SAE Car Software

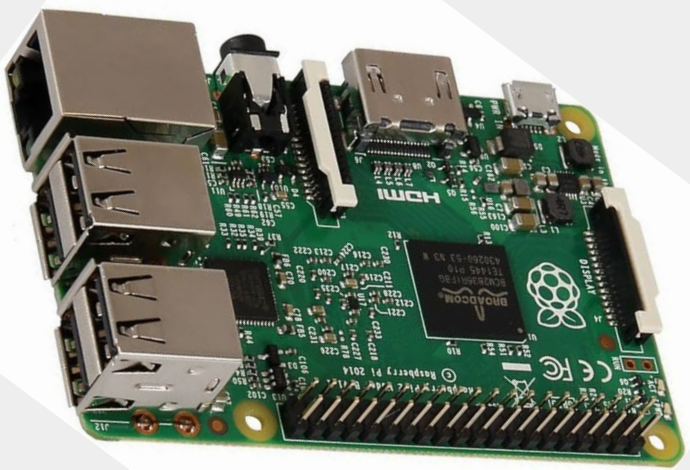
By Leo Dai, Conner Ryan Petersen, Lawrence Benitez, Aiden McDougald, Evan Steinhoff

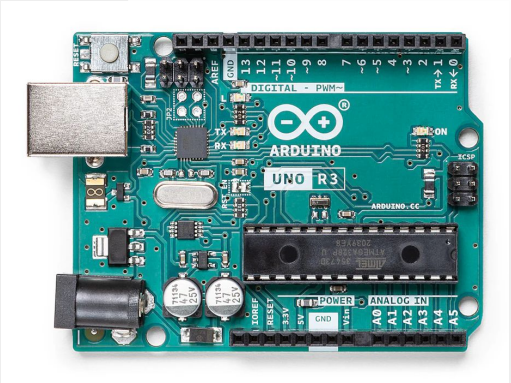
About the Car

We plan to build the software to support an electric Formula SAE car.

This will include:

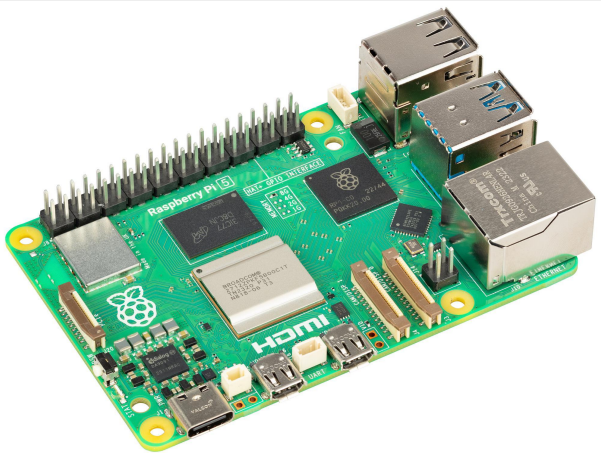
- Central Control Unit
- Active Suspension Units
- Motor Control Units
- Steering Wheel Unit
- Telemetry Database



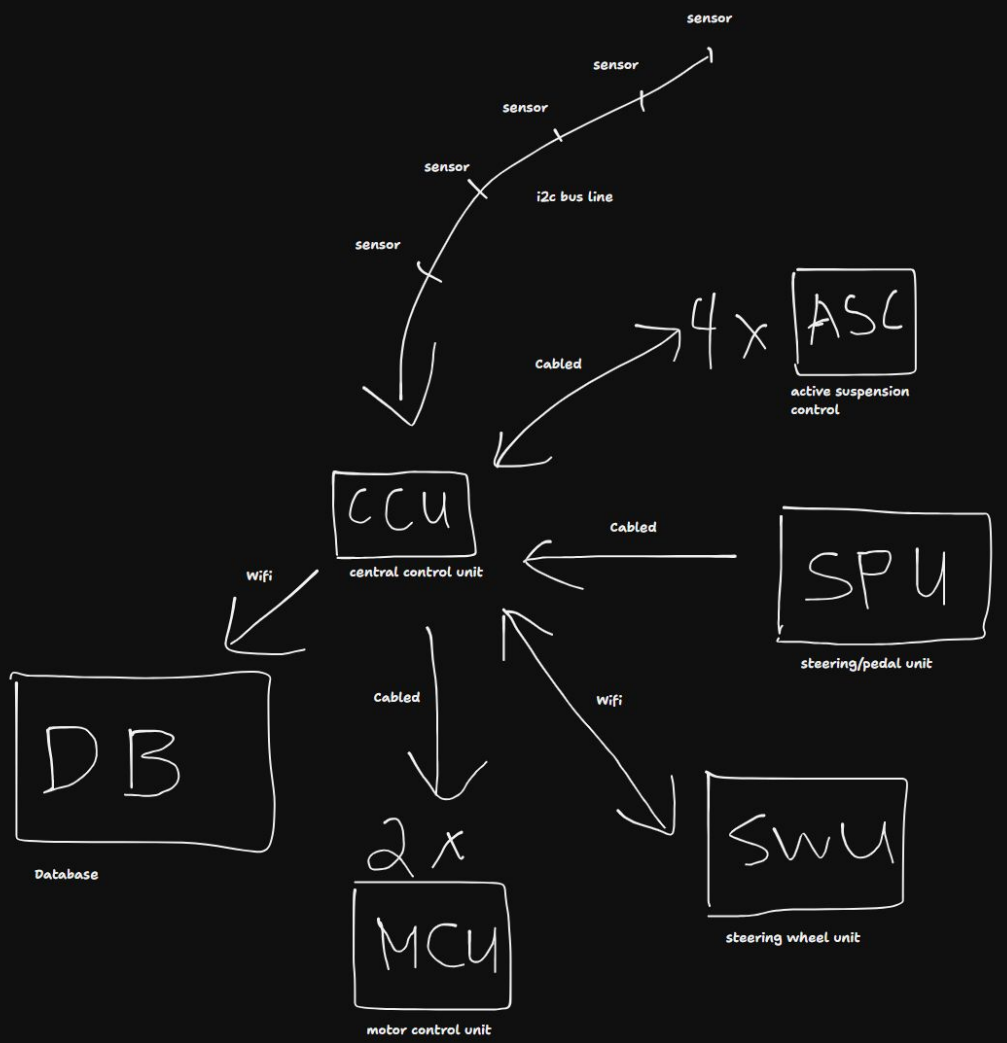


Central Control Unit (CCU)

- Raspberry Pi 5
- Handles all data from Subsystems
  - Sensors
  - ASCs
  - SPU
- Manages motor controllers
  - Virtual Differential
  - Traction Control
- Records Telemetry
- Updates Steering Wheel (SWU)
- Manages Subsystems



Network Map


sensor
sensor
sensor
sensor
sensor
i2c bus line
4 x
ASC
active suspension control
Cabled
CCU
central control unit
Cabled
SPU
steering/pedal unit
Wifi
DB
Database
Cabled
2 x
MCU
motor control unit
Wifi
SWU
steering wheel unit

Final Product

- Ecosystem of intercompatible softwares running on different hardwares
  - Each unit has its own unique software
  - Research or develop a communication protocol that ensures safe and quick packet arrival
  - Different platforms for different software i.e. arduino and raspberry pi (linux)
- Proper safety checks between different units
- Runs in realtime

Testing

- Unit Testing
  - Write tests
  - Check to see if we get expected output
- Real-world
  - Load onto board
  - Send in fake signals with signal generator
  - Check output
- Assetto Corsa Mod
  - Use game’s physics engine to generate fake data
  - Put it through software
  - Check output