Project Number: 12

Project Title: AI Driving Coach: Using Telemetry Data to Analyse Car Performance & Driver Emotion

Project Clients: Gelareh Mohammadi, Mahdi Bamdad

Project specializations: Software Development;Web Application Development;Mobile Application Development;Artificial Intelligence (Machine/Deep Learning, NLP);Big data Analytics and Visualization;System/game Development;Computer Hardware and Networks;Human Computer Interaction (HCI);Bioinformatics/Biomedical;

Number of groups: 2 group

Main contact: Gelareh Mohammadi, Mahdi Bamdad

Background:

We have designed and assembled a high-performance racing simulator, featuring a full cockpit setup, controllers, VR cameras, and a sensory device, all integrated with a fully licensed software package (SimHub). This newly established system is ready for both research and enjoyment.

Our project focuses on developing a driving coach/assistant that enhances racing performance by analyzing both car telemetry and driver emotions. A group member will serve as the test subject, making the experience both immersive and fun.

Project Goals: (1)Develop/Use a Custom SimHub Plugin – Enhance functionality by integrating external sensor data. (2) Forward UDP Telemetry for Processing –real-time driving data for analysis. (3) Integrate with an LLM (AI Race Engineer) – Enable hands-free coaching using voice commands and real-time insights. (4) Involving the emotion response and physiological measures (e.g. Heart-Rate)

Requirements and Scope:

Driving Coach Features: (1) Real-time Driving Assistance – Provides insights on car handling, race strategy, and performance. (2) Voice-Controlled Interaction – Communicate with the AI Race Engineer using natural language. (3) Hybrid Rule-Based & AI Engine – Combines a structured rule engine with GPT-powered natural language capabilities. (4) SimHub Integration – Bridges communication between the simulator and external software via UDP - API. (5) Dashboards – Displays performance metrics and driving recommendations.

Required Knowledge and skills:

(1) Software Development & AI Integration: Plugin Development , UDP & Network Programming

(2) Game Telemetry & Racing Simulation: SimHub API , Telemetry Data Analysis

(3) Sensors & Hardware Integration: Analyzing driving behavior, Speech Recognition , Text-to-Speech Synthesis

(4) Real-Time Data Processing/Visualization: Building live telemetry dashboards

(5) Testing and validation to ensure the performance meets functionality.

Expected outcomes/deliverables:

By combining sensor data, AI coaching, and real-time telemetry, this system provides an immersive and data-driven racing experience, helping drivers improve their skills while having fun! The project scope can be adjusted based on the group size. Don't worry about the large scope—we'll make sure everyone can contribute effectively on these items:

- Documentation: Detailed documentation of the software, including installation and usage instructions during testing and validation.
- Prototypes: Different design prototypes evaluated by the groups.