FLOBOT

H2020-ICT-2014-1
645376

Workshop

June 2018

Lyon, France

The need

Supermarkets, as well as other industrial, commercial and public premises, such as Airports, Trade fairs, Hospitals, Sport courts, **have huge floor surfaces to be cleaned regularly.**

- Carrefour estimates*: lack of cleanliness causes an 8% drop of sales*

Cleaning activities:

- Are time demanding in terms of human repetitive activities

- Take place at different times, often with a tight schedule. Often the personnel has to be present on standby

- Can be related to workers' health and ergonomics. The economic viability of the service offered, often relies on low wages and low-skilled personnel
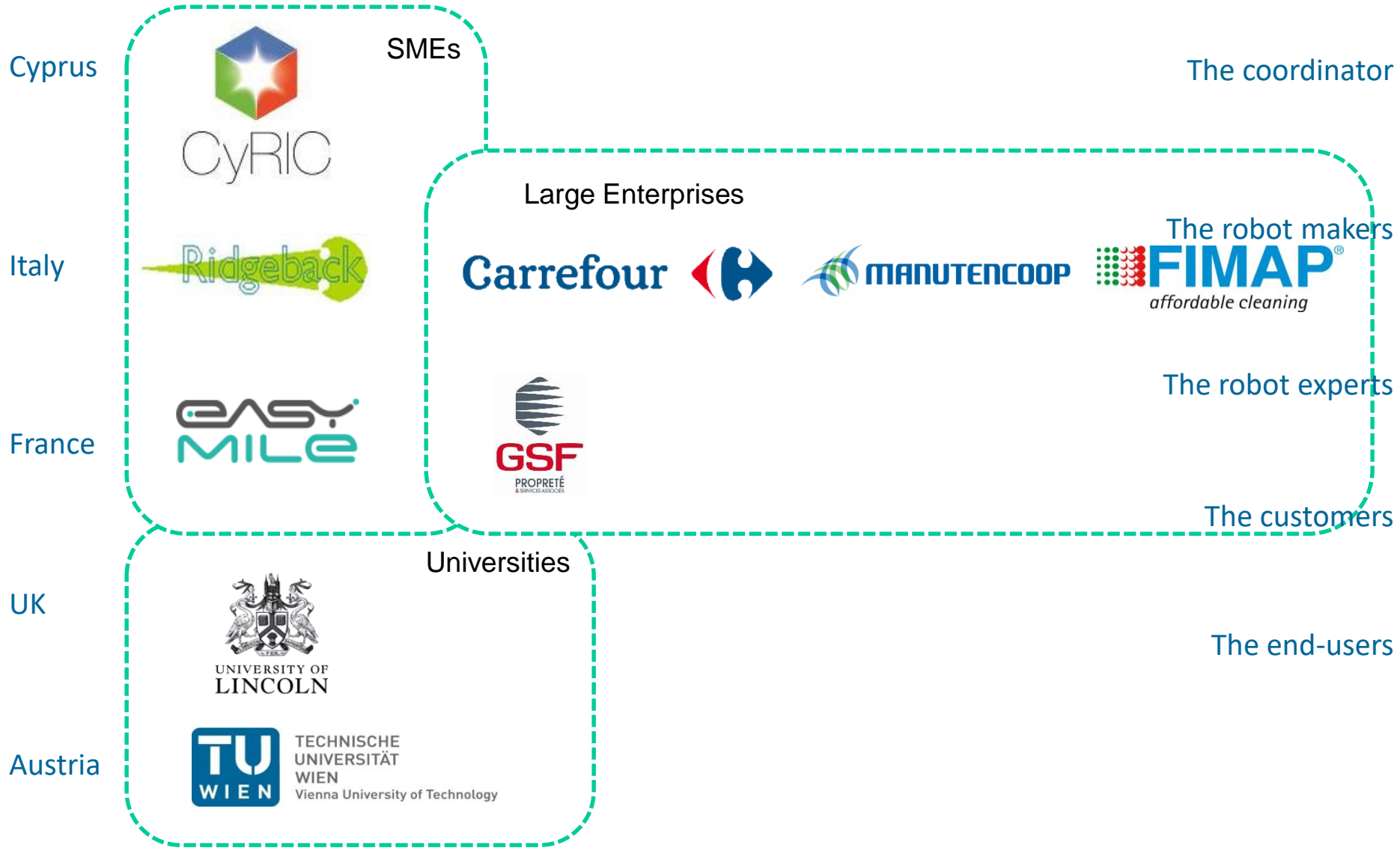
FLOBOT concept

FLOBOT addresses the problem, integrating existing and new research results into a professional floor washing robot for wide areas.

FLOBOT is a professional robot scrubber-dryer (floor washer with brushes and with suction to dry the floor). The system consists of a **mobile platform** (the floor washing robot) and a **docking station**. It includes software modules for Human tracking for safety, Floor cleaning intelligence (Image analysis for floor conditions and for objects identification), autonomous navigation, mission programming, connection to ERP, proactive safety.

The team

SMEs

Large Enterprises

Universities

Cyprus

Italy

France

UK

Austria

The coordinator

The robot makers

The robot experts

The customers

The end-users

The robot

Robotic platform with multiple sensors and software modules, based on a scrubber-dryer by FIMAP:

- Dimensions (mm): 1470 x 650 x 900

- Working width (mm): 560

- Squeegee width (mm): 650

- Max speed (km/h): 6

- Tanks (L): 75

- Battery duration (h): About 2h (lithium battery)
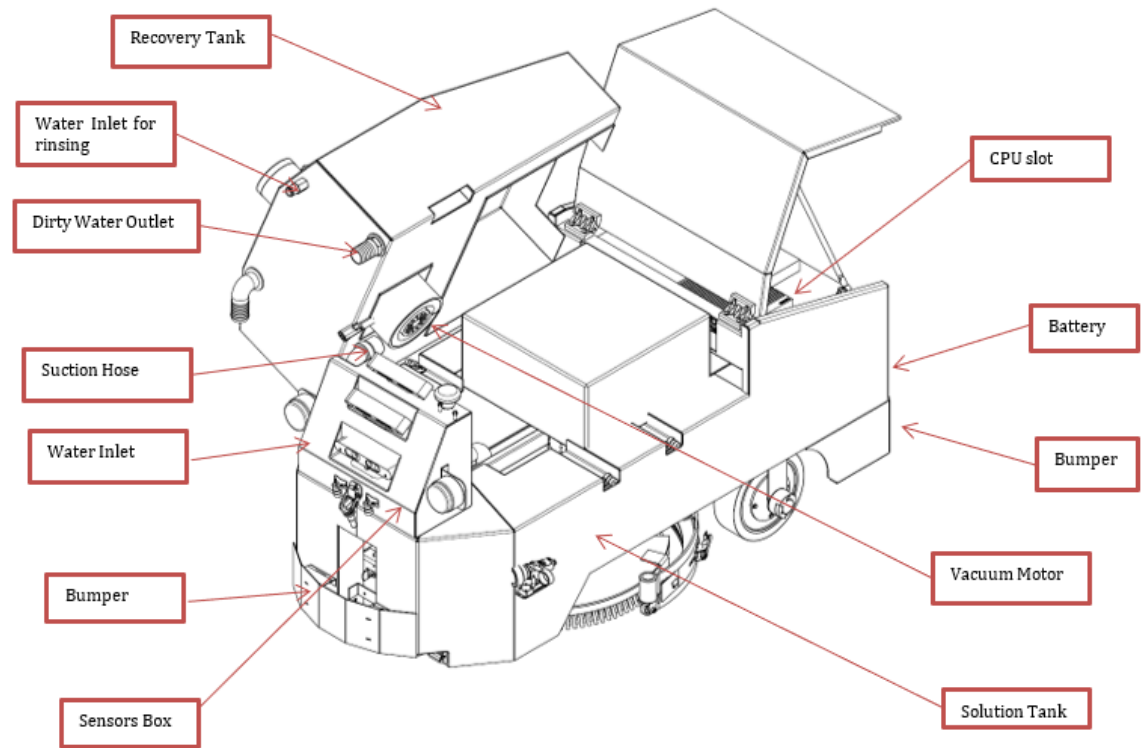
The robot

Software:

- Autonomous navigation

- Dirt and small objects detection

- Humans recognition

- Proactive safety

- Environment reasoning

- Tablet App for control

- Data management platform / Connection to ERP
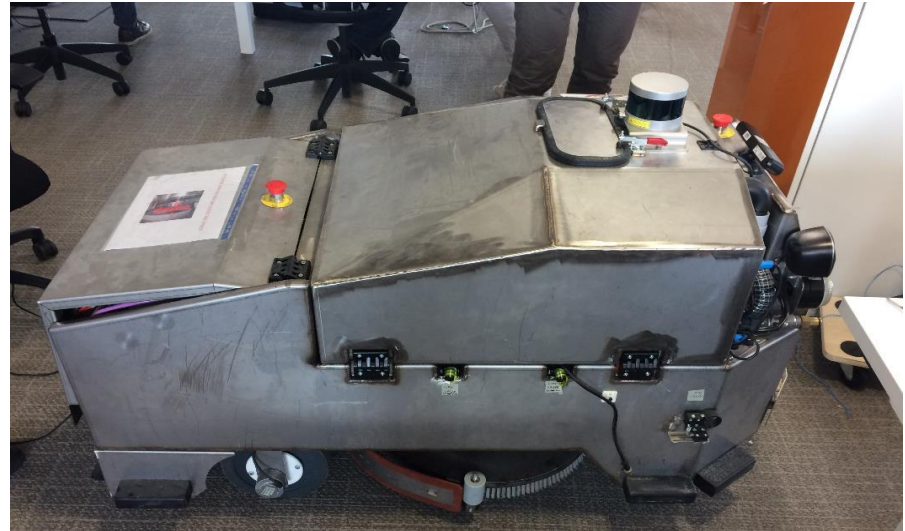
## Dirt and small objects detection

Detecting and quantifying, in real-time, the level of dirt on different floor surfaces, coping with reflections, shadows and inhomogeneous textures. Detecting small and medium size objects that may obstruct the robot's motion or damage its on-board cleaning system.

## Humans recognition and trajectory analysis

Robust sensor fusion methods for human detection and people tracking from a mobile platform for safe and fast navigation in highly dynamic environments. Statistical analysis of human trajectories for identification and efficient cleaning of floor areas more likely to be dirty.
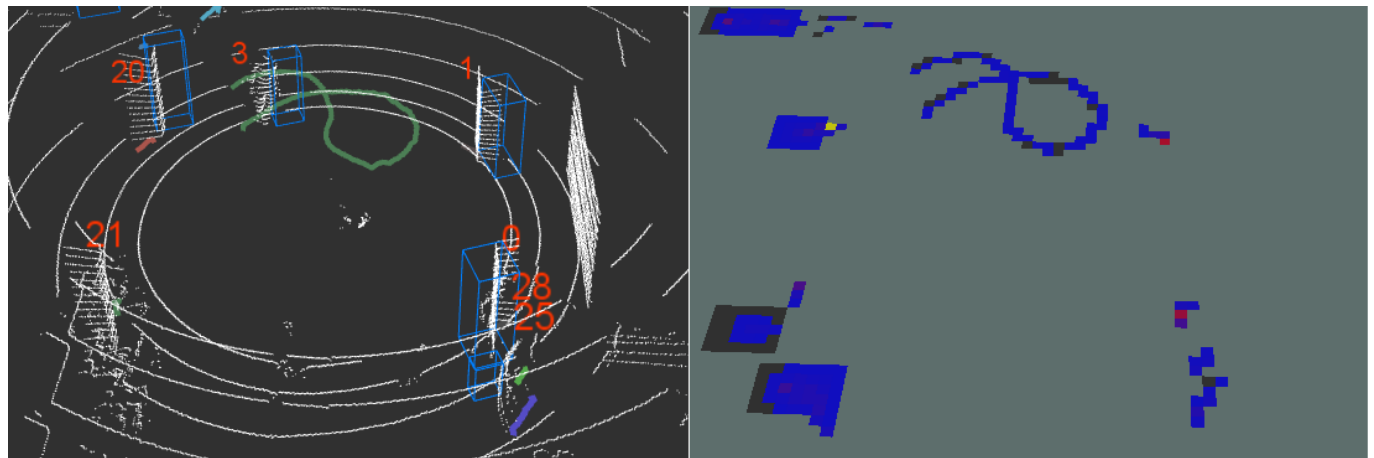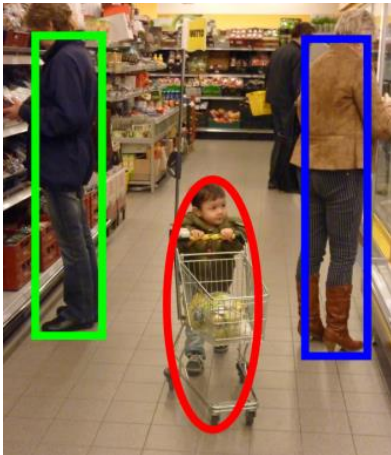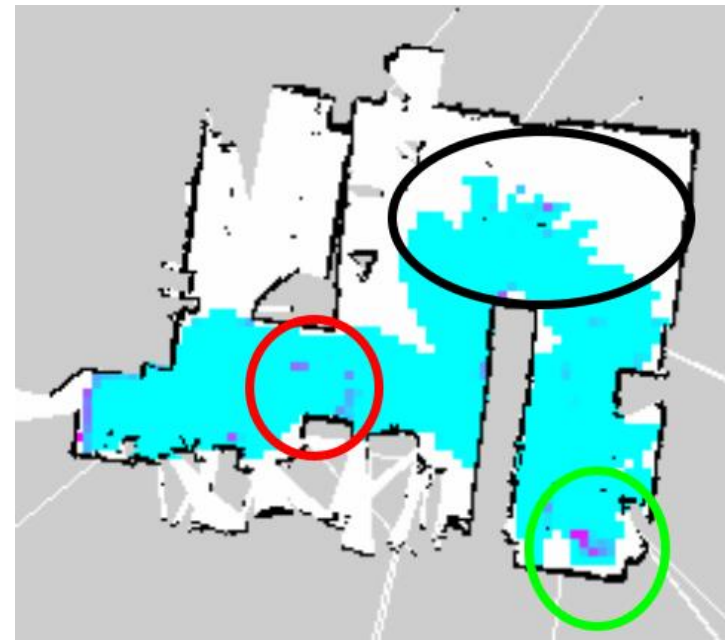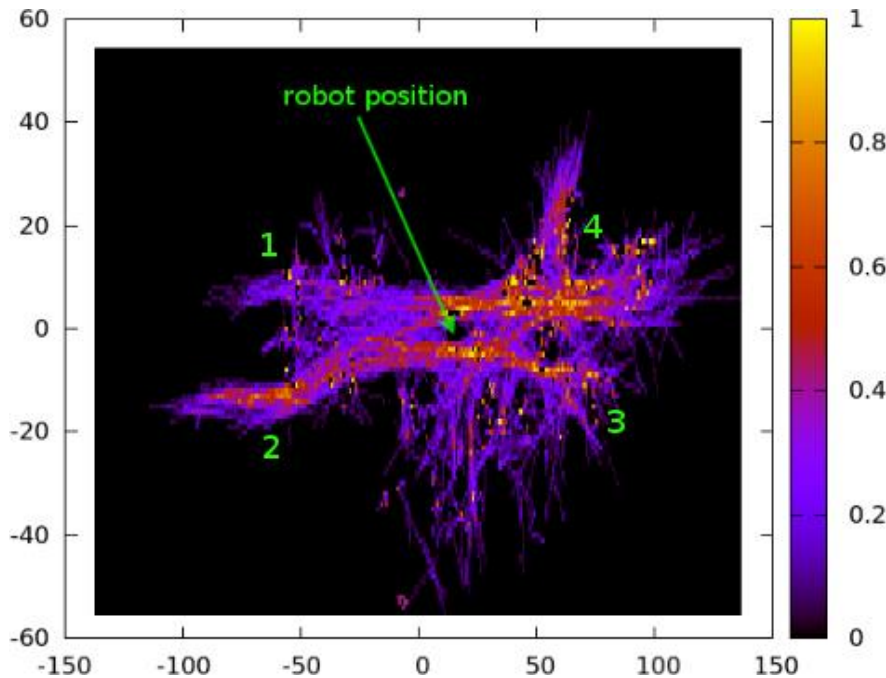
The robot

Proactive safety

Use of lasers and smart projection systems for notifying the people around the robot about its presence and planned movement for safety purposes, but also for avoiding continuous robot stops that could limit performance
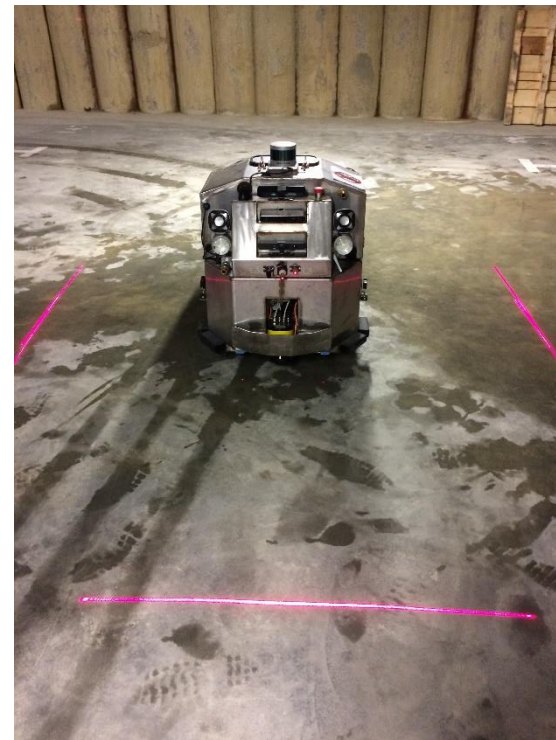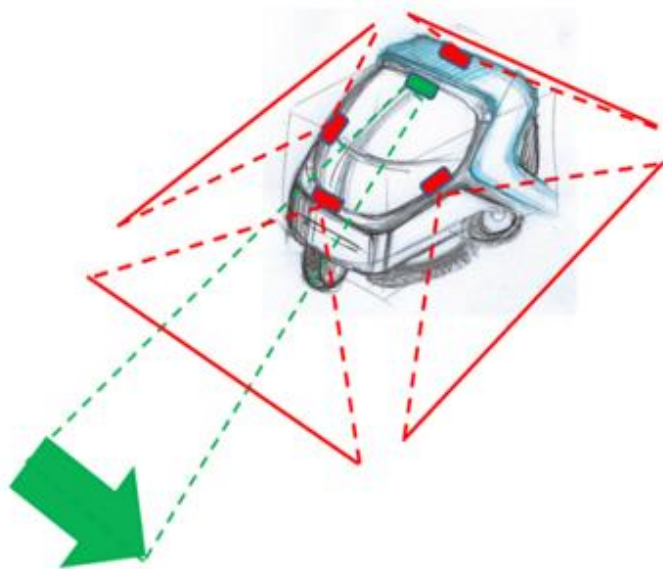
Environment reasoning

The robot can also generate statistics of human trajectories and the dirt expectation distribution over the map. The outputs are presented in the form of images and heatmaps to the user, through the tablet application. The user can then decide whether to change mission timing or the overall cleaning strategy

Tablet App

Most operations, including the setup and launch of an autonomous cleaning mission can be performed using a tablet App. It can also be used to manually drive the robot. The App is also used to receive notifications and warning and also for storing mission-related data. All collected data can then be uploaded in the data management system.
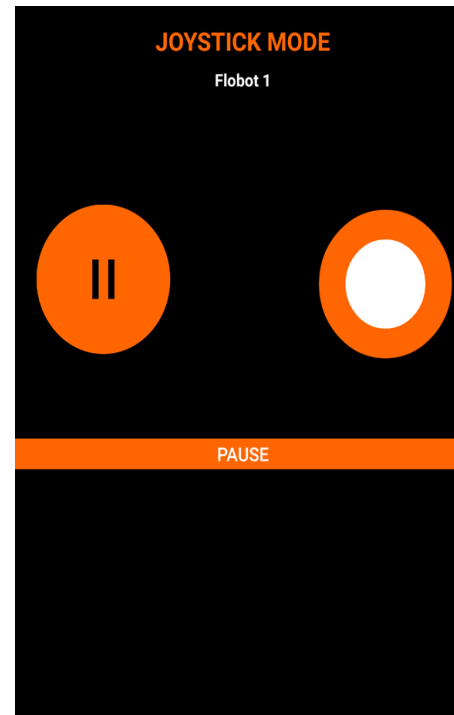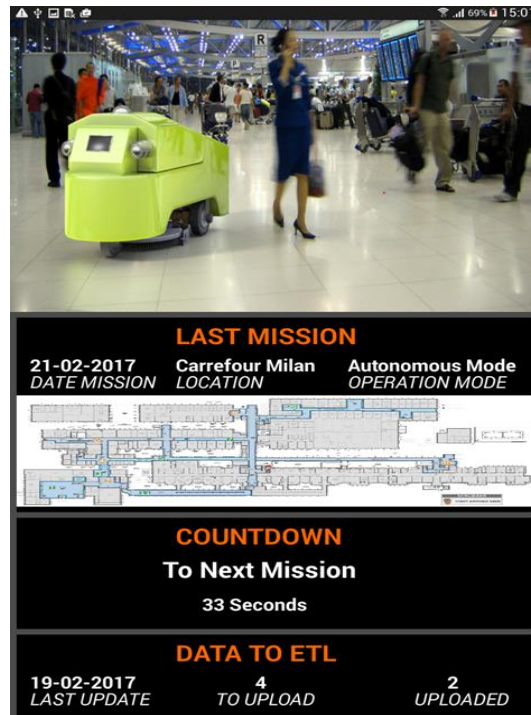
Data management platform / Connection to ERP

Data collected during a mission (time for cleaning each zone, power consumed, water consumed, errors etc.) are collected in the tablet and can be uploaded after the mission on the Flobot Data Management System (FDMS). The FDMS can be customized for each customer, depending on the reporting needs. The system also provides APIs (data interface functions) for sharing the data with the ERP systems of the client, if required.
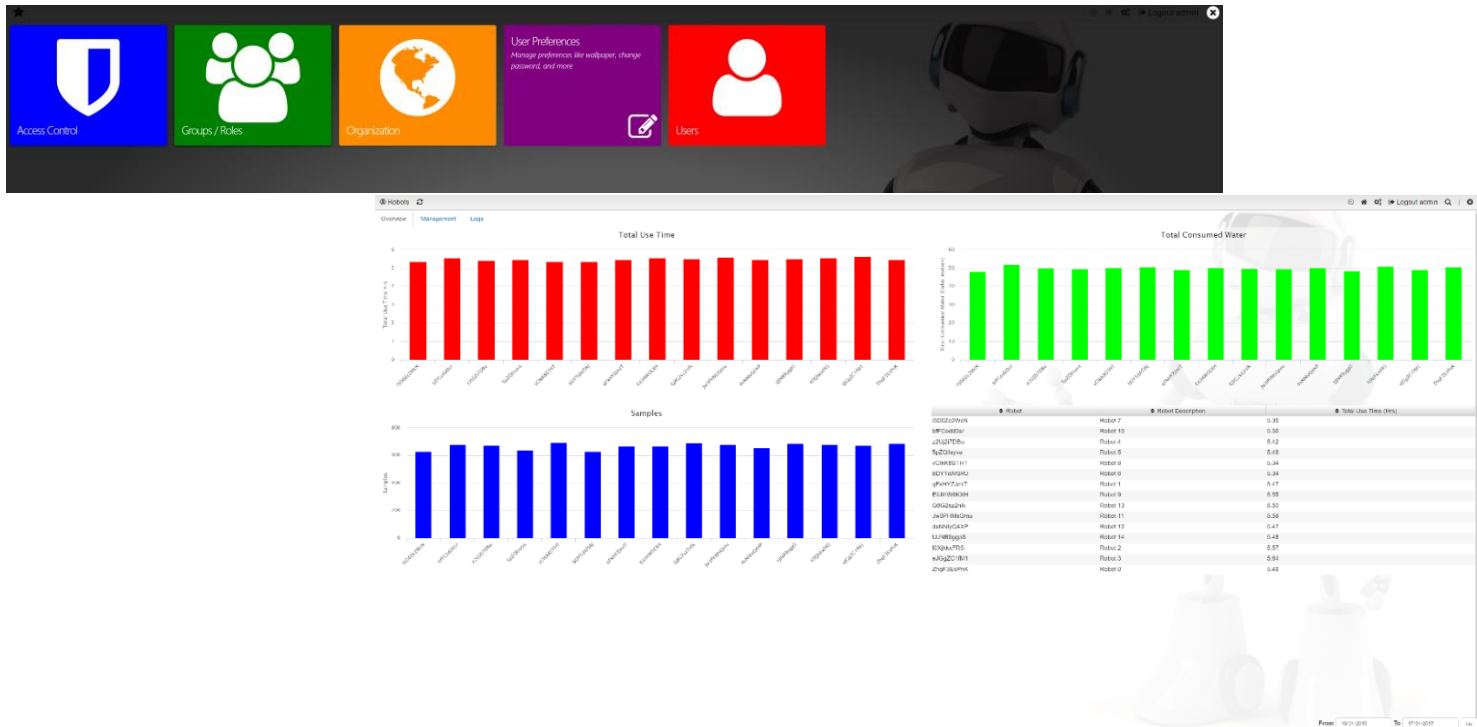
The docking station

The robot can connect to a docking station for regular, automated maintenance. In this way, human intervention is minimized and longer autonomous missions can be executed. The docking station allows: battery recharging, cleaning solution refill, emptying wastewater tank, cleaning wastewater tank.
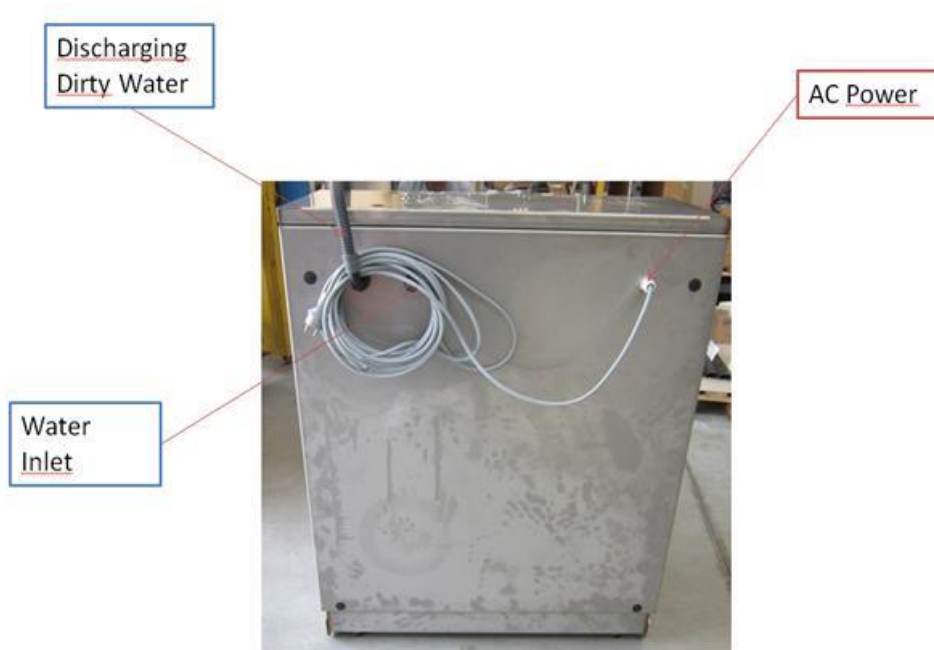
Operation description

What do I need to do before starting a FLOBOT mission?

- A cleaning mission needs to be setup, using the tablet App. This basically consists in selecting the map of the area, indicating the sequence of the zones to be cleaned and the starting time for the mission.

- The robot needs to be on the docking station or in one of the pre-selected initialization points before the mission can be launched. If the robot is not in one of these points, the operator must manually drive it there (using the App or the joystick)

- The mission will start on the scheduled time
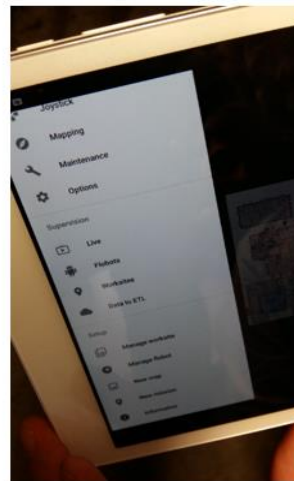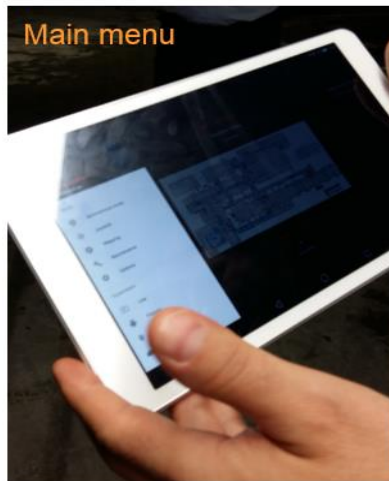
Operation description

What do I need to do before starting a FLOBOT mission?

- If needed, the data can also be uploaded on the Data Management system

Global ERP interface

Functions

Setting mode
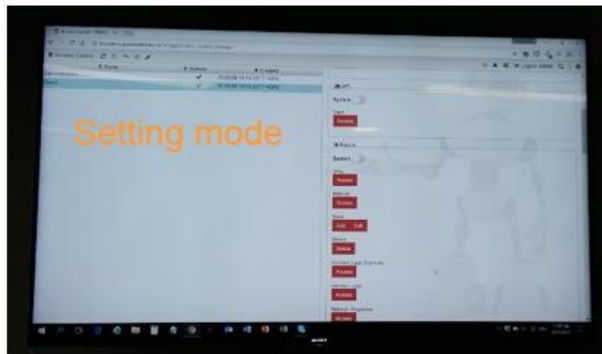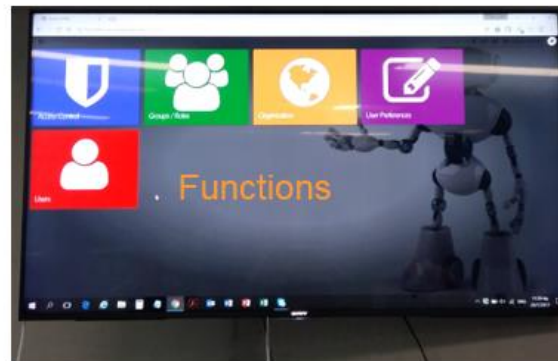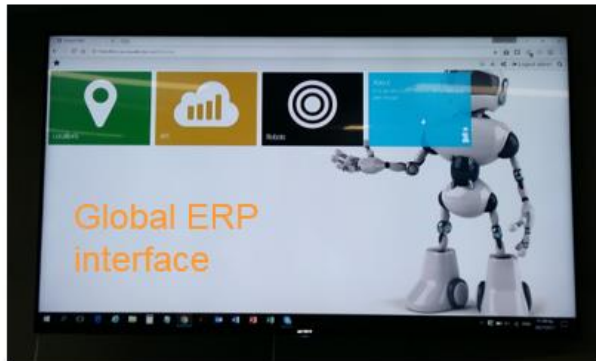
FLOBOT validations/demos

- We are currently in the process of validating/demonstrating the FLOBOT in real-world scenarios

- Four pilot sites have been selected:

  - Lyon airport and DHL warehouse in France

  - Carrefour hypermarket in Carugate (Milan) and Imola hospital in Italy

- Feedback is being collected for improvements (happy to have yours as well!)

- Project ends the research phase this month

- Plans for commercial exploitation are being prepared
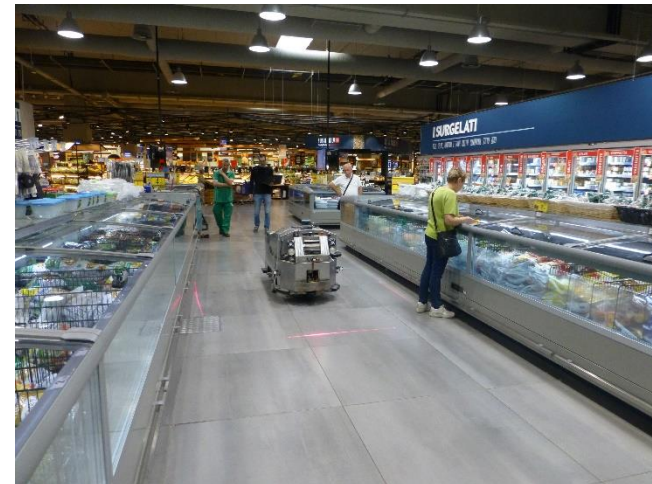
Thank you!

For more information: www.flobot.eu