

MISSION

Deliver a network that uses CAN protocol to communicate system analytics from the car's batteries and several other measured components and relay that information to the driver's display screen by converting CAN to UART.



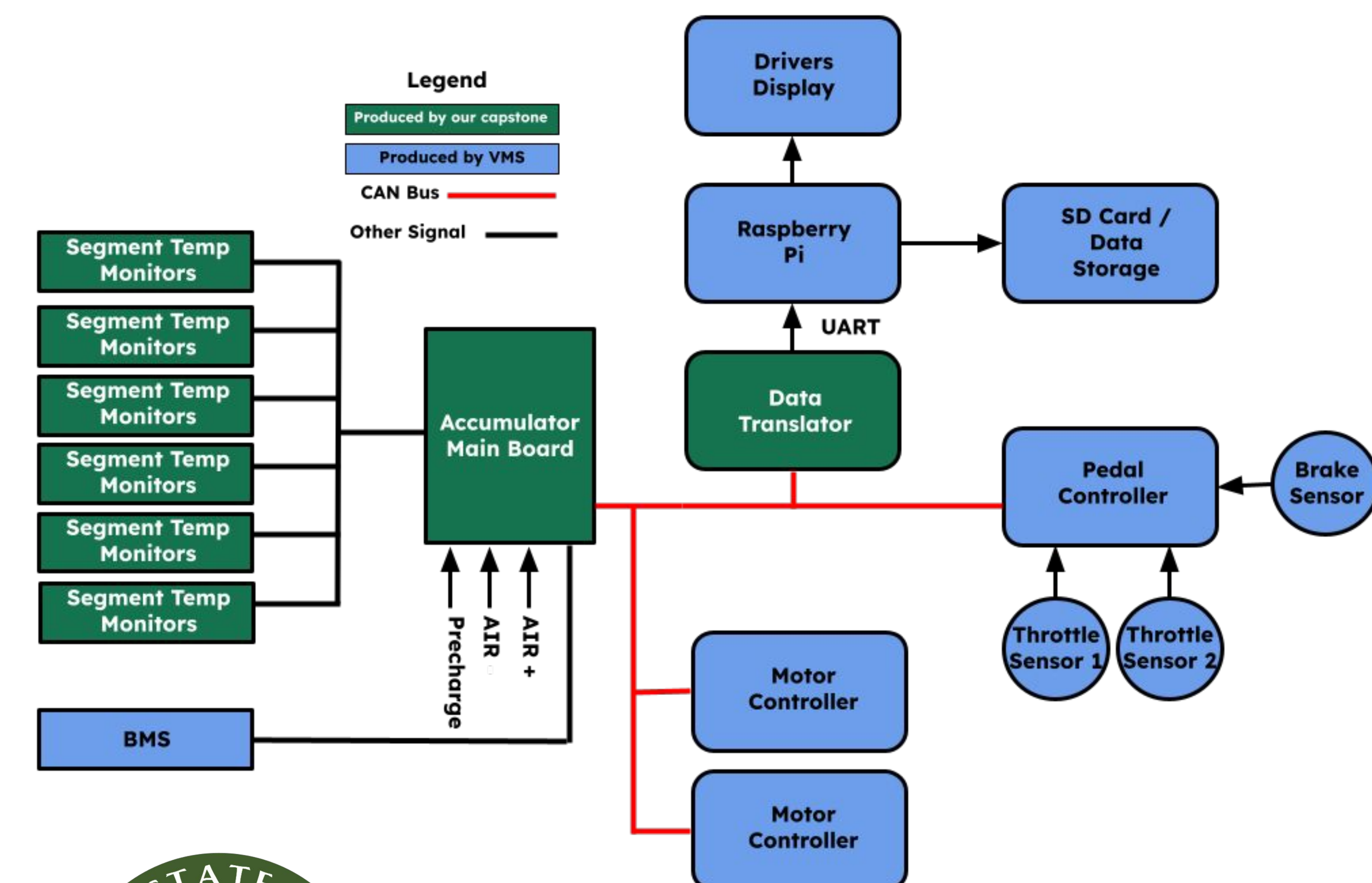
OVERVIEW

Microcontroller: STM NUCLEO-F303K8 in a 32-pin package which has built-in CAN and UART capabilities. Programmed using CubeIDE firmware.

CAN Protocol: A method of communication between electronic devices embedded in a vehicle using a bus (high and low) that connects each node together.

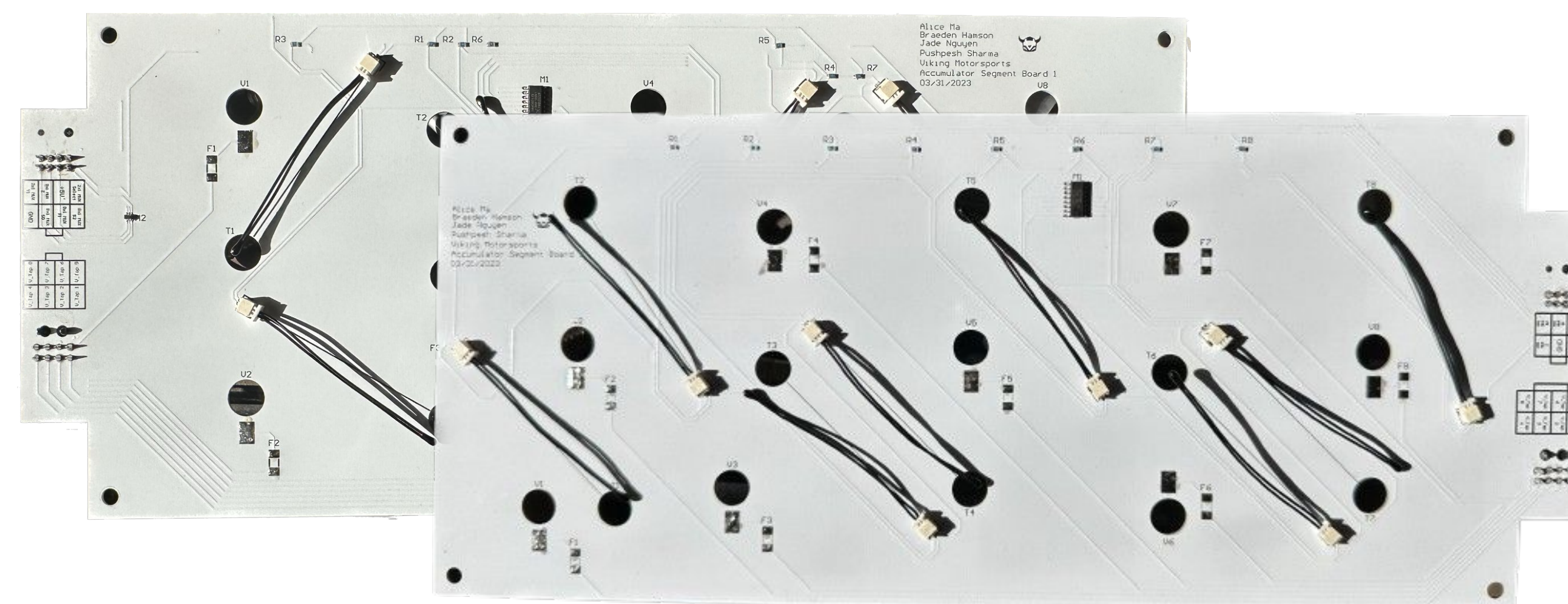
UART Protocol: A hardware communication protocol that uses asynchronous serial communication with configurable speed.

APPROACH



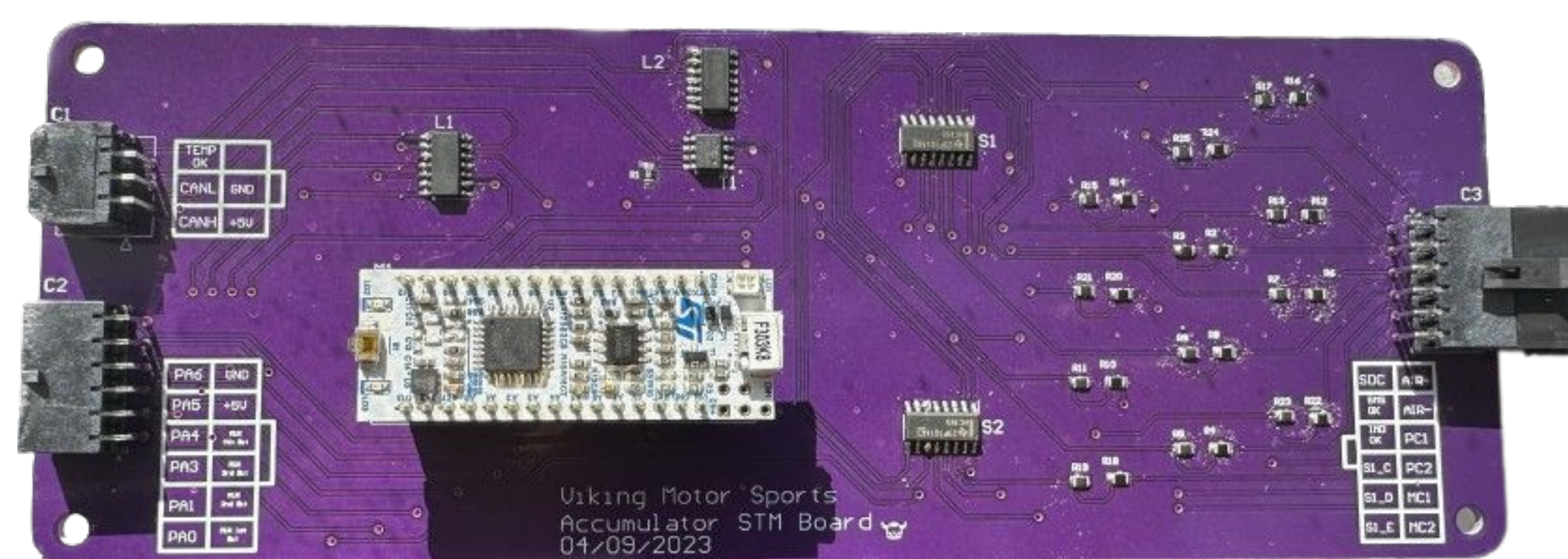
Battery Segment Boards

- Collect temperature data from batteries and send to Accumulator Main Board via GPIO pins.
- Collect Voltage data and send to Battery Management Systems.



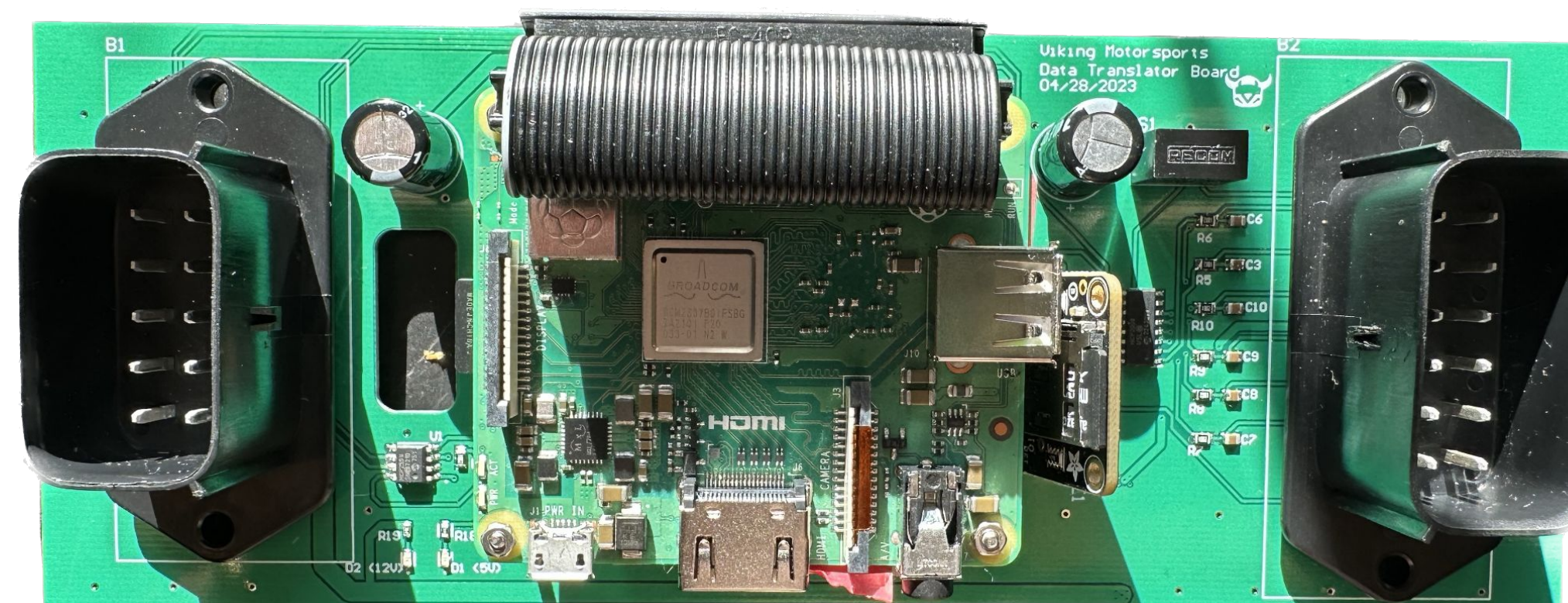
Accumulator Main Board

- Receives temperature data from the Battery Segment boards through GPIO pins
- Receives and decodes CAN messages from Battery Management Systems
- Formats and sends the data received through CAN bus to the Data Translator Board.



Data Translator Board

- Receives CAN messages from accumulator board, pedal controller board, motor controller, and the BMS.
- Formats collected data from CAN and send it to Raspberry Pi through UART protocol.



PROTOTYPING & TESTING

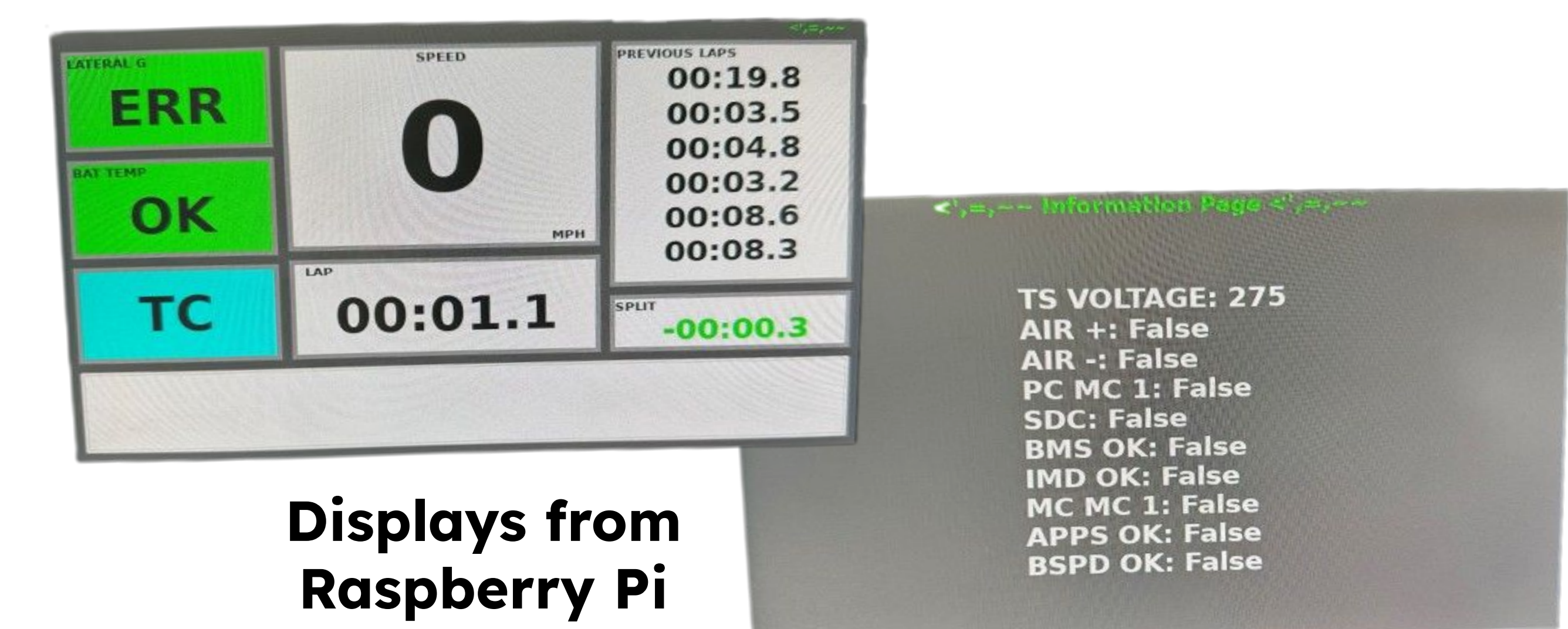
- Fabricated boards assembled and tested
- Individual wiring harnesses created for CAN bus and data collection from EV
- Boards and harnesses integrated into existing chassis.
- CAN communication coded and tested between each node.
- Data displayed on screen via Raspberry Pi

RESULTS

```
Seg1 = 30C Seg2 = 13C Seg3 = 3C
Seg4 = 12C Seg5 = 11C Seg6 = 13C

Receiving data from TxHeader: 104
187 10 0 0 0 0 0
DC Bus Voltage: 274.700000
Speed: 0.000000
Current: 0.000000
Relay states: 0 0
Receiving data from TxHeader: 102
1 0 0 0 0 0 0
UART transmission complete!
Receiving data from TxHeader: 104
187 10 0 0 0 0 0
DC Bus Voltage: 274.700000
Speed: 0.000000
Current: 0.000000
Relay states: 0 0
Receiving data from TxHeader: 102
1 0 0 0 0 0 0
Receiving data from TxHeader: 1
30 0 0 0 0 0 0
```

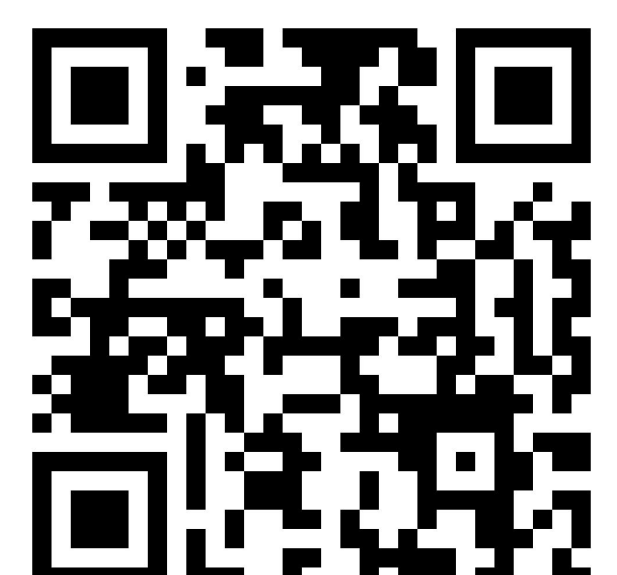
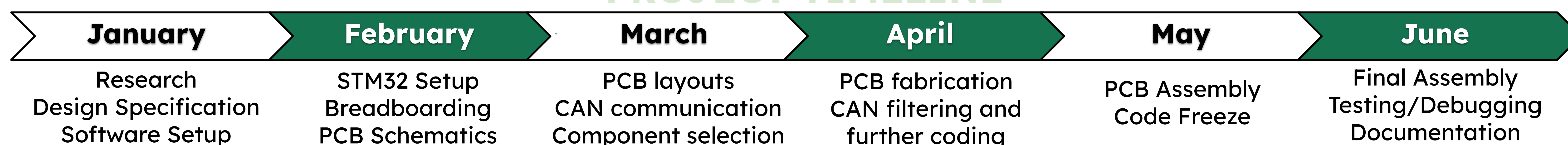
CAN messages received



Displays from Raspberry Pi

FUTURE WORK

- Need board revisions to fix mistakes and implement more features.
- Need full harness created around new Accumulator and updated chassis for FSAE Competition.
- Need more powerful microcontroller to handle CAN and UART at the same time.



Scan Me!