The Good Boy!

Sprint 2 Review

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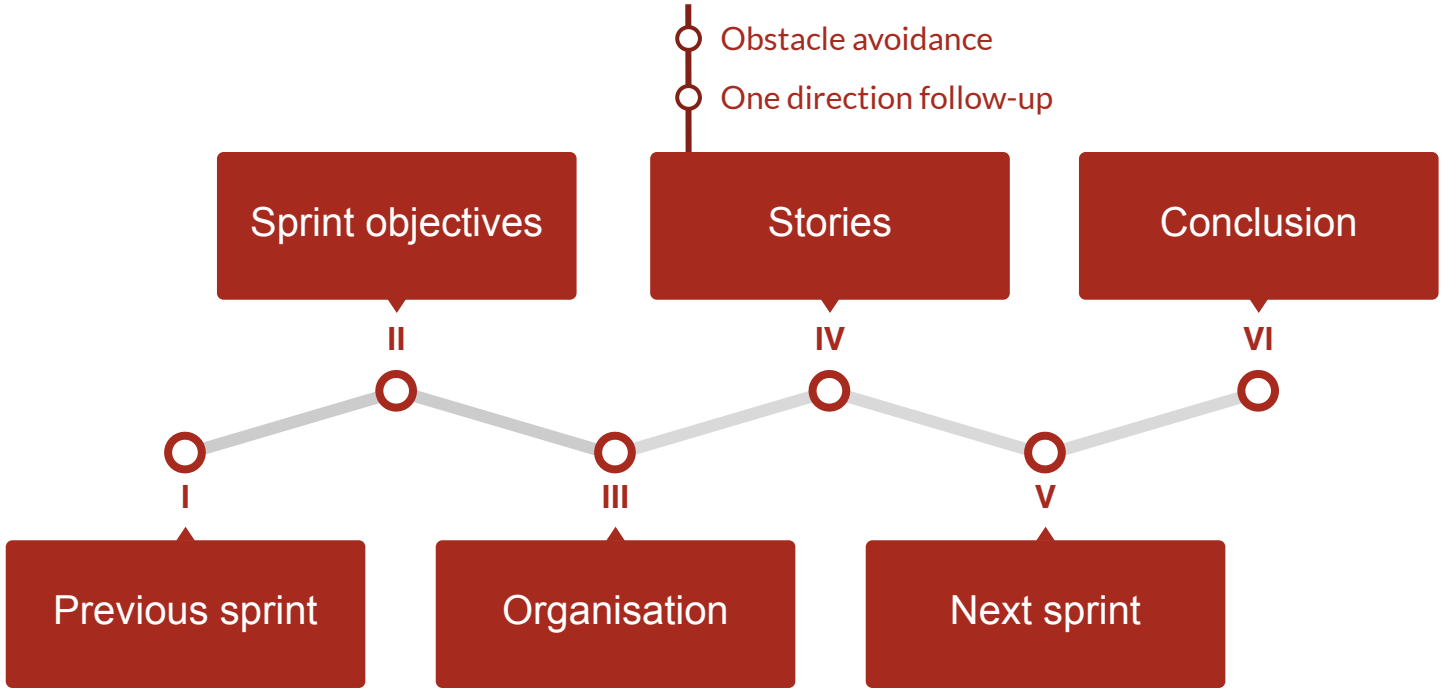
“The General” Project Team : Odran Brisset, Fabien Castilla, Ghizlane Dligui, Léa Pitault, Célestin Rongère, Julien Touchais

SUMMARY


Obstacle avoidance
One direction follow-up
Sprint objectives
Stories
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Previous sprint
Organisation
Next sprint

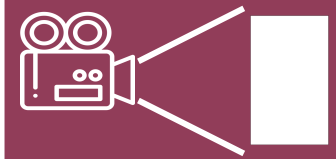
Previous sprint

Manual control

It is possible to make the robot **move forward, backward and turn** using **manual commands**

Ultrasounds detection

The ultrasounds detection is functional : the robot can **detect an obstacle** but it doesn't react to it



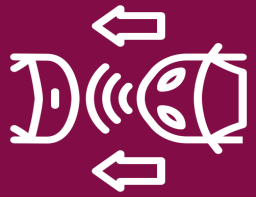
Camera detection

The robot is able to detect a person **dressed in white** on the camera, but it sometimes mistakes white elements as people

Sprint 2

- Sprint objectives
- Organisation

Sprint objectives

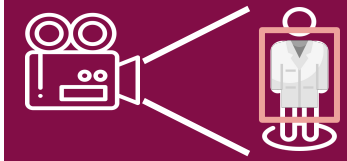


Obstacle detection

Placed in a open area (no objects nearby), **the robot stops** when an **obstacle** is detected at a distance of **50 cm or less**.

One direction follow-up

Placed in an open area, the robot **follows a person in front of it** at a distance of **two meters**, in a **straight line**.

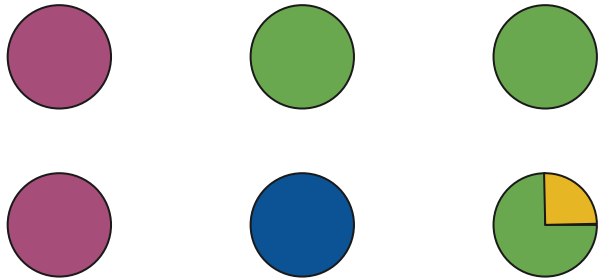


Detection of people dressed in white

The robot is able to detect a person **dressed in white** on the camera, and to **differentiate it** from another white object.

Organisation

- **Group organization** (each dot represents a team member)



Legend

Ultrasounds
LIDAR
Camera
Server

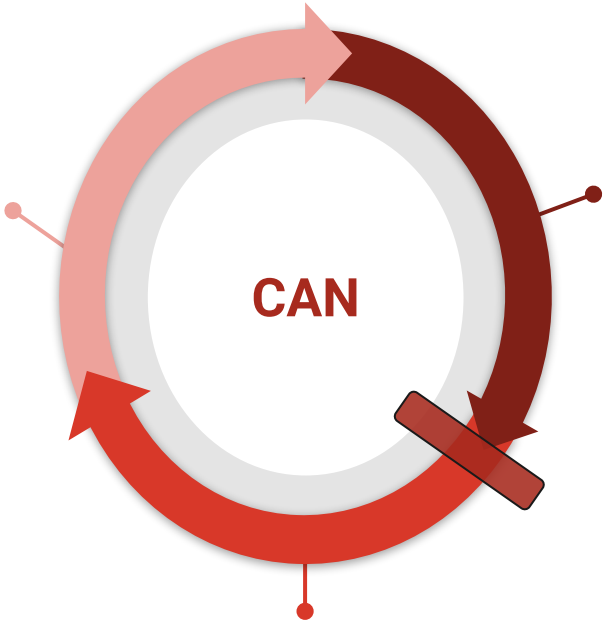
Stories

- Obstacle avoidance
- One direction follow-up

Obstacle avoidance

2 - RASPBERRY PI

Receive data from the Discovery & send data to the Nucleo



3 - NUCLEO

Receive interruptions from Raspberry Pi

1 - DISCOVERY

Send distance to Raspberry Pi

Obstacle avoidance

Message frame sent by the Raspberry Pi:

cansend	can0	ID#	Left speed	Right speed	Direction speed	Position

Ex: **60** = 3C = 1011100
1**1011100** → **BC**

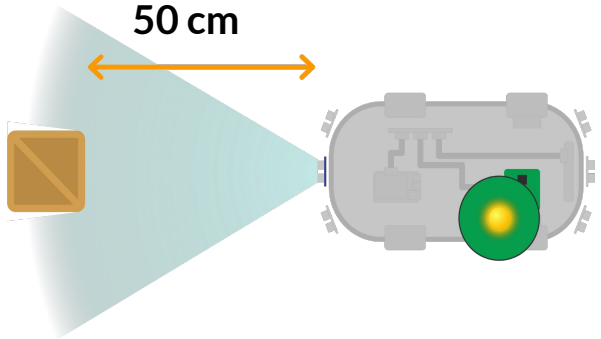
enable	1	0	1	1	1	0	0

Hex

Bin

If distance > 50 → Move forward

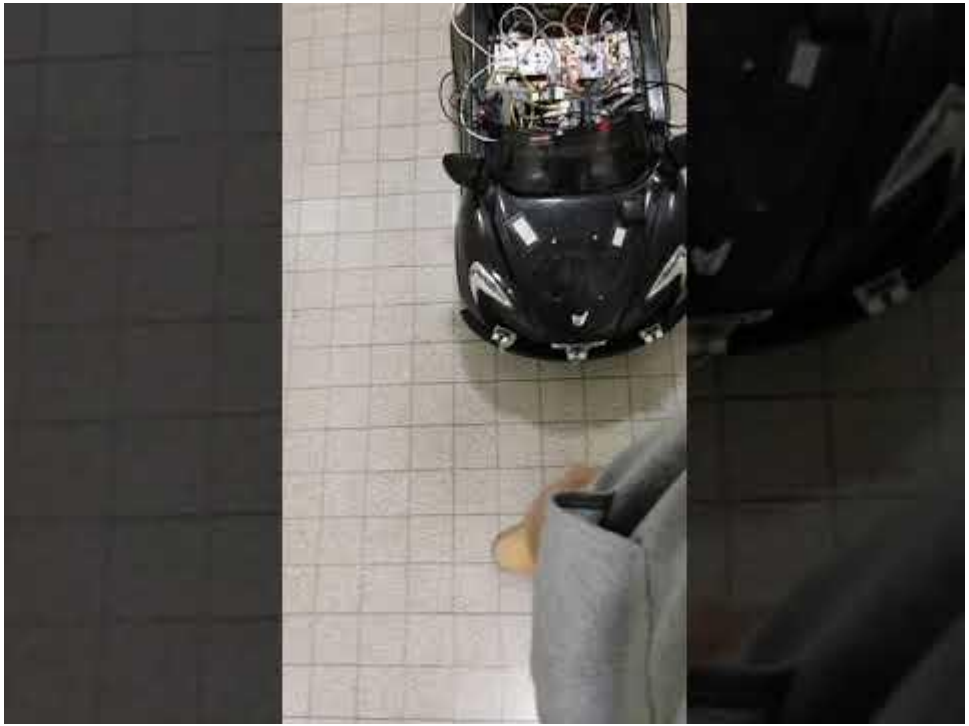
If distance < 50 → Stop !



Obstacle avoidance

Demonstration

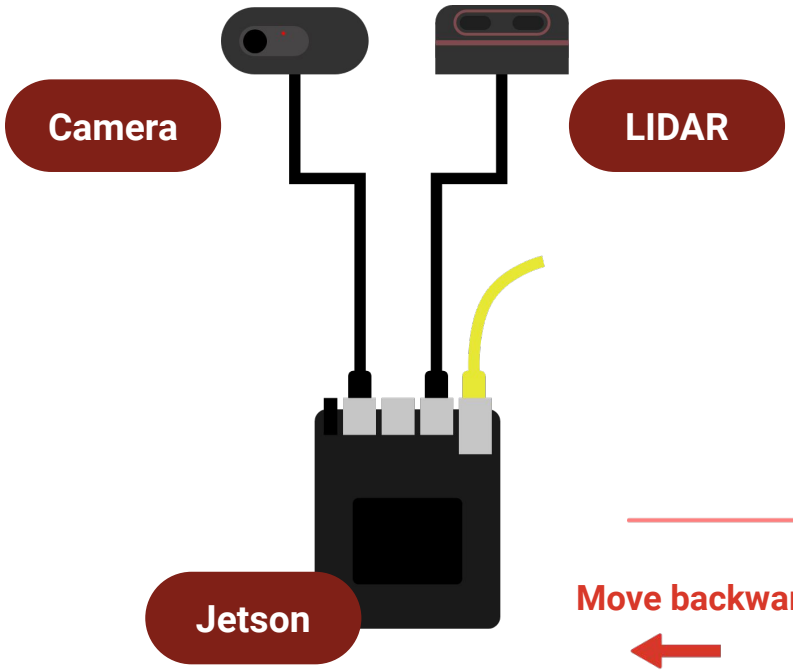
The robot will stop when an obstacle is placed in front of it at less than 50cm



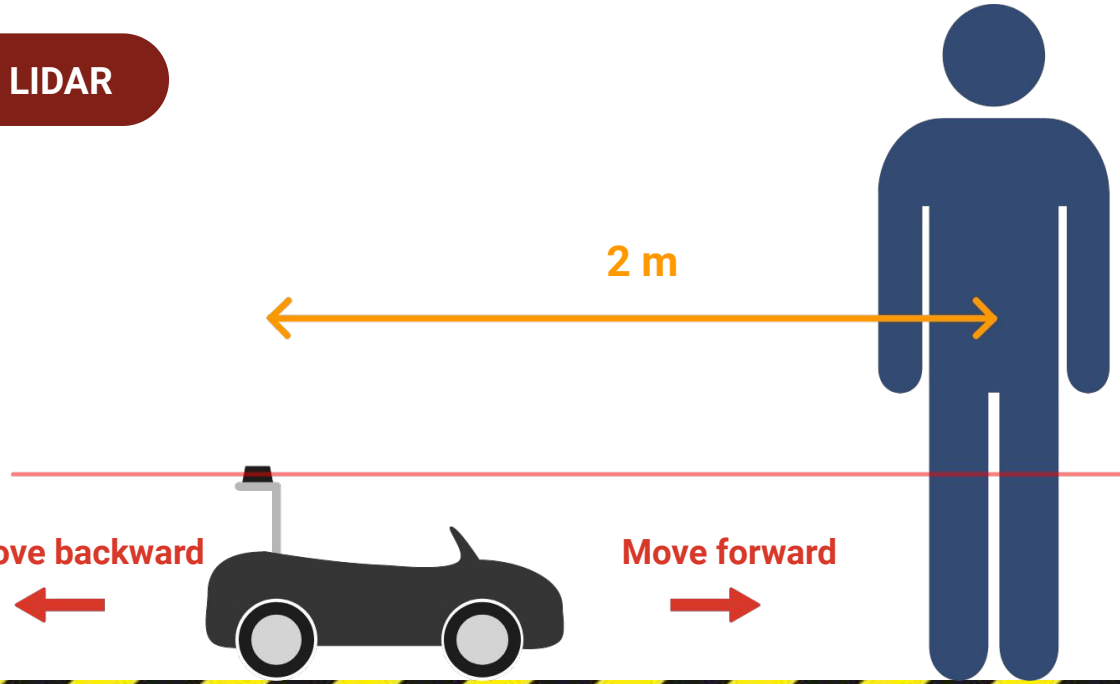
Demo - Avoid an obstacle: https://youtu.be/IYHnp5NiTsQ

One direction follow-up

Lidar



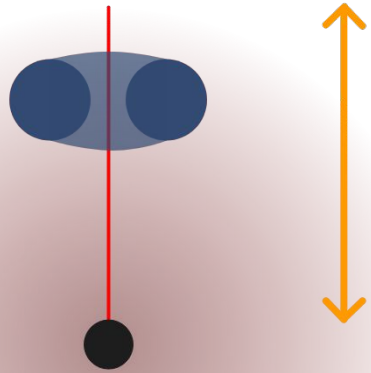
Follow somebody at 2 meters in one direction



One direction follow-up

Lidar

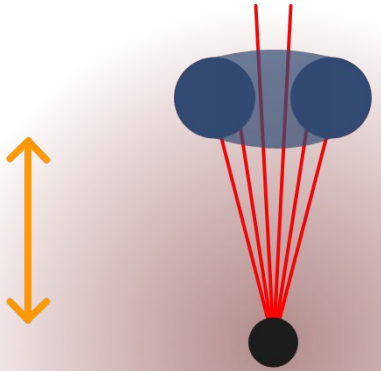
One angle



UNDETECTED

Measured distance

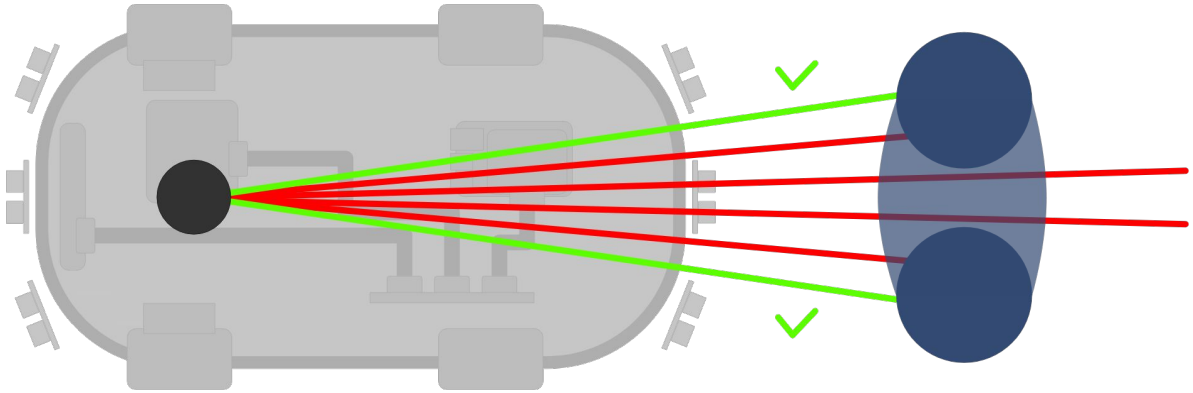
Several angles



DETECTED

One direction follow-up

Lidar



Minimum distance

lidar.cpp

Start LIDAR;

Get LIDAR's measures;

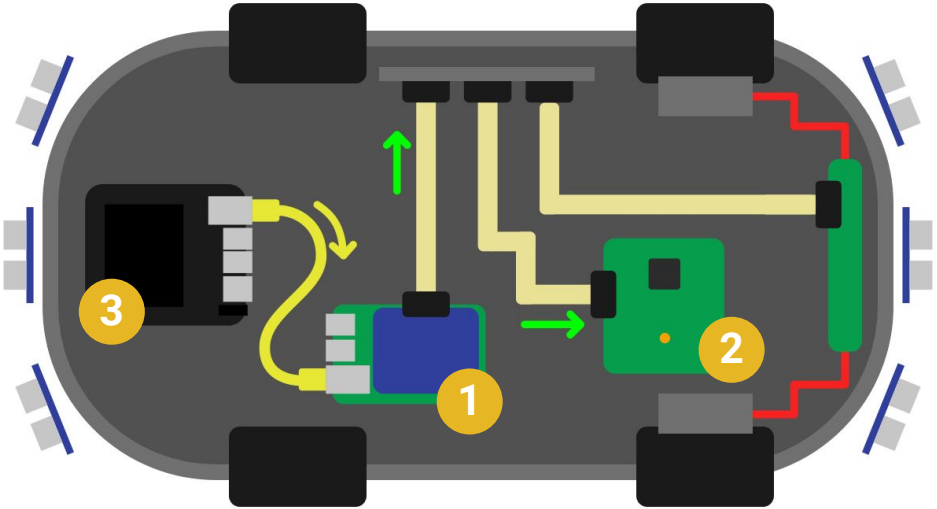
Check desired LIDAR's angles;

Choose the minimum distance associated;

Send it to the Raspberry Pi via ethernet;

One direction follow-up

Server



Ethernet link : Distance data from Jetson (Lidar)

CAN bus : Control motor commands

1	Raspberry Pi
2	Nucleo
3	Jetson

One direction follow-up

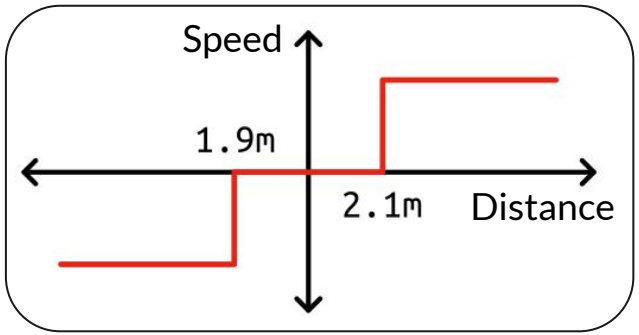
Server

Python script running on **Raspberry Pi**

Listen on Ethernet link for distance (from the Jetson)

Compare with thresholds and compose motor command CAN message accordingly

Send message on CAN bus



`d > 2.1m` → `'Go forward'`

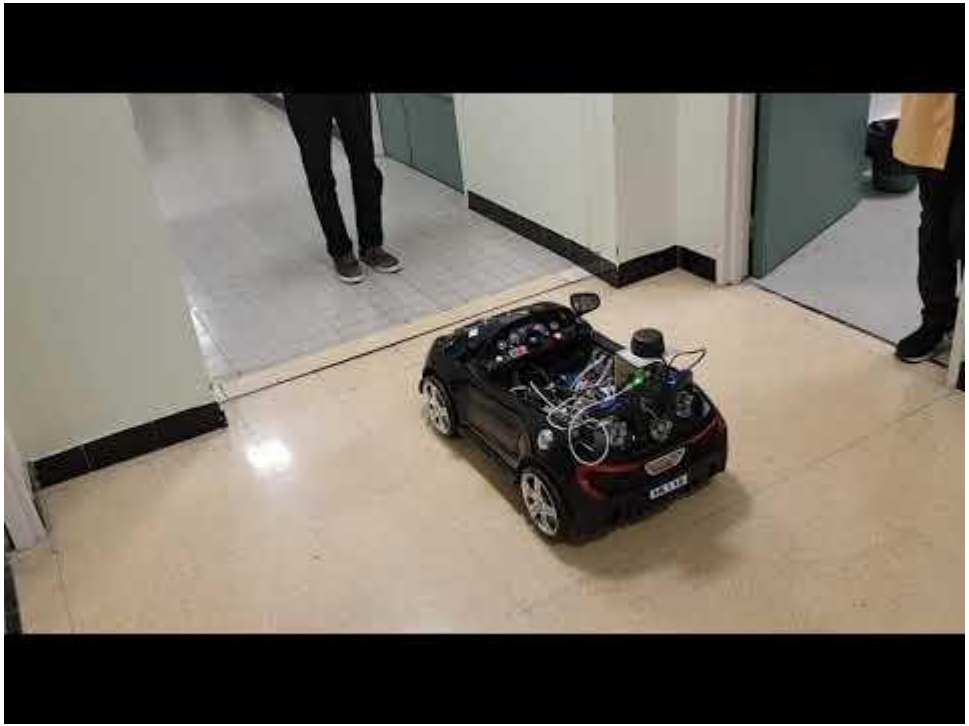
`1.9m ≤ d ≤ 2.1m` → `'Stop'`

`d < 1.9m` → `'Go backward'`

One direction follow-up

Demonstration

The robot will follow the closest target in front of it at 2 meters



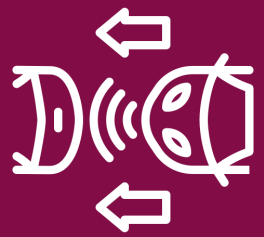
Demo - Following a target: https://youtu.be/jsxoynui_As

Sprint 2 → Sprint 3

Next Sprint

User-oriented objectives

Postponed from this sprint



Obstacle detection

Combine the **obstacle detection** using ultrasounds with the **follow-up functionality**

Next Sprint

User-oriented objectives

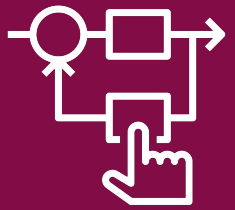
New in next sprint

Identification and follow-up of a rescuer

Placed in an open area, **identifies and follows** a rescuer using both **camera and LIDAR**, both in a **straight line** and **turns**

Trajectory control

Establishment of a **control law** using a **PID** for the speed and trajectory of the robot



Conclusion

- Better anticipation from the previous script
- Most expectations reached, delay from previous script caught up
- Functionalities still not centralized

- Optimization of the functionalities, with a command law approach
- “Follow Me” feature functional
- Client feedback ?

Sources

- Flaticon.com:
  - p.20: https://www.flaticon.com/authors/berkahicon
  - p.1, 4, 7, 19, 21: https://www.flaticon.com/authors/freepik
  - p.21: https://www.flaticon.com/authors/surang