INDUSTRIE 4.0 IN MECHATRONICS TRAINING

Development of an Industrie 4.0 demonstrator to teach Industrie 4.0 concepts as part of the professional training program for mechatronics specialists

PARTICIPANTS

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OVERVIEW

An Industrie 4.0 demonstrator has been developed from standard components from the so-called "maker" culture (parts from 3D printers, small computers such as Arduino and ESP8266). This demonstrator is used as a basis for a week-long workshop forming part of the mechatronics training program.

STARTING POINT

The IHK Darmstadt Vocational Training Center offers mechatronics training services and support to companies within the surrounding area. Trainers from the Vocational Training Center and associated businesses joined forces with members of the national Industrie 4.0 platform in a workshop to establish how Industrie 4.0 aspects could be incorporated as part of the mechatronics training program. As a result, they identified hardware and software platforms from the so-called "maker" culture as appropriate channels for teaching the trainees concepts from the Industrie 4.0 platform by means of practical examples from the various work groups.

SOLUTION

ESR Pollmeier GmbH took the results of the workshop and came up with the demonstrator concept. A mechatronics master's student designed the electronics side and developed the software during his internship with ESR Pollmeier.
The IHK Darmstadt Vocational Training Center helped with the mechanical aspects, comprising parts from a modified 3D printer kit. Eta|opt GmbH provided an energy-efficient suction lifting device.

INDUSTRIE 4.0 – FEATURES

Manufacturing an inexpensive demonstrator is a great way of teaching Industrie 4.0 concepts and illustrating the reference architecture model for Industrie 4.0 (RAMI 4.0) in a clear and comprehensible manner. The lifecycle elements type and instance are displayed, as well as the hierarchical aspects linking the product and the networked world to traditional machine functions. Trainees are taught how to incorporate and adapt Industrie 4.0 concepts and technologies in their companies, which in turn promotes early acceptance of digitalization and networking.
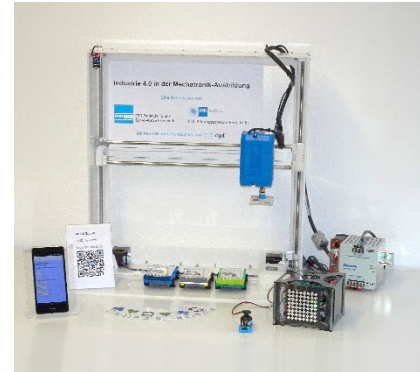
PROJECT DESCRIPTION

Mechatronics of the demonstrator is based on a two-axis positioning system. In both stepper motor drive technology and in small computers such as Arduino and ESP8266, this concept is based on components used to manufacture 3D printers in the "maker" culture. An electropneumatic suction lifting device is the moving object, carrying NFC/RFID chip cards (to represent products) to a specific transport cart depending on the data they contain. The history of the transported products (chip cards) is recorded on a web server and can be viewed on a smartphone browser. The trainees thus learn about manufacturing and using Industrie 4.0 technologies such as WLAN, web servers, RFID/NFC and QR codes. These aspects are accompanied by classic mechatronics subjects such as programming, electrical and mechanical drive technology and pneumatics. It provides the opportunity to introduce background information and interfaces with a range of technologies, including rapid prototyping methods based on widely used hardware and software platforms. By incorporating all these aspects in the training program, this ensures a bottom-up approach when introducing the notion of Industrie 4.0 in businesses.

CONTACT

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STANDARDIZATION APPROACHES

Rapid prototyping concepts are used and taught by means of cost-effective hardware platforms and open source software. This will play a vital role in the design of additional demonstrator models and more generally in ensuring an open approach to designing Industrie 4.0 solutions in companies.