

test automation spotguard®

Graduate



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Initial Situation: Together with the engineering office UNIQUS AG, tofmotion GmbH develops 3D camera systems that are used in industrial areas for human safety based on innovative time-of-flight technology (ToF). One of these systems is the spotguard®, which is the first safety-certified 3D camera on the market. Three-dimensional danger zones are defined in a room, which the camera monitors and reliably detects human intrusion.

For certification and compliance with all standards: ISO 12100, EN/IEC 61508, EN ISO 13849, EN ISO 13855 and EN/IEC 62061, extensive type tests must be carried out on the camera. These tests are currently set up on an event-specific basis and carried out manually by an inspector. This can lead to the following problems:

- Tests can take several hours
- Human error due to inattention and improper execution
- Documentation errors due to incorrect or incomplete documentation

The aim of this work is to develop an autonomous or semi-autonomous application/control system for carrying out inspections on the camera in compliance with the standard and to simplify the inspection process.

Approach: To this end, intensive research into standards was carried out, which serves as the basis for carrying out the tests. The standard EN/IEC 61496-1:2020 / -3:2019 (procedure and test parameters), which defines clear procedures and test parameters for the tests, was mainly analysed in detail.

In addition to the analysis of the theory, a practical analysis was also carried out, a detection test in accordance with the EN/IEC 61496 standard, in which the division of tasks for testers and application was analysed and defined for the further procedure. In addition, more detailed requirements for the application were incorporated into the specifications.

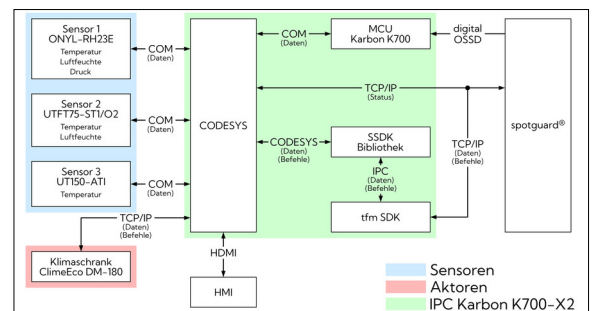
Result: The final application was realised based on a soft PLC using CODESYS. An existing industrial PC with Linux Ubuntu served as suitable hardware, as DI/Os and other interfaces for the camera as well as sensors and actuators were already integrated. Communication between the sequence controller and spotguard® and its SDK proved to be the biggest challenge. However, this was solved using a specially written CODESYS library with integrated C code. In a repeated test of a detection test according to EN/IEC 61496-3:2019, a significantly improved handling and simpler execution for the tester was finally determined. The application can visually display steps to be performed with instructions to the inspector via an HMI and display current data such as inspection progress, camera status, OSSD states or current

sensor values. For further use, points have been worked out as to how and where additional features can be integrated into the application to make the process even simpler and safer.

spotguard® Own presentation



system context diagram of test application Own presentation



"spotguard check" test application in operation Own presentation



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Subject Area

Mechanical Engineering, Information and Communication Systems, Computer Science

Project Partner

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