

## INCASE MISSION

Within the world of Industry 4.0, we develop test set-ups and demonstrators for sustainable technologies to prove the viability and applications of this technology. We introduce the technology to the industry by means of workshops and lectures based on own research and experience.

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# Project Robotics

## How robots collaborate with one another and can be fully deployed in smart warehouses in the future



### What

We do research on integrated robot systems and autonomous robots and have developed two prototypes of mobile robots having different types of technology, which are easy to use and not expensive. We subsequently let them collaborate with one another and perform tasks within a demonstration set-up.

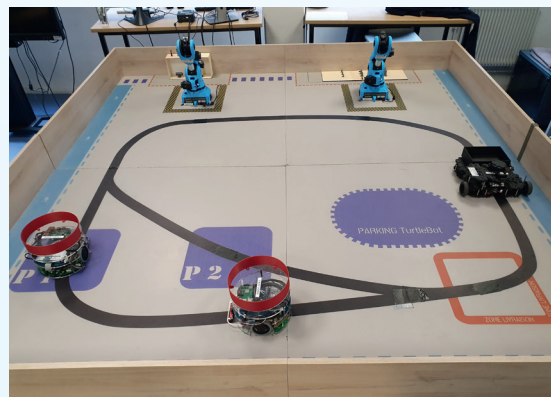
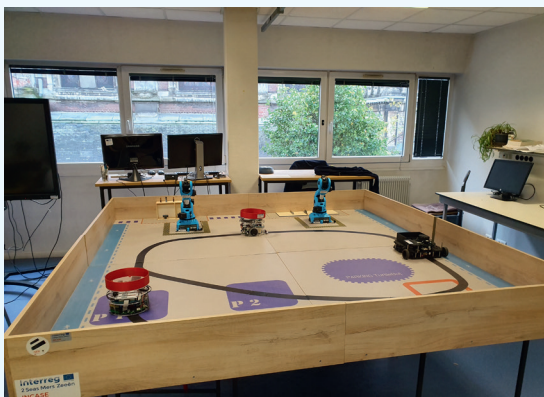
Our mission: to show that these robots can collaborate with one another fully automatically in a smart warehouse, to prepare for dispatch various products that a consumer ordered online or by means of an app.



### Pilots (applications)

Together with the French start-up Niryo, which has developed an educational version of an industrial robot, Niryo one, ISEN/Yncrea Hauts-de-France made a demonstration set-up consisting of five robots (two manipulators and three mobile robots) containing different types of technology that collaborate in a smart warehouse.

The customer orders two different products (for example screws and AA+ batteries) by using an app on his or her smartphone or through a webshop. The order is sent to an AI supervisor by means of WiFi, and the supervisor looks where the products are and which robots are "free". The supervisor then sends an instruction to the robots. Both mobile robots (ISEN) and Turtlebot depart and move in the direction of the manipulators to receive both orders.



The first Niryo robot carefully grasps a battery from a “shelf” and puts it in the rectangular box of the ISEN robot, which goes on its way to the second manipulator to receive the screws. While the first mobile robot does its work, the other one waits patiently to subsequently take action.

All the instructions for the robots’ tasks are given and directed by an AI control server that directs the entire communication process by means of an MQTT network. MQTT is a machine-to-machine (M2M) communication message and “Internet of Things” protocol. The protocol is excellently suited to send short messages between various machines. The server determines which one communicates with which one and delivers the correct “message” to the correct robot.



## Conclusion

In future, robots in smart warehouses that have different types of technology, will collaborate fully automatically with one another by means of AI, starting from the moment various products are ordered (product order), continuing with the product picking process and ending with the transport. People will be involved according to the type of task and product (e.g. in the case of extremely fragile products). The greatest challenge for a robot at the moment is to “grasp” the various products. That is why we are still continuing to work on more refined grasping devices. The most important factor is not to be scared of working with robots because they are continually improving in communicating with other machines in a production environment.



## Number of companies reached through workshops and lectures

We delivered various workshops and lectures on this theme and reached 173 unique companies and 336 people.

**Contact person:** Annemarie Kokosy, head of the Robotic Team at the ISEN, l’Ecole d’Ingénieurs des Hautes Technologies et du Numérique in Lille.