Road Condition **Monitoring**

Problem & Solution

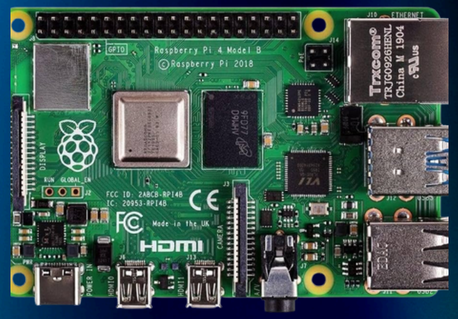
Traditional road quality auditing is manual, subjective, and slow.

Why Road-Condition Monitoring Matters: Unmarked hazards damage vehicle suspensions, while overloading commercial vehicles accelerates municipal infrastructure degradation.

Our Proposed Solution: An automated IoT edge computing platform that continuously maps road hazards and monitors dynamic vehicle weight using high-frequency sensor data.

Key Objectives: Replace rigid manual thresholds with automated classification, track independent leaf spring health, and generate instant geospatial audit reports.

Components Used



RASPBERRY PI 4
MODEL B



BNO055
(9 DOF SENSOR)



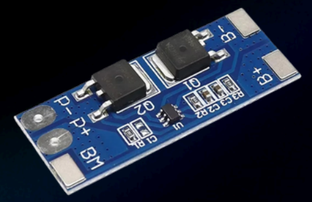
REYAX RY352A
GNSS MODULE



LITHIUM-ION
BATTERY CELLS



LM2596 DC-DC
BUCK
CONVERTER



2S BMS

Software Used

KiCad	PCB Designing
SW	3D Designing
Google Sheets	Data Logging
Flutter	App Development
Firebase	Database Management
MATLAB	Data Analysis

System Architecture



VEHICLE'S
LEAFSPRING

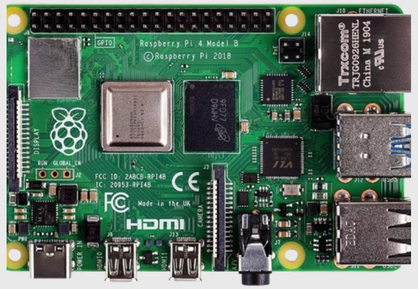


BNO055
(9 DOF SENSOR)





REYAX RY352A
GNSS MODULE



RASPBERRY PI 4
MODEL B



CLOUD



DB STORAGE



SIMPLE CSV



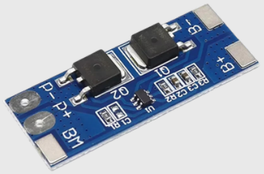
TINY ML



LITHIUM-ION
BATTERY CELLS



LM2596 DC-DC
BUCK CONVERTER

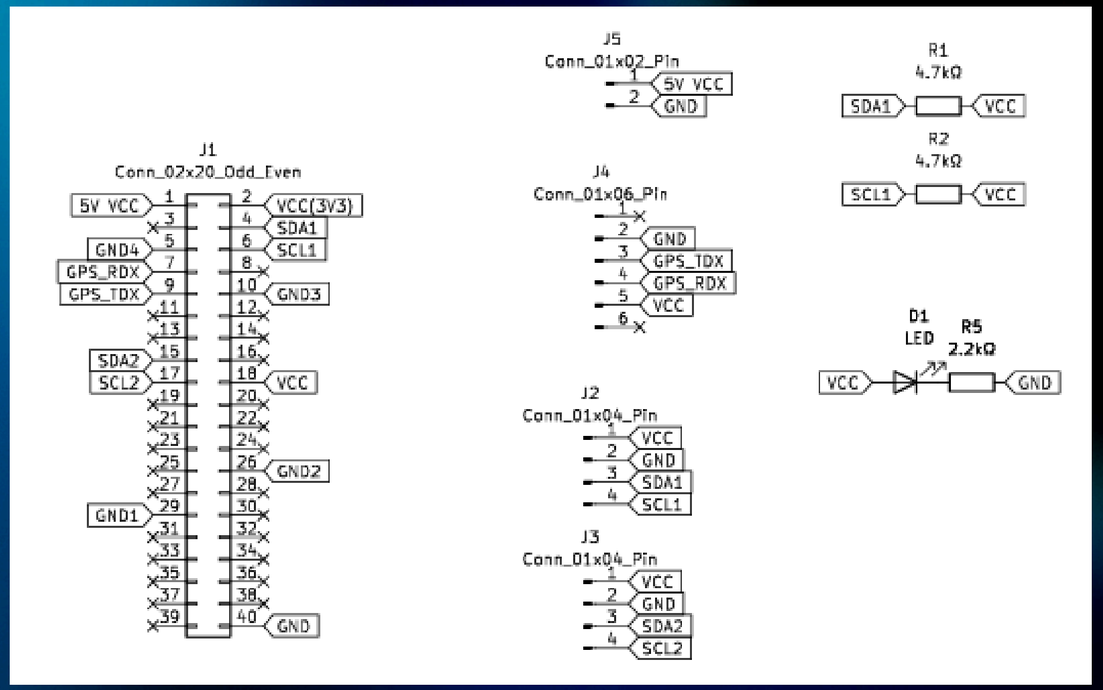


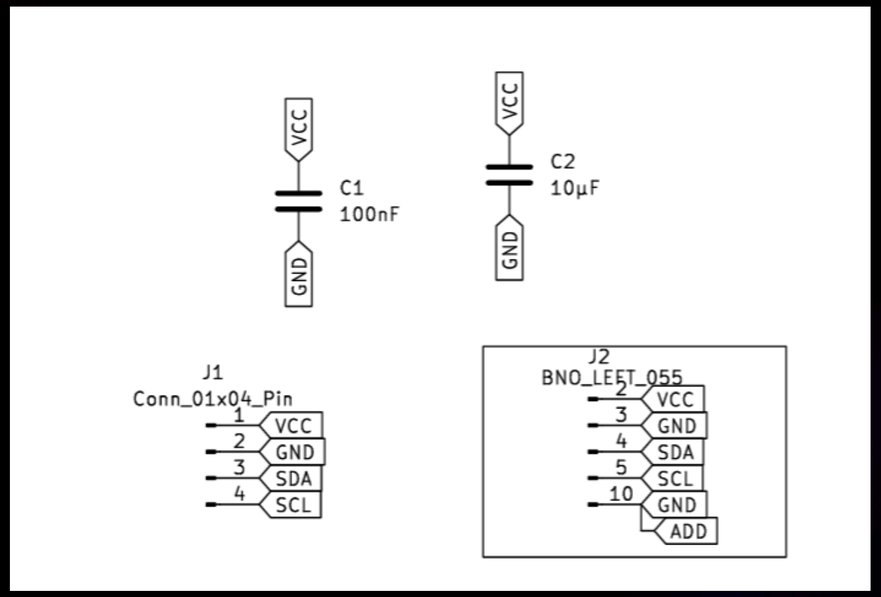
2S BMS

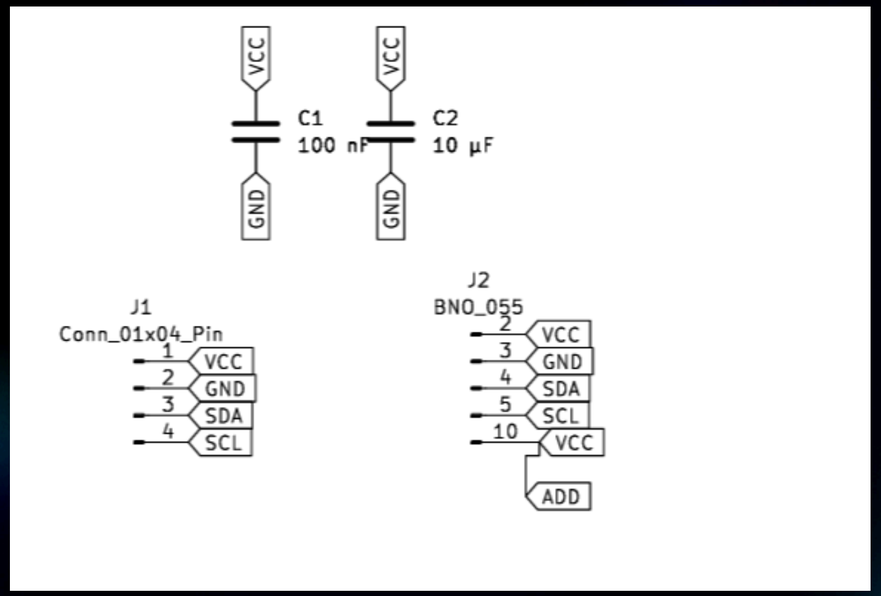


APP

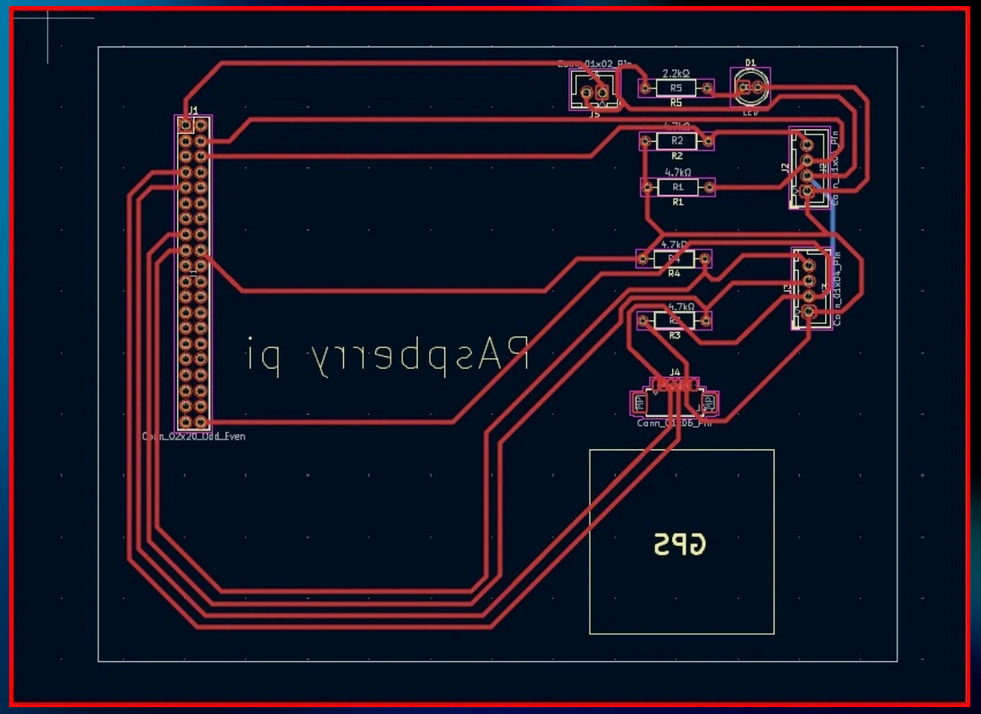
Schematic

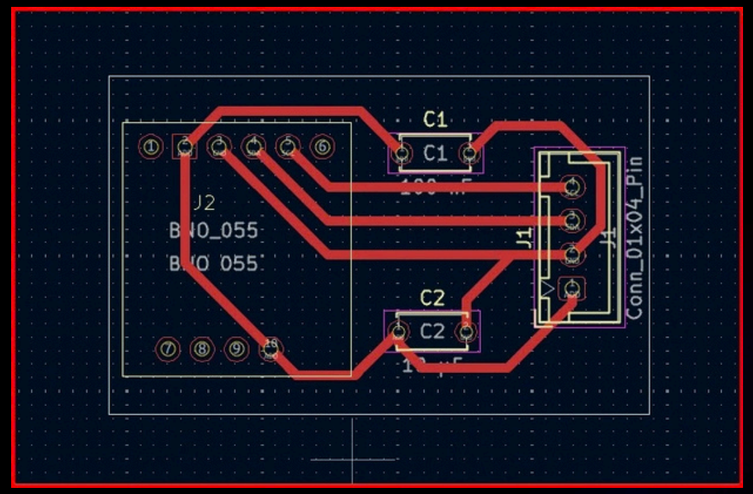

J1
Conn_02x20_Odd_Even
5V VCC
GND4
GPS_RDX
GPS_TDX
SDA2
SCL2
GND1
VCC(3V3)
SDA1
SCL1
GND3
VCC
GND2
GND
J5
Conn_01x02_Pin
5V VCC
GND
J4
Conn_01x06_Pin
GND
GPS_TDX
GPS_RDX
VCC
J2
Conn_01x04_Pin
VCC
GND
SDA1
SCL1
J3
Conn_01x04_Pin
VCC
GND
SDA2
SCL2
R1
4.7kΩ
SDA1
VCC
R2
4.7kΩ
SCL1
VCC
D1
LED
R5
2.2kΩ
VCC
GND

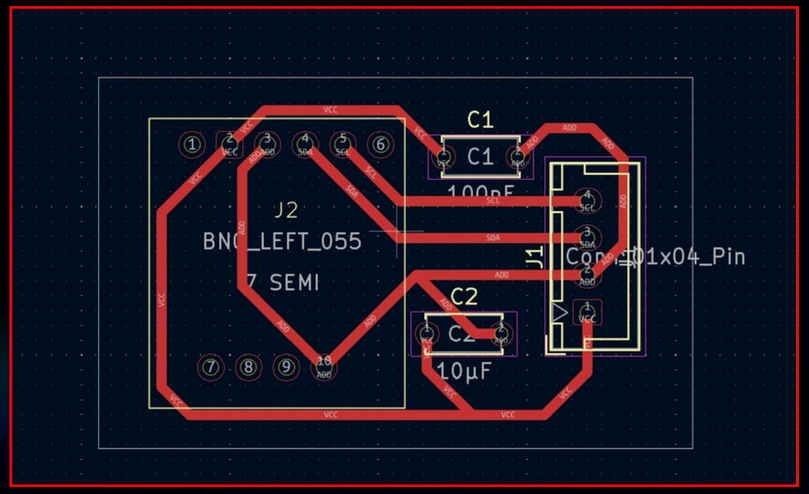

VCC
C1
100nF
GND
VCC
C2
10µF
GND
J1
Conn_01x04_Pin
VCC
GND
SDA
SCL
J2
BNO_LEFT_055
VCC
GND
SDA
SCL
GND
ADD


VCC
C1
100 nF
GND
VCC
C2
10 µF
GND
J1
Conn_01x04_Pin
VCC
GND
SDA
SCL
J2
BNO_055
VCC
GND
SDA
SCL
VCC
ADD

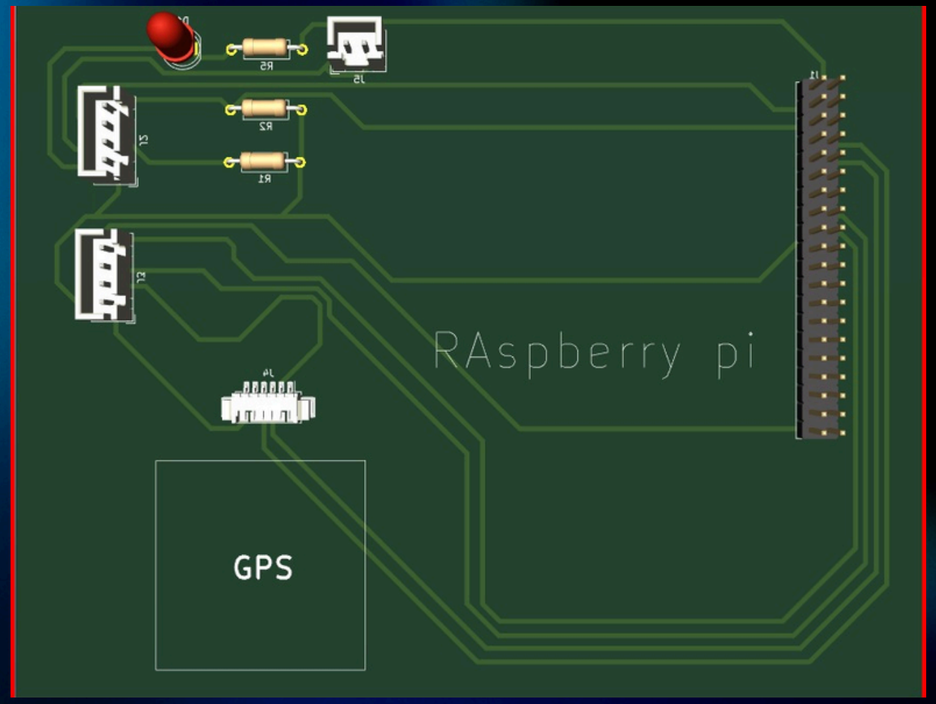
Routing

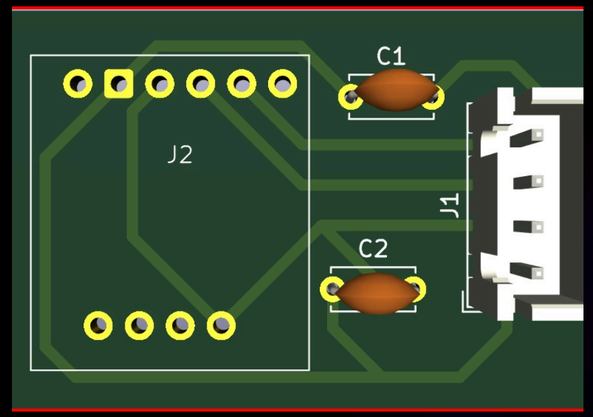

R5
2.2kΩ
D1
R2
4.7kΩ
R1
R4
4.7kΩ
R3
4.7kΩ
J4
Conn_01x05_Pin
J1
Conn_02x20_Odd_Even
J2
Conn_01x04_Pin
GPS

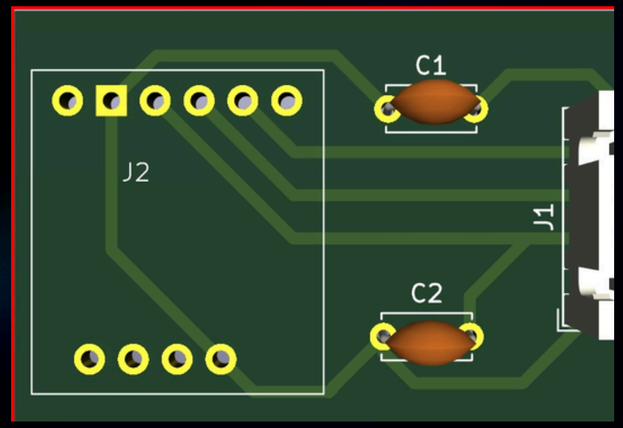

C1
C1
J2
J1
J4
Conn_01x04_Pin
C2
C2


C1
C1
100nF
J2
BNO_LEFT_055
7 SEMI
J1
Conn_01x04_Pin
C2
C2
10µF

3D View







APP Interface

