Metaverse Maintenance

VR Enabled Automotive Diagnostic Tool
Computer Science & Electrical Engineering | Class of 2023

Ryan Logsdon
Computer Science

Cory Gish
Electrical Engineering

David Mackenzie
Project Advisor

PRODIGY
Bold Ideas. Brought to Life.

Problem Statement

Unexpected automotive repairs cause financial and logistical issues for consumers and industry. Moreover, a lack of data on the cause of these issues costs mechanics precious time to repair these vehicles.

Mission Statement

Metaverse Maintenance provides a cross platform diagnostic solution to allow interactive analysis through a digital and real-time predictive maintenance via IoT connectivity.

Solution & Features

Raspberry Pi – On board computation is handled by a Raspberry Pi 3 Model B, which allows communication with the OBD interface, IoT module, and in-car display.

Raspberry Pi 3

OBD II Interface – Interaction with the car is done through a STN1110 chip, which is an OBD to UART interpreter.

PCB Layout

Blues Wireless IoT Module – The IoT module is integrated into the system to provide cellular and Wi-Fi connectivity.

Blues Notecard

Noda.io –Noda's integrated API allows for real-time data visualizations to create a digital twin for any automobile.

noda

Losant – This cloud-based IoT platform allows users to store and track real-time data for thousands of devices.

LOSANT

Process

Step 1: Installation
To use Metaverse Maintenance, a user first installs the OBD port connector and in-car display.

Step 2: Access Portal
Next, a user will create an account using the https://meta-maintenance.w3spaces.com/ portal.

Step 3: Track Data
Metaverse Maintenance provides 3 separate user interfaces for tracking data: in VR using Noda.io, on a mobile device using the custom portal, and in a cross platform virtual environment, FrameVR.

Final Product

Interfaces

Noda.io:
Noda provides an API to assist with 3D data visualization with a digital twin. Using Noda, we created an environment to provide mechanics and fleet managers with real-time diagnostic data.

Custom Web Application:
The Metaverse Maintenance portal hosts a users vehicle data for real-time updates and historical tracking. The fully interactive UI components are powered by the cloud-based IoT platform, Losant.
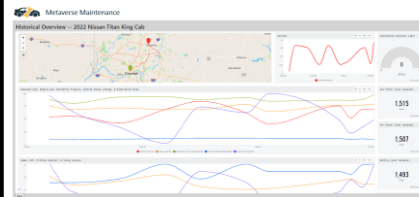
Frame VR:
Through our partnership with Prodigy, we created a multi-platform virtual environment for hosting multiple components of Metaverse Maintenance. This platform was also showcased at CES 2023.

Speed: 48 MPH
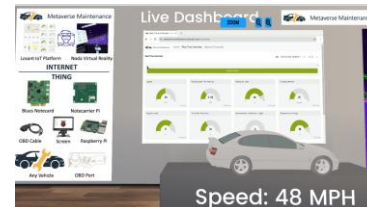
Challenges

Programming the Microcontroller:
Incorrect pin multiplexing and wrong baud rates slowed the development of our OBD interface

Bluetooth Communication:
In order to minimize latency, message passing optimization and improvement needed to occur between the OBD II port, microcontroller, Bluetooth module, and Raspberry Pi.

Accomplishments

CES 2023 Exhibitor:
Metaverse Maintenance was honored to be hosted by Prodigy and Blues Wireless as we presented our project for over 100,000 people at CES 2023.

← Live Dashboard

Frame VR →

Future Work

- Reduce size of OBD adapter and make in-car display optional
- Upgrade VR interface with custom models through Babylon.JS