

1 Introduction

We received the car on December 11th at the Bosch Serbia participant event. Initial issues included a defective camera and wheel blocking, both of which were resolved by replacing the camera temporarily and servicing the mechanical parts. We also enabled remote access to the Raspberry Pi for off-site development.

Currently, we are working on communication with the simulated Traffic Communication server to transmit sensor data (IMU, speed) and improve image processing stability and framerate. The project follows the suggested structure, with task tracking via GitHub Issues and clearly defined milestones. Team morale is high, and we are using the Scrum framework while preparing to fully focus on the project after completing university obligations.

2 Planned activities

Project tracking is realized with [GitHub Issues](#) feature, relevant activities for this project status are listed below (*excluding smaller activities that are listed in the [3rd section of report](#)*):

| Task | Assignee | Type | Status |
|-------------------------------------------------------|-----------------|--------------------------------------|----------|
| Setting up the demo | Proton ETF 1 | Testing and debugging | Finished |
| Replacing the broken parts | Dušan Petrović | Testing and debugging | Finished |
| Remote access to the brain | Milan Marković | Utilities | Finished |
| Traffic server communication | Milan Marković | Development, environment preparation | Ongoing |
| Making a list of planned hardware improvements | Dušan Petrović | Research | Ongoing |
| Basic image processing | Vladimir Daljić | Research, development | Ongoing |
| Sound signals | Dušan Petrović | Development, utilities, style | Ongoing |

3 Status of planned activities

- **Setting up the demo** finished

- Implementation:

The day we received the car we started working. The main issues were a faulty camera and motor blocking, both resolved by replacing the camera temporarily and servicing the mechanical parts. After this, the demo was fully functional. We also successfully set up SSH access to the RPi and configured the required settings, using PuTTY, RealVNC Viewer for remote access.

- **Getting the replacements of the broken parts** finished

- Implementation:

Dušan was responsible for obtaining replacement parts. We are currently using a borrowed camera and are seeking a sponsor to support acquiring the necessary parts for future development.

- Difficulties:

The parts are borrowed, and we need to buy our own replacement.

- **Remote access to the brain** finished
 - Implementation:
Milan's task was to ensure that team could access Raspberry Pi remotely. This was realized with Tailscale and with establishing a 24/7 power and internet access to the Raspberry Pi.
- **Traffic server communication** ongoing
 - Implementation:
Milan was tasked with setting up basic communication between the car and the simulated traffic server. After fixing minor issues in the demo code, the car can now send hardcoded location and speed data, which the server successfully processes. Milan is currently working on transmitting live data.
- **Making a list of planned hardware improvements** ongoing
 - Implementation:
Dušan had a task to make a list of hardware we wanted to use during the project and get in touch with the potential donors of the components. The task is still ongoing and will be finished shortly after this report.
- **Basic image processing** ongoing
 - Implementation:
Vladimir worked on basic image processing and completed line detection. He is now using the detected lines for improved steering and navigation. Visualization on the dashboard and performance optimization are planned as next steps, ahead of more advanced features for the second report.
 - Difficulties:
No working RPi camera at first. Code optimization for a better framerate.
- **Sound signals** ongoing
 - Implementation:
Dušan wanted to implement sound signals for alerting "passengers" that are crossing the road. This feature isn't crucial for the actual competition, but in real life would be a valuable safety measure for pedestrians. This feature will be implemented after basic YOLO is finished.
- **Other activities (research and hotfixes / adjustments)**
 - Strahinja and Dušan are getting familiar with the Embedded codebase; getting the better grasp of the codebase will ensure that the task "Failsafe for detecting obstacles" (*in case of camera misreading*) will be implemented more efficiently.
 - Dušan implemented line detection using IR sensor, currently it does not affect steering, but it is a base for future failsafe mechanisms.
 - Marko and Strahinja are getting familiar with the ROS, Gazebo and the simulator.

4 General status of the project

The car can currently run the demo, is accessible remotely, is able to communicate with the server without any errors or problems and can detect road lines. The basic image processing task needs more time for development since we had camera problems.

5 Upcoming activities

| | | |
|------------------------|------------------------|----------------------------------|
| Wheel odometry | Basic image processing | Failsafe for detecting obstacles |
| Car lightning | Precise line detection | Basic SLAM and Behavior |
| Intersection detection | Traffic sign detection | Obstacles detection |