Raspberry Pi Car Black Box

The Raspberry Pi Car Black Box revolutionizes road safety by integrating black box technology into the automotive context. Harnessing the versatility of the Raspberry Pi, it captures vital vehicle data, including speed and alcohol levels, through the CAN connection. This allows for detailed accident analysis, fostering a safer driving environment and promoting proactive road safety measures.

Introduction

With the surge in traffic accidents, the automotive sector lacks an equivalent accident analysis system common in aviation. This project aims to fill this gap by developing a Raspberry Pi-based system. It com?prehensively measures diverse vehicle parameters, including speed, and integrates an alcohol sensor for monitoring the driver's alcohol level. Data transmis?sion through MQTT enables seamless access in both real-time and post-accident scenarios.

Concept

At the core of this initiative is the Raspberry Pi, work?ing in harmony with a CAN module, GSM module, and an alcohol sensor. This combination forms a holistic solution for accident analysis. Using the CAN bus, the system captures diverse vehicle parameters, while the alcohol sensor monitors the driver. The collected data is then transmitted to a designated server through the MQTT protocol. An optional Android application enhances accessibility, providing a user-friendly interface for displaying comprehensive data logs.

Implementation

The project combines hardware components and Python software on the Raspberry Pi, which processes vehicle data. The CAN module captures data, and the GSM module handles wireless transmission. The alcohol sensor adds to the dataset. An Android app, created with Android Studio and Java, connects to the system via MQTT. It offers real-time data visualization and access to cloud stored data, enhancing the system's usability.

Results

The results obtained from our „Car Black Box" system are manifested in CSV files, serving as repositories for the information collected during driving. These files are accessible through the cloud, providing a database for our application. Users, by selecting the desired file, can explore various graphical visualiza?tions outlining critical parameters such as acceler?ation and speed. Beyond reviewing historical data, the application is designed to also provide real-time readings of vehicle performance, allowing users to monitor the current conditions of the vehicle while on the road.
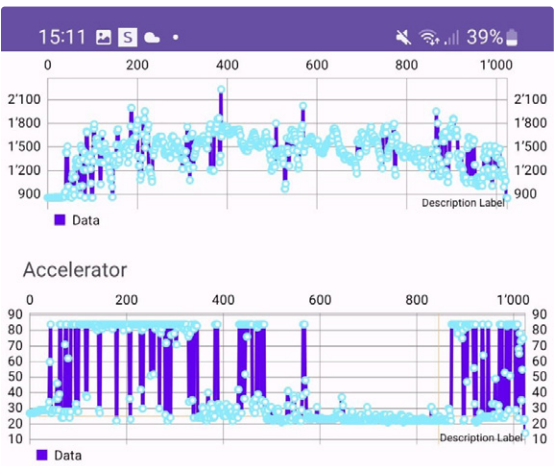
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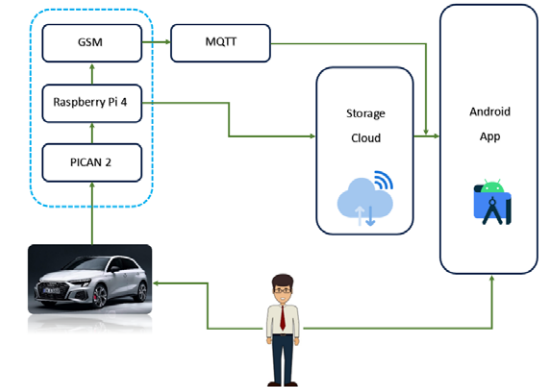
Data system diagram

Car Black Box App