

ROBOTICS PROJECT

on

Autonomous Driving of Turtlebot3

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Problem Statement

- This project focuses on elementary of turtlebot3 self-driving, which drives between two detected lanes;
- The project is to solve an autonomous driving lane tracking challenge; and
- All steps taken were described in [Turtlebot3 emanual.robotis.com](http://emanual.robotis.com).

Project Execution

Requirements:

- **TurtleBot3 Burger**
- A **stationary PC**, connected to the TurtleBot3 running **Ubuntu 18.04**
- Camera - **Raspberry Pi ‘fish-eye’ camera**
- **ROS_AutoRace_2020** and **dependent ROS packages** were installed by cloning this [Github TurtleBot3 AutoRace](https://github.com/TurtleBot3/AutoRace)

Project Execution

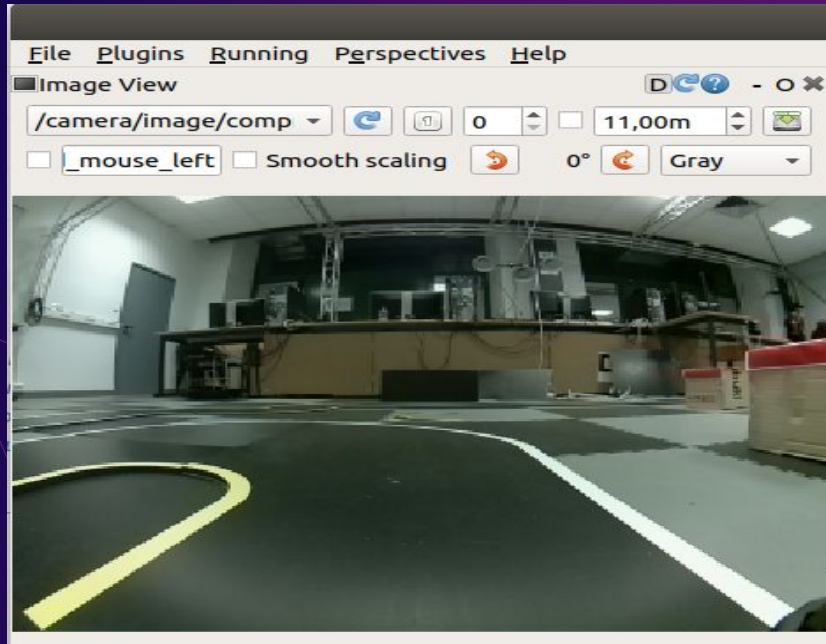
Architecture:

- Camera calibration:
 - Camera Imaging Calibration
 - Intrinsic Camera Calibration
 - Extrinsic Camera Calibration
- Lane Detection.

Project Execution

a. Camera Calibration

- Camera Imaging Calibration



```
camera:
ISO: 963
awb_mode: auto
brightness: 57
contrast: 6
exposureCompensation: 0
exposure_mode: auto
hFlip: false
saturation: 83
sharpness: 41
shutterSpeed: 25000
vFlip: false
videoStabilisation: false
zoom: 1.0
```

Project Execution

- Intrinsic Camera Calibration

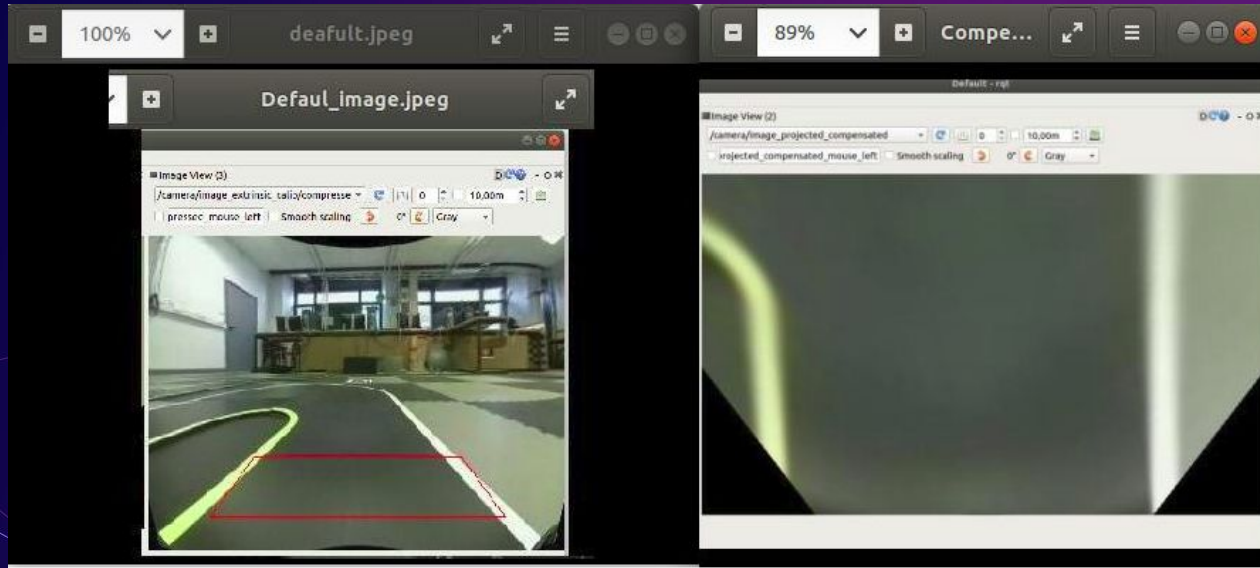


Undistorted Checkerboard



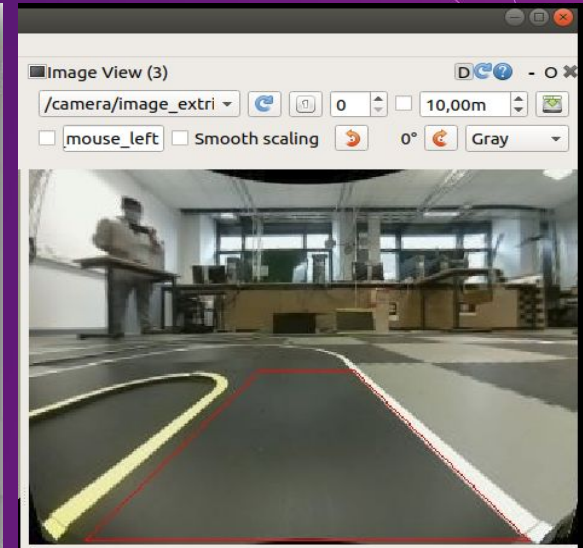
Project Execution

- Extrinsic Camera Calibration



Default

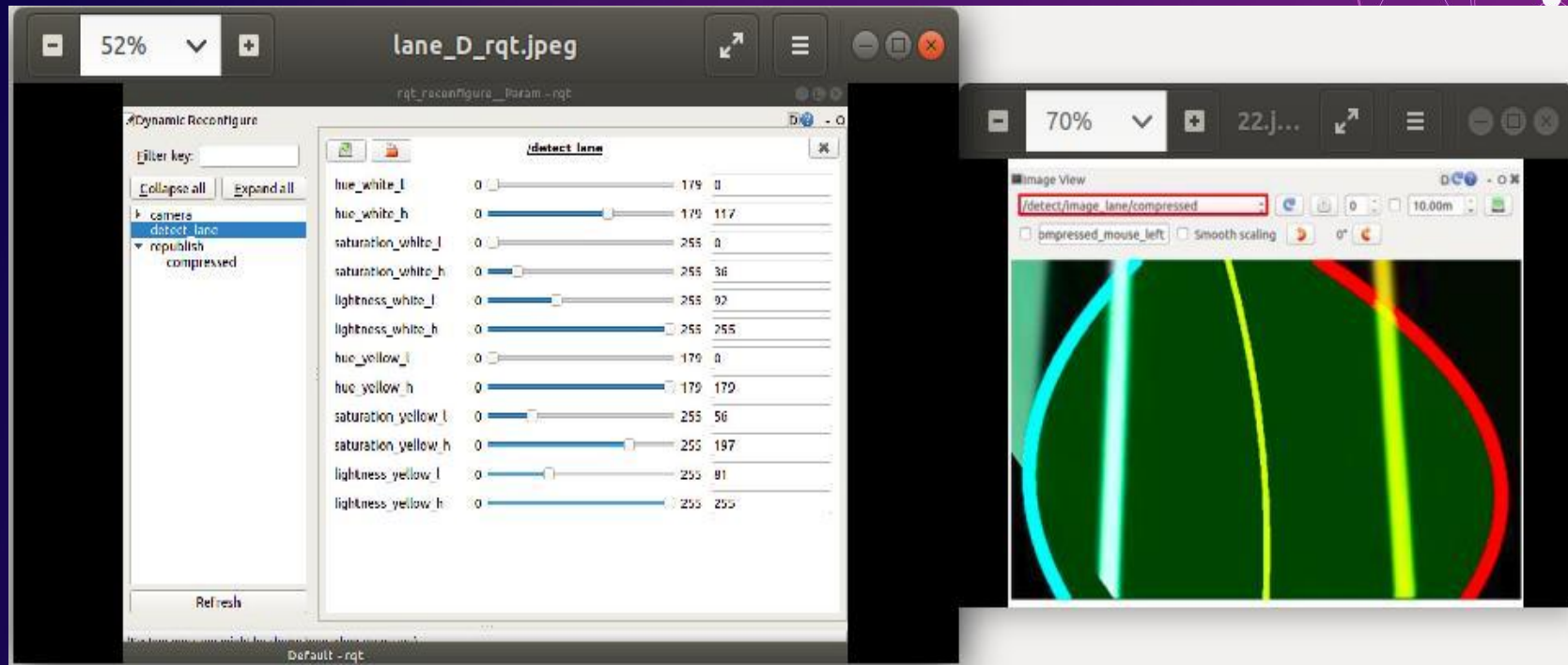
Compensated



Modified

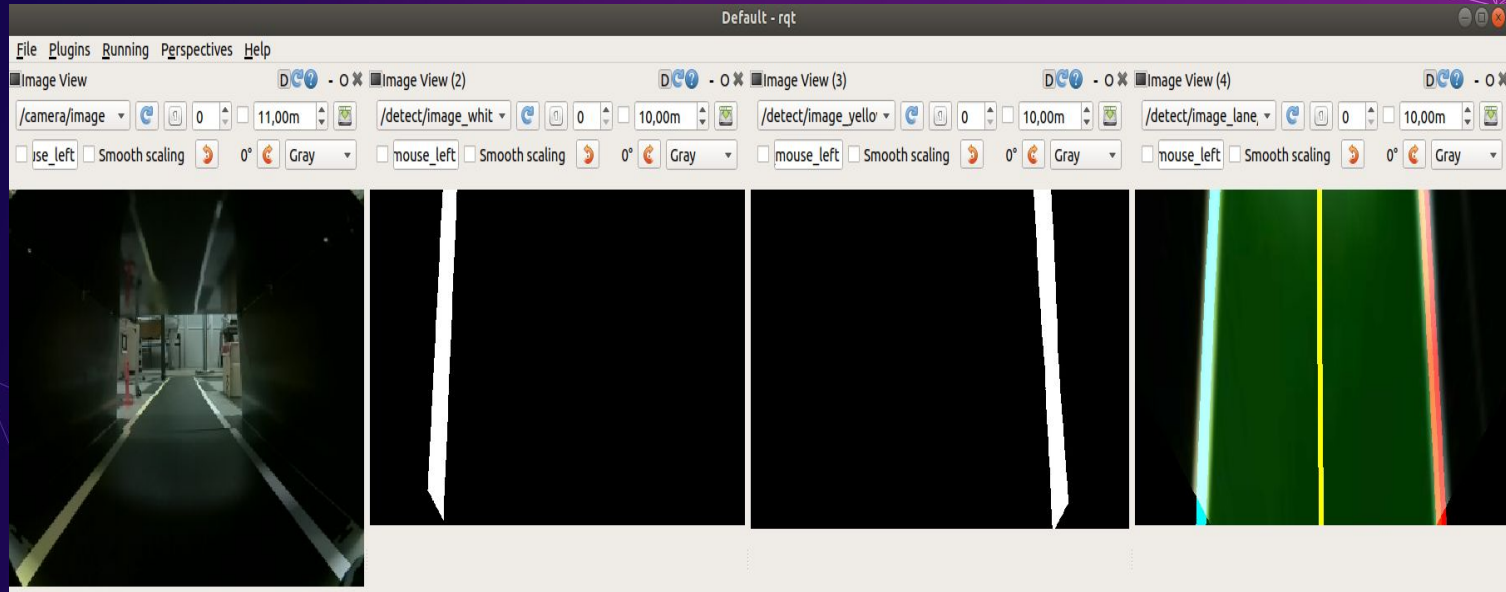
Project Execution

b. Lane Detection



Project Execution

b. Lane Detection



Result

5 Demo



Conclusion

- and the project focuses on driving the robot without external force by detecting two lanes
- The major limitation was the effect of environment light intensity.
- Our long time goal is to complete the traffic light detection and work further on other mission on the TurtleBot3-Aurora.

Reference:

- https://emanual.robotis.com/docs/en/platform/turtlebot3/autonomous_docking_manual/

The background is a solid purple color. In the top right corner, there is a complex network of thin white lines connecting several small white dots. In the bottom left corner, there is a similar but less dense network of white lines and dots. The text "Thank you for your attention!" is centered in the middle of the slide in a large, bold, white sans-serif font.

**Thank you for your
attention!**