INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES TOULOUSE

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The Good Boy

A robot designed to assist rescuers

The General team

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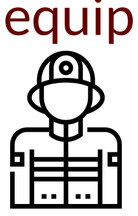
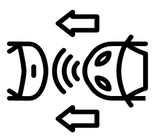
1 Objectives

The weight of complete equipment for firefighters or rescuers is heavy and sometimes complicated to carry. To facilitate transport, one idea is to use a robot to carry the equipment. Our project is to develop a robot which is capable of following a rescuer.



Follow me

Follow a rescuer wearing white clothes at a distance of 2 metres.

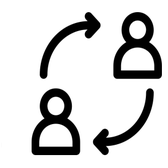


Outch

Detect and avoid collisions.

You shall not pass!

Stop or go after a signal from the rescuer.



See with him/her

Follow another rescuer after a signal from the currently followed rescuer.

I'm lost!

Detect a loss and alert the rescuer by sending a picture of its environment.

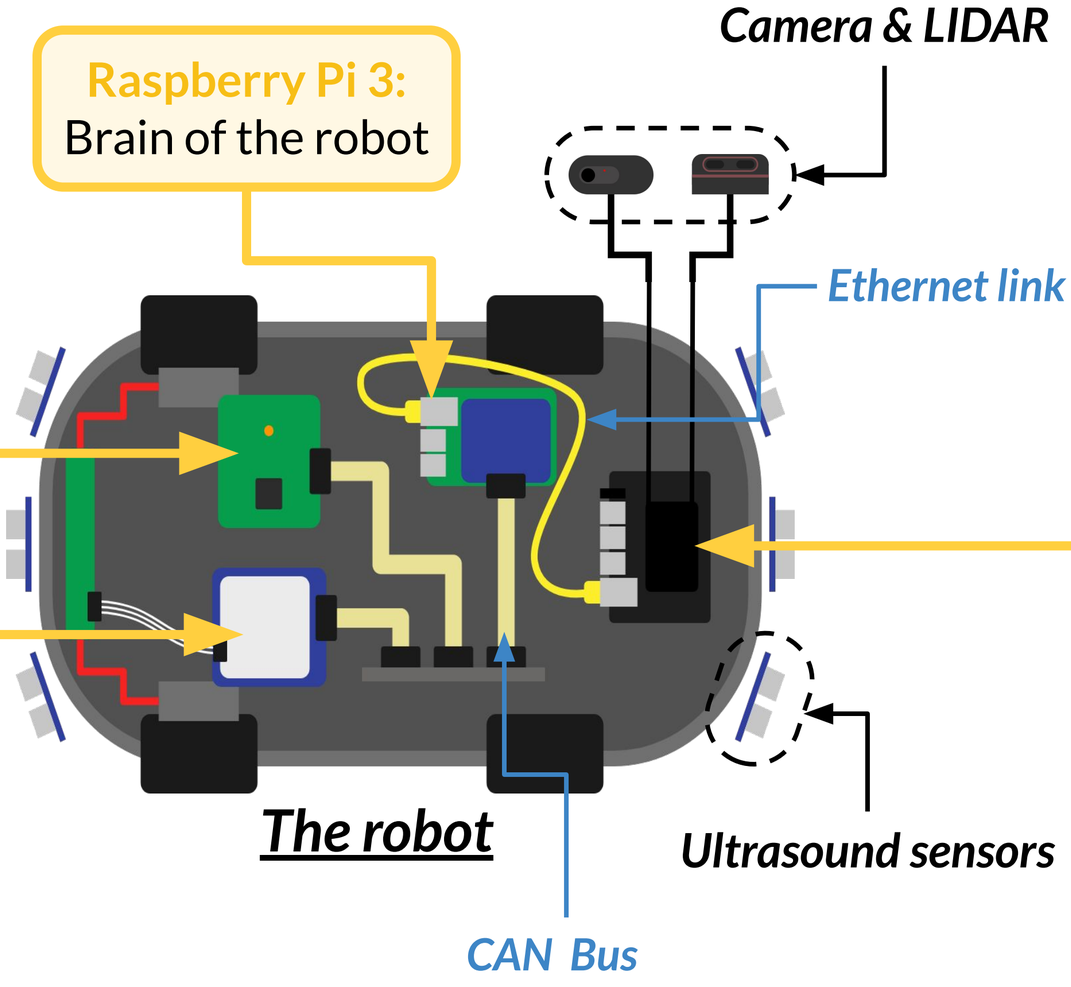
2 Design

System and Technological choices

Discovery card:
Processes the ultrasound data for obstacle detection

Raspberry Pi 3:
Brain of the robot

Nucleo card:
Controls the motors for speed and steering



Jetson Nano:
Processes the camera and LIDAR data in order to be able to follow the target

Scan me!

Our Website

Tools used

GitHub · Google Drive · STM32 Cube · python · OpenCV · Visual Studio

3 Results

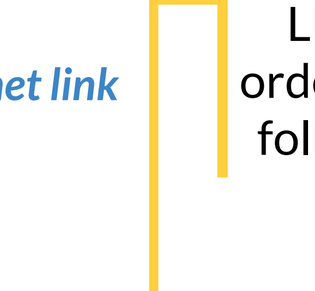
- Identification and follow-up of a rescuer by using camera and LiDAR
- Signs (red square and triangle) recognition:

Refocus the target on the square

Stop or go depending on the current state

- Obstacle detection and collision avoidance
- Position controlled by PID command law
- Lost detection, publication of a message and a picture on a web server

Work organisation



Based on the Agile method, our work is split into several Sprints. We delivered a functional version by the end of each one.

Possible improvements

- Send the robot location using GPS when it is lost in addition to the image
- Make the robot move faster
- Improve the PID controller
- Use a higher resolution camera

Thanks to our tutors, Yassine Ariba, Didier Le Botlan and Barbara Moore!

Any question? → touchais@insa-toulouse.fr