1 Introduction

In this report, we will describe our team and the initial steps taken in the competition we participated in. We will outline the activities planned at the start, the status of these planned activities, what we successfully completed, what remains unfinished, and the next steps to be undertaken.

First, we would like to introduce ourselves. We are IKA AusTorino, a team from Argentina, and we are very excited to be part of this competition. We are a group of friends from software engineering and industrial engineering.

As an initial focus, we will discuss our team's planning process, the effort to familiarize ourselves with the environment, and the details of the competition.

2 Planned activities

Regarding the activities planned at the start of the competition, there were several. Knowing that we had been accepted into the competition, we were aware that the car kit would take a few days to arrive. Therefore, we began by searching for materials to build, in the near future, the track where we would later carry out practices, line detection, and other related activities.

We planned to conduct a thorough review of the BFMC website to familiarize ourselves with it. This way, we could develop a clear understanding of where different topics are located in case we needed to refer to them.

Additionally, we planned how to approach the upcoming activities by reviewing the project status deliverables. Our goal was to execute some basic movements using the start-up code. Furthermore, as a team, we organized ourselves to attend the initial meetings, including the kick-off and the code explanation sessions.

We also considered, if time allowed, starting to research on image modification and enhancement within the code, autonomous navigation methods, path tracing, lane detection, signal interpretation, and algorithm training. Another focus was the utilization of nodes for guiding the car along its route.

It is also planned to familiarize ourselves with the car's components, identify any potential functionality issues, explore how to incorporate additional components, and possibly consider the placement of various components, such as the ultrasonic sensor.

To better understand, some roles we identified and proposed within the team are:

- Research: Entire team. General investigation and exploration of methodologies, tools, and techniques
- Control Systems: Ivan Otrowski.
- Software: Nicolas Mangini. Code development, debugging, and optimization for autonomous functionality
- Hardware: Juan Pittaro. Focus on hardware setup
- Environment: Nicolas Visintin. Train and test algorithms for lane detection
- Algorithm Trainer: Benjamin Vivanco. Train and test algorithms signal interpretation, and path planning.

- Documentation and Communication: Nicolas Visintin.
- System Integrator: Juan F. Pittaro. Integration of hardware and software components

Although these are some initial activities, as the research progresses, tasks will expand, and there will be interconnected support among team members to streamline learning, optimize time and efficiency. This approach fosters collaboration and teamwork.

3 Status of planned activities

Regarding the search for materials, tests were conducted using a cellphone camera to determine a material with low light reflection. This was done with a future focus on ensuring effective line detection and minimizing noise in the image. Below, we can see a comparison of light reflection:

With this material, we will conduct the first tests once the line detection phase begins. We were expecting to receive the car kit, but unfortunately, it has been delayed so we postponed the control of the car with the given start up code. Given this, we focused on what we could accomplish within the proposed activities. This involved advancing with research in various areas. We researched different methods for converting images to make decisions, building on a basic understanding and knowledge gained from some university courses. We proceeded to deepen and structure this information. This is an initial approach, and we have been attempting to modify an image and apply a series of filters, such as brightness threshold and gamma threshold, in order to control the different lighting conditions. We still need to complete an overview of autonomous navigation methods, path tracing, lane detection, and signal interpretation, which we will likely continue researching while we await the arrival of the car kit.

4 General status of the project

The current status is that we are in the research and deepening phase of the code. We are focused on understanding the communication between components, sensors, and decision-making processes with the Raspberry Pi.

We have not received the car yet, but we hope it arrives soon. There is still a need to further investigate and refine the ideas to be developed in the code.

5 Upcoming activities

For the next project status update, we aim to perform the initial configurations and control the car with the given start-up code, as well as gather input data from sensors and establish connections with actuators.