

Project Portunus: Universal Car Module

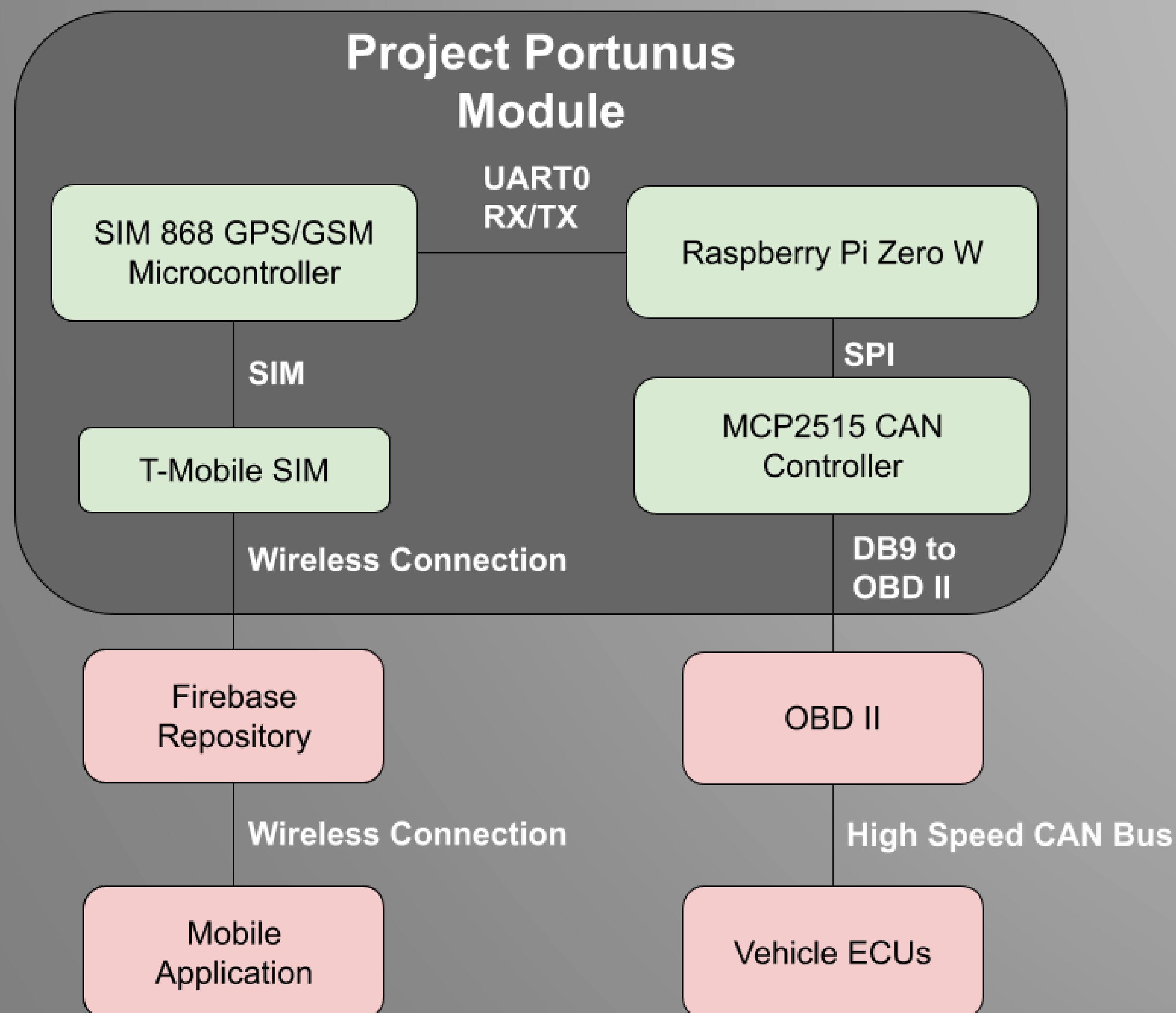
Background

Today, modern vehicles include partner apps as a solution to car keys and to control the vehicle. Currently, there is no universal standard or product to implement such app based control in other vehicles. Project Portunus seeks to fill in this gap by providing vehicle control, GPS tracking, and diagnostic read out via a Raspberry Pi based module with Android app based integration.

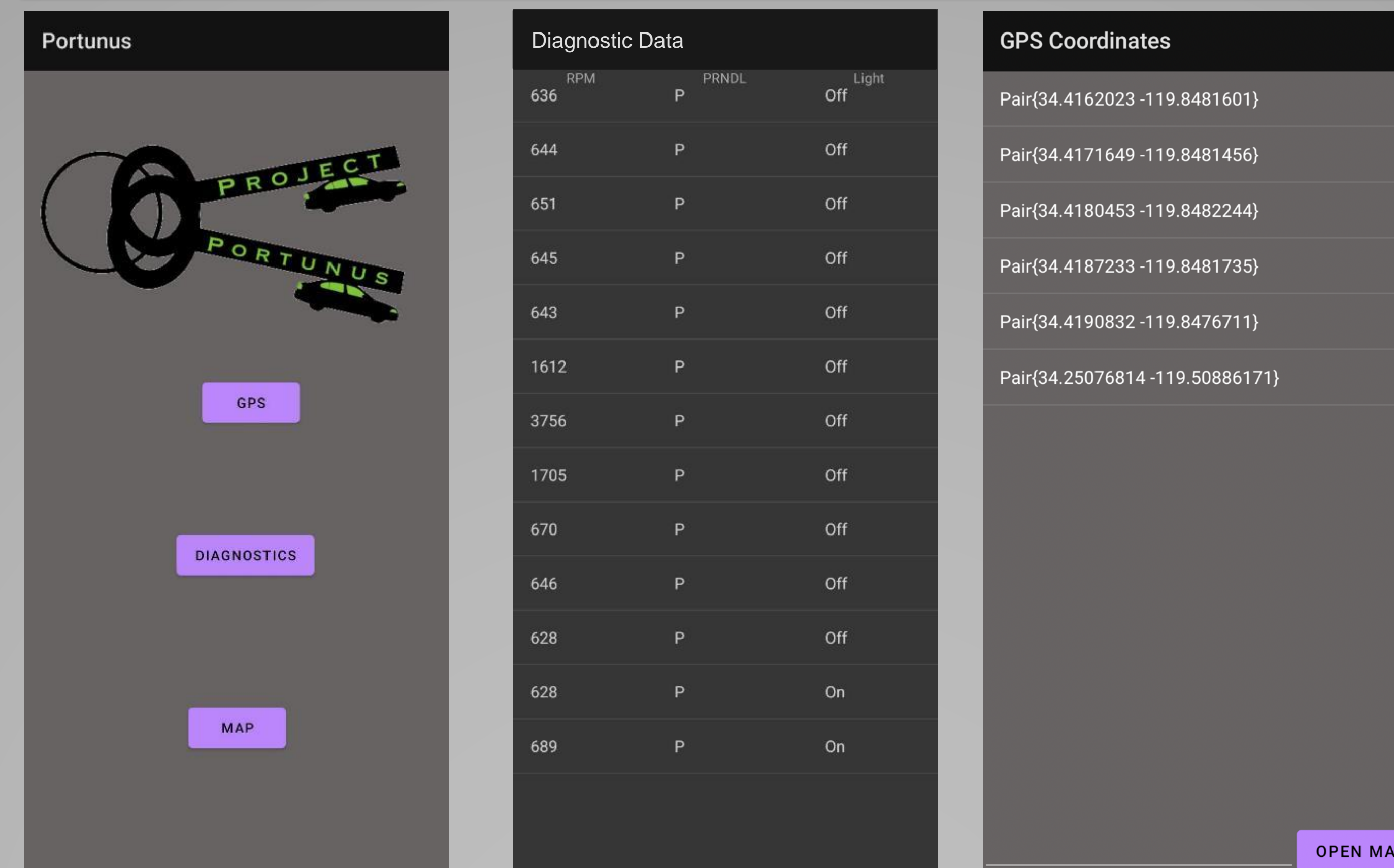
Overview / Design Specs

- Real-time data is stored on the server and the car's location history can be tracked in the phone app
- The module reads CAN messages from the car and sends them to the server via cellular network
- The application receives the data from the server and displays diagnostics in real-time

Block Diagram

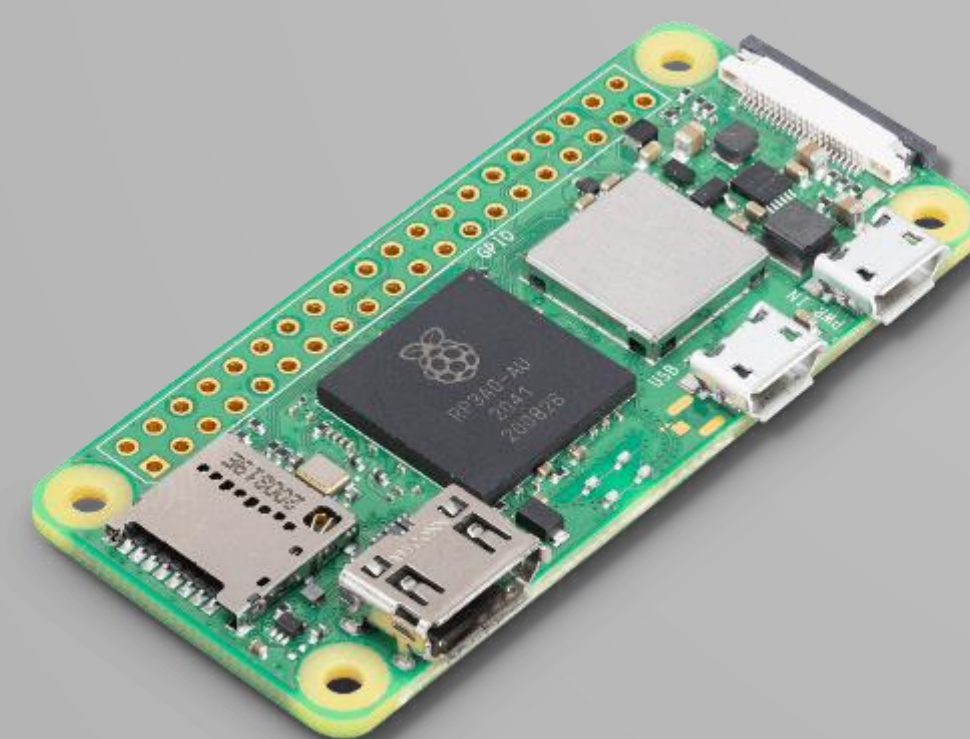


Mobile App



The module sends diagnostic and GPS data to Firebase which is retrieved and displayed by the partner application

Key Hardware



Raspberry Pi Zero W

- Vast accessory/Hat support
- Python Support
- SPI, UART interfaces
- Low power



Custom PCB

- CAN controller/transceiver
- Decode and transmit CAN messages
- Powers module over DB9 port



GSM/GPRS/GNSS Hat

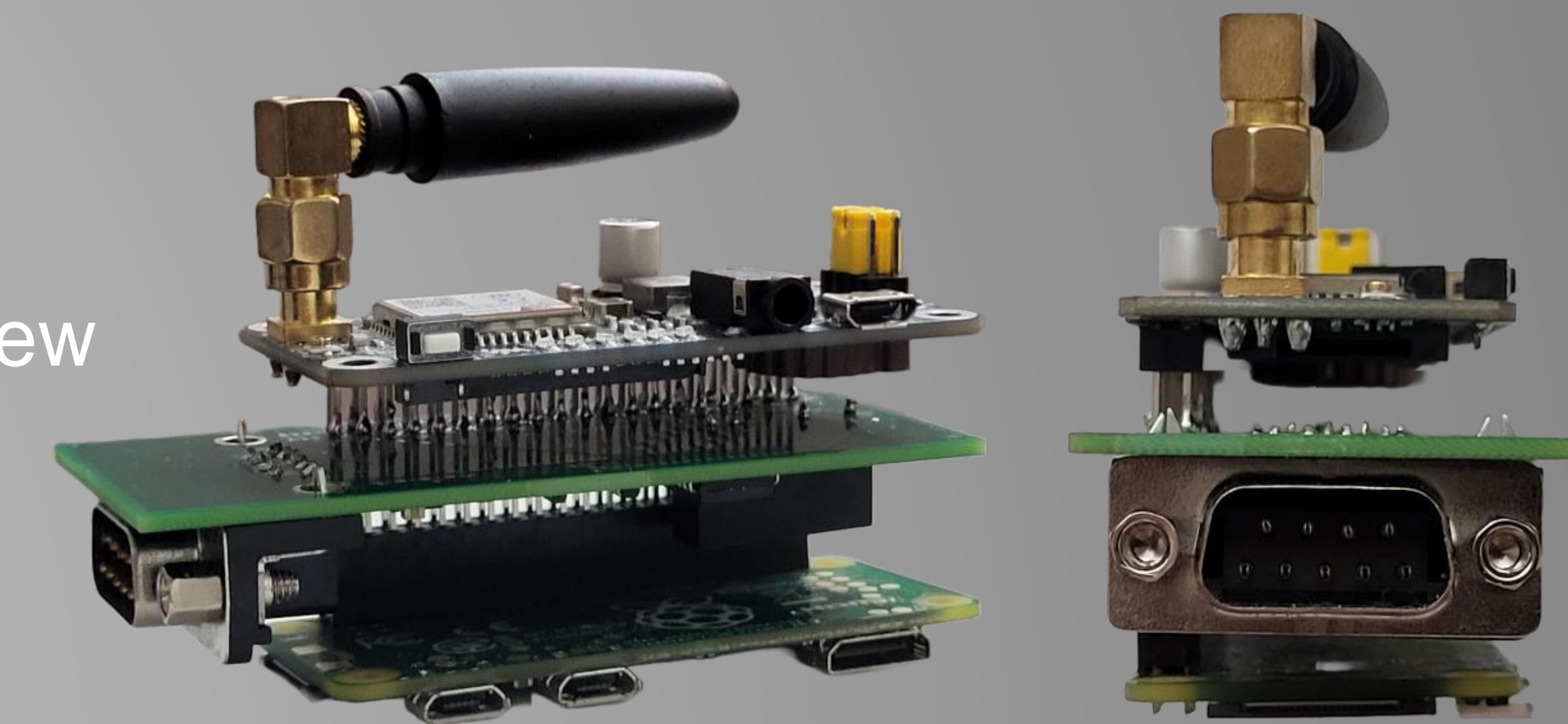
- Provides GPS tracking
- Wireless access for data uploads to Firebase

Final Product

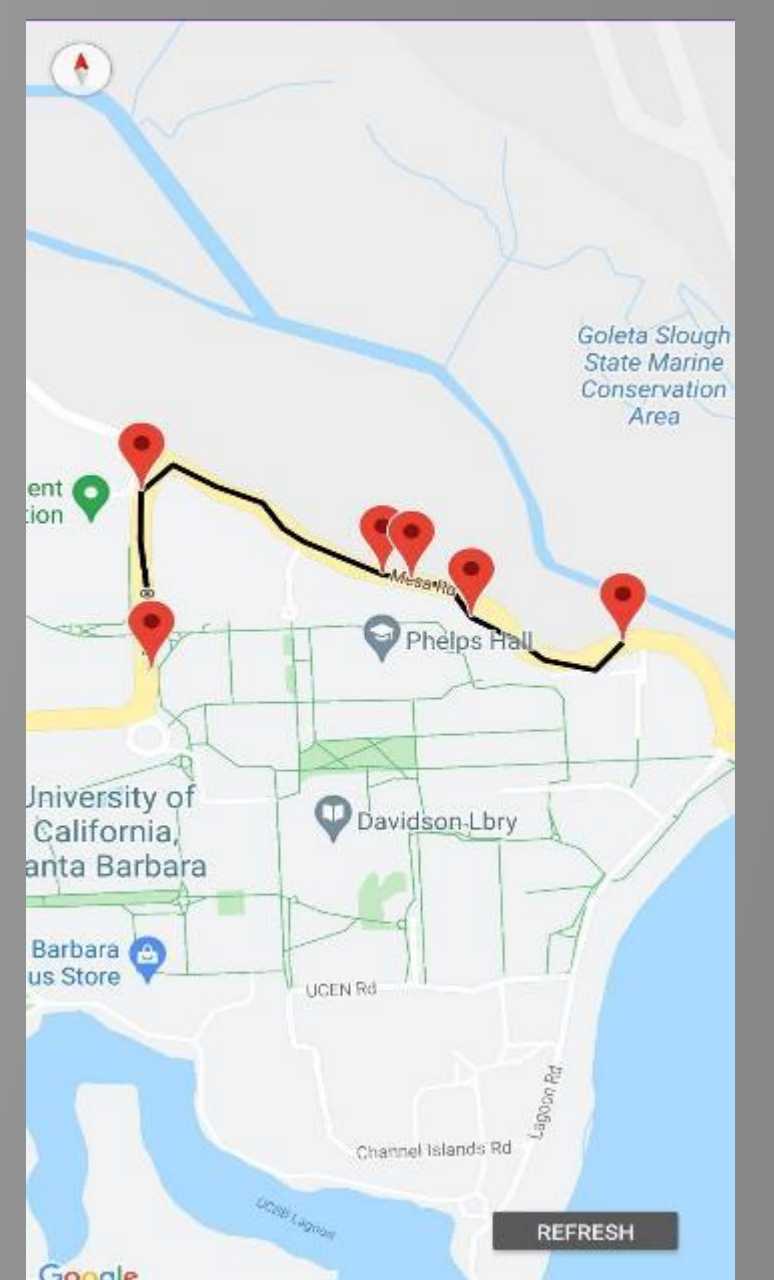
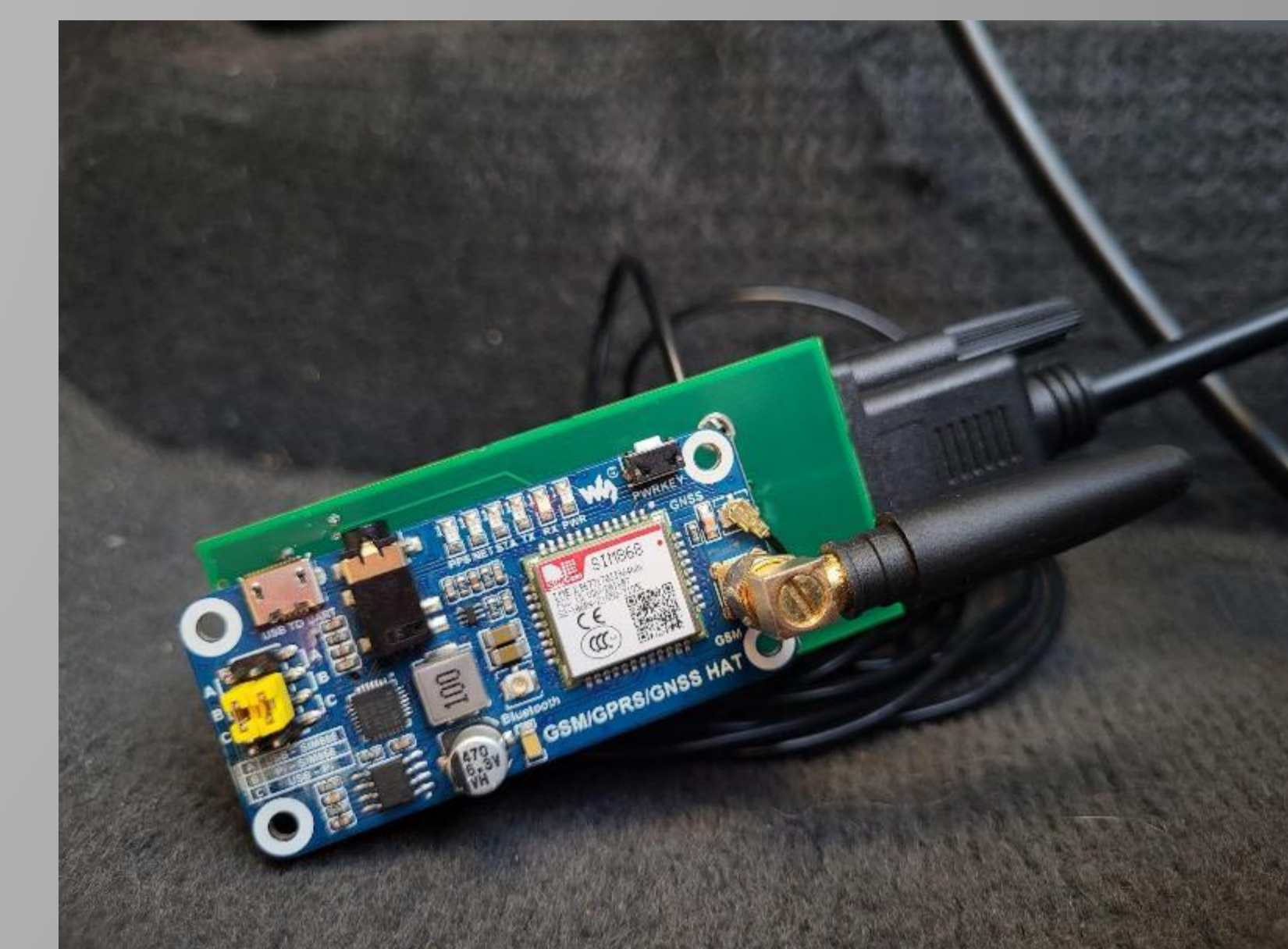
Top View



Side View



GPS



The module sends GPS data which can be viewed in a Google Maps interface in-app

Conclusions

The universal car module allows users to access diagnostic data such as the gear and RPM. It also allows users to locate their car using the integrated GPS and is powered by the car's OBD II port even when the car is off. Controlling power locks is limited to a few manufacturers, primarily Ford due to lock integration in the car's CAN bus network.



Acknowledgements:

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