**
  - The Communicator API is now available in the new version 2.0.0. It has been extended by the event "AcquisitionDone". This event is supported only for recipes that acquire images via the new Image Source Manager (ISM) and will not be emitted for MERLIC Vision Apps that contain the tool "Acquire Image from Camera". The "AcquisitionDone" event is emitted whenever the image acquisition from all ISM image sources is finished. The image processing job may still be in progress at that time. "AcquisitionDone" should be expected once for a call of "StartSingleJob" and multiple times for "StartContinuous" jobs. The corresponding job ID can be retrieved from the event.
  - The Communicator API now provides two new functions for querying result data:
    - `MV_GetResultById`: This function obtains the content and metadata of a specific result based on its ID.
    - `MV_GetResultListFiltered`: This function allows to query the result store for all results that match a certain filter.

Associated API functions for managing the data structures `MVResult_t` and `MVResultList_t` are also provided. Result metadata now also includes the creation time of the result, which can be accessed through the key `MV_PARAM_RESULT_TIMESTAMP` and is available through the new function `MV_Result_GetParameter`, as well as the existing function `MV_Event_GetParameter` for "ResultReady" events.

- The Communicator API now provides a new feature that supports plug-in developers in writing configurable plug-ins. The parameter description can be used by the respective Communicator client to provide a plug-in configuration interface for the user. This enables the user to configure the plug-in on-site, without having to change the plug-in source code or recompile the plug-in.
  In addition, the error and return codes defined by the Communicator API have also been revised for the new version. Note that this change affects the compatibility. [Read more.](#)
- The Communicator API now provides the function `MV_GetSystemStatus`. It can be used to obtain information on the current state and operational mode of the vision system as well as, if applicable, the IDs of the currently prepared recipe and the currently running job.
- The MERLIC Communicator now provides new command line arguments:
  - `--available_plugins / -l`: This command line argument lists all compatible plug-ins that were found in its plug-in directory, i.e., the directory in which the plug-ins are searched.
  - `--plugin_dir`: This command line argument enables the user to change the plug-in directory. If only the name of a plug-in is given after the command line option "`--plugin`" and not the absolute path, it is interpreted relative to the plug-in directory.
  - `--config_dir`: This command line argument enables the user to change the configuration directory for the JSON configuration files of the plug-ins.
  - `--command_timeout`: This command line argument defines the duration for a command timeout. A pending command to the vision system will time out after the defined duration.

In addition, the short flag of the command line argument "`--log-level`" is now "`-d`" instead of "`-l`" as in the previous MERLIC 4.6.x versions.

- MERLIC now provides an OPC UA server plug-in that can be used to integrate MERLIC as a machine vision system into a manufacturing machine. The OPC UA server is part of the MERLIC Communicator and can be used to set up the communication to an OPC UA client, e.g., a programmable logic controller (PLC). The OPC UA server plug-in is implemented based on the OPC UA Machine Vision Companion Specification - Part 1.

- **Enhancements**
  - The behavior of how the action IDs and job IDs were used in the MERLIC process integration mode has been revised. Previously, MERLIC used the action IDs also as job IDs which caused the job IDs to be in a non-consecutive order. Now, the job IDs are consecutive numbers and independent from action IDs. A new set of Communicator API functions has been added to allow Communicator plug-ins access to this information already at the point where the action is enqueued: `MV_QueueAction_WithInfo`, `MV_ActionInfo_GetParameter`, and `MV_ActionInfo_Clear`.
  - The timeout behavior of Communicator API functions that require communication with MERLIC has been improved. These functions will now no longer block indefinitely by default, but return with the error code `MV_CODE_TIMEOUT` after they have been pending for 5 seconds. This affects the existing functions `MV_QueueAction` and `MV_GetRecipeList`, as well as the new functions `MV_QueueAction_WithInfo`, `MV_GetSystemStatus`, `MV_GetResultById`, and `MV_GetResultListFiltered`. The timeout interval can be customized with the command line argument "`--command_timeout`" when starting the Communicator. The timeout can also be deactivated by defining a negative value which will cause pending command functions to block indefinitely, corresponding to the behavior in MERLIC 4.6.
  - Querying the input parameters of a recipe via the Communicator API function `MV_GetRecipeList` has been improved. Previously, `MV_GetRecipeList` returned only the output parameters of a recipe, i.e., the MVApp results, whereas the list of input parameters of a recipe, i.e., the MVApp parameters, was empty. Now, MERLIC also provides the list of MVApp parameters for the function `MV_GetRecipeList`. Therefore, the functions `MV_Recipe_InputParam_Next` and `MV_Recipe_InputParam_GetSize` can now be used to query information about the recipes and it is also possible to iterate over the input parameters with the macro `MV_Recipe_InputParam_foreach`.

- If a Communicator plug-in was loaded from a custom plug-in directory, any indirect dependencies that were located next to the plug-in were not resolved. This problem has been fixed.
- **Improved Usability**
  - The error messages that are returned by the Communicator regarding the plug-in management and the configuration have been improved. They now give more detailed information about the respective problem, e.g., the severity of the problem or in which component the problem occurred.

INTERFACES FOR PROCESS INTEGRATION

- **New Features**
  - The protocols for exchanging data when using MERLIC in process integration mode in combination with a Hilscher card have been extended by a new field "LastStartedJobId". MERLIC sends a new job ID whenever MERLIC successfully started a new "StartSingleJob" or "StartContinuous" command. In case the new Image Source Manager (ISM) is used, a new "LastStartedJobId" indicates that the respective image sources are ready to be triggered.
- **Enhancements**
  - The built-in plug-in for digital I/O devices has been revised. Due to the new support of continuous executions in the MERLIC process integration mode, it now turns off the "Ready" signal during a continuous execution job. As results become available, their boolean result values are set to the corresponding result signals in the same way as for single executions. However, the "Ready" signal will stay off for the entire time and must not be used to synchronize on new results. In the current MERLIC version, it is not possible to start a continuous execution using a digital I/O device.
  In addition, the built-in plug-in for digital I/O devices will now zero all previously set result signals when MERLIC unprepares the current recipe or when the write access in the MERLIC Frontend is active. This includes the case that MERLIC shuts down or the current recipe is changed.
  - The codes in the "ActionResponse" field of the data exchange protocol that is used by the provided Hilscher plug-in have been changed. They are now harmonized with the corresponding error codes defined in the Communicator API.

BACKEND

- **Improved Usability**

- The visualization of various buttons in MERLIC has been improved. Due to the revised icon set in the previous MERLIC version, it was not possible anymore to distinguish between enabled and disabled buttons, e.g., disabled ROIs in a MERLIC tool were visualized exactly the same as enabled ROIs. Now, the contrast of icons for disabled actions has been improved to provide a visual differentiation.
- **Fixed Problems**
  - The log option for the maximum number of log files that can be set in the MERLIC preferences was not applied. This problem has been fixed.
  - If the software rendering mode was activated, MERLIC crashed when a warning or error message in a MERLIC tool was opened. This problem has been fixed.
  - If the image coordinates and gray value of the pixel at the current mouse position were displayed by pressing the "AltGr" key, the pixel information appeared in a flickering display. This problem has been fixed.
  - If MERLIC was closed while a MERLIC Vision App was being executed in continuous mode, MERLIC did not terminate correctly in some cases. This problem has been fixed.
  - If MERLIC was set to a language different than English, the separator in the processing time, that is shown in the status bar, was always displayed with the English-specific decimal point "." instead of respective language-specific separator. This problem has been fixed.
  - The MERLIC Backend crashed when using images of type "int4" or "int8" in MERLIC tools with a training mode. This problem has been fixed.
  - Starting the MERLIC Backend or MERLIC in process integration mode failed silently, i.e., without any error message, if the specified logging directory was not accessible. This problem has been fixed. MERLIC will now show a warning when the directory is not accessible and can be started without logging.
  - If a waiting screen became active while an error or warning dialog of a tool was being displayed, the window of the tool message stayed open on top of the waiting screen and text. This problem has been fixed.

DESIGNER

- **Enhancements**
  - The Designer widgets "Label" and "Text Input" have been improved. It is now possible to enable text wrapping in both

widgets. In addition, the "Text Input" widget has been extended by the property to select the vertical alignment of the input.

- **Improved Usability**
  - The MERLIC Designer now provides a search functionality in the drop down list of the widget parameters "Connected Tool" and "Connected Parameter". This enables the user to quickly find the desired tool or parameter even if a large number of values is available.

FRONTEND

- **Fixed Problems**
  - If the language in the MERLIC Frontend has been changed, entering numbers into the input field of a "Text Box" widget did not work correctly anymore. This problem has been fixed.
  - If the execution of a MERLIC Vision App, that uses the new Image Source Manager for the image acquisition, was started in MERLIC 4.6.1 in the MERLIC Frontend via the "Execution Control" widget, the running state was not visualized immediately. In addition, the Frontend was not responsive until the acquisition from all image sources was completed. This problem has been fixed. Now, the correct running state is visualized immediately and the MERLIC Frontend stays responsive.
  - The MERLIC Frontend hanged when the reconnection timeout was reached. This problem has been fixed.
  - If a MERLIC Frontend was started via the command line using "`merlic.exe --pi`" or "`merlic.exe --frontend`" and the MERLIC executable "merlic.exe" was shut down afterward, the used TCP port for the connection of the MERLIC Frontend was not closed properly as long as the MERLIC Frontend was still running. This prevented newly started instances of MERLIC to reuse the TCP port again and it also prevented a proper cleanup of the log files according to the value for "LogFilesCount" in the MERLIC settings. In addition, other MERLIC Frontends that attempted to connect to the affected TCP port got also stuck as long as the initial MERLIC Frontend was still running. This problem has been fixed.
    Now, the used TCP port and references to any log-files are correctly released as soon as the MERLIC executable is shut down. Log-files are cleaned up properly and all MERLIC Frontends attempting to connect to the affected TCP port continuously re-try to connect independent of the initial MERLIC Frontend is still running or not.

TOOLS

- **New Features**
  - MERLIC has been extended by the new tool "Sort Coordinates". It has been added to the tool category "Postprocessing" and enables the user to sort coordinates according to the X or Y values.
- **Enhancements**
  - The image acquisition interfaces that are used for the new Image Source Manager (ISM) as well as for the tools "Acquire Image from Camera" and "Acquire Image from File", respectively, have been updated to a new revision. MERLIC now contains the following versions of the interfaces:
    - GigEVision2: Revision 18.11.12
    - GenICamGenTL: Revision 18.11.12
    - USB3Vision: Revision 18.11.14
    - File: Revision 18.11.4

    MERLIC Vision Apps that use the previous revision of the interfaces are still compatible and require no changes.

  - The tool "Image Source" that is used with the new Image Source Manager (ISM) has been improved. Previously, no image source was selected for the respective parameter when inserting the tool. Now, the first available image source in the list of available images sources is selected automatically when the tool is inserted. If no image sources are configured, the parameter is empty and the tool is in warning state.
  - The automatic operator parallelization of the underlying HALCON version has been enabled by default for all MERLIC tools to provide a performance improvement. Note that this change affects the compatibility. Read more.
- **Fixed Problems**
  - If the parameter "Mask Radius" of the tool "Apply Gray Morphology" was set to a value greater than or equal to 8, MERLIC crashed. This problem has been fixed.
  - If the tool "Detect Scratches" detected an very large number of scratches in an image, e.g., more than 10 000 scratches, MERLIC could crash. This problem has been fixed.
  - When the "Alt" key was pressed in the image of the tool "Merge Images" to get pixel information of the current mouse position, the pixel information of the first input image was shown instead of the information of the merged image. This problem has been fixed.
  - If the tool "Read Data Matrix ECC 200" was trained with data codes whose modules were greater than 100px, an internal error message occurred in some cases because the

parameters "Minimum Model Size" and "Maximum Model Size" were set to values greater than 100 which exceeds the allowed maximum value for the model size. This problem has been fixed.

- The tool "Read from Socket" hanged if the timeout was reached and no data had been received yet. This problem has been fixed. Now, an error message occurs that reports the timeout.

- Some parameters of the tools "Read Atzec Code", "Read Data Matrix ECC200", "Read PDF417", and "Read QR Code" have been changed or removed due to changes at the underlying HALCON version.

  - "Minimum Contrast": This parameter has been removed from the tool "Read Data Code ECC 200".

  - "Minimum Horizontal Gap Width" and "Minimum Vertical Gap Width": These parameters have been merged and are now available as parameter "Minimum Gap Width".

  - "Maximum Horizontal Gap Width" and "Maximum Vertical Gap Width": These parameters have been merged and are now available as parameter "Maximum Gap Width".

Note that this change affects the compatibility. Read more.

EXAMPLES

- **New Features**
  - The Communicator example plug-in "action-sender" has been revised. It now provides the possibility to configure a port within the dynamic port range 49152 - 65535 in addition to the ports used by the Communicator and MERLIC.
- **Improved Usability**
  - The following example MERLIC Vision Apps have been improved:
    - adapt_brightness_for_measuring.mvapp
    - check_correct_filling_in_3d_height_images.mvapp
    - measure_distance_between_corners.mvapp
    - measure_distance_segment_circle_calibrated.mvapp

For some tools in the examples, user-given names have been defined to better indicate the actual task of the respective tools in the application. In addition, some errors have been fixed.

DOCUMENTATION

- **Enhancements**

- The tool reference in the MERLIC manual has been improved. The overview topics of the tool categories now provide more information about the possible use cases for the respective tools. This makes it easier to find the right tool for the required task.
- The tool reference of the tool "Convert Disparity to Height Image" has been improved. It now contains more information about the use case of the tool.
- The reference documentation of the MERLIC Communicator API has been improved. The layout and style has been adjusted to be consistent with other MERLIC manuals. It also now provides a new start page with general information about the MERLIC Communicator API.
- The tool reference has been improved. Previously, the descriptions of the general tool results "Tool State" and "Processing Time" were only available in the overview topic of the tool reference. Now, it has been added to the tool reference of each tool to make it easier to find in the respective tool.
- The documentation of the MERLIC Communicator has been improved. The MERLIC Communicator manual and the Communicator reference have been restructured to provide the respective relevant information where it is needed. For this, some contents that are relevant for the plug-in implementation have been moved to the Communicator reference. In addition, the Communicator reference has been extended by a description about the life cycle of a plug-in instance.
- **Fixed Problems**
  - The tool reference of various MERLIC tools contained some misleading and wrong information. This problem has been fixed.
  - In the tool reference of the tool "Locate Bright Tips", the documentation of the spotlight feature for mouseover actions on the graphics window was missing. This problem has been fixed.

INSTALLATION

- **New Features**
  - The MERLIC installer has been extended. After the installation, MERLIC now provides new start menu entries for the MERLIC process integration mode (MERLIC PI) and the new Communicator OPC UA server plug-in to easily start MERLIC PI and the OPC UA server.
- **Fixed Problems**

- MERLIC did not start correctly when the selected path for the installation or example files contained special non-native characters such as Japanese or Chinese characters on English systems. This problem has been fixed.

LICENSING

- **Enhancements**
  - The time limit for the execution mode of the MERLIC trial version has been increased from 2 minutes to 30 minutes. It is now possible to run a MERLIC Vision App continuously for up to 30 minutes. This also applies for the execution of MERLIC in the process integration mode.

MISCELLANEOUS

- To profit from the improvements of the new HALCON version, the HALCON libraries used by MERLIC have been upgraded to the HALCON 20.11 Progress version. Note that this change affects the compatibility. Read more.

MERLIC LANGUAGES

MERLIC is now available only in the following languages: English, German, Japanese, and simplified Chinese. This applies to the MERLIC application, e.g., MERLIC Backend or MERLIC Designer, as well as to the MERLIC manual. Other languages of previous MERLIC versions are no longer available. However, it is still possible to define a custom language for the Frontend and to provide a custom translation for the text that are visible in the Frontend.

RELEASE NOTES FOR MERLIC 4.6.1

This document provides the release notes for MVTec MERLIC 4.6.1, as released in December 2020.

CONTENTS

- [Documentation](#)

SUPPORTED OPERATING SYSTEMS

WINDOWS

MERLIC 4.6.1 is available for Windows 7 and Windows 10 (64-bit operating system).

During the installation, the environment variable `MERLIC4EXAMPLES` is set to `C:\Users\Public\Documents\MVTec\MERLIC 4` by default. It contains the path to the directory in which additional files such as example applications or images are installed.

Please refer to the "Readme" in the MERLIC manual for more information about the system requirements.

LINUX

MERLIC 4.6.1 is available for selected Linux ARM 64-bit platforms. This edition requires a specific license that needs to be activated on the ARM device. Please contact [MVTec](#) to get more information about how to obtain this license. After the license activation, the ARM device also functions as a license dongle for the PC version of MERLIC 4.6.1, however, with some limitations.

Please refer to the "Help → About" dialog in the MERLIC Backend for the respective limitations.

IMAGE SOURCE MANAGEMENT

- **Fixed Problems**
    - When starting MERLIC, the image source management (ISM) connected to the camera, that is defined in the default configuration, with the maximum resolution, i.e., the images were acquired automatically with the maximum width and height. This problem has been fixed. Now, the resolution settings are not adjusted anymore when connecting to the camera.

COMMUNICATOR

- **Enhancements**
    - The Communicator API has been updated to version 1.1.0. It is now possible to override recipe parameters for individual iterations when calling "StartSingleJob" from a Communicator

plug-in. The parameter set that shall be used for a specific single execution can be defined in the parameter "MV_PARAM_START_PARAMS" in form of a tuple. However, it is mandatory to provide parameter values for all recipe parameters and to select data types that enable a lossless conversion to the data type of the parameters defined in the recipe. Otherwise, the values defined in the recipe will be used and an "Error" event is emitted.

BACKEND

- **New Features**
  - The context menu of the tool parameters and tool results has been extended. It now provides new context menu entries that allow the user to copy the name and the value of the respective parameter or result to the clipboard.

- **Improved Usability**
  - The visualization of various buttons in MERLIC has been improved. Due to the revised icon set in the previous MERLIC version, it was not possible anymore to distinguish between enabled and disabled buttons, e.g., disabled ROIs in a MERLIC tool were visualized exactly the same as enabled ROIs. Now, the contrast of icons for disabled actions has been improved to provide a visual differentiation.

- **Fixed Problems**
  - Starting MERLIC in continuous mode via the Backend or the Frontend led to unexpected results of the first two iterations or even crashes. This problem has been fixed.

PROCESS INTEGRATION

- **Fixed Problems**
  - MERLIC did not shutdown correctly when it received a "taskkill" command, for example when trying to exit the process integration mode. This problem has been fixed.
  - In some cases, MERLIC crashed when preparing a recipe using MERLIC in process integeration mode while a Frontend is connected. This problem has been fixed.

DOCUMENTATION

- **New Features**
  - The MERLIC Communicator manual has been extended. It is now also available in simplified Chinese.

- **Enhancements**
  - The MERLIC manual has been improved and corrected in various topics. It now provides a unified design for the reference documentation of the Designer widgets and the MERLIC tools. In addition, the order of the widget parameters, tool parameters, and tool results in the respective reference documentation has been adapted to the actual order in MERLIC.
  - The layout of overview images in the tool reference of the MERLIC manual has been revised. Previously, these images also showed several text overlays that hid parts of the actual tool board. Now, the images give a clear view over the whole tool board.
  - The documentation of the "Measuring" tools has been improved. The tool reference provides an overview of the common use cases of the "Measuring" tools to make it easier to decide which tool fits best for desired measurement. In addition, the tool reference of the respective tools has been revised to be more clear.
  - The documentation of the "Table" widget has been improved. It now describes more clearly the property "Arrangement".
  - The reference documentation of the Designer widgets has been extended. It now contains a list of MVApp examples in which the widget is used.
  - The documentation of the parameter "Method" in the tool reference of "Apply Region Morphology" has been extended and restructured.
  - The documentation of the tool "Merge Images" has been improved. It now contains more detailed information about the merge methods "average", "subtract", and "multiply".

- **Fixed Problems**
  - The MERLIC manual contained some translation errors. This problem has been fixed.
  - The topic "Logging" in the MERLIC manual contained outdated log-level information. This problem has been fixed.
  - In some cases, it was not possible to change the language in the MERLIC manual because the navigation bar overlapped the drop down menu of the language list. This problem has been fixed.

RELEASE NOTES FOR MERLIC 4.6.0

This document provides the release notes for MVTec MERLIC 4.6.0, as released in October 2020.

CONTENTS

SUPPORTED OPERATING SYSTEMS

WINDOWS

MERLIC 4.6.0 is available for Windows 7 and Windows 10 (64-bit operating system).

During the installation, the environment variable `MERLIC4EXAMPLES` is set to `C:\Users\Public\Documents\MVTec\MERLIC 4` by default. It contains the path to the directory in which additional files such as example applications or images are installed.

Please refer to the "Readme" in the MERLIC manual for more information about the system requirements.

LINUX

MERLIC 4.6.0 is available for selected Linux ARM 64-bit platforms. This edition requires a specific license that needs to be activated on the ARM device. Please contact [MVTec](#) to get more information about how to obtain this license. After the license activation, the ARM device also functions as a license dongle for the PC version of MERLIC 4.6.0, however, with some limitations.

Please refer to the "Help → About" dialog in the MERLIC Backend for the respective limitations.

IMAGE SOURCE MANAGEMENT

- **New Features**
  - MERLIC has been extended by a preliminary version of a new image source management (ISM). The image acquisition via ISM allows to configure all kinds of image sources independent from the MERLIC Vision App. It comes with the new tool "Image Source" which delivers the image acquired by the ISM to the MERLIC Vision App. The ISM handles the rest such as the acquisition of images from files, directories, and camera devices. This preliminary version of the ISM still requires some manual configuration tasks. However, it enables the user to test the new image acquisistion management and to provide feedback for improvements in future MERLIC releases.
  To enable an easy start with the ISM, MERLIC provides example configuration files and an example MVApp for the image source management including exemplary persistent camera parameter files. MERLIC also provides a README file with a step-by-step description how to use the examples. In addition, the MERLIC manual has been extended by the topic "MERLIC Image Source Management" and the tool reference for the new tool "Image Source" which contain more detailed description about the image source management.

COMMUNICATOR

- **New Features**
  - MERLIC has been extended by the "Communicator", an SDK that enables the user to implement plug-ins for the use with MERLIC Process Integration. MERLIC itself currently provides interfaces for specific Hilscher PCI cards, digital I/O devices (Advantech, Contec, NIDAQmx), and camera devices with GenICam compliant digital I/O lines. With the Communicator, any device can be used for the process integration mode of MERLIC. It provides an API and libraries with various functions for the implementation of plug-ins for the respective devices. The plug-ins can be started via the MERLIC Communicator executable which runs as an independent process from MERLIC. As soon as the Communicator is started, its plug-ins will receive "events" from MERLIC to monitor the vision system and can post "actions" to control MERLIC.
  To enable an easy start with the Communicator, MERLIC provides some example plug-ins that show how a plug-in can be implemented. They can be found in the folder "communicator_plugins" within the MERLIC example folder. In addition, MERLIC provides a new manual "Communicator for MERLIC 4.6.0" that contains general information about the

Communicator as well as a reference documentation for the
Communicator API.

BACKEND

- **Enhancements**
  - Copying MERLIC tools in the Tool Flow of the MERLIC
    Backend has been improved. Previously, tools could only be
    copied within the Tool Flow of the current MERLIC instance.
    Now, it is also possible to copy MERLIC tools to the Tool Flow
    of a different MERLIC instance.
  - The "File" menu entry of "Recently Opened" MERLIC Vision
    Apps in the MERLIC Backend has been improved. Previously,
    the list also showed MERLIC Vision Apps that have already
    been deleted. Now, the user has the possibility to choose if the
    MVApp should be removed from the list of recently opened files
    when a previously deleted MVApp is selected from the
    "Recently Opened" file list or if an erroneous MVApp is
    selected to be opened.

- **Improved Usability**
  - The user interface of the MERLIC Backend and the MVTec
    MERLIC Process Integration Setup has been improved.
    Various icons have been simplified and unified to provide a
    clear and consistent user interface.

- **Fixed Problems**
  - In some cases, tool tips that were displayed in the Tool Flow of
    the MERLIC Backend did not disappear anymore. This problem
    has been fixed.
  - In some cases, MERLIC crashed if the user repeatedly
    switched between tools in the MERLIC Backend. This problem
    has been fixed.
  - Under some circumstances, a "debug.log" file with warning and
    error messages was created when working in the MERLIC
    Backend. This problem has been fixed.

FRONTEND

- **New Features**
  - The MERLIC Frontend has been extended by the possibility to
    add a custom icon for the window title bar and the task bar.
    The icon has to be specified as an INI Parameter "IconFile" or
    a command line parameter "--icon_file".

- **Enhancements**

- The MERLIC Frontend has been improved. It is now possible to hide the window title bar of the Frontend via the command line option "-hide_window_title_bar=true" or by setting the Frontend property "HideWindowTitleBar = true" in the .ini file.

- **Fixed Problems**
    - It was not possible to connect a MERLIC Frontend that runs on a Linux system to a MERLIC instance on a Windows system. This problem has been fixed.

TOOLS

- **New Features**
    - The tool "Write to File" has been extended by the parameter "Create Directories". The new parameter enables the user to create a new directory for the path that is defined in the parameter "File Name".

- **Enhancements**
    - The following tools have been improved:
        - "Determine Alignment with Matching"
        - "Check Presence with Matching"
        - "Count with Matching"
        - "Locate with Matching"

      They have been extended by the new training parameter "Polarity Metric Train" which enables the user to determine additional conditions under which the training model is recognized in the image.

    - The tools "Read Atzec Code", "Read Data Matrix ECC 200", "Read PDF147", and "Read QR Code" have been improved. The processing time of these tools has been sped up by ~20%.
    - The tool "Write Image to File" has been improved. It has been extended by the following output formats for the parameter "File Format":
        - hobj
        - png best
        - png fastest
        - png none
    - The following tools have been improved regarding their behavior during the execution of the tool:
        - "Write to File"
        - "Write Region to File"
        - "Write Image to File"

Previously, the tools applied their respective functionality for each execution of the tool including the executions that were caused by parameter changes at the tools itself or by parameter changes at previous tools that are connected, and even executions that were triggered during the loading process of an MVApp. In detail, this led to the undesired effect that the tools also conducted write operations when the MVApp was loaded or a parameter was changed.

Now, these tools only apply their functionality if the MVApp is executed explicitly either in a continuous mode or a single execution. Loading an MVApp or changing any parameter values of these tools will have no effect on their results or intended functionality.

- **Fixed Problems**
    - If a .tif image file with a thumbnail, whose channels have different sizes, was connected and used in certain MERLIC tools, e.g., "Convert Pixel Type" or "Determine Alignment with Matching", MERLIC crashed. This problem has been fixed. Images with more than four channels and images whose channels have different dimensions will not be loaded anymore. If such an image is selected in the tool "Acquire Image from File", an error message occurs which informs the user why the image could not be loaded.
    - The tool "Determine Alignment with Straight Border" always created a search ROI with a width of 160px, independent of the image size. This led to some problems in small images. ROIs were drawn over the image border and the image borders itself were detected as lines. This problem has been fixed. Now, the width of the search ROI considers the dimension of the image.
    - If regions of interest (ROIs) of a previous tool were connected to the parameter "ROI" of the tool "Measure Circle" and the transferred ROIs contained no circle ROI, the tool "Measure Circle" did not work because it requires at least one circle ROI for the measurment. However, no error message was displayed to inform the user why no measurement was performed. This problem has been fixed. Now, an error message occurs if the "ROI" parameter contains no circle ROI. Furthermore, a warning will be displayed if additional non-circle ROIs are given.
    - The tool "Read Data Matrix ECC 200" did not detect more than one complex codes. This problem has been fixed.
    - If a new file was specified in the tool "Write to File", the file was already created when setting the parameter "Connect" to 1. This problem has been fixed. The behavior has been changed

to be consistent with the tools "Write Image to File" and "Write Region to File". Now, a new file will created and opened by the MVApp if the parameter "Connect" is set to 1 and the MVApp is executed

PROCESS INTEGRATION

- **New Features**
  - The MERLIC Process Integration mode has been extended. It is now possible to use multiple devices for the process integration in parallel. The configuration of the devices can be set in the MVTec MERLIC Process Integration Setup which also allows the user to enable multiple devices for the use with MERLIC in process integration mode. In addition, the setup also shows devices with an invalid configuration. This enables the user to check and fix the settings.

- **Enhancements**
  - The state machine in the MERLIC process integration mode has been revised to the effect of greater compatibility with the OPC UA Machine Vision Companion Specification. In particular, the behavior upon the preparation of a new recipe has been revised. Previously, the state machine erroneously remained in the "Ready" state when preparing a new recipe. Now, the state machine returns to the "Initialized" state. Furthermore, log messages now contain more details regarding the causes of the logged events and state changes such as identifiers of the triggering command and caller thereof.
  - The MERLIC process integration mode has been improved for the use on a PALLAS smart camera. Previously, a recipe change was only possible by selecting a different recipe file and restarting the MERLIC process integration. Now, it is possible to change the recipe during the process integration mode via the command "PrepareRecipe". However, you have to make sure that all MERLIC Vision Apps that are referenced in the used recipe files acquire the images via the new image source management instead of the tool "Acquire Image from Camera".

- **Improved Usability**
  - The usability of the MVTec MERLIC Process Integration Setup has been improved. Previously, devices in the "Hardware Setup" Tab could only be enabled and disabled via the respective buttons. Now, devices can also be enabled and disabled by double-clicking on the respective device. In

addition, the warning about potential data loss while disabling a device with default configuration is no longer shown because in this case no data loss occurs.

- **Fixed Problems**
  - Some translations in the MVTec MERLIC Process Integration setup were not correct or inconsistent. This problem has been fixed.

DOCUMENTATION

- **Enhancements**
  - The general documentation of tool connectors, parameters, and results has been improved throughout the MERLIC manual to provide a better concept how they are used in MERLIC.
  - The MERLIC manual has been improved. It has been extended by the new topic "Speed-Up Tips" that provides tips on how to optimize the processing time in MERLIC.
  - The MERLIC manual for customer specific MERLIC versions has been improved. Previously, MERLIC provided the same manual for all MERLIC variations. Now, customer specific versions of MERLIC contain a MERLIC manual that provides documentation also for features that are only available in the respective MERLIC version. In addition, the MERLIC manual is provided only in the required languages. If the MERLIC Backend is opened in a language in which the manual is not available and the user opens the help via F1 or via the menu bar, the MERLIC manual is opened in English.
  - The tool reference of the tool "Read Bar Code" has been improved. It now provides more detailed information about the reading direction when detecting bar codes of type "PharmaCode".
  - The MERLIC manual has been improved. It has been extended by the new topic "Using the Manual" that provides a description of some features within the MERLIC manual such as the search functionality, glossary, and the breadcrumb bar.

INSTALLATION

- **Fixed Problems**
  - When the MERLIC setup was started in simplified Chinese, the version number of MERLIC was not displayed correctly. This problem has been fixed.
  - The MERLIC setup did not set the firewall rules for the exectubale "merlic_pi_setup.exe" of the MVTec MERLIC Process integration Setup. This problem has been fixed.

LICENSING

- **Fixed Problems**
    - Several vulnerabilities in CodeMeter Runtime, the license management of MERLIC, have been disclosed on the [website of WIBU Systems](#) on September 8, 2020. Successful exploitation of these vulnerabilities could potentially lead to remote code execution or prevent normal operation of MERLIC. This problem has been fixed. This MERLIC version uses the updated CodeMeter Runtime version 7.10a which secures the remote access.

MISCELLANEOUS

- The behavior of the parallel execution of the tools in the Tool Flow has been changed. Now, the continuous execution behaves as a sequence of "Run Once" commands. Independent tool flows will be executed synchronous, i.e., the overall cycle time of one iteration corresponds to the one of with the longest cycle time.

RELEASE NOTES FOR MERLIC 4.5.1

This document provides the release notes for MVTec MERLIC 4.5.1, as released in July 2020.

CONTENTS

- [Supported Operating Systems](#)
- [Backend](#)
- [Frontend](#)
- [Process Integration](#)

SUPPORTED OPERATING SYSTEMS

WINDOWS

MERLIC 4.5.1 is available for Windows 7 and Windows 10 (64-bit operating system).

During the installation, the environment variable `MERLIC4EXAMPLES` is set to `C:\Users\Public\Documents\MVTec\MERLIC 4` by default. It contains

the path to the directory in which additional files such as example applications or images are installed.

Please refer to the "Readme" in the MERLIC manual for more information about the system requirements.

LINUX

MERLIC 4.5.1 is available for selected Linux ARM 64-bit platforms. This edition requires a specific license that needs to be activated on the ARM device. Please contact MVTec to get more information about how to obtain this license. After the license activation, the ARM device also functions as a license dongle for the PC version of MERLIC 4.5.1, however, with some limitations.

Please refer to the "Help → About" dialog in the MERLIC Backend for the respective limitations.

BACKEND

- **Fixed Problems**
    - When using MERLIC on Windows 7, the quick info of the MERLIC tools was not shown. Instead an error message was repeatedly displayed that the QtWebengine process for rendering the quick info crashed. This problem has been fixed.

FRONTEND

- **Fixed Problems**
    - When using the MERLIC Frontend via a Remote Desktop Connection to a Windows 7 host, the MERLIC Frontend did not close when pressing the Close button. This problem has been fixed.

PROCESS INTEGRATION

- **Fixed Problems**
    - Sometimes, MERLIC crashed when it was started in process integration mode. This problem has been fixed.

RELEASE NOTES FOR MERLIC 4.5.0

This document provides the release notes for MVTec MERLIC 4.5.0, as released in May 2020.

CONTENTS

SUPPORTED OPERATING SYSTEMS

WINDOWS

MERLIC 4.5.0 is available for Windows 7 and Windows 10 (64-bit operating system).

During the installation, the environment variable `MERLIC4EXAMPLES` is set to `C:\Users\Public\Documents\MVTec\MERLIC 4` by default. It contains the path to the directory in which additional files such as example applications or images are installed.

Please refer to the "Readme" in the MERLIC manual for more information about the system requirements.

LINUX

MERLIC 4.5.0 is available for selected Linux ARM 64-bit platforms. This edition requires a specific license that needs to be activated on the ARM device. Please contact MVTec to get more information about how to obtain this license. After the license activation, the ARM device also functions as a license dongle for the PC version of MERLIC 4.5.0, however, with some limitations.

Please refer to the "Help → About" dialog in the MERLIC Backend for the respective limitations.

MAJOR NEW FEATURES

TOOL-BASED RUNTIME DATA

MERLIC 4.5.0 now provides information about the runtime for each tool as tool result. This allows developers to identify bottlenecks by analyzing the most recent execution time of each individual tool used within an MVApp.

COMPATIBILITY

Since the last MERLIC version we have been working hard to improve MERLIC in every way. This has, however, resulted in a few of incompatibilities. We apologize for the inconvenience.

- **Designer**
  - The minimum size of some Designer widgets has been adjusted. If an MVApp of a previous MERLIC version contains widgets that are smaller than the new minimum size, the widgets are still displayed in the respective size. However, when resizing the widgets, the new minimum width and height settings apply. More information.

BACKEND

- **Enhancements**
  - The start-up time of MERLIC has been improved significantly. It is now up to five times faster than previous MERLIC versions.

- **Fixed Problems**
  - The quick info of the MERLIC tools took longer than usual to be displayed when adding a tool to the MERLIC Vision App. This problem has been fixed.
  - When an ROI button was selected in a MERLIC tool before changing to a different tool, the ROI was still active and it was possible to draw the ROI in the new tool even if this tool does not support the respective ROI type. This problem has been fixed.
  - When starting the trial version of MERLIC, the respective start dialog that shows information about the MERLIC trial version was sometimes hidden behind other windows. This led to the problem that the MERLIC startup could not continue because the user could not access the information in the hidden dialog. This problem has been fixed. The start up dialog of the trial version is now always opened on top of other windows and the MERLIC startup continues independently of the confirmation by the user.
  - The start-up time of MERLIC was prolonged if MERLIC was used in the trial version. This problem has been fixed. Now, the overall start-up time has been reduced.

- In rare cases, MERLIC crashed if the continuous execution of a MERLIC Vision App was stopped by double-clicking on the "Run" button in the MERLIC Backend. This problem has been fixed.
- When the MERLIC Backend was closed while the MERLIC Vision App was still being executed in continuous mode, the process of the MERLIC Backend did not close properly. This problem has been fixed.

DESIGNER

- **Improved Usability**
    - The usability of the Designer widgets has been improved. The minimal size for selected widgets has been reduced to enable the user more flexibility when designing the Frontend for the use on small screens. The following widgets have been adjusted:

WIDGET	PREVIOUS SIZE	NEW SIZE
Dialog Button	50x20	20x20
easyTouch	32x16	40x20
Execution Control	130x60	50x20
Label	60x20	30x20
OK/NOK	50x50	20x20
Rectangle	60x40	20x20
Slider	50x20	40x20
Text Box	80x40	30x30
Write Access	32x16	40x20

    - Note that this change affects the compatibility. Read more.

- **Fixed Problems**
    - If multiple Designer widgets were selected and edited at once via the properties panel, various erroneous effects occurred such as disappearing of texts in "Label" widgets. To ensure that no undesired effects occur when working with Designer widgets, the settings in the properties panel can now only be adjusted for one widget instead of multiple widgets at once.
    - When right-clicking in the workspace of the MERLIC Designer, the context menu was displayed at a wrong position. In addition, when right-clicking on a widget to open the context menu for the selected widget, no context menu was opened. These problems have been fixed.

FRONTEND

- **Fixed Problems**
  - In some cases, the visualization of a widget was not correctly updated in the MERLIC Frontend if an invalid value was selected. This led to the impression that the invalid value was accepted although the value was internally rejected. This problem has been fixed.

TOOLS

- **Enhancements**
  - The tool "Get Execution Info" has been improved. It now enables to also measure the execution time of a specific tool or a specific set of tools. For this, the tool has been extended by several values:
    - The new tool parameter "Start Time" can be used to set the start time for measuring the tool execution.
    - The new tool parameter "Reset" allows to reset all data that have been collected so far for a new measurement.
    - The new value "relative" of the tool parameter "Time Format" enables the user to measure the time in Unix time stamp format in milliseconds.
    - The new tool result "Duration since Start Time" returns the resulting execution time of the respective tool to be measured. It represents the time difference between the value of the result "Time" and the value that is defined in the parameter "Start Time".

    In addition, the parameter "Reset" of the tool "Determine Data History" has been adjusted to the same behavior as the new "Reset" parameter of "Get Execution Info". The value is automatically set back to 0 after a reset.

  - The following tools have been improved regarding their behavior during the execution of the tool:
    - "Read from Socket"
    - "Write to Socket"
    - "Read from Serial Interface"
    - "Write to Serial Interface"
    - "Determine Data History"
    - "Delay Execution"
    - "Get Execution Info"

    Previously, the tools applied their respective functionality for each execution of the tool including the executions that were caused by parameter changes at the tools itself or by

parameter changes at previous tools that are connected, and even executions that were triggered during the loading process of an MVApp. In detail, this led to a variety of undesired effects when working with these tools:

- The tools "Read from Socket", "Write to Socket", "Read from Serial Interface", and "Write to Serial Interface" also conducted read and write operations when the MVApp was loaded or a parameter was changed.
- The tool "Determine Data History" also added data to the buffer when loading an MVApp or changing a parameter value. This caused the buffer to be non-empty although no explicit MVApp execution has been triggered by the user.
- The tool "Delay Execution" also delayed the execution when loading an MVApp or changing a parameter value.
- The results of the tool "Get Execution Info" also contained the execution cycles that were caused by parameter changes or by loading the MVApp.

Now, these tools only apply their functionality if the MVApp is executed explicitly either in a continuous run or a single execution. Loading an MVApp or changing any parameter values of these tools will have no effect on their results or intended functionality.
Note that if the "Connect" parameter of the tools for serial interfaces and sockets is set to 1, the tools still try to establish a connection to the remote device when the MVApp is loaded or parameters are changed.

- The image acquisition interfaces have been released in a new revision. MERLIC now contains the following versions of the interfaces:
    - GenICamGenTL Revision 13.0.8
    - GigEVision2 Revision 13.0.6
    - USB3Vision Revision 13.0.10

In addition, the GigEVision2 streaming filter has been released in a new revision. MERLIC now contains the version 2.1.8.2 of the streaming filter.

- **Fixed Problems**
    - The tool "Write to Serial Interface" used the value of the parameter "Number of Stop Bits" to set the data bits instead of

the value that was defined in the parameter "Number of Data Bits". This problem has been fixed.

PROCESS INTEGRATION

- **Enhancements**
  - The import of MERLIC recipe files in the MVTec MERLIC Process Integration Setup has been improved. Previously, only one recipe file could be selected for the import. To import multiple recipe files, each file needed to be imported separately. Now, it is possible to import multiple recipe files at once.

DOCUMENTATION

- **Enhancements**
  - The MERLIC manual has been improved. Previously, the information about the various settings in the .ini file were distributed over several topics. Now, the manual provides the new topic "MERLIC .ini File" that provides an overview of all available settings in the .ini file and also refers to the respective topics for more details.
  - The search functionality of the MERLIC documentation has been improved. It now also provides "micro content" for selected search entries. It is shown on top of the search results page and provides a short description for the search entry.
  - The documentation of MERLIC process integration has been improved. The topics about the signals and commands of the respective types of devices now also refer to the description of how to work with the respective commands. In addition, the description of the current MERLIC state now correctly explains that only one of the two bytes for the current state is used.

- **Fixed Problems**
  - The Readme of the MERLIC manual missed the information and reference to the chapter "MERLIC Process Integration". This problem has been fixed.
  - Some screenshots in the chapter MERLIC manual were not up-to-date. This problem has been fixed.

LICENSING

- **Enhancements**
  - The WiBu tools that are used by MERLIC for the licensing have been updated to the version 7.00.

MISCELLANEOUS

- If a log message mentioned a specific MERLIC tool, a tool parameter, or a tool result, the respective name was translated although information in the log file shall only be provided in English. This resulted in log entries with different languages. This problem has been fixed.
- When shutting down the mrun process, MERLIC reported the wrong log message "Writing settings to INI file". This problem has been fixed.

RELEASE NOTES FOR MERLIC 4.4.1

This document provides the release notes for MVTec MERLIC 4.4.1, as released in July 2020.

CONTENTS

SUPPORTED OPERATING SYSTEMS

WINDOWS

MERLIC 4.4.1 is available for Windows 7 and Windows 10 (64-bit operating system).

During the installation, the environment variable `MERLIC4EXAMPLES` is set to `C:\Users\Public\Documents\MVTec\MERLIC 4` by default. It contains the path to the directory in which additional files such as example applications or images are installed.

Please refer to the "Readme" in the MERLIC manual for more information about the system requirements.

MERLIC 4.4.1 is available for selected Linux ARM 64-bit platforms. This edition requires a specific license that needs to be activated on the ARM device. Please contact MVTec to get more information about how to obtain this license. After the license activation, the ARM device also functions as a license dongle for the PC version of MERLIC 4.4.1, however, with some limitations.

Please refer to the "Help → About" dialog in the MERLIC Backend for the respective limitations.

COMPATIBILITY

Since the last MERLIC version we have been working hard to improve MERLIC in every way. This has, however, resulted in a few of incompatibilities. We apologize for the inconvenience.

- **Designer**
  - The minimum size of some Designer widgets has been adjusted. If an MVApp of a previous MERLIC version contains widgets that are smaller than the new minimum size, the widgets are still displayed in the respective size. However, when resizing the widgets, the new minimum width and height settings apply. More information.

BACKEND

- **Enhancements**
  - The start-up time of MERLIC has been improved significantly. It is now up to five times faster than previous MERLIC versions.

- **Fixed Problems**
  - The start-up time of MERLIC was prolonged if MERLIC was used in the trial version. This problem has been fixed. Now, the overall start-up time has been reduced.
  - In rare cases, MERLIC crashed if the continuous execution of a MERLIC Vision App was stopped by double-clicking on the "Run" button in the MERLIC Backend. This problem has been fixed.
  - When the MERLIC Backend was closed while the MERLIC Vision App was still being executed in continuous mode, the process of the MERLIC Backend did not close properly. This problem has been fixed.

- When using MERLIC on Windows 7, the quick info of the MERLIC tools was not shown. Instead an error message was repeatedly displayed that the QtWebengine process for rendering the quick info crashed. This problem has been fixed.

DESIGNER

- **Improved Usability**
  - The usability of the Designer widgets has been improved. The minimal size for selected widgets has been reduced to enable the user more flexibility when designing the Frontend for the use on small screens. The following widgets have been adjusted:

WIDGET	PREVIOUS SIZE	NEW SIZE
Dialog Button	50x20	20x20
easyTouch	32x16	40x20
Execution Control	130x60	50x20
Label	60x20	30x20
OK/NOK	50x50	20x20
Rectangle	60x40	20x20
Slider	50x20	40x20
Text Box	80x40	30x30
Write Access	32x16	40x20

  - Note that this change affects the compatibility. Read more.

- **Fixed Problems**
  - When right-clicking in the workspace of the MERLIC Designer, the context menu was displayed at a wrong position. In addition, when right-clicking on a widget to open the context menu for the selected widget, no context menu was opened. These problems have been fixed.

FRONTEND

- **Fixed Problems**
  - When using the MERLIC Frontend via a Remote Desktop Connection to a Windows 7 host, the MERLIC Frontend did not close when pressing the Close button. This problem has been fixed.
  - The MERLIC Frontend could not be operated via touchscreen anymore. This problem has been fixed.

PROCESS INTEGRATION

- **Fixed Problems**
  - Sometimes, MERLIC crashed when it was started in process integration mode. This problem has been fixed.

RELEASE NOTES FOR MERLIC 4.4.0

This document provides the release notes for MVTec MERLIC 4.4.0, as released in March 2020.

CONTENTS

SUPPORTED OPERATING SYSTEMS

WINDOWS

MERLIC 4.4.0 is available for Windows 7 and Windows 10 (64-bit operating system).

During the installation, the environment variable `MERLICEXAMPLES` is set to `C:\Users\Public\Documents\MVTec\MERLIC 4` by default. It contains the path to the directory in which additional files such as example applications or images are installed.

Please refer to the "Readme" in the MERLIC manual for more information about the system requirements.

LINUX

MERLIC 4.4.0 is available for selected Linux ARM 64-bit platforms. This edition requires a specific license that needs to be activated on the ARM device. After the license activation, the ARM device also functions as a

license dongle for the PC version of MERLIC 4.4.0, however, with some limitations.

Please refer to the "Help → About" dialog in the MERLIC Backend for the respective limitations.

MAJOR NEW FEATURES

Process Integration with Digital I/O Communication
MERLIC 4.4.0 is providing communication via digital I/O interfaces supporting Advantech, NIDAQmx, and Contec cards. In addition, the new version enables cameras to communicate via GenICam digital I/O control.

Greatly improved recipe management
The newly designed Recipe Manager helps to keep the overview of the used recipes and to organize them for the production line thanks to the easy-to-use graphical user interface.

BACKEND

- **Enhancements**
    - The scaling of the MERLIC Backend, Designer, and Frontend has been improved. Previously, GUI elements, e.g., fonts, icons, or arrows, were scaled differently when running MERLIC on high-DPI screens such as Microsoft Surface. Now, MERLIC scales correctly when running on screens with high resolutions.
    - The startup behavior of the MERLIC Backend has been improved. Previously, the MERLIC Backend did not start but raised an error message in case the underlying configuration for MERLIC process integration contained errors. Now, the MERLIC Backend starts without error messages. A possible misconfiguration of the MERLIC process integration can be seen and investigated inside the new "MVTec MERLIC Process Integration Setup" which can be opened via the MERLIC Backend or as stand-alone application.
    - The minimal window size of MERLIC has been revised. Previously, the MERLIC Backend, MERLIC Designer, and the user management dialog were available in different minimal window sizes. Especially, the minimal size of the MERLIC Designer was too small to be applicable. Now, the minimal window size has been unified for the Backend, Designer, and the user management dialog to 1024x786.

- **Improved Usability**

- The search functionality of the Tool Library in the MERLIC Backend has been improved. Previously, the search bar became only visible via a click on the search icon. In addition, by clicking on the close icon the search bar was closed instead of clearing the search text. Now, the search bar is placed on top of the Tool Library panel and is always visible and the close icon now clears the search text.
- The naming convention of input and output parameters that can be used for the communication during the MERLIC process integration has been revised and unified. Previously, they were named "interface parameters". Now, these parameters have been renamed to "MVApp parameters" and "MVApp results".

- **Fixed Problems**
    - In some cases, long tool error messages were not completely visible in the message box of MERLIC tools. This problem has been fixed.
    - When closing the MERLIC Backend, pending user actions, e.g., save on exit, were discarded under certain circumstances. This problem has been fixed.
    - In some cases, the MERLIC Frontend restored settings in the .ini file that have been changed by the MERLIC Backend and vice versa. This problem has been fixed.
    - If the .ini file contained erroneous entries or caused validation errors, the MERLIC Backend did not start anymore. This problem has been fixed.
    - MERLIC could not be started if the "Maximum size of log files" was set very high in the MERLIC preferences. This problem has been fixed. The "Maximum size of log files" is now limited to a maximum value of 1024 MB.

DESIGNER

- **Improved Usability**
    - The menu icon for the MERLIC Designer has been revised. It has been redesigned to fit to the design of the new "MVTec MERLIC Process Integration Setup".

- **Fixed Problems**
    - If a Designer widget was connected to a tool parameter or tool result and the respective tool was then deleted in the Backend, the connection between the widget and the tool parameter or result was lost. A generic error message was shown that did not mention the actual problem and the respective combo

boxes "Connected Tool" and "Connected Parameter" were empty instead of indicating that no tool or tool parameter is connected. This problem has been fixed. Now, a widget instantly shows the info that no tool or parameter is connected and no error message is displayed.

- If a widget in the MERLIC Designer was connected to a tool parameter with tuple type "long", the respective parameter value was sometimes not displayed correctly and could not be edited in the Frontend. This problem has been fixed.

- If the "Table" widget was configured in the MERLIC Designer by selecting multiple table cells at once and adjusting a widget property such as the colors, previously defined cell texts have been deleted. This problem has been fixed. In addition, the configuration of multiple table cells is now restricted to properties that do not represent the cell texts.

- If MERLIC was set to a language other than English, the "Action" property of the "Dialog Button" widget showed an empty combo box in the Designer instead of the view selection. This problem has been fixed.

FRONTEND

- **Enhancements**
  - The usage of the MERLIC Frontend during MERLIC process integration has been improved. Now, the user can use the new Designer widget "Write Access" to activate the write mode in the Frontend for modifying parameters and saving the MERLIC Vision App. When write access is granted to the MERLIC Frontend, the internal state of MERLIC process integration changes to "Manual" and the currently connected communication device or control system is no longer allowed to trigger commands for the execution of the MVApp or to prepare a recipe.

- **Fixed Problems**
  - When displaying a multi-valued parameter in a table in the MERLIC Frontend, the first value was not shown but the last value of the parameter was shown twice instead. This problem has been fixed.
  - The menu entries and dialog texts within the MERLIC Frontend were always shown in English even if a different language was selected. This problem has been fixed.
  - If the Designer widget "Label" or a cell of the "Table" widget was connected to a tool result that might contain an empty tuple, e.g., the result "Decoded Data" of the tool "Read Bar

Code", the respective text field still showed the result of the previous MVApp execution in the Frontend if the execution resulted in an empty tuple, e.g., if no bar code was visible in the image. This problem has been fixed. The text will now be set to an empty string if the connected tool result contains an empty tuple.

TOOLS

- **Enhancements**
  - The tool "Acquire Image from Camera" has been revised. It is now possible to achieve higher frame rates for cameras that support GenICam SFNC-conform software trigger. With this change, it is no longer possible to configure these cameras to be triggered by hardware.

- **Fixed Problems**
  - When trying to select a calibration plate descriptor file in the tool "Calibrate Camera", the file selection dialog automatically filtered for image files instead of files with file ending ".cpd". This problem has been fixed.
  - The tool "Measure Opposite Edges" did not respect connected calibration data when calculating the angle between opposite edges. This problem has been fixed.
  - In case of communication issues when using the tools "Read from Serial Interface", "Write to Serial Interface", "Read from Socket", or "Write to Socket", the respective tool state was set only for some of the tools. This problem has been fixed. The tool state is now set consistently for all of these tools.
  - To open a socket connection the maximum timeout was used. This increased the loading time for MERLIC Vision Apps that contains the tools "Read from Socket" or "Write from Socket". This problem has been fixed. Now, the read/write timeout that is specified in these tools is also used for opening the socket connection. In addition, the default timeout has been adjusted to 0.5 seconds and the maximum value has been changed to 10 seconds.

PROCESS INTEGRATION

- **New Features**
  - MERLIC has been extended by the new application "MVTec MERLIC Process Integration Setup" (MERLIC PI Setup) that provides a graphical user interface for the configuration of the MERLIC process integration mode. It is provided as a stand-alone software that can be opened from the MERLIC Backend

or with the respective executable file without starting the MERLIC Backend.

The MERLIC PI Setup is divided in two configuration areas: the "Recipe Manager" and the "Hardware Setup". The "Recipe Manager" enables the user to import and check existing MERLIC recipe files whereas the "Hardware Setup" enables the user to select and configure the communication device that is used for the process integration of MERLIC.

- **Fixed Problems**
  - When MERLIC was started via command line with the option --ini and a file with the wrong file type was defined for the --ini option, e.g., an MVApp file instead of a .ini file, the content of the specified file has been changed. This problem has been fixed. Now, the file is not overwritten anymore if a wrong file type is specified. Instead, MERLIC is started with the default settings.
  - The "Interface Parameters" panel in the MERLIC Backend displayed the position ID of the respective interface parameters two times instead of only once. In addition, the position was counted beginning from 1. This problem has been fixed. The numbering has been unified with the numbering in the new "MVTec MERLIC Process Integration Setup" and now starts with the ID 0. The visualization of the position ID has been fixed in the course of renaming the panel to "MVApp Parameters and Results".
  - In rare cases, MERLIC hanged if it was running in process integration mode with the simulated PLC, i.e., no further executions were triggered. This problem has been fixed.
  - In some cases, the preamble byte sent by the PLC was ignored by MERLIC in process integration mode. If the preamble byte was set to a wrong value, the command was still executed. This problem has been fixed. Now, messages with a wrong preamble byte are ignored and commands will not be executed.

DOCUMENTATION

- **Enhancements**
  - The documentation of several tools has been improved. The quick info and tool references of the tools of the category "Combined Measuring" have been extended to be more clear. In addition, also the quick info of further tools has been extended to describe more clearly how to use the tools.

- The documentation of the tools in the category "Reading" has been improved. The respective tool references have been extended by a description how the training is performed.
- The documentation of the tools "Read from File" and "Write from File" has been improved. It has been extended by a description on how to finish the writing mode and close a file.
- The MERLIC manual has been improved. Images and videos have been revised and are now displayed with a simplified user interface to provide a clear look and focus the user's attention on the features to be shown in the images and videos.

- **Fixed Problems**
    - The documentation of the logging mechanism of MERLIC contained an example in which the log file size was set to 100 bytes. However, this was misleading because MERLIC ignores values less than 1 MB. This problem has been fixed. The example now uses an appropriate log file size.
    - The tool reference of the tool "Write to File" contained wrong information about how the file is opened for writing. This problem has been fixed.

INSTALLATION

- **New Features**
    - MERLIC has been extended to provide a new entry for the MERLIC Frontend in the Windows start menu in addition to the new "MVTec MERLIC Process Integration Setup".

- **Fixed Problems**
    - After installing MERLIC, the language of the MERLIC Backend was set to English even if a different language was selected during the installation process. This problem has been fixed.

MISCELLANEOUS

- If comments were added in the MERLIC configuration file (.ini file), these comments were deleted as soon as the settings have been overwritten due to adjustments from the MERLIC GUI. This problem has been fixed. Now, the comment lines starting with "#" or ";" are not removed anymore from the configuration file.
- The loading time for MERLIC Vision Apps has been improved. Especially, large MVApps and those without complex tool connections and trainings are loaded significantly faster.
- The configuration of MERLIC via the .ini file has been improved. MERLIC now uses the new .ini file "MERLIC4.ini" to

enable separate settings for different major versions. Previously, the settings in the .ini file were applied for all MERLIC instances of all major version. Now, the new .ini file is applied only for the respective major version. When MERLIC is installed on a system that contains only a "MERLIC.ini" and no "MERLIC4.ini" yet, the settings in the "MERLIC.ini" will be automatically converted to the new "MERLIC4.ini".

RELEASE NOTES FOR MERLIC 4.3.0

This document provides the release notes for MVTec MERLIC 4.3.0, as released in August 2019.

CONTENTS

- [Backend](#)
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BACKEND

- **Fixed Problems**
  - Error dialogs that were shown during the startup of MERLIC were not visible because they were hidden by the splash screen. This problem has been fixed.
  - The menu of the MERLIC Backend was disabled when pressing the keyboard shortcut ALT+Tab while the mouse cursor hovered over the image of the tool board. This problem has been fixed.
  - When moving the mouse cursor over the image in the tool board while pressing the keyboard shortcut ALT, the image coordinates and gray values of the respective pixel are shown. However, if the mouse cursor was moved, the displayed values were truncated and not readable anymore. This problem has been fixed.
  - When changing the value of image specific training parameters, such as "Sample Type" in the tool "Check Presence with Gray Features", the respective value was highlighted in the wrong font size. This problem has been fixed.

- If a tool parameter name has been renamed to an HTML code instead of a text, the HTML code was accepted as parameter name, parsed, and rendered. This problem has been fixed.
- If a tool with multiple connections to subsequent tools was displayed in the tool workspace, the text of the drop area for new tool connections was hidden by the labels of the connected tools. This problem has been fixed.
- If a tool parameter with a predefined list of values was adjusted, the combo box with the value list was only opened after a second click on the respective connector instead on the first click. This problem has been fixed.

TOOLS

- **New Features**
    - The path settings for the tools of the category "File Access" have been improved. Previously, the tools used paths that were relative to the working directory. Now, relative paths refer to the directory "%USERPROFILE%/Documents". Furthermore, the "File Name" parameter of these tools are now set to an absolute path by default and it is now possible to use "/" as well as "\" as path separators.

- **Fixed Problems**
    - In some cases, the tool "Detect Scratches" threw an error message that too many scratches were found right after inserting the tool. This problem has been fixed. Now, the tool shows a warning which gives more detailed information about the number of found scratches and the allowed maximum number of scratches for the respective image size.
    - If the ALT key was pressed while moving the mouse cursor over the image in the tool "Invert Gray Values", the respective information about the gray value and the coordinates of the original image were displayed instead of the pixel information of the inverted image that is displayed in the tool. This problem has been fixed.
    - Each time the tool "Level Surface" was added to an MVApp, an error message was written to the log file. This problem has been fixed.

DOCUMENTATION

- **Enhancements**
    - The information about the system requirements of MERLIC have been improved. They are now more clear on which operating systems are supported. In addition, they have been

extended by a link to the system requirements of the supported image acquisition interfaces to provide an easy access to the respective information.

- **Fixed Problems**
  - Some screenshots in the MERLIC manual were not up to date. This problem has been fixed.

INSTALLATION

- **Fixed Problems**
  - In some cases, the display of the installer option to install the MVTec GigEVision streaming filter was broken. This problem has been fixed. This option is now displayed on two separate pages instead of one single page.
  - If the MERLIC setup was executed on a system with an installed MVTec GigEVision streaming filter, the respective files of the streaming filter were deleted when deselecting the option to install the streaming filter during the MERLIC setup. This problem has been fixed.

LICENSING

- **New Features**
  - MERLIC 4.3.0 is now available as a new edition for selected Linux ARM 64-bit platforms. This edition requires a specific license that needs to be activated on the ARM device. After the license activation, the ARM device also functions as a license dongle for the PC version of MERLIC 4.3.0, however, with some limitations. Please refer to the "Help → About" dialog in the MERLIC Backend for the respective limitations.

MISCELLANEOUS

- The MERLIC configuration settings in the .ini file have been improved. Previously, paths needed to be given with double backslashes "\" as path separator. Now, it is possible to also use to regular slashes "/" and backslashes "\" as path separators in the .ini file. In addition, the [ProcessIntegration] setting "RecipeCount" has been removed.
- In some cases, settings with language-specific characters in the .ini configuration file could not be read correctly. This problem has been fixed. Note that the .ini file requires an UTF8 character encoding on all platforms.

RELEASE NOTES FOR MERLIC 4.2

This document provides the release notes for MVTec MERLIC 4.2, as released in February 2019. It contains information about new functionality and fixed bugs since MERLIC 3.0.9 as well as information about fixed bugs since MERLIC 4.1 Preview.

CONTENTS

MAJOR NEW FEATURES

Parallelization

One highlight of the new version is the parallel processing and execution of different tools. This simplifies the implementation of multi-camera setups and allows for a more efficient use of the system's computing power.

3D Vision Tools

The software also provides 3D vision tools to work on height images. This enables users, for example, to read embossed text, check heights, and perform other 3D machine vision tasks. For this, four new tools are included that make it possible to prepare images from 3D sensors or 3D cameras so that inspections can be subsequently carried out using MERLIC's existing 2D tools.

Process Integration with Real-Time Ethernet and Fieldbus Systems

Moreover, MERLIC 4 provides optimized process integration via Hilscher cifX cards (slave/device) of all current form factors. The software can thus communicate with common fieldbus and real-time Ethernet industrial protocols, such as EtherCAT, PROFINET, and many others, via Hilscher PC cards. This makes it possible to seamlessly integrate machine vision systems running MERLIC with a programmable logic controller (PLC).

Besides, MERLIC now supports 'recipes' which allow for the rapid reconfiguration of different machine vision tasks.

Improved Usability with Optimized Tool Flow

MERLIC 4 provides users with an even clearer and more intuitive user interface with a completely redesigned tool flow. Thanks to the tool flow it is possible to easily arrange and connect tools and logic elements using known principles like drag&drop, copy&paste, and multiselection. Automatisms to connect tools have been optimized. Branches between the strands (Branch on Condition) are now displayed more clearly. Using 'Triggers', the user has an additional possibility to control the program flow logically.

A quick search for tools has been implemented, allowing for better usability. For camera parameters a quick search is available now, simplifying the setup of camera settings greatly.

Customized Translations

Moreover, MERLIC 4 allows customized translations of standard texts in the Frontend for all languages.

MERLIC Trial Version

Additionally, with the new release, it is no longer necessary to unlock MERLIC trial versions with an activation ticket online. This allows easier and faster testing of MERLIC 4.

COMPATIBILITY

Since the last MERLIC 3 version we have been working hard to improve MERLIC in every way. This has, however, resulted in a few of incompatibilities. We apologize for the inconvenience.

Use of MERLIC Vision Apps created in MERLIC 3

The format of the MERLIC Vision App files has changed since MERLIC 3. MERLIC Vision Apps that have been created in MERLIC 3, e.g., MERLIC 3.0.2, must be converted to the new format if they are loaded in MERLIC 4.2. This may lead to functional changes. Therefore, a backup file of the MERLIC Vision App should be created before loading the application. The backup file ensures that you can still use your original application in the previous MERLIC version.

The first save action in MERLIC 4.2 stores the application according to the new internal structure and makes it incompatible to previous MERLIC versions. If no backup file was created for the MERLIC Vision App, we recommend to save the converted application with a new name.

In case a MERLIC Vision App of MERLIC 3 is also password protected, it cannot be loaded in MERLIC 4, as MERLIC 4 uses a different, more secure encryption. To still open the MVApp, the encryption must first be removed in the old version.

- **Tools**
  - When loading MERLIC Vision Apps from previous MERLIC versions, the stored name of the connected camera is not restored correctly in the tool 'Acquire Image from Camera' because the format of the displayed camera name has been adjusted. Therefore, you have to select the correct camera manually and save the MVApp again. More information.
  - The tool 'Branch on Condition' is no longer compatible since it has been completely revised. MERLIC Vision Apps that contain this tool must be converted to the current version. Note that the conversion may lead to functional changes. To ensure a consistent state, it is recommended to check the configuration of the tool again after the conversion. The chapter 'MERLIC Backend > Parallel Processing > Error Causes' of the MERLIC manual gives more detailed information about possible error causes. More information.
  - If a MERLIC Vision App, that contains one of the following tools, is opened in MERLIC, the respective tool is automatically removed from the MVApp because the tools are no longer available in MERLIC:
    - 'Communicate via Hilscher cifX'
    - 'Communicate via OPC UA'
    - 'Communicate via Digital I/O'
    - 'Stop Execution'

    A backup file of the original MVApp is automatically stored if the MVApp is opened in this MERLIC version. More information.

  - Tools provided in MERLIC 4 cannot be loaded in previous MERLIC versions because the protection format of the MERLIC tools has been improved. More information.

- **Miscellaneous**
  - Protected MERLIC Vision App of previous MERLIC versions cannot be loaded in this MERLIC version because the password protection has been improved. You first have to load the application in the previous MERLIC version and remove the password protection. Then you may load the application in MERLIC 4 and define a new password. More information.

BACKEND

- **New Features**
  - The Tool Flow panel has been extended to support the visualization of parallel tool flows. It is now possible to arrange the tools of a MERLIC Vision App side-by-side to indicate the parallel processing of the tools.
  - The Tool Flow panel has been extended by the following modification features:
    - Copy and paste
      - It is now possible to copy any number of selected tools including their currently set parameter values. They can be pasted at an arbitrary position in the Tool Flow panel. For this, the Tool Flow panel has been extended by a new context menu which enables the user to copy and paste the selected tools. Alternatively, the shortcuts 'Ctrl+C' and 'Ctrl+V' can be used for copy and paste.
    - Delete
      - It is now possible to delete a tool directly in the Tool Flow panel via the new context menu of the tool or via the shortcut 'Del'.
    - Move
      - It is now possible to move any number of selected tools within the Tool Flow panel via drag and drop. This enables the user to easily arrange the tools of the MERLIC Vision App according to the requirements.
    - Selection of multiple tools
      - It is now possible to select multiple tools within the Tool Flow panel. This enables the user to apply a specific modification to multiple tools at once, e.g., moving a group of tools. The selection can be defined via a lasso selection or by pressing the 'Ctrl' or 'Shift' key while clicking on the desired tools.
  - The Tool Flow panel has been extended to visualize the connections of all tools. For a better distinction they are visualized in different colors depending on their state:
    - Connections in an erroneous state are highlighted in red.
    - Connections of currently selected tools are highlighted in blue.
    - Connections of currently not selected tools are visualized in dark gray.

- MERLIC now supports the use of trigger connections. This enables the user to control various aspects in the execution of a MERLIC Vision App:
    - Execution of a specific tool at a specific time
    - Execution order of the tools in parallel processing
    - Synchronization of tools during parallel processing

    For this, the MERLIC tools have been extended by trigger connectors on the right of the Tool Board. They can be used to create a trigger connection between tools. Use the + button on the top right of the tool to define one or more incoming triggers connections. The new output trigger connector 'Default Trigger' is displayed by default at the bottom right of the tool and can be used to define trigger connections to subsequent tools.

- With respect to the new process integration mode, MERLIC now enables to specify the tool parameters that can be set via a recipe file and the tool results that are accessible for the connected programmable logic controller (PLC) with a new icon at the respective tool connectors in the MERLIC Backend.
- With respect to the new process integration mode, the Tool Flow panel in the MERLIC Backend has been redesigned to highlight the tools with specified interface parameters for the process integration. It provides a quick overview to easily recognize the respective tools.
- With respect to the new process integration mode, the MERLIC Backend has been extended by a new panel that shows an overview of all specified interface parameters for the process integration. It lists all tool parameters that are set via a recipe file and all tool results that are accessible for the programmable logic controller (PLC) with the respective data type.

- **Enhancements**
    - The Tool Workspace of the MERLIC Backend has been improved in multiple ways.
        - In MERLIC 3, the workspace displayed the currently selected tool as well as part of the previous and subsequent tool. Now, only the currently selected tool is displayed in the Tool Workspace. The additional area is now used to visualize more information about the connected tools.
        - In MERLIC 3, only the name of the connected tools were displayed at the connections within the Tool Workspace.

Now, the connections also display the name of the respective parameter or result that is connected.

- In MERLIC 3, the Tool Workspace offered + buttons on the top right and bottom right of a tool for adding new tools directly from the Tool Workspace. Since the tools can now be processed in parallel and can therefore be arranged side-by-side, these + buttons have been removed. This ensures that the focus in the Tool Workspace is solely on the modification of the currently selected tool. All types of modifications regarding the arrangement of current and new tools can be done in the Tool Flow panel.
- The renaming of tools, parameters, and results has been improved. If a tool, parameter, or result is renamed, its new name is now displayed together with its original name. The names may contain any valid Unicode character.
  For the tools 'Evaluate Expression' and 'Branch on Condition' additional restrictions apply when renaming the parameters:
    - The new name must not contain any white spaces.
    - The new name must not contain any of following characters:
      -
      -
      -
      -] [! \ " # $ % & ' ( ) * + , . / : ; < = > ? @ ^ ` { | } ~ -
    - The new name must not be equal to a functional operator, e.g. sin, cos ...
- If the Quick Info of a tool was expanded or closed, this setting was only applied to the respective tool. Now, this setting is also applied for all other tools. This enables you to close the Quick Info of the tools with a single click. However, the Quick Info of tools that do not have any controls in the tool board, such as the tool 'Write to File', is always shown.

- **Improved Usability**
  - The usability of the Tool Library has been improved. In MERLIC 3, the subcategories and tools were not always sorted in an explicit order. Now, the subcategories and tools are sorted alphabetically.
  - The tool parameters and results for the various types of handles, e.g., file handle, were named identically. To better distinguish the respective parameters and results, the tool results that represent a handle are now marked with the suffix 'Used'.

- The usability of the MERLIC Backend has been improved. In MERLIC 3, no visual feedback was displayed in case a user operation took some time, e.g. loading a MERLIC Vision App, which led to the impression that MERLIC hangs. Now, a waiting screen is shown that informs that a user command is still processed.
- The usability of the Tool Library panel has been improved. It has been extended by a search filter to enable the search for available tools by arbitrary keywords or texts.
- The usability of the context menu of tool parameters and tool results has been improved. The menu entries 'Connect from/to' and 'Disconnect from' now display the available tools in alphabetical order instead of an arbitrary order.
- The format the MERLIC Backend window title has been changed to 'MVTec MERLIC - *<MVApp_Filename.mvapp>*'.

- **Fixed Problems**
  - If the error message dialog of the Tool Board has been moved with the mouse, parts of the background of the MERLIC Backend were not displayed correctly. This problem has been fixed. The dialog cannot be moved anymore.
  - If the name of a parameter of the tool 'Evaluate Expression' has been set to an empty string, an error message was shown that this parameter name is already in use. This problem has been fixed. Now, the parameter is set to its default name if the name is set to an empty string.
  - If a text part of the Quick Info was selected and dragged with the mouse while the MERLIC Vision App was running continuously, the execution of the application stopped. This problem has been fixed.
  - If a tool error has been resolved by a structural change, the respective tool error message did not disappear. This problem has been fixed.
  - Sometimes, the region of interest (ROI), that was shown with the easyTouch preview when hovering with the mouse cursor over the image, was still visible after the mouse cursor was moved out of the image boundaries. This problem has been fixed.
  - If the context menu of a parameter or result was used to create a connection to other tools, not all available parameters or results were listed in the context menu. This problem has been fixed. Now, all connectable parameters are shown in the context menu.
  - If a MERLIC Vision App has been loaded and then the first tool of the application has been deleted, the visualization in the

Tool Flow panel was not correctly updated. This problem has been fixed.

- Sometimes, tool parameters were displayed as a floating point number instead of an integer number if the value has been adjusted via the slider. This problem has been fixed.
- If MERLIC was used in Windows 10, a parameter value list could not be opened with a single mouse click on the respective connector. Instead a double-click was necessary to display the list of available parameter values. This problem has been fixed.
- If a parameter with numeric values has been adjusted by clicking on the arrows < and > at the respective connector, the value was not adjusted correctly in step increments of 1. This problem has been fixed.
- If a parameter has been changed by easyTouch and the context menu of this parameter was opened while the new parameter value was still being highlighted in blue, the text of the context menu was also displayed in blue. This problem has been fixed.
- The names of the MERLIC tools were not consistent in the MERLIC Backend of MERLIC 4.1 Preview. This problem has been fixed.
- If a tool parameter was set to a negative value or a value > 10, the size of the respective connector was adjusted to a very small width in MERLIC 4.1 Preview. This problem has been fixed.
- The 'Open Designer' button at the menu bar of the MERLIC Backend sometimes did not show the correct state whether the MERLIC Designer is open or closed. This problem has been fixed. In addition, if the MERLIC Designer is already open in the background and the 'Open Designer' button or menu entry is clicked, the MERLIC Designer window will be shown in the foreground.
- Removing an incoming connection of a parameter by dragging the arrow handle of the connection away from the connector did not work when the arrow handle was dragged to the left. This problem has been fixed.
- In MERLIC 4.1 Preview, the paste process after copying a tool was sometimes canceled when the mouse was moved outside of the Tool Flow panel. This problem has been fixed.
- In rare cases MERLIC crashed when renaming a tool. This problem has been fixed.

- In MERLIC 4.1 Preview, the tool tip shown for the tool name at the tool board missed the information about the internal tool name. This problem has been fixed.
- In some cases, if the 'Del' or 'Backspace' key was pressed while an ROI was being drawn in a tool, the ROI was deleted but it was not possible anymore to draw any further ROIs in any tool. This problem has been fixed.
- In MERLIC 4.1 Preview, trigger connections were sometimes not correctly visualized. This problem has been fixed.
- If the tool focus was changed in a large MERLIC Vision App in MERLIC 4.1 Preview with more than about 250 tools, it took very long until the user interface reacted to user actions again. This problem has been fixed.
- Loading MERLIC Vision Apps with complex Frontend GUI designs was very slow. This problem has been fixed. The speed of loading such MVApps has been improved significantly.
- The training data set of tools with a training mode was sometimes not restored correctly. If an ROI was drawn into the training image and then the application was saved and loaded again in MERLIC, the ROI was loaded as an ROI for the processing image instead of a training ROI. This problem has been fixed.
- MERLIC crashed if it was used on a system with Intel HD Graphics 3000. This problem has been fixed.
- In MERLIC 4.1 Preview, regions of interest (ROIs) that have been connected from a previous tool were not visualized in the correct color that has been set for input ROIs in the MERLIC preferences. This problem has been fixed.
- If an already selected ROI was selected anew in a tool within the MERLIC Backend and then the image was modified, e.g., by zooming or moving the image, the ROI was not adjusted correctly to the modification because its state was still inconsistent. This problem has been fixed.

DESIGNER

- **Improved Usability**
  - The usability of opening the MERLIC Frontend has been improved. Previously, different keyboard shortcuts were defined for the MERLIC Backend and the Designer to open the Frontend. Now, the Frontend can be opened from the Backend and the Designer with the same keyboard shortcut F10.

- **Fixed Problems**

- The 'Label' widget could be connected to tool parameters and tool results that represented an ROI. This problem has been fixed.
- In the MERLIC Designer newly inserted widgets were not reliably placed atop of all widgets of the current layout. This problem has been fixed. Now, newly inserted widgets are always placed atop of all widgets of the current layout.
- If a group of widgets has been copied and pasted within the MERLIC Designer, the pasted widgets changed their z-order order randomly. This problem has been fixed. Now, when pasting a copied group of widgets, the z-order of the widgets is kept correctly and the group is placed atop of all widgets of the current layout.
- If the name of a tab view has been edited within the MERLIC Designer and the input field of the name was still visible when clicking on any place outside of the input field, the changes were not adopted. This problem has been fixed.
- If multiple views were added and reordered within the MERLIC Designer, the defined order of the views was not correctly stored. In addition, the names of the views were not correctly updated in the 'Tab View' widget if a view has been renamed. These problems have been fixed.
- If the MERLIC Designer window was minimized or inactive, it could not be reactivated and opened in the front by clicking the 'Open Designer' button in the menu bar of the MERLIC Backend. This problem has been fixed.
- If multiple views were used in the MERLIC Designer and a 'Tab View' widget has been copied or cut and then pasted into another view, MERLIC did not mark recursive view specifications as misconfigured. This problem has been fixed.
- If multiple views were renamed and then reordered, the changes were not correctly reversed via the undo functionality. This problem has been fixed.
- The cells of the 'Table' widget could not be connected to tool parameters that are connected to other tools. This problem has been fixed.
- In the MERLIC Designer the configuration of the widget 'Check Box' was not validated correctly. The widget was not recognized correctly as misconfigured if it was connected to a not editable tool parameter. This problem has been fixed. Now, the misconfiguration is correctly detected, the widget is marked as misconfigured, and the Frontend can no longer be started while the widget is misconfigured.

FRONTEND

- **New Features**
    - With respect to the new process integration mode, MERLIC now ensures that it can be controlled only from the PLC by setting the MERLIC Frontend automatically to read-only mode in case it is executed in the new process integration mode.

- **Improved Usability**
    - The usability of the Frontend menu bar has been improved. It is now possible to open the Frontend in full screen mode using the new menu entry 'View -> Full Screen' or the shortcut F11.

- **Fixed Problems**
    - If the 'Image Display' widget was used in the MERLIC Frontend and an invalid image was selected while the application was being executed, the 'Image Display' widget started flickering. This problem has been fixed.
    - If the MERLIC Frontend was started via the command line option, it was not checked, whether the file name or directory of the MVApp existed. This problem has been fixed. Now, the completeness of the command line option is checked as well as whether the specified file or directory exists. If it does not exist, an error message is shown and the application is closed.
    - If a MERLIC Vision App has been started via the context menu entry 'Launch in Frontend' or via the command line with the option '--frontend', the splash screen showed the message 'Starting MERLIC Backend'. This problem has been fixed.
    - The Frontend of an unsaved MERLIC Vision App could not be started via a remote connection. This problem has been fixed.
    - The 'Image Display' widget still displayed the previous image in the MERLIC Frontend in case the image of the current iteration was invalid or empty. This problem has been fixed. Now, the 'Image Display' widget shows no image if the image is invalid or empty.
    - The 'Image Display' widget did not display the regions of interest (ROIs) with the edit mode 'Display only' in the configured color. This problem has been fixed. Now, these non-modifiable ROIs are displayed in the color that is defined for the property 'Inactive color'.
    - If an ROI has been moved in the 'Image Display' widget within the MERLIC Frontend, it was temporarily displayed in its previous position. This problem has been fixed.
    - If the 'easyTouch Button' was activated in the MERLIC Frontend and the image in the 'Image Display' widget has been zoomed using the mouse wheel, sometimes the easyTouch

preview was no longer visualized while the mouse cursor was being moved over the image. This problem has been fixed.

- If the widget 'Check Box' was connected to a string parameter, two clicks instead of one single click were required in the Frontend to uncheck the check box correctly. This problem has been fixed.

- The widget 'Execution Control' did not display the 'Run Once' state correctly in the MERLIC Frontend if the MERLIC Vision App was executed once. This problem has been fixed. The widget now toggles its state correctly while the MERLIC Vision App is executed.

- The 'Table' widget did not display the values of tuples correctly in the MERLIC Frontend. This problem has been fixed.

- In some rare cases MERLIC crashed while opening the MERLIC Designer or MERLIC Frontend. This problem has been fixed.

- If multiple ROI parameter were editable in the Frontend and one of the not selected ROIs was deleted, sometimes a different ROI parameter was selected afterwards. This problem has been fixed.

- While deleting ROIs in the MERLIC Frontend using the corresponding button within the ROI toolbar of the 'Image Display' widget, the active ROI was not displayed reliably in the correct color. This problem has been fixed.

- If the MERLIC Frontend was opened, the visualization of the MERLIC Vision App was sometimes delayed. This problem has been fixed.

- The user management of the MERLIC Frontend did not work correctly. It was not possible to login although the correct user credentials were given. This problem has been fixed.

- MERLIC 4.1 Preview crashed when loading an empty MERLIC Vision App with an invalid Frontend definition. This problem has been fixed.

- If a Frontend design contained the 'Dialog Button' widget with a modeless configuration and the respective dialog window was closed, the Frontend sometimes crashed. This problem has been fixed.

- In some cases the MERLIC Frontend was not displayed in the selected language. This problem has been fixed.

- When a MERLIC Frontend lost the connection to the server, already opened dialogs were not closed. This problem has been fixed.

TOOLS

- **New Features**
  - MERLIC has been extended by the following tools of the new tool category '3D Height Image':
    - 'Convert Disparity To Height Image'
      - This tool can be used to convert a disparity image to a calibrated height image.
    - 'Level Surface'
      - This tool can be used to level tilted or curved areas and objects on 3D height images.
    - 'Remove Outlier Pixels'
      - This tool can be used to fill small holes in 3D height images and to determine the region that excludes outlier pixels.
    - 'Scale Gray Range to 8 Bit'
      - This tool can be used in order to scale a 16 bit image to a 8 bit image according to a user defined gray range.

- **Enhancements**
  - MERLIC now provides the new GigEVision2 interface (Revision 13.0.3) for the tool 'Acquire Image from Camera'. It supports devices complying with the GigE Vision 2.x standard and replaces the old GigEVision interface.
    In addition, the image acquisition interfaces GenICamGenTL and USB3Vision have been released in a new revision.
    MERLIC now contains the following versions of the interfaces:
    - GenICamGenTL Revision 13.0.5
    - USB3Vision Revision 13.0.7

  - The tool 'Acquire Image from Camera' now uses a synchronous grab of an image from the specified image acquisition devices to ensure the usage of the most current image.
  - The tool 'Branch on Condition' has been improved. It has been completely revised:
    - The different branches are no longer visualized by separate areas.
    - The execution of the tools in the different branches is now initiated by triggers.
    - The output branch triggers 'Condition' and 'Default' have been added to the tool. They can be connected to all tools that should be executed if the condition is true or false, respectively.

- The parameter properties must be instantly defined if a new parameter is added via the + button. The properties cannot be changed afterwards anymore.

Note that this change affects the compatibility. [Read more.](#)

- The tools 'Branch on Condition' and 'Evaluate Expression' have been improved. Previously, the user could choose from a wide range of semantic types for a newly added parameter. Now, the list of semantic types that can be selected for a new parameter has been reduced to the basic semantic types 'any', 'double', 'long', and 'string' in order to increase the clarity. The semantic types of existing MERLIC Vision Apps are automatically assigned to one of the basic semantic types.
- The tool 'Calibrate Camera' has been improved. It has been extended by the new training results 'Marks Train' and 'Calibration Error Train'. They return the contours of the found calibration marks and the calibration error, respectively.
- The tool 'Check Presence with Gray Features' has been improved. It has been extended by the new training results 'Feature 1 Train Out' and 'Feature 2 Train Out'. They return the values that have been used for the training parameters 'Feature 1' and 'Feature 2' in the trained model.
- The following tools with a training mode have been improved:
    - 'Check Presence with Gray Features'
    - 'Check Presence with Matching'
    - 'Read Aztec Code'
    - 'Read Bar Code'
    - 'Read Data Matrix ECC 200'
    - 'Read PDF417'
    - 'Read QR Code'

  In MERLIC 3, the current processing image was automatically added as training image when the tool was inserted. Now, the training image must be added manually. This ensures that only the desired images are selected for the training.
  Furthermore, the modes for the training images of the tool 'Check Presence with Matching' are not defined automatically anymore. They must be defined manually for each training image.

- The tool 'Check Presence with Matching' has been improved. The parameter 'Reference Position' is now an additional

parameter. Furthermore, the tool has been extended by the following new training parameters:

- 'Deformation Tolerance Train'
- 'Maximum Overlap Train'
- 'Minimum Score Train'
- 'Orientation Tolerance Train'

In addition the tool has been extended by the new training result 'Highest Pyramid Level Train Used'. It returns the value that has been used for the training parameter 'Highest Pyramid Level' in the trained model.

- Due to the new process integration mode, the tool 'Communicate via Hilscher cifX' that has been provided in MERLIC 4.1 Preview is not required anymore. Therefore it has been removed.
  In addition, the tools 'Communicate via OPC UA', 'Communicate via Digital I/O', and 'Stop Execution' have been removed with respect to future approaches for more efficient solutions.
  Note that this change affects the compatibility. [Read more.](#)
- The training parameters of the following tools have been renamed:
    - Determine Alignment with Matching
    - Determine Alignment with Straight Border
    - Check Presence with Gray Features
    - Check Presence with Matching
    - Count with Matching
    - Locate with Matching

All names of the training parameters now end with the suffix 'Train' to distinguish them from the processing parameters.

- The tool 'Determine Alignment with Straight Border' has been improved. The processing parameters 'Edge Contrast', 'Edge Width', and 'Edge Transition' have been moved to the training parameters on right side of the tool board to visualize that they are used for the training.
- The tool 'Read Bar Code' has been improved. It has been extended by the following training results:
    - 'Code Type Out'
    - 'Maximum Element Width Out'
    - 'Minimum Element Width Out'
    - 'Minimum Absolute Edge Amplitude Out'
    - 'Minimum Relative Edge Amplitude Out'

- 'Minimum Bar Code Width Out'
- 'Orientation Out'
- 'Orientation Tolerance Out'

The new training results return the value of the respective processing parameters that were used in the trained model.

- The following tools of the category 'Reading' have been improved:
  - 'Read Atzec Code'
  - 'Read Bar Code'
  - 'Read Data Matrix ECC200'
  - 'Read PDF417'
  - 'Read QR Code'

The tools have been adjusted to return the values in the result 'Decoded Data' in a specific order. They are now sorted with respect to their 'row' and 'column' values in which they appear in the image.

- The tools 'Read Data Matrix ECC 200' and 'Read PDF417' have been improved. They have been extended by the following training results:
  - 'Code Property Out'
  - 'Conform to Standard Out'
  - 'Expected Number of Codes Out'
  - 'Maximum Number of Columns Out'
  - 'Minimum Number of Columns Out'
  - 'Maximum Number of Rows Out'
  - 'Minimum Number of Rows Out'
  - 'Minimum Contrast Out'
  - 'Mirrored Code Out'
  - 'Robust Against Small Modules Out'

Further new training results for the tool 'Read Data Matrix ECC 200' are:

  - 'Contrast Tolerance Out'
  - 'Finder Pattern Tolerance Out'
  - 'Maximum Horizontal Gap Width Out'
  - 'Minimum Horizontal Gap Width Out'
  - 'Maximum Module Size Out'
  - 'Minimum Module Size Out'
  - 'Maximum Slant Out'
  - 'Maximum Vertical Gap Width Out'

- 'Minimum Vertical Gap Width Out'
- 'Module Size Tolerance Out'

Further new training results for the tool 'Read QR Code' are:

- 'Maximum Module Aspect Ratio Out'
- 'Minimum Module Aspect Ratio Out'
- 'Maximum Module Width Out'
- 'Minimum Module Width Out'

The new training results return the value of the respective processing parameters that were used in the trained model.

- The tools 'Read Atzec Code' and 'Read QR Code' have been improved. They have been extended by the following training results:
  - 'Code Property Out'
  - 'Conform to Standard Out'
  - 'Expected Number of Codes Out'
  - 'Maximum Horizontal Gap Width Out'
  - 'Minimum Horizontal Gap Width Out'
  - 'Maximum Vertical Gap Width Out'
  - 'Minimum Vertical Gap Width Out'
  - 'Maximum Module Size Out'
  - 'Minimum Module Size Out'
  - 'Minimum Contrast Out'
  - 'Mirrored Code Out'
  - 'Robust Against Small Modules Out'

  Further new training results for the tool 'Read Atzec Code' are:

  - 'Finder Pattern Tolerance Out'
  - 'Maximum Code Size Out'
  - 'Minimum Code Size Out'

  Further new training results for the tool 'Read QR Code' are:

  - 'Maximum Code Version Out'
  - 'Minimum Code Version Out'
  - 'Minimum Number of Position Patterns Out'
  - 'Quiet Zone Available Out'

  The new training results return the value of the respective processing parameters that were used in the trained model.

- The tool 'Rotate Image' has been improved. It has been extended by the new parameter 'Keep Image Size' that enables the user to select if the original image size, i.e., the width and height of the image, is adjusted after the rotation.
- The tools of the category 'Image Transformation' have been improved. In MERLIC 3, the tools displayed the resulting image on top of the input image. This could be confusing in some cases. Now, the tools only display the input image and possible input ROIs. The resulting image is shown in all subsequent tools. This faciliates the use and configuration in the input image.
- The protection format of the MERLIC tools has been changed to improve security. Note that this change affects the compatibility. [Read more.](#)

- **Improved Usability**
  - If the selected camera in the tool 'Acquire Image from Camera' could not be connected because the IP address was misconfigured, no error message was shown in MERLIC 4.1 Preview to inform the user about the problem. Now, MERLIC shows an error message for the tool to inform the user about this problem. In addition, an alternative IP address is suggested for the use in MERLIC.
  - The usability of the tool 'Locate Objects with Similar Gray Values' has been improved. Previously, the parameters 'Minimum Area' and 'Maximum Area' were defined as additional parameters. If they were not added, it was not visible by default that their values are adjusted if easyTouch was used to select the objects. Now, the parameters have been changed to basic parameters and are now visible by default.
  - The following tools of the category 'Communication' are now deprecated:
    - Read from Serial Interface
    - Read from Socket
    - Write to Serial Interface
    - Write to Socket

    These tools will no longer be maintained or updated. The functionality of these tools will be available in future MERLIC versions. However, they might be provided at a different location.
    In addition, the following tools of the category 'Communication' have been moved to the new tool category 'File Access':

    - Read from File

- Read Region from File
- Write Image to File
- Write Region to File
- Write to File

- **Fixed Problems**
  - In MERLIC 4.1 Preview, the tool 'Acquire Image from Camera' did not display the names of some camera parameters correctly. If the name of a camera parameter contained square brackets, these were not displayed in the configuration area. This problem has been fixed.
  - If a camera device was connected in the tool 'Acquire Image from Camera', a new search for available camera devices caused the disconnection of the current camera. This problem has been fixed. Due to this fix, the displayed names of the devices are shortened to the camera user ID or the vendor-defined camera unique ID. Note that this change affects the compatibility. Read more.
  - If the tool 'Acquire Image from Camera' has been used and some camera parameters with dependencies to other camera parameters were modified, MERLIC crashed. This problem has been fixed.
  - In some cases, the tool 'Acquire Image from Camera' did not display the correct values of the camera parameters that are set internally. This problem has been fixed.
  - If the currently selected camera of the tool 'Acquire Image from Camera' has been removed, the name of the camera was still displayed in the list of available cameras. This problem has been fixed.
  - The tools 'Branch on Condition' and 'Evaluate Expression' threw an error if the user tried to paste an image into the expression field via 'Ctrl+V'. This problem has been fixed.
  - The value of the training parameter 'Matching Method Train' of the tools 'Count with Matching' and 'Locate with Matching' could be edited manually. Therefore, it was possible to define a matching method that is not available for these tools. This problem has been fixed. Now, the value list of the parameter is set to read-only to ensure that only the provided matching methods can be selected.
  - If the MERLIC Backend was set to a language other than English and the tool 'Create Paraxial Rectangle' was loaded, the tool erroneously showed an error. This problem has been fixed.

- The tool 'Determine Data History' added the value of the connected parameter 'Data Value' to its result buffer 'Buffer Data' if certain parameters were changed. This problem has been fixed. Now, the configuration is updated without adding the data value again.
- If a parameter of the tool 'Determine Data History' has been adjusted, constant values were not added to the buffer anymore. This problem has been fixed.
- If the contour selection in the tool 'Evaluate Contours' has been extended via easyTouch+, the last mouse click was always ignored. This problem has been fixed.
- If a new parameter with the semantic type 'string' had been added to the tool 'Evaluate Expression' and then an integer result of a previous tool was connected to the parameter, the semantic type of the parameters was converted to 'int'. This problem has been fixed. Now, the semantic type of the connected value is not adjusted anymore and the connected value is processed as a string.
- If a tool was used that defined a parameter range via two separate minimum and maximum parameters, e.g., 'Evaluate Regions', and these parameters were connected with a previous tool, the parameters could contain inconsistent minimum and maximum values. This problem has been fixed.
- The values of the parameters 'Minimum Feature Value' and 'Maximum Feature Value' of the tools 'Evaluate Regions' and 'Evaluate Contours' could not be set higher than the predefined ranges. This problem has been fixed. Now, the ranges can be set to higher values by editing the parameter field or using a parameter with a higher value from a previous tool.
- The counter of the tool 'Get Execution Info' was sometimes not incremented correctly. If an incoming connection was deleted from the tool, the counter was incremented by 2 instead of 1. This problem has been fixed.
- The 'Time Format' parameter of the tool 'Get Execution Info' could be set to a format that is not supported if the parameter was connected to a result of a previous tool, e.g., to the result of the tool 'Evaluate Expression'. This problem has been fixed. Now, a warning is shown if a time format is defined that is not supported.
- The result 'Y End' of the tool 'Get Segment Properties' was set to the semantic type 'coordinates' instead of 'coordinates.y'. This problem has been fixed.

- If ROIs were drawn in the following tools, they could not be reliably associated with the correct ROI parameter and thus led to errors when these tools were executed.
    - 'Measure Circle to Point'
    - 'Measure Circle to Segment'
    - 'Measure Point to Point'
    - 'Measure Segment to Point'
    - 'Measure Segment to Segment'

  This problem has been fixed. Now, it is no longer possible to draw input ROIs for these tools. The required ROI parameters must be delivered from previous tools, e.g., from the tools of the category 'ROI Creation'.

- If easyTouch was used to select a circle in the tool 'Measure Circle', sometimes a circle ROI without a valid result was highlighted by the easyTouch preview. This problem has been fixed.
- If multiple ROIs have been used in the tool 'Measure Circle' and one of the ROIs was moved, a different ROI was selected as active ROI instead of the ROI that has been moved. This problem has been fixed.
- If very small circles were selected via easyTouch in the tool 'Measure Circle', the resulting ROI sometimes differed from the selected input ROI and the two ROIs were not displayed correctly on top of each other. This problem has been fixed. The correlation of the resulting ROI to the input ROI is now more suitable.
- The tool 'Measure Opposite Edges' sometimes returned an exception without information about the error cause if only one edge was detected instead of an opposite edge pair. This problem has been fixed. Now, an adequate error message is shown in this case.
- Sometimes the tool 'Read Data Matrix ECC 200' returned an error if the parameter 'Minimum Number of Columns' or 'Minimum Number of Rows' had been changed. This problem has been fixed.
- If easyTouch was used in the tool 'Read Text and Numbers', the easyTouch preview did not highlight the result that was returned when the preview was confirmed with a mouse click. This problem has been fixed.
- If easyTouch has been used in the tool 'Read Text and Numbers', the easyTouch preview sometimes suggested two overlapping regions. This problem has been fixed.

- The tools 'Write to File' and 'Read from File' could be connected via the 'File Handle' parameter which resulted in an error. This problem has been fixed.
- The tool 'Write to Socket' closed and re-opened an existing connection if no data was present to be sent. This problem has been fixed.
- The training tools that require only one training data set have been improved. In MERLIC 3, it was possible to remove the training image which sometimes led to unexpected behavior. Now, the training image can only be replaced with a new one but it cannot be deleted anymore. This ensures that a training data set is always available.
- If a tool of the category 'ROI Creation' has been inserted or loaded, the modifications at the respective 'ROI' parameter were not applied at the first attempt. This problem has been fixed.
- In MERLIC 4.1 Preview, tools sometimes stayed inactive, e.g., the image was not updated and easyTouch did not work, after the tool has been selected as focus tool. This problem has been fixed.
- In MERLIC 4.1 Preview, activating the configuration mode took a long time for some cameras. This problem has been fixed.

EXAMPLES

- **New Features**
  - MERLIC has been extended by the following MERLIC Vision App examples and example recipe files that show example applications for the new process integration mode:
    - read_barcode.mvapp
    - verify_chip_number.mvapp
    - read_barcode_recipe1.mrcp
    - read_barcode_recipe2.mrcp
    - read_barcode_recipe3.mrcp
    - read_barcode_recipe4.mrcp
    - verify_chip_number_recipe.mrcp

    They are stored in the directory '%MERLIC4EXAMPLES% ecipes\'.

  - MERLIC has been extended by the new MERLIC Vision App example 'read_text_in_3d_height_images.mvapp'. It shows how to use the new tools 'Remove Outlier Pixels' and 'Scale Gray Range to 8 Bit' of the category '3D Height Images' to read text in images with height information.

- MERLIC has been extended by the new MERLIC Vision App example 'check_correct_filling_on_3d_height_image.mvapp'. It shows how to use the new tools of the category '3D Height Images' to check if the filling level in a cookie box.

- **Enhancements**
  - The following example MERLIC Vision Apps have been revised. They have been adapted to the new Tool Flow panel, i.e., if applicable, the tools have been rearranged for parallel processing. In addition, the parameter settings of some tools have been optimized.
    - adapt_brightness_for_measuring.mvapp
    - check_bent_leads.mvapp
    - check_pen_parts.mvapp
    - check_presence_of_fuses.mvapp
    - check_saw_angles.mvapp
    - check_single_switches.mvapp
    - detect_scratches_on_metal.mvapp
    - determine_circle_quality.mvapp
    - measure_distance_between_corners.mvapp
    - measure_distance_segment_circle_calibrated.mvapp
    - measure_distance_to_center_led.mvapp

- **Improved Usability**
  - The example MERLIC Vision App 'check_bottles_parallel.mvapp' that was provided in MERLIC 4.1 Preview is not available anymore because only parts of the demonstrated functionality is applicable with the new process integration mode.

- **Fixed Problems**
  - The widget 'Execution State' in the example MERLIC Vision App 'determine_circle_quality.mvapp' always showed the state 'Bad' because some parameters needed to be adjusted. This problem has been fixed. The value of the parameter 'MinimumScore' of the tool 'Evaluate Expression' has been adjusted to a value with two decimal points. In addition the value range of the parameter has been adjusted to 0-1.
  - The Frontend design of the example MERLIC Vision App 'read_lot_number_and_ECC200.mvapp' was missing. This problem has been fixed.
  - The following examples were not up-to-date:
    - calibrate_for_ruler_changes_distance.mvapp
    - calibrate_for_ruler_distorted.mvapp
    - calibrate_for_ruler_simple.mvapp

- check_bent_leads.mvapp
- check_presence_of_fuses.mvapp
- check_saw_angles.mvapp
- check_single_switches.mvapp
- count_defect_clusters.mvapp
- determine_circle_quality.mvapp
- measure_distance_between_corners.mvapp

The examples still contained an outdated version of the 'Image Display' widget. Therefore, the widget was displayed with the previous name of the widget, i.e., 'CameraView', instead of the current name. This problem has been fixed.

DOCUMENTATION

- **New Features**
  - The layout of the MERLIC manuals has been completely revised. The following improvements have been implemented:
    - The toolbar with various buttons for the navigation, language and print settings has been moved to the top right of the topics and is now placed on the same level as the breadcrumbs path.
    - The navigation between and within the topics has been improved:
      - A new navigation area on the bottom has been added. It provides navigation buttons to the previous topic, the next topic, and also a button that leads to the top of the topic. This navigation area is always visible and therefore easily available at each position in the topic. Note that this functionality is not provided for the Internet Explorer.
      - A new header has been added to the MERLIC manuals. Clicking on the MERLIC logo in the header leads to the start page of the respective manual.
    - The structure of the glossary has been improved:
      - It is now visualized as a regular topic and can be accessed via the side navigation. Therefore it is not required anymore to click on each glossary term to display the respective description. Now, all glossary entries and descriptions are visible at once if the glossary topic is opened.
    - The MERLIC manuals now offer a responsive design. They are now displayed depending on the width of the

used device display. For display width < 800px the tablet mode is activated and for display width < 400px the mobile mode is activated.

- In addition some further minor improvements have been made for a consistent layout throughout the documentation, e.g., exchanging the icons for the drop down menus with the same icons as in the side navigation menu.

- **Enhancements**
  - The documentation of the tool 'Measure Segment to Segment' has been improved. Now, it describes the logic behind the selection of the angle.
  - The MERLIC documentation has been improved. The MERLIC manuals have been extended by a new button that enables the user to change the language of the documentation directly within the manual.
  - The documentation of the following tools with a training mode has been improved:
    - 'Calibrate Camera'
    - 'Determine Alignment with Matching'
    - 'Determine Alignment with Straight Border'
    - 'Check Presence with Matching'
    - 'Check Presence with Gray Features'
    - 'Count with Matching'
    - 'Locate with Matching'

    The descriptions of how to define the training settings and search settings have been revised in the tool reference and are now structured more clearly.

  - The print settings of the MERLIC Manual have been improved. In MERLIC 3, tables were only printed with an outer border but no cell borders. Now, tables are also printed with cell borders for a better readability.
  - The documentation of the MERLIC tools has been improved. The reference of a tool now contains a new section 'Application Example' that lists all provided example applications in which the tool is used.
  - The documentation of the tool 'Correct Shading' has been improved. Now, the effect of the shading correction on the processing image directly after adding the tool is described more clearly.
  - The tool reference of the tool 'Check Presence with Matching' has been improved. The description missed some information

for the use of the parameter 'Reference Positions' and the definition of the reference positions for the object model. Now, the tool reference has been adjusted and extended by the information which type of ROI is expected and how the definition of the reference positions in a training image differs from the use of the parameter 'Reference Positions'.

- **Fixed Problems**
  - The documentation of the tool 'Measure Segment to Point' was not clear enough. The description of the result 'Orientation of Distance Segment' did not clearly state that it is returned as a positive real value for counterclockwise angles and a negative value for clockwise angles.
  In addition, the description of the results 'Perpendicular Distance', 'Minimum Segment Distance', and 'Maximum Segment Distance' missed the information that they are returned in world units in case calibration data is used in the tool. These problems have been fixed.
  - Some translations in the tool reference of the tool 'Evaluate Expression' were not correct. The names of various operations, e.g., boolean operators, were translated although they need to be used with their original proper name. This problem has been fixed.
  - The search functionality in the MERLIC manuals did not offer the possibility to search for words with special characters. This problem has been fixed. Now, it is possible to search for words with special characters. In addition it is now possible to use quotes to encompass a search phrase of multiple words, for example the search phrase "data code".

LICENSING

- **Enhancements**
  - The MERLIC webdepot website for the activation of a MERLIC license has been moved to a new address. The license activation is now available on the 'MVTec License WebDepot' site http://license.mvtec.com/merlic.

- **Fixed Problems**
  - If the MERLIC Trial version has been used, the continuous execution of a MERLIC Vision App was sometimes stopped too early. This problem has been fixed. Now, the application is executed up to the maximum time limit of 2 minutes as allowed for MERLIC Trial versions.

- If the MERLIC Trial version has been used and a second instance of MERLIC was opened, a wrong error message appeared that stated that the trial license has expired. This problem has been fixed. Now, the error message correctly states that only one instance of MERLIC can be used in the MERLIC Trial version.

MISCELLANEOUS

- The password protection of MERLIC Vision Apps has been improved. The protection is now more secure. Note that this change affects the compatibility. Read more.
- The configuration of the MERLIC server has been improved. Previously, the configuration of the server needed to be defined in a separate XML configuration file. Now, the configuration settings for the server can also be defined in the MERLIC.ini file.
- The system requirements of MERLIC have been changed. The operating system Windows 8 is not supported anymore. To use MERLIC 4.2, the operating system Windows 7 or Windows 10 is required.
- The system requirements for MERLIC have been changed. MERLIC for 32 bit PC systems is discontinued and will no longer be available since version 4.2.0.

RESTORED FEATURES SINCE MERLIC 4.1 PREVIEW

Languages
The localization of the MERLIC Backend, the MERLIC Designer, and the MERLIC manual has been restored since MERLIC 4.1 Preview. Now, the translations of the user interface of all MERLIC components are reactivated and up-to-date. The documentation has also been updated in all MERLIC languages.

Logging
The logging functionality has been restored since MERLIC 4.1 Preview. The respective settings have been reactivated in the preferences dialog and in the MERLIC.ini file. Now, the logging of error messages and other types of messages into log files is provided again. The logging mechanism has also been extended by a new configuration parameter that enables you to restrict the maximal size of a single log file. In addition, MERLIC logs the messages asynchronously, i.e., while MERLIC is running, the log file might not yet contain the information about all occurred events.

CHANGES AS COMPARED TO MERLIC 3

MERLIC is developed in a customer-centric and agile manner. MVTec has focused on the strengths of the software and prioritized value-adding features for the customer. Thus, some features were strongly improved or newly added. By this, the creation of machine vision applications becomes even simpler, more efficient, and more user-friendly. The range of functions has also been streamlined with regards to obsolete technologies and thereby optimized for users developing real world solutions.

In the following, the changes compared to MERLIC 3 are described:

- **MERLIC Tool Development**

  - The interface for custom tools has been changed: Customers who want to create a new custom tool or make an existing tool available in MERLIC 4.2 should contact the usual support channels to have the respective HALCON procedure converted into a MERLIC tool. Training and **easyTouch** are not supported anymore with custom tools. The tool template examples and the Tool Development Manual have been removed in this version. In addition, the command line options `-t`, `-p`, and `-tool_filter` that could be used to define the directories for tools and procedures to be loaded, are not supported in this version.

- **Training Functionality in the MERLIC Frontend**

  - The training functionality in the MERLIC Frontend is no longer supported in this MERLIC version. Therefore, the Designer widget 'Training' is not provided in this version and it is not possible to modify the training data set of a tool within the Frontend. In addition, the example MERLIC Vision App 'measure_angle_with_training_mode.mvapp', that demonstrated the training functionality in the MERLIC Frontend, has been removed.

- **Removed Tools of the Categories 'Communication' and 'System'**

  - The tools 'Communicate Via OPC UA', 'Communicate via Digital I/O', and 'Stop Execution' are no longer available in this MERLIC version.

- **Undo and Redo Functionality in the MERLIC Backend**

- The undo and redo functionality of the MERLIC Backend is not available in this MERLIC version. However, it is still possible to undo and redo changes within the MERLIC Designer.

- **Automatic Tool Connection**

  - In MERLIC 3, the tool connections between parameters and results have been automatically established after inserting a tool. In this MERLIC version, the automatic connection is only supported for image parameters to avoid unwanted tool connections. All other types of parameters and results need to be connected manually after inserting the tool.

- **Configuration of Camera Parameters**

  - In this MERLIC version, the configuration of camera parameters in the tool 'Acquire Image from Camera' does not offer the same functionality as in MERLIC 3. The different modes for beginners, advanced users, and experienced users are not available anymore and the live mode can now be simulated via the execution of the MERLIC Vision App instead of an explicit 'Live Mode' button. In addition, it is not supported to add camera parameters to the tool parameters at the tool board.

- **MERLIC Engine**

  - The functionality of the MERLIC Engine is no longer included in this version. Thus, it is not possible to use a MERLIC Vision App in your own C++ or .Net application or to integrate an MVApp as ActiveX Control in your application. The MERLIC Engine example applications and the MERLIC Engine Manual have been removed in this version.

- **easyTouch and easyTouch+**

  - The tools 'Read Aztec Code', 'Read Bar Code', 'Read Data Matrix ECC 200', 'Read PDF417', and 'Read QR Code' do not visualize the decoded data in the **easyTouch** preview anymore because the required interface procedure is not supported in this version.

  - In this MERLIC version, **easyTouch+** no longer displays an info box if another selection is added that does not fit to the

parameter settings of the
previous **easyTouch** or **easyTouch+** selection.

- **Restricted Color Settings**

  - In MERLIC 3, the colors in which various graphical elements
    are visualized within a tool could be defined in the preferences
    dialog of the MERLIC Backend. In this MERLIC version, the
    color settings are restricted to a reduced set of graphical
    elements. Due to the color restrictions in the MERLIC Backend,
    the regions in the tools of the category 'Filter' are now
    visualized with a margin instead of a filled color to ensure that
    they can still be recognized in the image.

- **Simultaneous Use of MERLIC Backend, Designer, and Frontend**

  - In MERLIC 3, it was possible to edit the MERLIC Vision
    App simultaneously in all three MERLIC components,
    i.e., MERLIC Backend, MERLIC Designer, and MERLIC
    Frontend. In this MERLIC version,
    the Backend and Designer windows are locked for editing if
    the Frontend is opened. Therefore, you have to close
    the Frontend in order to make adjustments in the Backend or
    the Designer.

- **Error Logging**

  - In this MERLIC version, the output console for the display of
    error messages, warnings and other types of messages is no
    longer available. Tool messages are still shown in the bubble
    help window of the tools. However, only the message of the
    last MVApp execution is displayed.

RELEASE NOTES FOR MERLIC 4.1 PREVIEW

This document provides the release notes for MVTec MERLIC 4.1 Preview,
as released in June 2018. MERLIC 4.1 Preview provides new and restored
functionality as well as fixed bugs.

Feature Preview

MERLIC 4.1 Preview is a preview version that gives an outlook on current improvements and novelties in MVTec MERLIC. It is a fully tested and stable version that allows you an early access to upcoming features. However, it contains only a subset of features from MERLIC 3. Please see the section [Reduced Functionality](#) for a detailed list of features not included in this preview version.

Expiration

This version is available for a limited time period until December 31, 2018. All versions of MERLIC 4.1 Preview expire on that date.

Support

Since this version is a preview, we reserve the right not to provide support for it.

Usage

We recommend using this version only for test purposes and not in final applications deployed in manufacturing. For the latter, please use the latest retail version MERLIC 3.

CONTENTS

MAJOR NEW FEATURE

Prototype Tool for the Communication via Hilscher PCI Cards

MERLIC now provides a prototype tool for the communication via Hilscher PCI cards. This tool gives a sneak preview of the current development towards the seamless integration of a programmable logic controller (PLC) into vision systems using MERLIC. It supports reading and sending data via a Hilscher PCI card.

RESTORED FEATURE

Frontend Localization

In this version, the translations of the Frontend user interface to different languages have been restored. This also includes the language settings for the Frontend, which enable a customized translation of the Frontend user interface.

COMPATIBILITY

Since the last MERLIC 3 version we have been working hard to improve MERLIC in every way. This has, however, resulted in a few of incompatibilities. We apologize for the inconvenience.

Use of MERLIC Vision Apps created in MERLIC 3
The format of the MERLIC Vision App files has changed since MERLIC 3. MERLIC Vision Apps that have been created in MERLIC 3, e.g., MERLIC 3.0.2, must be converted to the new format if they are loaded in MERLIC 4.1 Preview. This may lead to functional changes. Therefore, a backup file of the MERLIC Vision App should be created when loading the application.

If no backup file was created for the MERLIC Vision App, we recommend to save the converted application with a new name because the first save action in the MERLIC 4.1 Preview stores the application according to the new internal structure and makes it incompatible to previous MERLIC versions.

Therefore, the backup file ensures that you can still use your original application in the previous MERLIC version.

- **Miscellaneous**
  - Tools provided in MERLIC 4.1 Preview cannot be loaded in previous MERLIC versions because the protection format of the MERLIC tools has been improved. More information.

BACKEND

- **Enhancements**
  - The visualization of trigger connections in the Tool Flow panel has been improved. Previously, trigger connections often crossed other connections which could be confusing to the user. Now, the number of crossings is reduced to improve the clarity of the Tool Flow.

- **Improved Usability**
  - The usability of the Tool Library panel has been improved. It has been extended by a search filter to enable the search for available tools by arbitrary keywords or texts.

- **Fixed Problems**
  - The 'Open Designer' button at the menu bar of the MERLIC Backend sometimes did not show the correct state whether the MERLIC Designer is open or closed. This problem has been fixed. In addition, if the MERLIC Desiger is already open in the background and the 'Open Designer' button or menu entry is clicked, the MERLIC Designer window will be shown in the foreground.
  - While copying and pasting multiple tools in the Tool Flow panel, the respective symbol that shows the number of copied tools was not displayed at the correct position. This problem has been fixed.
  - If a paraxial rectangle ROI had been drawn in a MERLIC Vision App of MERLIC 3, the ROI was not correctly loaded if the application was opened in MERLIC 4.0 Preview. This problem has been fixed.
  - The tool tip shown for the tool name at the tool board missed the information about the internal tool name. This problem has been fixed.
  - While copying and pasting multiple tools in the Tool Flow panel, the automatic scrolling for the Tool Flow view during the selection of the final insert position was broken. This problem has been fixed.

DESIGNER

- **Improved Usability**
  - The usability of opening the MERLIC Frontend has been improved. Previously, different keyboard shortcuts were defined for the MERLIC Backend and the Designer to open the Frontend. Now, the Frontend can be opened from the Backend and the Designer with the same keyboard shortcut F10.

FRONTEND

- **Fixed Problems**
  - If multiple ROI parameter were editable in the Frontend and one of the not selected ROIs was deleted, sometimes a different ROI parameter was selected afterwards. This problem has been fixed.
  - While deleting ROIs in the MERLIC Frontend using the corresponding button within the ROI toolbar of the 'Image Display' widget, the active ROI was not displayed reliably in the correct color. This problem has been fixed.

- The user management of the MERLIC Frontend did not work correctly. It was not possible to login although the correct user credentials were given. This problem has been fixed.

TOOLS

- **Enhancements**
  - The image acquisition interfaces have been released in a new revision. MERLIC now contains the following versions of the interfaces:
    - GenICamGenTL Revision 13.0.4
    - GigEVision2 Revision 13.0.2
    - USB3Vision Revision 13.0.5

- **Fixed Problems**
  - The counter of the tool 'Get Execution Info' was sometimes not incremented correctly. If an incoming connection was deleted from the tool, the counter was incremented by 2 instead of 1. This problem has been fixed.
  - The result 'Y_End' of the tool 'Get Segment Properties' was set to the semantic type 'coordinates' instead of 'coordinates.y'. This problem has been fixed.
  - The tool 'Write to Socket' closed and re-opened an existing connection if no data was present to be sent. This problem has been fixed.
  - If a tool of the category 'ROI Creation' has been inserted or loaded, the modifications at the respective 'ROI' parameter were not applied at the first attempt. This problem has been fixed.

DOCUMENTATION

- **Fixed Problems**
  - The description of possible use cases for the parallel processing with MERLIC was not clear enough. This problem has been fixed.
  - The documentation about the naming conventions of tool names, parameter names, and result names missed the information that hyphens are not allowed characters. This problem has been fixed.

MISCELLANEOUS

- The protection format of the MERLIC tools has been changed to improve security. Note that this change affects the compatibility. Read more.

REDUCED FUNCTIONALITY

MERLIC 4.1 Preview offers new and restored features including the localization of the Frontend. However, there are also some functionalities of the previous MERLIC 3 version that are not yet available in this MERLIC version but they will be provided for upcoming MERLIC releases.

- **Languages**

    - MERLIC 3 was available in multiple languages. However, in MERLIC 4.1 Preview only the Frontend offers updated translations in all languages. In case of the Backend and the Designer only the English version of the user interface is up-to-date. Furthermore, only the English version of the MERLIC manual contains the updated documentation of MERLIC. If MERLIC is set to a language different than English, only some parts of the Backend and Designer user interface are translated, i.e., the parts that were already translated in the previous version. In addition the documentation including the Quick Info of the tools contains no updates in other languages. Therefore, we recommend to set the language of the MERLIC Backend to English and to use only the English version of the MERLIC manual to ensure that all information is up-to-date.

- **MERLIC Backend**

    - In this MERLIC version, the undo functionality is not available in the MERLIC Backend. It is not possible to undo any changes in the Backend.

    - Previously, it was possible to define the colors in which various graphical elements are visualized within a tool. In this MERLIC version, only a small set of colors is supported. Therefore, the 'Colors' tab of the preferences dialog has been reduced to the colors that are currently available.

- **MERLIC Designer**

    - This MERLIC version does not support the training functionality in the Frontend. Therefore, the 'Training' widget is not available in this version.

- **MERLIC Frontend**

- This MERLIC version does not support the training functionality in the Frontend. Therefore, it is not possible to modify the training data set of a tool within the Frontend. The respective Designer widget 'Training' is also not provided in this version.

- In MERLIC 3, it was possible to edit the MERLIC Vision App simultaneously in all three MERLIC components, i.e., MERLIC Backend, MERLIC Designer, and MERLIC Frontend. In this MERLIC version, the Backend and Designer windows are locked for editing if the Frontend is opened. Therefore, you have to close the Frontend in order to make adjustments in the Backend or the Designer.

- **Tools**

  - The configuration of the tool 'Acquire Image from Camera' does not offer the full functionality as in MERLIC 3, e.g., the live mode. Please see the reference documentation for more detailed information about the configuration options in the tool.

  - The tools 'Communicate Via OPC UA' and 'Stop Execution' are not available in this version.

  - Due to the color restrictions in the MERLIC Backend, the regions in the tools of the category 'Filter' are now visualized with a margin instead of a filled color to ensure that they can still be recognized in the image.

  - If a tool is added, only the automatic connection for image parameters is supported in this MERLIC version. All other types of parameters and results are not automatically connected anymore but need to be connected manually after inserting the tool.

  - Previously, space characters were used to separate the text in the names of tool parameters and tool results. In this version, the names are separated with underscores because parts of the translation functionality is not supported yet.

  - The tools 'Read Aztec Code', 'Read Bar Code', 'Read Data Matrix ECC 200', 'Read PDF417', and 'Read QR Code' do not visualize the decoded data in the **easyTouch** preview anymore

because the required interface procedure is not supported in this version.

- If **easyTouch+** was used to add another selection that did not fit to the parameter settings of the previous selection, an info box was displayed at the tool as feedback that this selection might not be possible or affects the parameter settings. This functionality is not supported in this MERLIC version.

- **MERLIC Examples**

  - The example MERLIC Vision App 'measure_angle_with_training_mode.mvapp' is not available in this version because it uses the 'Training' widget to allow modifications at the training data set. Since this MERLIC version does not support the training within the Frontend, the application is not provided.

- **MERLIC Tool Development**

  - The use of custom tools is not supported in this version. The respective settings for the tool paths and procedure paths have been removed from the preferences dialog of the MERLIC Backend. The tool template examples have been removed in this version. The Tool Development manual of the previous version is still available. However, it does not contain any updates.

- **MERLIC Engine**

  - The functionality of the MERLIC Engine is not available in this version. Thus, it is not possible to use a MERLIC Vision App in your own C++ or .Net application or to integrate an MVApp as ActiveX Control in your application. The MERLIC Engine example applications have been removed in this version.

- **Error Logging**

  - In MERLIC 3, errors were shown in the output console, the tool state, and the bubble help window of the tool. However, in this version the output console is not available. Therefore, errors are only displayed in the bubble help window of the tool and in the tool state. In addition, errors are not aggregated. Only the errors from the last tool execution are displayed.

- Because errors are not aggregated in this version, it is not possible to create a log file with the errors. The respective setting has been removed from the preferences dialog of the MERLIC Backend.

  - **Miscellaneous**

    - When MERLIC is started via the command line, several command line options are provided. In MERLIC 3 it was possible to use the command line options `-t`, `-p`, and `-tool_filter` to define the directories for MERLIC tools, MERLIC procedures, and to define the tools that should be loaded. Since the use of custom tools is not supported in this version, these command line options are also not supported anymore.

RELEASE NOTES FOR MERLIC 4 PREVIEW

This document provides the release notes for MVTec MERLIC 4 Preview, as released in March 2018. MERLIC 4 Preview provides new and improved functionality as well as fixed bugs.

Feature Preview
MERLIC 4 Preview is a preview version that gives an outlook on current improvements and novelties in MVTec MERLIC. It is a fully tested and stable version that allows you an early access to upcoming features. However, it contains only a subset of features from previous MERLIC versions. Please see the section Reduced Functionality for a detailed list of features not included in this preview version.

Expiration
This version is available for a limited time period until December 1, 2018. All versions of MERLIC 4 Preview expire on that date.

Support
Since this version is a preview, we reserve the right not to provide support for it.

Usage
We recommend using this version only for test purposes and not in final applications deployed in manufacturing. For the latter, please use the latest official release MERLIC 3.

CONTENTS

MAJOR NEW FEATURES

Parallel Processing

MERLIC allows the parallel processing of tools to perform multiple tasks at the same time. This allows the user to perform multiple image processing tasks in parallel, e.g., independent inspection with multiple cameras. To enable the user to control the execution order and the synchronization of the tools during the parallel processing, MERLIC now supports the use of trigger connections between tools.

Tool Flow Panel

The Tool Flow panel has been completely revised, providing a better overview over the used tools. It has been extended to support the visualization of parallel tool flows and the visualization of the tool connections has also been improved. These are now displayed in different colors depending on the respective state. Lastly, the Tool Flow panel now also allows users to copy/paste and move tools within the window.

Branch on Condition

The tool Branch on Condition has been redesigned. The configuration of the connections for the different branches is now easier and more clear.

COMPATIBILITY

Since the last product version we have been working hard to improve MERLIC in every way. This has, however, resulted in a few of incompatibilities. We apologize for the inconvenience.

Use of previous MERLIC Vision Apps

The format of the MERLIC Vision App files has changed since the last version of MERLIC. MERLIC Vision Apps that have been created in a

previous MERLIC version, e.g., MERLIC 3.0.2, must be converted to the new format if they are loaded in MERLIC 4 Preview. This may lead to functional changes. Therefore, a backup file of the MERLIC Vision App should be created when loading the application.

If no backup file was created for the MERLIC Vision App, we recommend to save the converted application with a new name because the first save action in the MERLIC 4 Preview stores the application according to the new internal structure and makes it incompatible to previous MERLIC versions.

Therefore, the backup file ensures that you can still use your original application in the previous MERLIC version.

- **Tools**
    - The tool 'Branch on Condition' is no longer compatible since it has been completely revised. MERLIC Vision Apps that contain this tool must be converted to the current version. Note that the conversion may lead to functional changes. To ensure a consistent state, it is recommended to check the configuration of the tool again after the conversion. The chapter 'MERLIC Backend > Parallel Processing > Error Causes' of the MERLIC manual gives more detailed information about possible error causes. More information.

- **Miscellaneous**
    - Protected MERLIC Vision App of previous MERLIC versions cannot be loaded in this MERIC version because the password protection has been improved. You first have to load the application in the previous MERLIC version and remove the password protection. Then you may load the application in MERLIC 4 Preview and define a new password. More information.

BACKEND

- **New Features**
    - The Tool Flow panel has been extended to support the visualization of parallel tool flows. It is now possible to arrange the tools of a MERLIC Vision App side-by-side to indicate the parallel processing of the tools.
    - The Tool Flow panel has been extended by the following modification features:
        - Copy and paste
            - It is now possible to copy any number of selected tools including their currently set parameter values. They can be pasted at an arbitrary position in the

Tool Flow panel. For this, the Tool Flow panel has been extended by a new context menu which enables the user to copy and paste the selected tools. Alternatively, the shortcuts 'Ctrl+C' and 'Ctrl+V' can be used for copy and paste.

- Delete
  - It is now possible to delete a tool directly in the Tool Flow panel via the new context menu of the tool or via the shortcut 'Del'.
- Move
  - It is now possible to move any number of selected tools within the Tool Flow panel via drag and drop. This enables the user to easily arrange the tools of the MERLIC Vision App according to the requirements.
- Selection of multiple tools
  - It is now possible to select multiple tools within the Tool Flow panel. This enables the user to apply a specific modification to multiple tools at once, e.g., moving a group of tools. The selection can be defined via a lasso selection or by pressing the 'Ctrl' or 'Shift' key while clicking on the desired tools.

- The Tool Flow panel has been extended to visualize the connections of all tools. For a better distinction they are visualized in different colors depending on their state:
  - Connections in an erroneous state are highlighted in red.
  - Connections of currently selected tools are highlighted in blue.
  - Connections of currently not selected tools are visualized in dark gray.
- MERLIC now supports the use of trigger connections. This enables the user to control various aspects in the execution of a MERLIC Vision App:
  - Execution of a specific tool at a specific time
  - Execution order of the tools in parallel processing
  - Synchronization of tools during parallel processing

For this, the MERLIC tools have been extended by trigger connectors on the right of the Tool Board. They can be used to create a trigger connection between tools. Use the + button on the top right of the tool to define one or more incoming triggers connections. The new output trigger connector 'Default_Trigger' is displayed by default at the bottom right of

the tool and can be used to define trigger connections to subsequent tools.

- **Enhancements**
  - The Tool Workspace of the MERLIC Backend has been improved in multiple ways.
    - Previously, the workspace displayed the currently selected tool as well as part of the previous and subsequent tool. Now, only the currently selected tool is displayed in the Tool Workspace. The additional area is now used to visualize more information about the connected tools.
    - Previously, only the name of the connected tools were displayed at the connections within the Tool Workspace. Now, the connections also display the name of the respective parameter or result that is connected.
    - Previously, the Tool Workspace offered + buttons on the top right and bottom right of a tool for adding new tools directly from the Tool Workspace. Since the tools can now be processed in parallel and can therefore be arranged side-by-side, these + buttons have been removed. This ensures that the focus in the Tool Workspace is solely on the modification of the currently selected tool. All types of modifications regarding the arrangement of current and new tools can be done in the Tool Flow panel.
  - The naming conventions for tool names, parameter names, and result names have been improved. Previously, the naming conventions for the tools 'Branch on Condition' and 'Evaluate Expression' differed from the naming conventions for other tools. Now, they are consistent for all tools.
    - The following punctuation marks are still allowed:
      - Underscores, e.g., 'Name_2'
      - Hyphens, e.g., 'Name-2'
      - Points, e.g., 'Name.2'
      - Spaces, e.g., 'Tool Name', but only for tool names. For parameter or result names spaces are not allowed.
    - The names of tool parameters and results may not begin with the following characters:
      - Double underscores, e.g., '__Name'
      - Digit, e.g., '1_Name'
      - Point, e.g., '.Name'
    - The following punctuation marks are not allowed anymore:

-
-
-
- []!"#$%&'()*+,/\:;<=>?@^`{|}~
-

- **Improved Usability**
  - The usability of the Tool Library has been improved. Previously, the subcategories and tools were not always sorted in an explicit order. Now, the subcategories and tools are sorted alphabetically.
  - The usability of the MERLIC Backend has been improved. Previously, no visual feedback was displayed in case a user operation took some time, e.g. loading a MERLIC Vision App, which led to the impression that MERLIC hangs. Now, a waiting screen is shown that informs that a user command is still processed.
  - The usability of the context menu of tool parameters and tool results has been improved. The menu entries 'Connect from/to' and 'Disconnect from' now display the available tools in alphabetical order instead of an arbitrary order.

- **Fixed Problems**
  - If the error message dialog of the Tool Board has been moved with the mouse, parts of the background of the MERLIC Backend were not displayed correctly. This problem has been fixed. The dialog cannot be moved anymore.
  - If the name of a parameter of the tool 'Evaluate Expression' has been set to an empty string, an error message was shown that this parameter name is already in use. This problem has been fixed. Now, the parameter is set to its default name if the name is set to an empty string.
  - If a text part of the Quick Info was selected and dragged with the mouse while the MERLIC Vision App was running continuously, the execution of the application stopped. This problem has been fixed.
  - If a tool error has been resolved by a structural change, the respective tool error message did not disappear. This problem has been fixed.
  - MERLIC crashed, if it was used on a system with Intel HD Graphics 3000. This problem has been fixed.
  - If the context menu of a parameter or result was used to create a connection to other tools, not all available parameters or results were listed in the context menu. This problem has been

fixed. Now, all connectable parameters are shown in the context menu.

- If a MERLIC Vision App has been loaded and then the first tool of the application has been deleted, the visualization in the Tool Flow panel was not correctly updated. This problem has been fixed.
- Sometimes, tool parameters were displayed as a floating point number instead of an integer number if the value has been adjusted via the slider. This problem has been fixed.
- If MERLIC was used in Windows 10, a parameter value list could not be opened with a single mouse click on the respective connector. Instead a double-click was necessary to display the list of available parameter values. This problem has been fixed.
- If a parameter with numeric values has been adjusted by clicking on the arrows < and > at the respective connector, the value was not adjusted correctly in step increments of 1. This problem has been fixed.
- If a parameter has been changed by easyTouch and the context menu of this parameter was opened while the new parameter value was still being highlighted in blue, the text of the context menu was also displayed in blue. This problem has been fixed.

DESIGNER

- **Fixed Problems**
  - The 'Label' widget could be connected to tool parameters and tool results that represented an ROI. This problem has been fixed.
  - In MERLIC Designer newly inserted widgets were not reliably placed atop of all widgets of the current layout. This problem has been fixed. Now, newly inserted widgets are always placed atop of all widgets of the current layout.
  - If a group of widgets has been copied and pasted within the MERLIC Designer, the pasted widgets changed their z-order order randomly. This problem has been fixed. Now, when pasting a copied group of widgets, the z-order of the widgets is kept correctly and the group is placed atop of all widgets of the current layout.
  - If the name of a tab view has been edited within the MERLIC Designer and the input field of the name was still visible when clicking on any place outside of the input field, the changes were not adopted. This problem has been fixed.

- If multiple views were added and reordered within the MERLIC Designer, the defined order of the views was not correctly stored. In addition, the names of the views were not correctly updated in the 'Tab View' widget if a view has been renamed. These problems have been fixed.
- If multiple views were used in the MERLIC Designer and a 'Tab View' widget has been copied or cut and then pasted into another view, MERLIC did not mark invalid, i.e., recursive, specifications. This problem has been fixed.
- If multiple views were renamed and then reordered, the changes were not correctly reversed via the undo functionality. This problem has been fixed.

FRONTEND

- **Improved Usability**
  - The usability of the Frontend menu bar has been improved. It is now possible to open the Frontend in full screen mode using the new menu entry 'View -> Full Screen' or the shortcut F11.

- **Fixed Problems**
  - If the 'Image Display' widget was used in the MERLIC Frontend and an invalid image was selected while the application was being executed, the 'Image Display' widget started flickering. This problem has been fixed.
  - If the MERLIC Frontend was started via the command line option, it was not checked, whether the file name or directory of the MVApp existed. This problem has been fixed. Now, the completeness of the command line option is checked as well as whether the specified file or directory exists. If it does not exist, an error message is shown and the application is closed.
  - If a MERLIC Vision App has been started via the context menu entry 'Launch in Frontend' or via the command line with the option '--frontend', the splash screen showed the message 'Starting MERLIC Backend'. This problem has been fixed.
  - When using the widget 'Training' in combination with the widget 'Image Display', the combo box of the image display did not automatically select the current ROI if the user switched between processing mode and training mode. This problem has been fixed.
  - The Frontend of an unsaved MERLIC Vision App could not be started via a remote connection. This problem has been fixed.
  - The 'Image Display' widget still displayed the previous image in the MERLIC Frontend in case the image of the current iteration was invalid or empty. This problem has been fixed. Now, the

'Image Display' widget shows no image if the image is invalid or empty.

- The 'Image Display' widget did not display the regions of interest (ROIs) with the edit mode 'Display only' in the configured color. This problem has been fixed. Now, these non-modifiable ROIs are displayed in the color that is defined for the property 'Inactive color'.
- If an ROI has been moved in the 'Image Display' widget within the MERLIC Frontend, it was temporarily displayed in its previous position. This problem has been fixed.
- If the 'easyTouch Button' was activated in the MERLIC Frontend and the image in the 'Image Display' widget has been zoomed using the mouse wheel, sometimes the easyTouch preview was no longer visualized while the mouse cursor was being moved over the image. This problem has been fixed.
- If the widget 'Check Box' was connected to a string parameter, two clicks instead of one single click were required in the Frontend to uncheck the check box correctly. This problem has been fixed.

TOOLS

- **Enhancements**
  - MERLIC now provides the new GigEVision2 interface (Revision 13.0.1) for the tool 'Acquire Image from Camera'. It supports devices complying with the GigE Vision 2.x standard and replaces the old GigEVision interface.
  - The tool 'Branch on Condition' has been improved. It has been completely revised:
    - The different branches are no longer visualized by separate areas.
    - The execution of the tools in the different branches is now initiated by triggers.
    - The output branch triggers 'Condition' and 'Default' have been added to the tool. They can be connected to all tools that should be executed if the condition is true or false, respectively.
    - The parameter properties must be instantly defined if a new parameter is added via the + button. The properties cannot be changed afterwards anymore.

    Note that this change affects the compatibility. Read more.

  - The tools 'Branch on Condition' and 'Evaluate Expression' have been improved. Previously, the user could choose from a wide

range of semantic types for a newly added parameter. Now, the list of semantic types that can be selected for a new parameter has been reduced to the basic semantic types 'any', 'double', 'long', and 'string' in order to increase the clarity. The semantic types of existing MERLIC Vision Apps are automatically assigned to one of the basic semantic types.

- The tool 'Calibrate Camera' has been improved. It has been extended by the new training results 'Marks_Train' and 'Calibration_Error_Train'. They return the contours of the found calibration marks and the calibration error, respectively.
- The tool 'Check Presence with Gray Features' has been improved. It has been extended by the new training results 'Feature_1_Train_Out' and 'Feature_2_Train_Out'. They return the values that have been used for the training parameters 'Feature_1' and 'Feature_2' in the trained model.
- The following tools with a training mode have been improved:
    - 'Check Presence with Gray Features'
    - 'Check Presence with Matching'
    - 'Read Aztec Code'
    - 'Read Bar Code'
    - 'Read Data Matrix ECC 200'
    - 'Read PDF417'
    - 'Read QR Code'

    Previously, the current processing image was automatically added as training image when the tool was inserted. Now, the training image must be added manually. This ensures that only the desired images are selected for the training.
    Furthermore, the modes for the training images of the tool 'Check Presence with Matching' are not defined automatically anymore. They must be defined manually for each training image.

- The tool 'Check Presence with Matching' has been improved. The parameter 'Reference Position' is now an additional parameter. Furthermore, the tool has been extended by the following new training parameters:
    - 'Deformation_Tolerance_Train'
    - 'Maximum_Overlap_Train'
    - 'Minimum_Score_Train'
    - 'Orientation_Tolerance_Train'

    In addition the tool has been extended by the new training result 'Highest_Pyramid_Level_Train_Used'. It returns the

value that has been used for the training parameter 'Highest_Pyramid_Level' in the trained model.

- The training parameters of the following tools have been renamed:
    - Determine Alignment with Matching
    - Determine Alignment with Straight Border
    - Check Presence with Gray Features
    - Check Presence with Matching
    - Count with Matching
    - Locate with Matching

    All names of the training parameters now end with the suffix '_Train' to distinguish them from the processing parameters.

- The tool 'Determine Alignment with Straight Border' has been improved. The processing parameters 'Edge Contrast', 'Edge Width', and 'Edge Transition' have been moved to the training parameters on right side of the tool board to visualize that they are used for the training.
- The tool 'Read Bar Code' has been improved. It has been extended by the following training results:
    - 'Code_Type_Out'
    - 'Maximum_Element_Width_Out'
    - 'Minimum_Element_Width_Out'
    - 'Minimum_Absolute_Edge_Amplitude_Out'
    - 'Minimum_Relative_Edge_Amplitude_Out'
    - 'Minimum_Bar_Code_Width_Out'
    - 'Orientation_Out'
    - 'Orientation_Tolerance_Out'

    The new training results return the value of the respective processing parameters that were used in the trained model.

- The following tools of the category 'Reading' have been improved:
    - 'Read Atzec Code'
    - 'Read Bar Code'
    - 'Read Data Matrix ECC200'
    - 'Read PDF417'
    - 'Read QR Code'

    The tools have been adjusted to return the values in the result 'Decoded Data' in a specific order. They are now sorted with

respect to their 'row' and 'column' values in which they appear in the image.

- The tools 'Read Data Matrix ECC 200' and 'Read PDF417' have been improved. They have been extended by the following training results:
    - 'Code_Property_Out'
    - 'Conform_To_Standard_Out'
    - 'Expected_Number_Of_Codes_Out'
    - 'Maximum_Number_Of_Columns_Out'
    - 'Minimum_Number_Of_Columns_Out'
    - 'Maximum_Number_Of_Rows_Out'
    - 'Minimum_Number_Of_Rows_Out'
    - 'Minimum_Contrast_Out'
    - 'Mirrored_Code_Out'
    - 'Robust_Against_Small_Modules_Out'

    Further new training results for the tool 'Read Data Matrix ECC 200' are:

    - 'Contrast_Tolerance_Out'
    - 'Finder_Pattern_Tolerance_Out'
    - 'Maximum_Horizontal_Gap_Width_Out'
    - 'Minimum_Horizontal_Gap_Width_Out'
    - 'Maximum_Module_Size_Out'
    - 'Minimum_Module_Size_Out'
    - 'Maximum_Slant_Out'
    - 'Maximum_Vertical_Gap_Width_Out'
    - 'Minimum_Vertical_Gap_Width_Out'
    - 'Module_Size_Tolerance_Out'

    Further new training results for the tool 'Read QR Code' are:

    - 'Maximum_Module_Aspect_Ratio_Out'
    - 'Minimum_Module_Aspect_Ratio_Out'
    - 'Maximum_Module_Width_Out'
    - 'Minimum_Module_Width_Out'

    The new training results return the value of the respective processing parameters that were used in the trained model.

- The tools 'Read Atzec Code' and 'Read QR Code' have been improved. They have been extended by the following training results:
    - 'Code_Property_Out'

- 'Conform_To_Standard_Out'
- 'Expected_Number_Of_Codes_Out'
- 'Maximum_Horizontal_Gap_Width_Out'
- 'Minimum_Horizontal_Gap_Width_Out'
- 'Maximum_Vertical_Gap_Width_Out'
- 'Minimum_Vertical_Gap_Width_Out'
- 'Maximum_Module_Size_Out'
- 'Minimum_Module_Size_Out'
- 'Minimum_Contrast_Out'
- 'Mirrored_Code_Out'
- 'Robust_Against_Small_Modules_Out'

Further new training results for the tool 'Read Atzec Code' are:

- 'Finder_Pattern_Tolerance_Out'
- 'Maximum_Code_Size_Out'
- 'Minimum_Code_Size_Out'

Further new training results for the tool 'Read QR Code' are:

- 'Maximum_Code_Version_Out'
- 'Minimum_Code_Version_Out'
- 'Minimum_Number_Of_Position_Patterns_Out'
- 'Quiet_Zone_Available_Out'

The new training results return the value of the respective processing parameters that were used in the trained model.

- The tool 'Rotate Image' has been improved. It has been extended by the new parameter 'Keep_Image_Size' that enables the user to select if the original image size, i.e., the width and height of the image, is adjusted after the rotation.
- The tools of the category 'Image Transformation' have been improved. Previously, the tools displayed the resulting image on top of the input image. This could be confusing in some cases. Now, the tools only display the input image and possible input ROIs. The resulting image is shown in all subsequent tools. This faciliates the use and configuration in the input image.

- **Improved Usability**
  - The usability of the tool 'Communicate via Digital I/O' has been improved. The tool now offers an additional and editable name for each channel. The names in the list of channels are now composed of an editable channel name and the internal

channel name. If a channel is added to the Tool Board as a parameter or result, the new editable name is used for the respective connector. This enables the user to change the channel name.

In addition, the internal channel names have been adjusted to fit to the general naming conventions of MERLIC. Punctuation marks, i.e., dots and hyphens ('.', '-'), are replaced by underscores.

- The usability of the tool 'Locate Objects with Similar Gray Values' has been improved. Previously, the parameters 'Minimum Area' and 'Maximum Area' were defined as additional parameters. If they were not added, it was not visible by default that their values are adjusted if easyTouch was used to select the objects. Now, the parameters have been changed to basic parameters and are now visible by default.

- **Fixed Problems**
  - If the tool 'Acquire Image from Camera' has been used and some camera parameters with dependencies to other camera parameters were modified, MERLIC crashed. This problem has been fixed.
  - If the currently selected camera of the tool 'Acquire Image from Camera' has been removed, the name of the camera was still displayed in the list of available cameras. This problem has been fixed.
  - The tools 'Branch on Condition' and 'Evaluate Expression' threw an error if the user tried to paste an image into the expression field via 'Ctrl+V'. This problem has been fixed.
  - When using the tool 'Communicate via Digital I/O', it was possible to change the value range of channels that have been added to the tool as parameters. This problem has been fixed.
  - If the MERLIC Backend was set to a language other than English and the tool 'Create Paraxial Rectangle' was loaded, the tool erroneously showed an error. This problem has been fixed.
  - If a parameter of the tool 'Determine Data History' has been adjusted, constant values were not added to the buffer anymore. This problem has been fixed.
  - If the contour selection in the tool 'Evaluate Contours' has been extended via easyTouch+, the last mouse click was always ignored. This problem has been fixed.
  - If a new parameter with the semantic type 'string' had been added to the tool 'Evaluate Expression' and then an integer result of a previous tool was connected to the parameter, the semantic type of the parameters was converted to 'int'. This

problem has been fixed. Now, the semantic type of the connected value is not adjusted anymore and the connected value is processed as a string.

- If a tool was used that defined a parameter range via two separate minimum and maximum parameters, e.g., 'Evaluate Regions', and these parameters were connected with a previous tool, the parameters could contain inconsistent minimum and maximum values. This problem has been fixed.
- The values of the parameters 'Minimum_Feature_Value' and 'Maximum_Feature_Value' of the tools 'Evaluate Regions' and 'Evaluate Contours' could not be set higher than the predefined ranges. This problem has been fixed. Now, the ranges can be set to higher values by editing the parameter field or using a parameter with a higher value from a previous tool.
- The 'Time Format' parameter of the tool 'Get Execution Info' could be set to a format that is not supported if the parameter was connected to a result of a previous tool, e.g., to the result of the tool 'Evaluate Expression'. This problem has been fixed. Now, a warning is shown if a time format is defined that is not supported.
- If ROIs were drawn in the following tools, they could not be reliably associated with the correct ROI parameter and thus led to errors when these tools were executed.
    - 'Measure Circle to Point'
    - 'Measure Circle to Segment'
    - 'Measure Point to Point'
    - 'Measure Segment to Point'
    - 'Measure Segment to Segment'

  This problem has been fixed. Now, it is no longer possible to draw input ROIs for these tools. The required ROI parameters must be delivered from previous tools, e.g., from the tools of the category 'ROI Creation'.

- If easyTouch was used to select a circle in the tool 'Measure Circle', sometimes a circle ROI without a valid result was highlighted by the easyTouch preview. This problem has been fixed.
- If multiple ROIs have been used in the tool 'Measure Circle' and one of the ROIs was moved, a different ROI was selected as active ROI instead of the ROI that has been moved. This problem has been fixed.
- If very small circles were selected via easyTouch in the tool 'Measure Circle', the resulting ROI sometimes differed from the selected input ROI and the two ROIs were not displayed

correctly on top of each other. This problem has been fixed. The correlation of the resulting ROI to the input ROI is now more suitable.

- The tool 'Measure Opposite Edges' sometimes returned an exception without information about the error cause if only one edge was detected instead of an opposite edge pair. This problem has been fixed. Now, an adequate error message is shown in this case.

- Sometimes the tool 'Read Data Matrix ECC 200' returned an error if the parameter 'Minimum Number of Columns' or 'Minimum Number of Rows' had been changed. This problem has been fixed.

- If easyTouch was used in the tool 'Read Text and Numbers', the easyTouch preview did not highlight the result that was returned when the preview was confirmed with a mouse click. This problem has been fixed.

- If easyTouch has been used in the tool 'Read Text and Numbers', the easyTouch preview sometimes suggested two overlapping regions. This problem has been fixed.

- The tools 'Write to File' and 'Read from File' could be connected via the 'File Handle' parameter which resulted in an error. This problem has been fixed.

- The training tools that require only one training data set have been improved. Previously, it was possible to remove the training image which sometimes led to unexpected behavior. Now, the training image can only be replaced with a new one but it cannot be deleted anymore. This ensures that a training data set is always available.

EXAMPLES

- **New Features**
  - MERLIC has been extended by the new example MERLIC Vision App 'check_bottles_parallel.mvapp'. It shows the parallel inspection of different parts of a bottle.

- **Enhancements**
  - The following example MERLIC Vision Apps have been revised. They have been adapted to the new Tool Flow panel, i.e., if applicable, the tools have been rearranged for parallel processing. In addition, the parameter settings of some tools have been optimized.
    - adapt_brightness_for_measuring.mvapp
    - check_bent_leads.mvapp
    - check_pen_parts.mvapp

- check_presence_of_fuses.mvapp
- check_saw_angles.mvapp
- check_single_switches.mvapp
- detect_scratches_on_metal.mvapp
- determine_circle_quality.mvapp
- measure_distance_between_corners.mvapp
- measure_distance_segment_circle_calibrated.mvapp
- measure_distance_to_center_led.mvapp

- **Fixed Problems**
  - The widget 'Execution State' in the example MERLIC Vision App 'determine_circle_quality.mvapp' always showed the state 'Bad' because some parameters needed to be adjusted. This problem has been fixed. The value of the parameter 'MinimumScore' of the tool 'Evaluate Expression' has been adjusted to a value with two decimal points. In addition the value range of the parameter has been adjusted to 0-1.
  - The Frontend design of the example MERLIC Vision App 'read_lot_number_and_ECC200.mvapp' was missing. This problem has been fixed.
  - The following examples were not up-to-date:
    - calibrate_for_ruler_changes_distance.mvapp
    - calibrate_for_ruler_distorted.mvapp
    - calibrate_for_ruler_simple.mvapp
    - check_bent_leads.mvapp
    - check_presence_of_fuses.mvapp
    - check_saw_angles.mvapp
    - check_single_switches.mvapp
    - count_defect_clusters.mvapp
    - determine_circle_quality.mvapp
    - measure_angle_with_training_mode.mvapp
    - measure_distance_between_corners.mvapp

    The examples still contained an outdated version of the 'Image Display' widget. Therefore, the widget was displayed with the previous name of the widget, i.e., 'CameraView', instead of the current name. This problem has been fixed.

DOCUMENTATION

- **Enhancements**
  - The documentation of the tool 'Measure Segment to Segment' has been improved. Now, it describes the logic behind the selection of the angle.

- The MERLIC documentation has been improved. The MERLIC manuals have been extended by a new button that enables the user to change the language of the documentation directly within the manual.
- The documentation of the following tools with a training mode has been improved:
    - 'Calibrate Camera'
    - 'Determine Alignment with Matching'
    - 'Determine Alignment with Straight Border'
    - 'Check Presence with Matching'
    - 'Check Presence with Gray Features'
    - 'Count with Matching'
    - 'Locate with Matching'

    The descriptions of how to define the training settings and search settings have been revised in the tool reference and are now structured more clearly.

- The documentation of the MERLIC tools has been improved. The reference of a tool now contains a new section 'Application Example' that lists all provided example applications in which the tool is used.

- **Fixed Problems**
    - The documentation of the tool 'Measure Segment to Point' was not clear enough. The description of the result 'Orientation of Distance Segment' did not clearly state that it is returned as a positive real value for counterclockwise angles and a negative value for clockwise angles.
    In addition, the description of the results 'Perpendicular Distance', 'Minimum Segment Distance', and 'Maximum Segment Distance' missed the information that they are returned in world units in case calibration data is used in the tool. These problems have been fixed.

LICENSING

- **Fixed Problems**
    - If the MERLIC Trial version has been used, the continuous execution of a MERLIC Vision App was sometimes stopped too early. This problem has been fixed. Now, the application is executed up to the maximum time limit of 2 minutes as allowed for MERLIC Trial versions.
    - If the MERLIC Trial version has been used and a second instance of MERLIC was opened, a wrong error message

appeared that stated that the trial license has expired. This problem has been fixed. Now, the error message correctly states that only one instance of MERLIC can be used in the MERLIC Trial version.

MISCELLANEOUS

- The password protection of MERLIC Vision Apps has been improved. The protection is now more secure. Note that this change affects the compatibility. Read more.
- The configuration of the MERLIC server has been improved. Previously, the configuration of the server needed to be defined in a separate XML configuration file. Now, the configuration settings for the server can also be defined in the MERLIC.ini file.

REDUCED FUNCTIONALITY

MERLIC 4 Preview offers various new features including a completely revised Tool Flow panel and the parallel processing of your application. However, there are also some functionalities of previous MERLIC version that are not yet available in this MERLIC version but they will be provided for upcoming MERLIC releases.

- **MERLIC Backend**

    - In this MERLIC version, the undo functionality is not available in the MERLIC Backend. It is not possible to undo any changes in the Backend.

    - Previously, it was possible to define the colors in which various graphical elements are visualized within a tool. In this MERLIC version, only a small set of colors is supported. Therefore, the 'Colors' tab of the preferences dialog has been reduced to the colors that are currently available.

- **MERLIC Designer**

    - This MERLIC version does not support the training functionality in the Frontend. Therefore, the 'Training' widget is not available in this version.

    - In previous versions, it was possible to define customized language settings and translations for the texts in the Designer widgets. This functionality is not supported in

this MERLIC version. The respective Designer menu entry 'Localization' has been removed.

- **MERLIC Frontend**

    - This MERLIC version does not support the training functionality in the Frontend. Therefore, it is not possible to modify the training data set of a tool within the Frontend. The respective Designer widget 'Training' is also not provided in this version.

    - Previously, the Frontend offered the possibility to display the texts in a previously defined language. This MERLIC version does not support the functionality that is required to define the customized language settings and translations. Therefore, it is not possible to create a MERLIC Vision App with customized language settings. However, you can still use an old MERLIC Vision App with customized language settings from a previous MERLIC version. The defined translations and language settings will still be visible if the application is loaded in MERLIC 4 Preview.

- **Tools**

    - The configuration of the tool 'Acquire Image from Camera' has been revised. However, it does not offer the full functionality as in the previous MERLIC version:

        - The configuration modes 'Beginner', 'Advanced', and 'Guru' are not available anymore. Therefore, the configuration area lists all camera parameters if the configuration mode is activated.

        - It is not supported to add a camera parameter as a tool parameter to the top of the tool board.

    - The tools 'Communicate Via OPC UA' and 'Stop Execution' are not available in this version.

    - Due to the color restrictions in the MERLIC Backend, the regions in the tools of the category 'Filter' are now visualized with a margin instead of a filled color to ensure that they can still be recognized in the image.

- If a tool is added, only the automatic connection for image parameters is supported in this MERLIC version. All other types of parameters and results are not automatically connected anymore but need to be connected manually after inserting the tool.

- Previously, space characters were used to separate the text in the names of tool parameters and tool results. In this version, the names are separated with underscores because parts of the translation functionality is not supported yet.

- The tools 'Read Aztec Code', 'Read Bar Code', 'Read Data Matrix ECC 200', 'Read PDF417', and 'Read QR Code' do not visualize the decoded data in the **easyTouch** preview anymore because the required interface procedure is not supported in this version.

- In previous versions, the MERLIC tools showed an info box

- If **easyTouch+** was used to add another selection that did not fit to the parameter settings of the previous selection, an info box was displayed at the tool as feedback that this selection might not be possible or affects the parameter settings. This functionality is not supported in this MERLIC version.

MERLIC Examples

- The example MERLIC Vision App 'measure_angle_with_training_mode.mvapp' is not available in this version because it uses the 'Training' widget to allow modifications at the training data set. Since this MERLIC version does not support the training within the Frontend, the application is not provided.

MERLIC Documentation

- The MERLIC Manual of this version is only provided and up-to-date in English. The documentation of MERLIC 3.0.2 in other languages is still provided. However, the manuals contain no updates. In addition, previous functionality that is currently not provided in this MERLIC version is also marked with a respective note in the English version of the MERLIC Manual. This helps to instantly recognize if a functionality is not available in this version.

- **MERLIC Tool Development**

  - The use of custom tools is not supported in this version. The respective settings for the tool paths and procedure paths have been removed from the preferences dialog of the MERLIC Backend. The tool template examples have been removed in this version. The Tool Development manual of the previous version is still available. However, it does not contain any updates.

- **MERLIC Engine**

  - The functionality of the MERLIC Engine is not available in this version. Thus, it is not possible to use a MERLIC Vision App into your own C++ or .Net application or to integrate an MVApp as ActiveX Control in your application. The MERLIC Engine example applications have been removed in this version. The MERLIC Engine manual of the previous version is still available. However, it does not contain any updates.

- **Error Logging**

  - Previously, errors were shown in the output console, the tool state, and the bubble help window of the tool. However, in this version the output console is not available. Therefore, errors are only displayed in the bubble help window of the tool and in the tool state. In addition, errors are not aggregated. Only the errors from the last tool execution are displayed.

  - Because errors are not aggregated in this version, it is not possible to create a log file with the errors. The respective setting has been removed from the preferences dialog of the MERLIC Backend.

- **Miscellaneous**

  - In previous versions MERLIC was available in multiple languages. However, in the MERLIC 4 Preview only the English version of the user interface is up-to-date. Furthermore, only the English version of the MERLIC manual contains the updated documentation of MERLIC. If MERLIC is set to a different language than English, only some parts of the user interface are translated, i.e., the parts that were already translated in the previous version. In addition the documentation including the Quick Info of the tools contains no

updates in other languages. Therefore, we recommend to set the language of the user interface to English and to use only the English version of the MERLIC manual to ensure that all information is up-to-date.

- When MERLIC is started via the command line, several command line options are provided. Previously it was possible to use the command line options `-t`, `-p`, and `-tool_filter` to define the directories for MERLIC tools, MERLIC procedures, and to define the tools that should be loaded. Since the use of custom tools is not supported in this version, these command line options are also not supported anymore.