Report No. 1
Team Street Precision Las Vegas
Date 21/12/2025

1. Introduction

This report presents the initial setup and verification activities performed by Team Street Precision Las Vegas. The main objective of this phase was to ensure correct operation of the BFMC vehicle, verify communication between hardware and software components, and prepare the system for autonomous development.

2. Planned Activities

A1: Assemble and verify the electrical integrity of the vehicle platform.
A2: Establish a secure remote connection (SSH) between the development workstation and the High-Level Controller (Raspberry Pi).
A3: Execute the BFMC "Brain" startup code to verify hardware-software synchronization.
A4: Test the manual control interface (WASD) and live camera streaming via the web dashboard.
A5: Set up the version control system (GitHub) and team documentation structure.

3. Status of Planned Activities

Activity 1: Vehicle power verification

- Status: Completed
- Implementation: Vehicle power system and Electronic Speed Controller (ESC) were successfully initialized.
- Difficulties: None

Activity 2: Demo System Verification

- Status: Completed
- Implementation: The BFMC demo environment was successfully tested using the web-based dashboard. Manual control of the vehicle was achieved, confirming correct operation of the Brain software, camera system, and communication with the embedded controller and actuators.
- Difficulties: None

Activity 3: Communication with Raspberry Pi and Software Stack

- Status: Completed
- Implementation: SSH access to the Raspberry Pi was established and verified

- Difficulties: Initial configuration and installation of required development extensions were necessary for correct execution.

Activity 4: Brain Software Execution

- Status: Completed
- Implementation: The Brain software was successfully executed from the terminal
- Difficulties: Camera access conflicts were observed when the dashboard and terminal-based Brain execution were run simultaneously. This issue was resolved by ensuring that only one Brain instance was running at a time.

4. General Status of the Project

The project is currently on track, and all primary milestones for Report 1 have been achieved.

- Hardware: Connectivity between the Raspberry Pi, Nucleo, and Camera is stable. Physical cable management has been optimized to prevent future "resource busy" or -1 errors.
- Software & Simulation: The BFMC simulation environment is correctly configured and running. This allows the team to test logic in a virtual space before deploying to the physical car, reducing the risk of hardware damage.
- Readiness: With the manual control and camera stream verified, the team has a solid foundation. We are now prepared to transition into the development of perception algorithms, specifically focusing on Machine Learning and Computer Vision for autonomous lane following and sign recognition.

5. Upcoming Activities

- Lane Detection Development: Implementing OpenCV filters (Canny Edge, Hough Transforms) to identify track boundaries.
- Closed-Loop Steering: Linking camera input data to steering actuator output to achieve basic autonomous lane following.
- Report No. 2 Submission: Documenting the transition from manual WASD control to camera-based steering control.
- Track Construction: Setting up a localized testing environment that mimics the official BFMC track specifications.