EyeVision & the Multisensorial Data Acquisition Network

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About EVT's documentation for OPTIMAI

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EVT & OPTIMAI: Introduction

EVT is providing industrial vision sensors to the OPTIMAI project.

The **wiki page** offers a direct access to project related technical documentation and information to all project partners that are working with EyeVision.

Login is required and can be achieved by simply clicking on the Register button on the page.

All linked documents are freely accessible or require additional registration on EVT's EyeCademy.
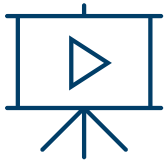
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General

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EyeVision: General

To get familiar with EyeVision in general, EVT strongly recommend to use the following resources:

Tutorials in the EyeCademy: A comprehensive collection of videos and other resources that covers most topics of EyeVision.

Basics of EyeVision software: Another entry point into the documentation wiki of EyeVision, that addresses new users that want to get familiar with System.

Webinars and personal trainings. EVT is informing about new webinars on their homepage and in regular newsletters. Project partners are invited to contact the technical support to have personal trainings.

An email to the **Technical support** is the first place to clarify questions about or beyond the training materials. The guidelines about support requests as presented inside the link should be followed.

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EyeVision: General

Specialised tools for different industries help to solve domain specific applications:
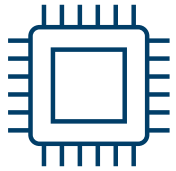
Chip control: Functions and tools for inspection and analysis within semi-conductor production.

Robot vision: EyeVision provides communication tools and a lot of different image processing tools in 2D and 3D to solve challenging robot vision tasks. This includes powerful tools for calibration and transformation between robot and image processing coordinate systems.
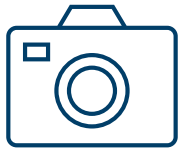
Integrated access to state-of-the-art **communication protocols**. The most relevant communications for OPTIMAI are presented in an upcoming section of this document.

Image Acquisition

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EyeVision: Image Acquisition

Tools used for image acquisition include:

EyeVison integrates **cameras and i/o hardware** of different vendors. GeniCAM, GenTL standard are used, where possible. During OPTIMAI EVT develops their own implementation of the GeniCam TL interface and also develops producers for their own hardware. An SDK will be published during the project. SDK and documentation will be linked here.

MIPI: Overview on systems that use MIPI for image acquisition.

Image transfer: Sending images to the middle ware via **REST API**, **save images to file system**, use EVT's **EyeView protocol**.
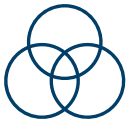
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Communication

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EyeVision: Communication

Tools used for communication include:

How to transfer data with **MQTT** to the middle ware.

How to communicate data via **REST API** to the middle ware.

Overview on **OPC UA integration**.

Profinet, **Modbus**, and the basic protocols **TCP/IP** , **UDP** and **RS232** can be used.

Robot communication: A common task when dealing with communication of robots is the representation of coordinate systems and data formats. Any robot programmer knows about the confusion by different angle conventions. EVT has written a tool to adapt the format of data based on a template file.
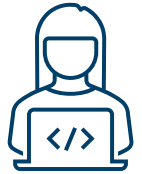
Artificial Intelligence

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EyeVision: Artificial Intelligence

EVT is providing industrial vision sensors to the OPTIMAI project.

Machine learning and Deep learning tools integrated to EyeVision: Video tutorials.

Annotation: How to use the Annotation- and Training GUI to train an AI-model to solve your application.

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3D Processing with EyeVision

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3D Processing with EyeVision

A variety of different 3D tools can be used to perform 3D processing or preprocessing.

For example, for the defect detection on antennas in a robotic line, the 3D cylinder detection has been used to find regions of interest, where defects may occur.

This approach has been used to reduced the amount of data that the deep learning image classificator requires for detection of broken material.

3D Preprocessing: General overview on 3D processing with EyeVision.

Cylinder segmentation.

Convert point cloud to 2.5D image: Deep learning algorithms in EVT require 2D images, so point clouds can be converted to 2.5D depth image using this tool

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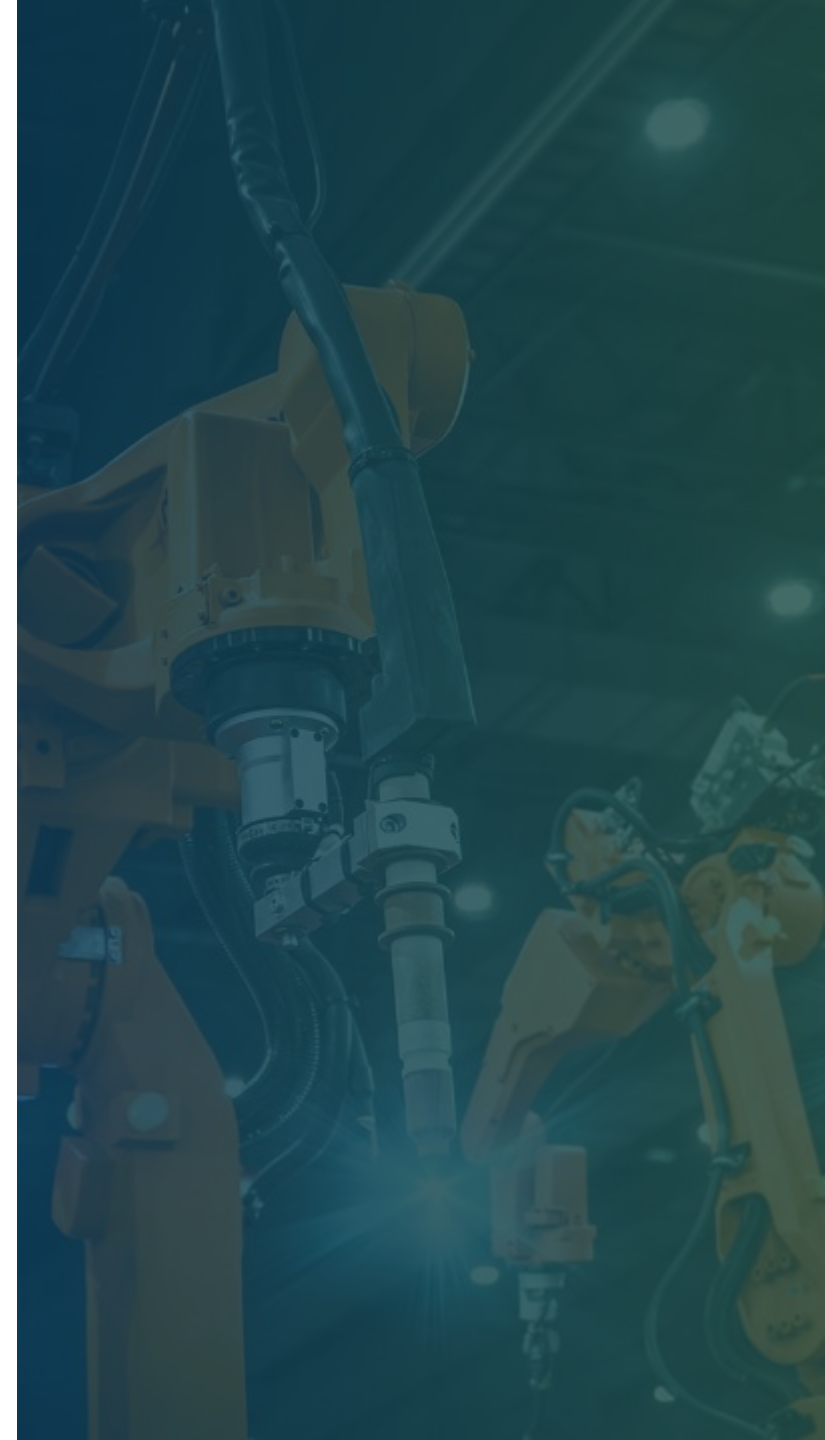# EyeVision as a Scalable Component on the Edge

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EyeVision as a Scalable Component on the Edge

EyeVision consists of integrated communication modules and the ability to run on a variety of different hardware platforms - such as **ARM based embedded systems** with integrated image acquisition, based on **bi-directional REST API access.**

This makes it easy to configure the system in a way that it acquires and processes images and results, as well as automatically communication images via the middle ware, to any communication partner that needs access to the data.

Installation instruction on ARM platform.

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Thank you