Cobotic Solution for Watch Bracelet Assembly

The Industry 4.0 revolution is in full swing bringing new automation possibilities through technologies such as Cobotics. With this in mind, Cartier Horlogerie has decided to launch a project aimed at renewing the production process for watch bracelets. For now, most of the stages of production are carried out by hand. This is a very monotonous, unrewarding work, which is suitable for automation. A system that is both flexible and highly precise is required.

Initial Situation

Cartier Horlogerie is still producing luxury watches mainly using manual processes. Reason for this are the comparably complex and small parts, as well as small lot sizes and a large product portfolio, which make traditional automation economically difficult. The answer for a cost-effective automation is a workplace that can easily be set-up and changed over between different products/processes. With this equipment/workplace, small lot- sizes of various products can be treated. Quick and simple change-over between products ensure efficient production despite small lot sizes.

Workplace

The workstation is equipped with an UR5e robot that is mounted on a linear axis to increase its reach (thus providing access to a larger workspace). To execute the various tasks, different parts (targets) must be recognized. In the case of this project, the camera is directly mounted to the robot arm. In this way, the regions on and around the workstation can be detected. This provides great flexibility to the user, as they are not tied to fixed locations.
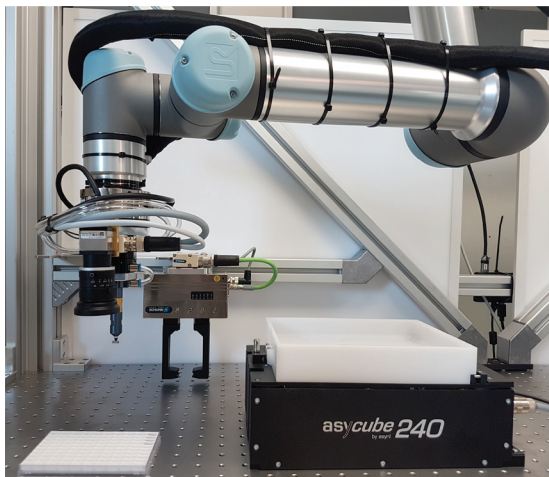
The lexibility is further enhanced by the integration of a tool changer, which allows the use of various tools to perform the required tasks.

User Interface

The user interface must be as simple and easy to use as possible in order to reduce training as well as mistakes. The basis is a no-code blockly-like programming environment that is intuitive to use. By combining blocks, a complex program to define movements of the robot or vision algorithms for object detection, can be created in a few minutes. This tremendously reduces the required time. Personnel with little training can carry out small changes.
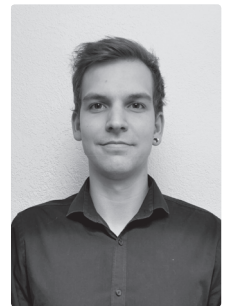
Results

The flexibility of the workplace is increased tremendously compared to more traditional automation systems. The creation of programs – for the detection as well as handling of parts – is much faster and requires little practice. Very complex tasks still require a certain amount of time, but are greatly supported by the graphical interface. The integrated tool changer enables more complex tasks to be performed without interruption.

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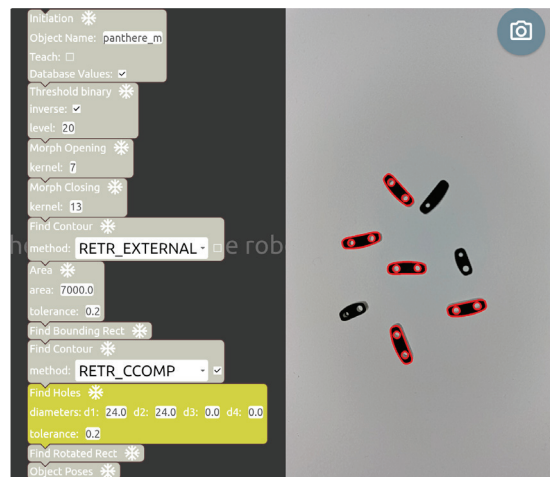Figure 1: UR5e robot performs an example task. The links are placed in a pallet, which can be exchanged automatically.

Figure 2: Detection of links with developed method creator.