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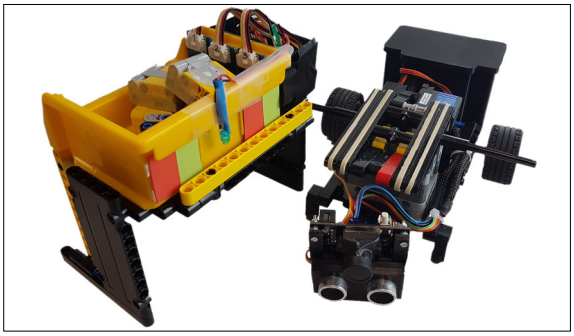
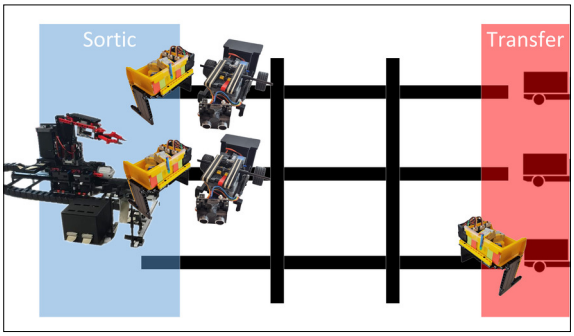
Subject Area	Information Technology for Mechanical Engineering

Smart Factory - Sortic

An autonomous package distribution system which is intelligent, modular, scalable and reusable



The SmartBox and the SmartVehicle.
Own presentment

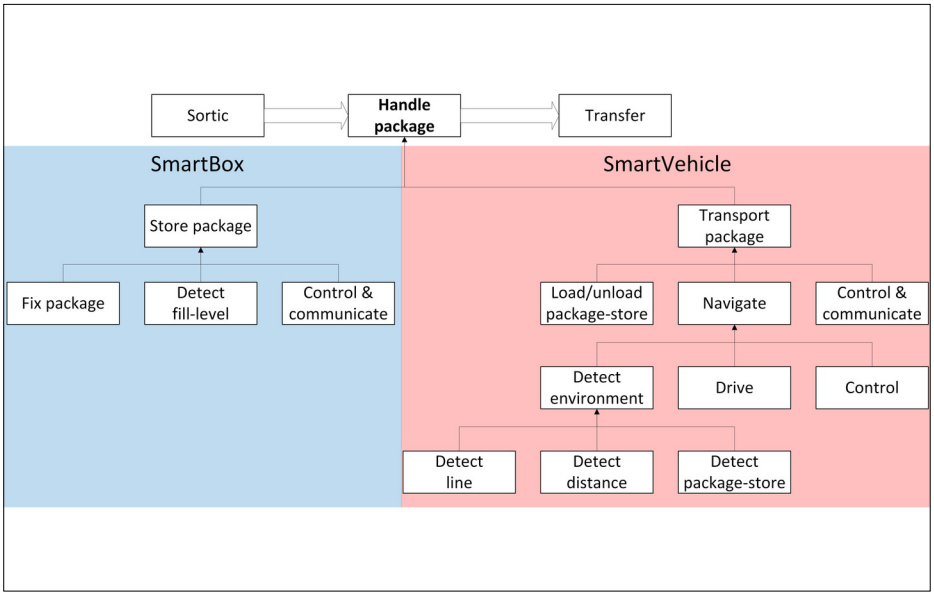


Here you can see the collaboration between Sortic, SmartVehicle, SmartBox and Transfer.
Own presentment

Initial Situation: The company Sortic manufactures automation solutions. These are sold according to the business model "machine as a service". The customer does not buy the machine itself, but only the "sorting capacity". The functional model of the sorting-machine was developed as a "pick and place" machine based on Lego and Arduino (electrics and software). Sortic is to be expanded by another stage; an autonomous package distribution system. A vehicle and a box were created for this in preliminary work. The aim of this thesis is the integration of the subsystems "Smartbox" and "Vehicle". The new system should be modular, expandable and not require a central control station. Adding and removing participants should be possible without great configuration effort.

Approach: The box as well as the vehicle were not compatible with each other. Therefore a completely new software was written for both.
A functional structure was created for this purpose. The individual modules were identified and solved in an object-oriented manner. For handling all the different processes a pattern of a finite-state-machine, which can also be nested, was written. This way the processes can be controlled by different events. WLAN and MQTT are used for communication.

Result: With this approach it was possible to design a scalable and modular system. The clearly defined interfaces also allow to integrate the resulting basic modules into other projects without any problems. The new package distribution system has been extensively tested and has proven to be reliable. The only weaknesses are the correct detection of the lines used for orientation and the limited fill level detection. A central control panel can be completely omitted. With the help of a graphical user interface (GUI), the position and status of the vehicles and boxes can be monitored at any time and intervened if necessary.



This figure shows a simplified functional structure where you can see which functions have been solved by the SmartVehicle and which by the SmartBox.
Own presentment