# 1 Introduction

This is the 3rd report of team ATROTON for the Bosch Future Mobility Challenge 2025. In this report we are going to cover the activities that were prepared during the last month and what we are looking to accomplish till the next report.

# 2 Planned activities

In this part of the report, we are going to enumerate all of the planned activities for this period and specify the members for each activity.

**Vehicle Perception & Control:**

- Lane Detection
- Intersection Detection
- Traffic Signs Detection
- Traffic Lights Detection
- Parking
- Path planning

**External activities:**

- Track Setup

The past month we had some difficulties with our exams and didn't work on the car that made us take a setback

# 3 Status of planned activities

**Intersection Detection**
Status: Ongoing
Implementation: This is still under development, we are looking into ways to implement it. We've been thinking about using the horizontal lines that procced the intersection or using a state machine algorithm for our goal.

Difficulties: So far this topic is in the research state yet so we don't have any difficulties that have occurred during the implementation.
**Lane Following and Steering/Speed Control**
Status: Complete
Implementation: The car can stay in lane and take turns
Difficulties: We don't have the track yet. The tests for the algorithms are tested on a temporary track.
**Traffic Lights & Signs Detection**
Status: Complete
Implementation: Both traffic lights and signs are being detected by our model that we trained with YOLO8s in ROBOFLOW, but we haven't implemented it in rpi to detect any of them in real time.

Difficulties: We don't have the signs in real time for some testing

**Track Setup**

Status: Ongoing

Implementation: We have found a printing company for the track and have positive answer for printing on the pool liner with uv printing. We also made contact with the pool company to get price for the material and awaiting their response. We expect a response by Wednesday 19th Feb. In the meantime we are making a vector image of the test track for the print.

Difficulties: At this time we have solved all problems regarding the track.

**Path planning**

Status: Ongoing

Implementation: We are currently working to make the path planning with different algorithms.

Difficulties: It needs further improvement and proper testing with the real track.

**Parking**

Status: Ongoing

Implementation: We are working to make a static approach to parking when detecting the parking sign.

Difficulties: We don't have the track to test some of the first algorithms

**Localization**

Status: Ongoing

Implementation: We are working on utilizing the imu to extract the vehicle coordinates and researching ways to fuse the gps coordinates with the imu coordinates, to compensate for the imu drift.

Difficulties: No difficulties yet.

**Pid controllers**

Status: Ongoing

Implementation: we are working on a pid controller for the steering and the speed for a smooth ride.

Difficulties: no difficulties yet

# 4 General status of the project

So far, we have completed the lane following and the sign detection we are working on the path planning. Also we are looking into the parking and 3d printing the traffic signs. We are behind on the project plan but we are working on the car every day to catch up. The testing track will be printed in 2 weeks time. We are currently waiting on the materials from Germany.

# 5 Upcoming activities

The next steps are finishing the tasks that are still ongoing from this report and then moving forward on working on the upcoming activities that will be assigned according the previous ones to each member. For starters, the most important is setting the track and then the rest.

Perception:

- Lane Following improvement
- Intersection Detection & Navigation
- Parking

Vehicle Control:

- Path Planning Algorithm
- Finite State Machine Diagram
- Localization
- PID controllers