The Good Boy!

Sprint 4 Review

01/04/2022
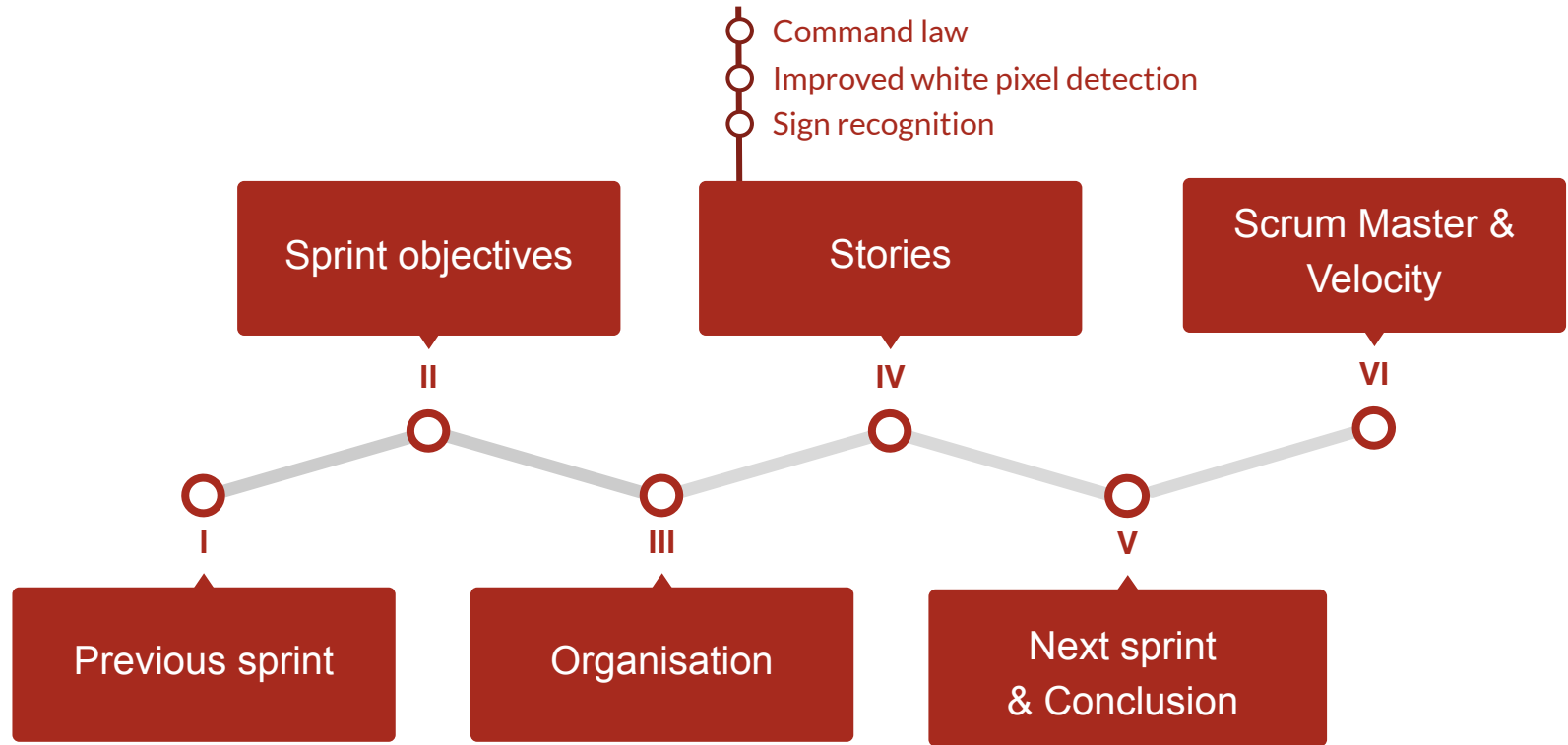
Happy New Year ! 2022

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

SUMMARY

○ Command law
○ Improved white pixel detection
○ Sign recognition

Sprint objectives

Stories

Scrum Master & Velocity

II

IV

VI

I

III

V

Previous sprint

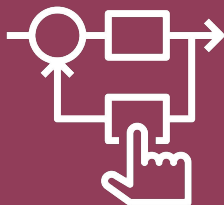**Organisation**

Next sprint & Conclusion

Previous 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 **Proportional controller** for the **speed** and **trajectory** of the robot

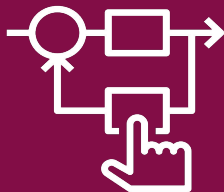# Sprint 4

- Sprint objectives
- Organisation

Sprint objectives

Sign recognition

The robot must be able to **recognize two signs and to act upon them**, a red **square** to refocus on a target and a red **triangle** to stop

Trajectory control

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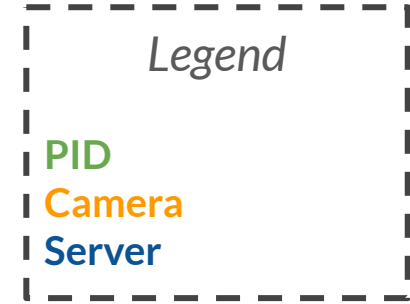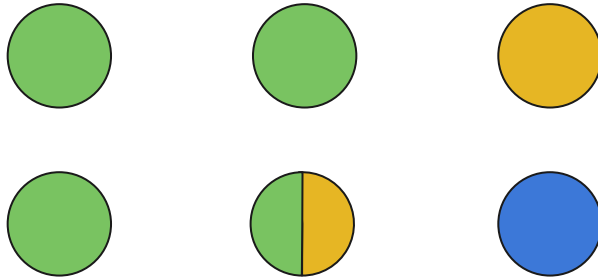
Basic server

Create a server and a web page so that the robot will later be able to upload its position and an image when lost

Organisation

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

Legend

PID
Camera
Server

Stories

Command Law M

Improved white pixels detection S
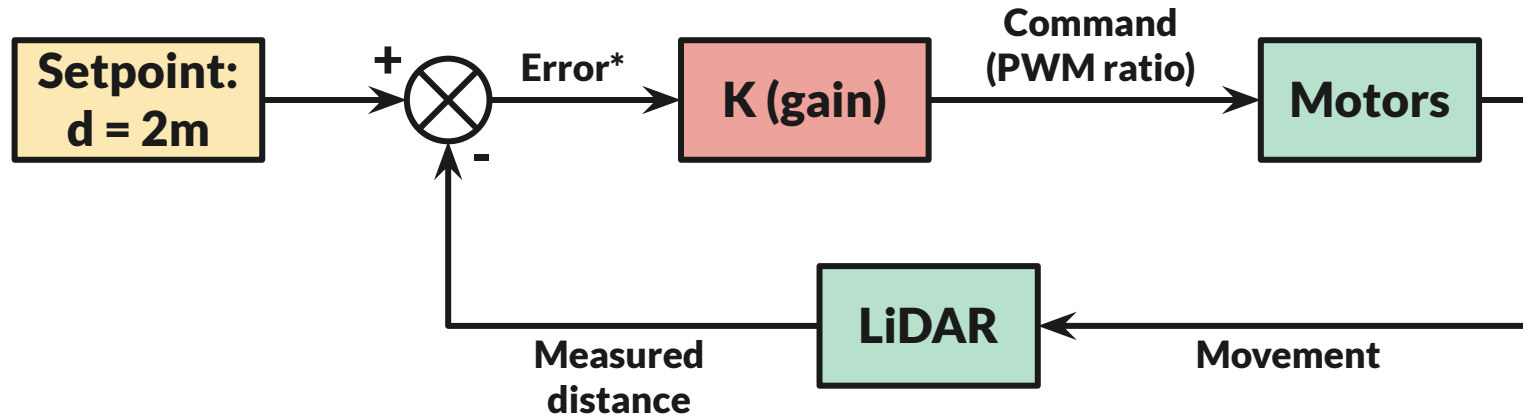
Sign recognition M

Basic server S

Command Law

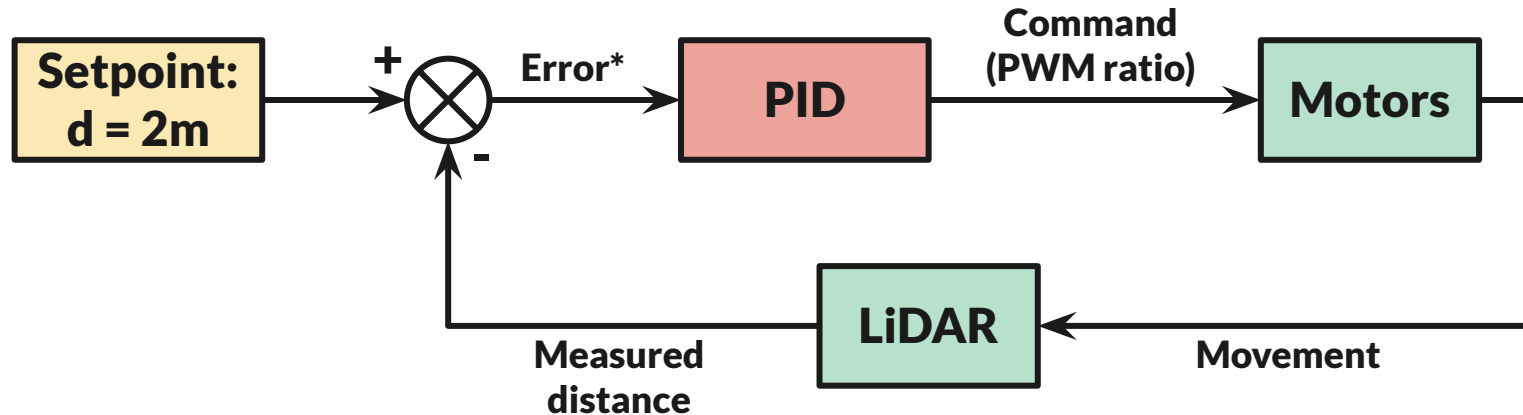## Previously...

Proportional command law

*In this context, the error is the distance between the setpoint and the measured value
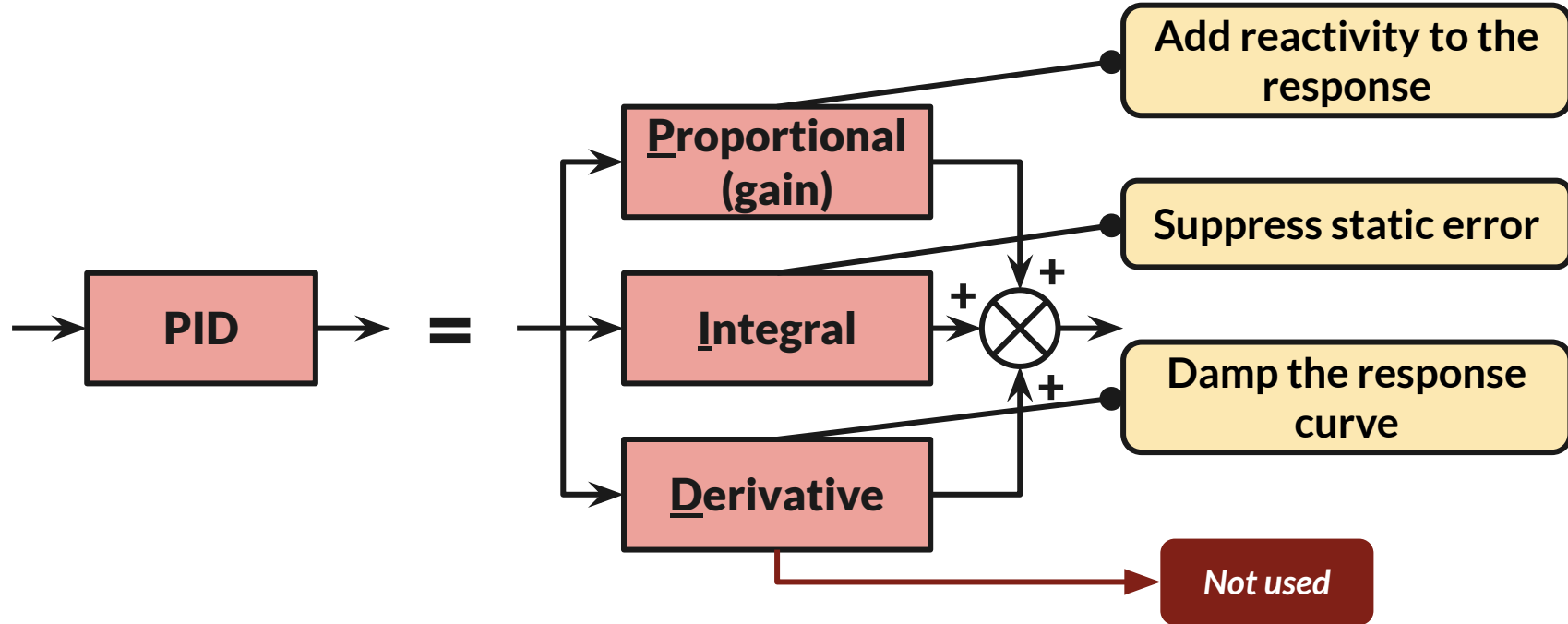
Command Law

And now

PID controller

*In this context, the error is the distance between the setpoint and the measured value

Command Law

Principle

PID =

- **Proportional (gain)** → Add reactivity to the response
- **Integral** → Suppress static error
- **Derivative** → Damp the response curve
- *Not used*

Improved white pixels detection

Basic white pixels detection

Threshold on a grayscale picture

+

Edge detection

Detect variation of color on a picture to draw edges on it

→

Combined image

Logical AND between the two image to get a white pixel detection that can differentiate a white object from its background or another one
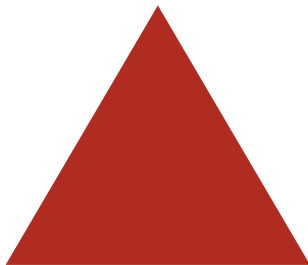
Improved white pixels detection

Sign recognition

Red square

Look for a target around the sign

Used to refocus on a target

Red triangle

Stop and go

Sign recognition

| Red pixels detection | Find squares and triangles | Act upon the found signs |

We apply a threshold to keep only pixels within a chosen range of values per color channels (red, green blue)
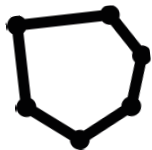
Red : 70 - 255

Green : 0 - 80

Blue : 0 - 80

Sign recognition

Red pixels detection | **Find squares and triangles** | **Act upon the found signs**
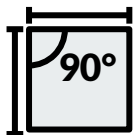
We look for polygons on the picture.

We ignore small polygons (noise).

We sort them by their number of vertices. By doing that, we can find triangles.

For squares, we also check for the angles between vertices and we check the length of the vertices to ignore rectangles

Sign recognition

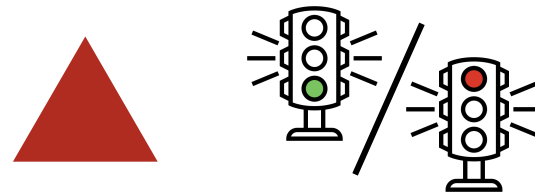| Red pixels detection	Find squares and triangles	Act upon the found signs

Red square

Update the position of the target to the position of the detected square

Red triangle

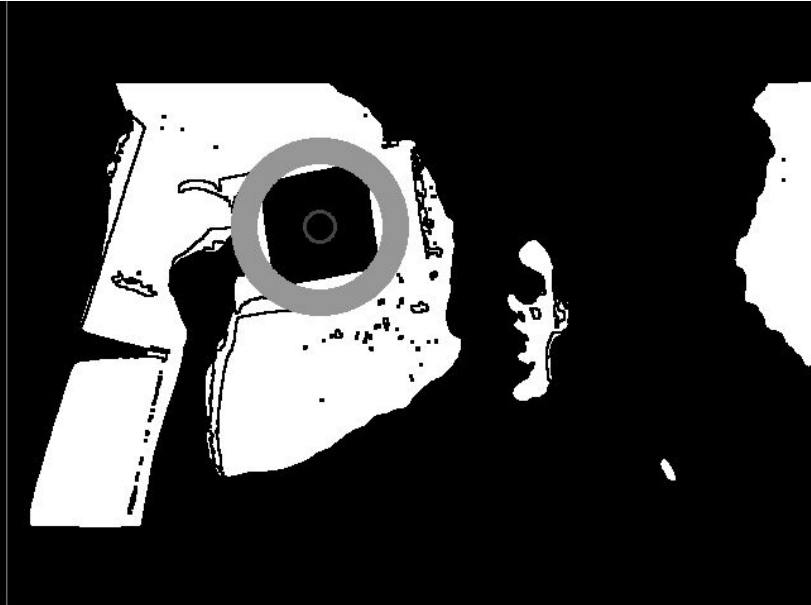**Stop or go depending on the current state**

Sign recognition

Red pixels detection   **Find squares and triangles**   **Act upon the found signs**

Sign recognition and white pixels detection

Tests

- The test will be done on a laptop

- A white object will be shown in front of the camera of the laptop, the program should follow this object

- A square will be shown in front of the camera of the laptop, the program should look for a new target around the square

- A triangle will be shown in front of the camera of the laptop, the program should print "STOP" in the console. It must wait 3 sec between each triangle detection.
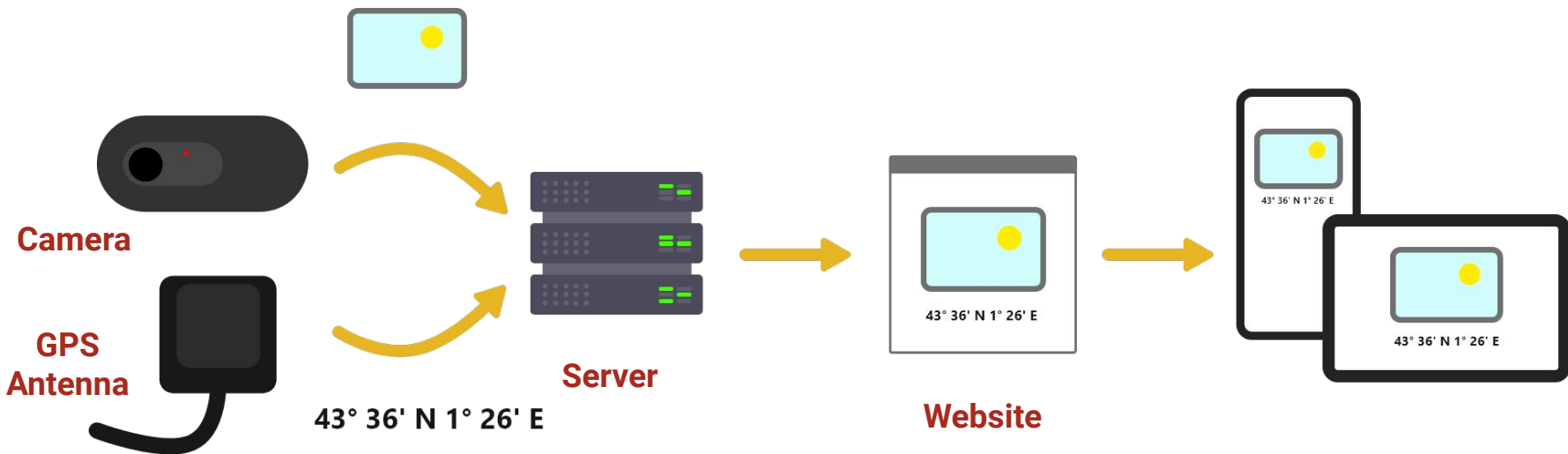
Demonstration

Lost detection and information sending

No detection for more than 30 seconds = ROBOT IS LOST !!!

Camera

GPS Antenna

43° 36' N 1° 26' E

Server

43° 36' N 1° 26' E

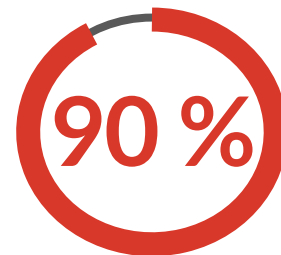Website

43° 36' N 1° 26' E

43° 36' N 1° 26' E
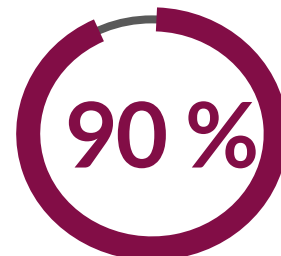
Objectives completion

Sign recognition

The robot must be able to **recognize two signs and to act upon them**, a red **square** to refocus on a target and a red **triangle** to stop
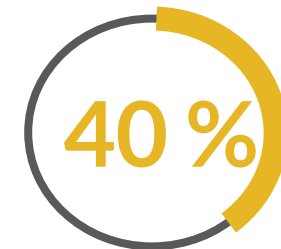
90 %

Trajectory control

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

90 %

Basic server

Create a server and a web page so that the robot will later be able to upload its position and an image when lost

40 %

Sprint 4 → **Sprint 5**

Next Sprint

User-oriented objectives

Postponed from this sprint

Sign recognition

Find better settings for the shape detection

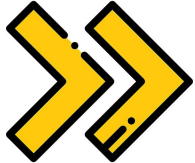**Find better settings for the PID controllers**

Trajectory control

Lost detection and information sending

Conclusion

- A better time optimization among our team member
- An effective sign recognition
- A PID Controller instead of a simple gain

- Complete each task 100 %
- More tests to fully approve implemented features
- Clean and harmonize the code

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Scrum master time !

Tasks

Fixing objectives at the first meeting

Distributing tasks and roles

Collaboration between teams and helping each other

Velocity evaluation :

Velocity

Forcast (%)   Actual (%)