



DRIVESENSE

Drive Aware. Drive Smart. DriveSense.

LOCKEDIN LTD

Fall 2025 – University of Ottawa
Group 3

CEG 4913 – Computer Engineering Design Project II

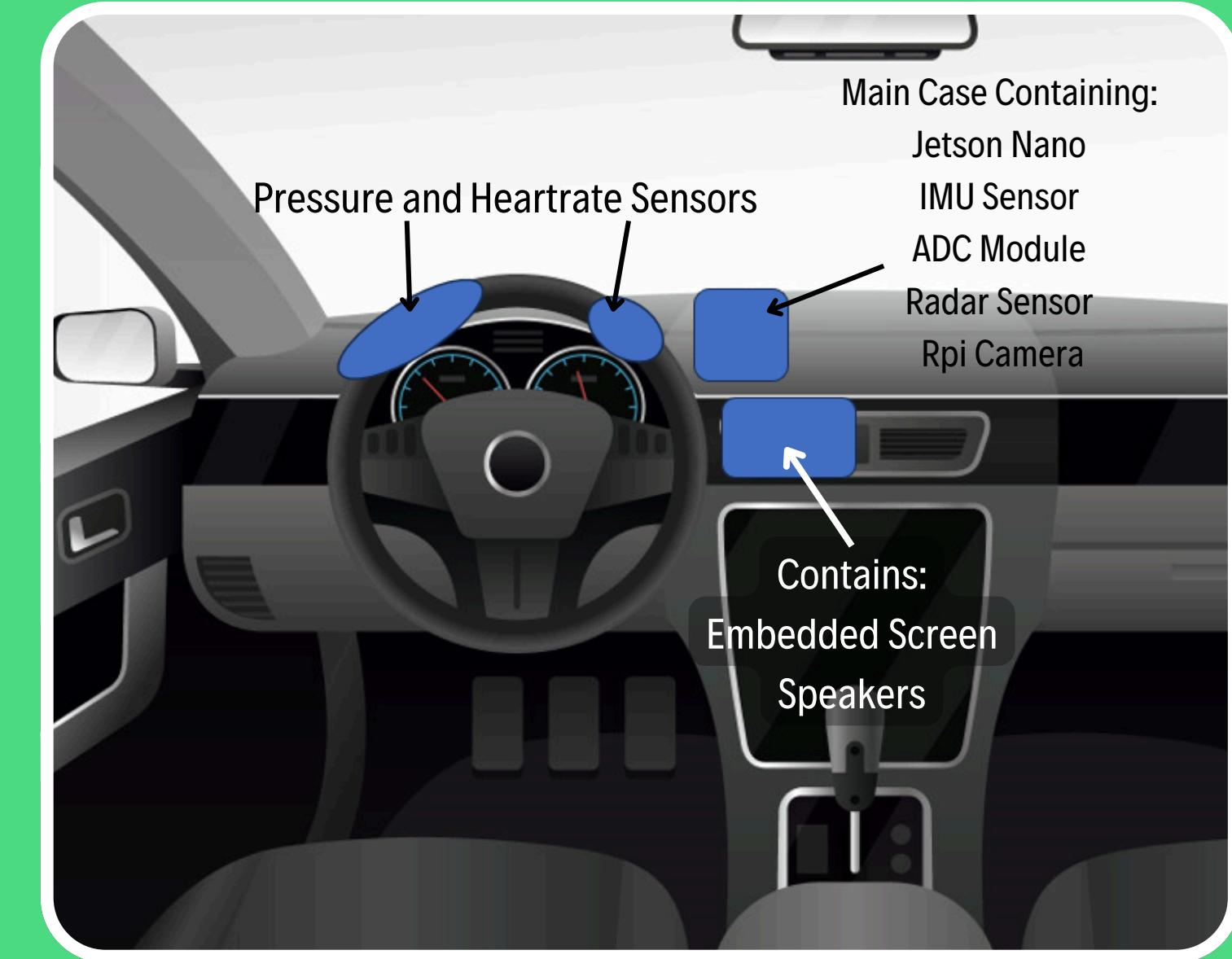
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Project Description

DriveSense is a driver alert system designed to monitor and assess a driver's attentiveness in real-time. By integrating sensors, cameras, and intelligent software, the system detects signs of drowsiness or distress, helping to prevent accidents and save lives.

Vision

To enhance road safety through real-time driver monitoring using smart technology.



Mission

To build a compact, sensor-based system that detects drowsiness.

THE ARCHITECTURE OF THE PROJECT

Requirements:

- Detecting drowsiness.
- Alerting the driver.
- Logging events securely.
- Enabling immediate access to critical information through a user-friendly interface.



Hardware Implementation

Detecting drowsiness using embedded sensors.



Software Development

Handling real-time alerting including a user-friendly UI.



Cloud Integration

Storing logs/event details in the cloud.



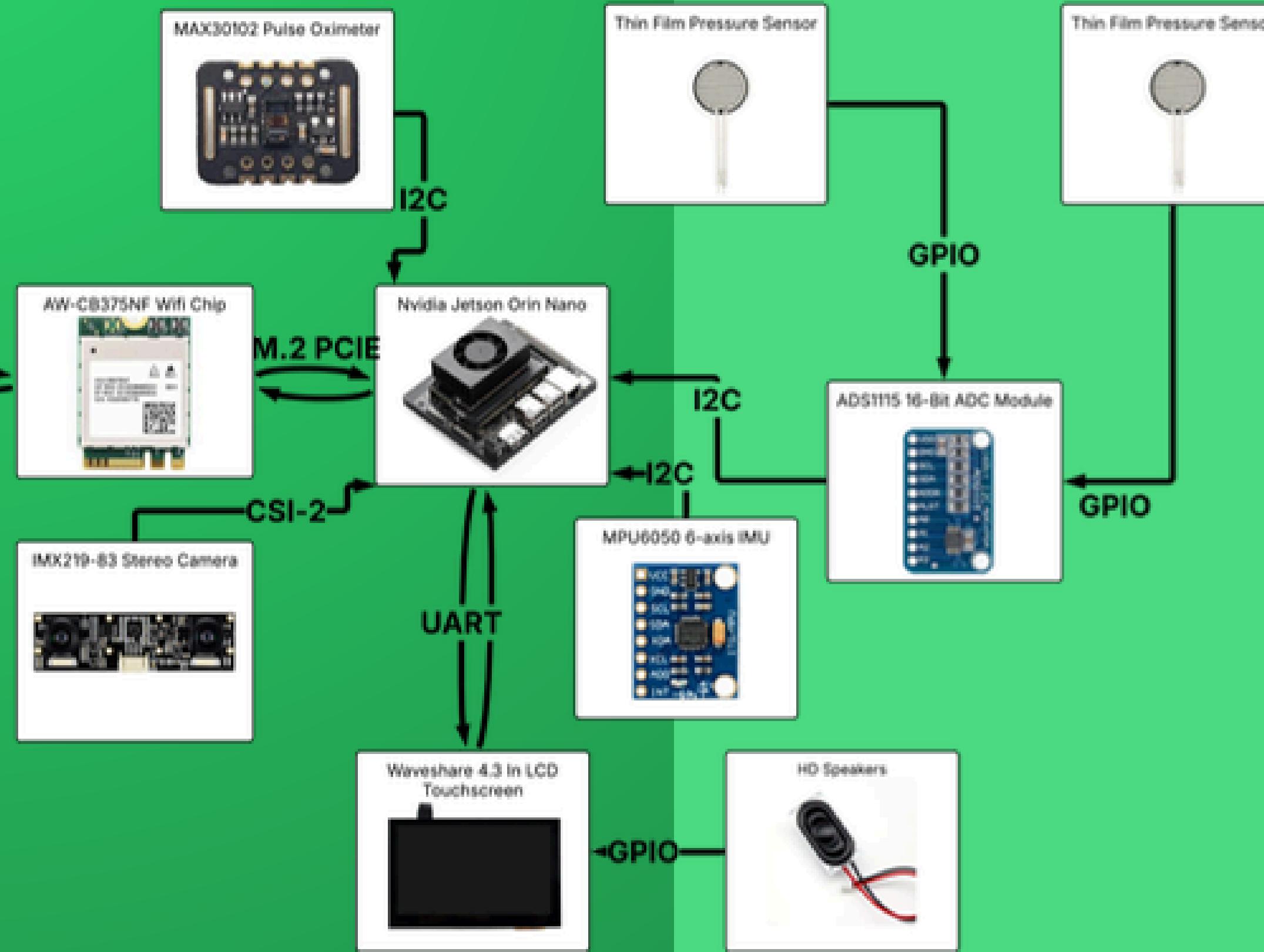
AI Model

Training a model to identify driver drowsiness.



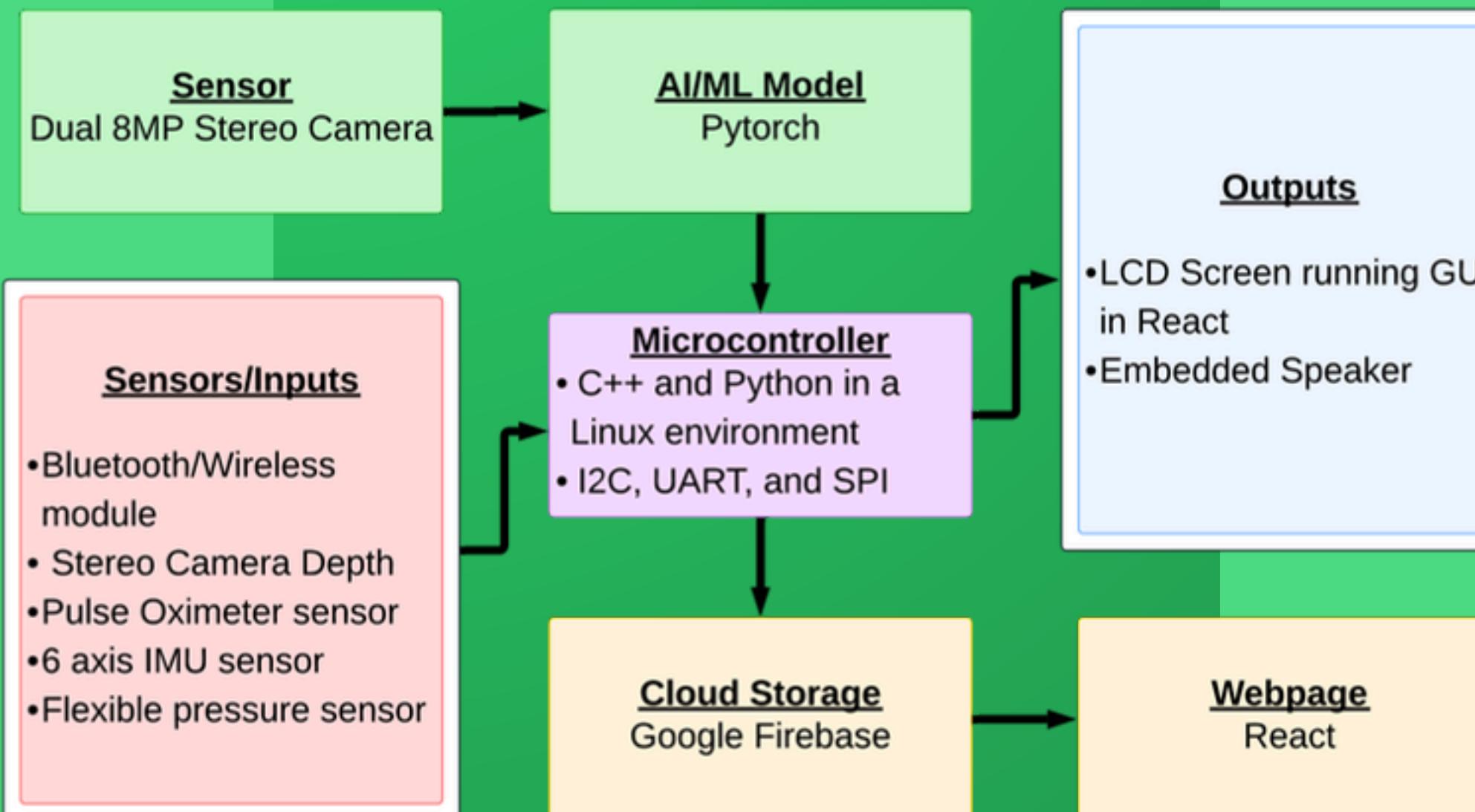
HARDWARE Architecture

-801 AC wireless



- Single Board Computer (SBC)
- Analog Digital converter (ADC)
- Bluetooth/Wireless module
- Pulse Oximeter sensor
- Dual Stereo IR Camera
- IMU sensor
- Flexible pressure sensor
- LCD Touch Screen
- Speaker

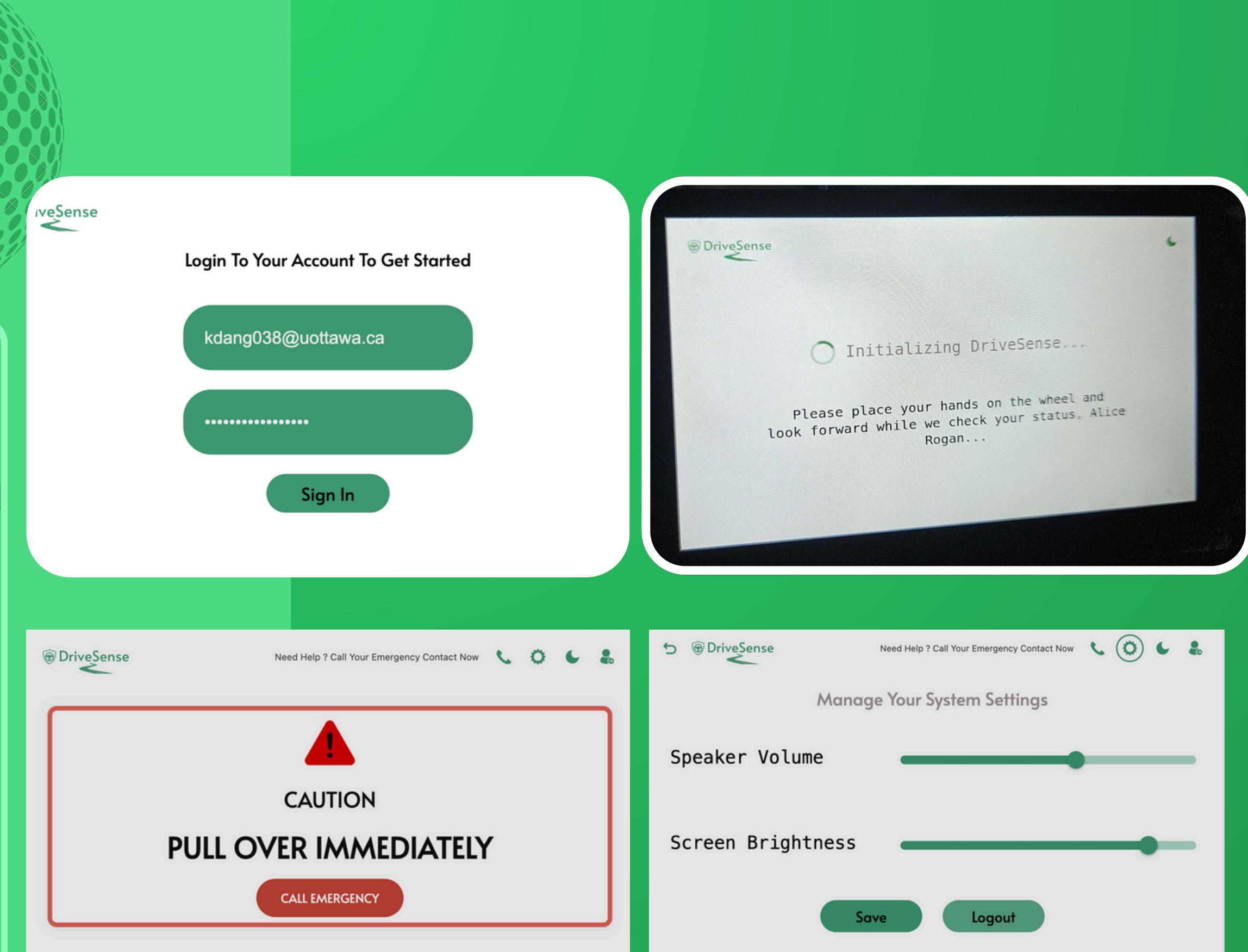
SOFTWARE Architecture



- **ML computer vision facial scanning**
- **Firebase database**
- **React Frontend and GUI**
- **Embedded sensor drivers and communication protocols**
- **PUB–SUB model for IPC**

Embedded UI Screen

- React + TypeScript for a fast, modular UI.
- Secure login connected to Firebase Authentication.
- Vite for instant hot-reload + lightweight embedded builds.
- Status-processing screen during system initialization.
- Real-time driver data streamed from Firebase.
- REST API connection to backend services.
- Twilio integration for emergency phone calls.
- Critical Alert UI with alarm sound .
- Settings screen with brightness & volume control.



```

  + Start collection
    drivers
    events
    users >
      + Add document
        user_joe_li_1762369779855 >
          + Start collection
            + Add field
              email: "kdang038@uottawa.ca"
              name: "Daniel Li"
              password: "8d969eef6ecad3c29a3a629280"
              phoneNumber: "6134924021"
              userId: "user_joe_li_1762369779855"
  
```

Front-End Website

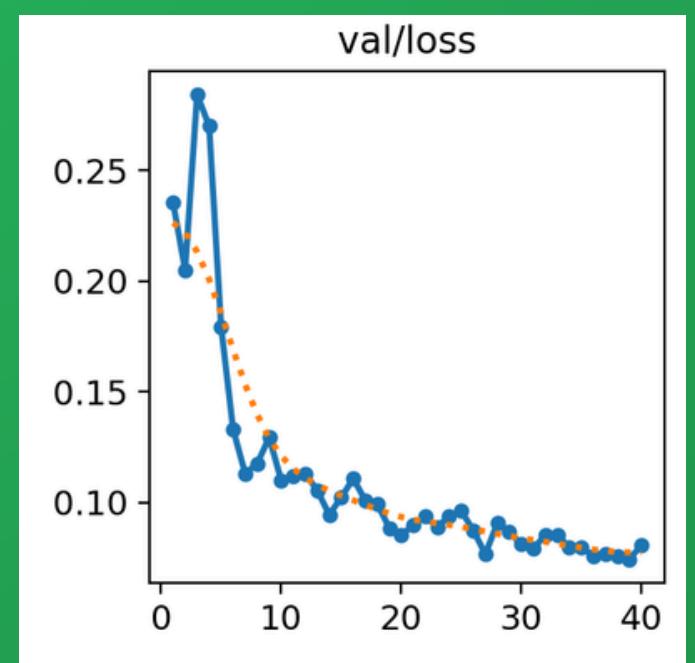
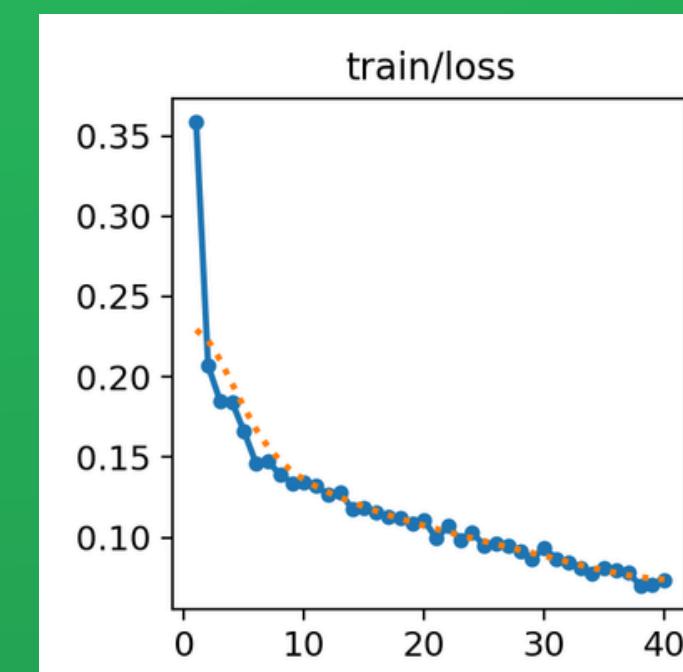
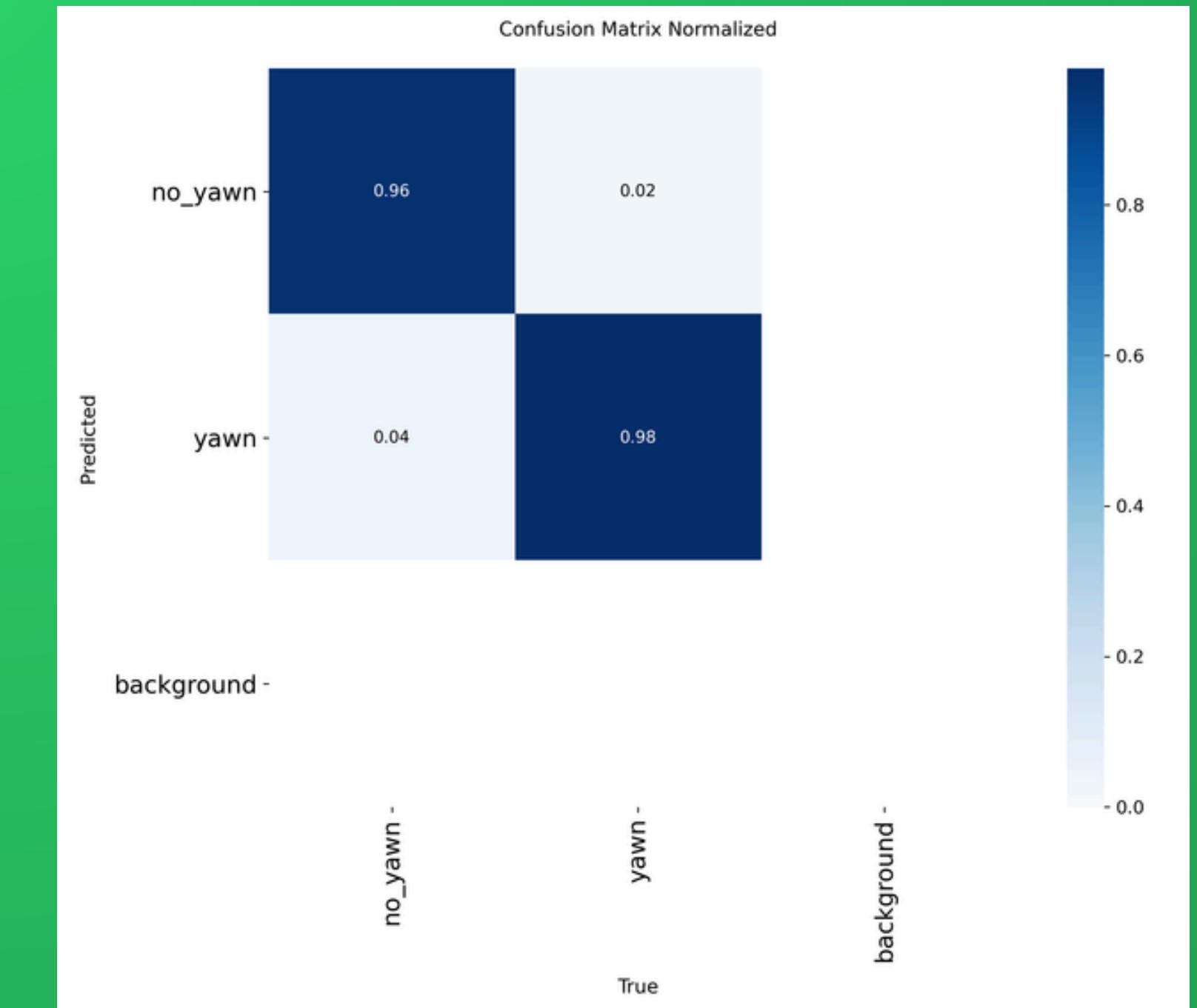
- Built with React.js for its flexibility, consistency, and ease of use
- Uses to email.js to send emails to users
- Allows for secure login and account management with firebase integration
- Driver status' and telemetry updated in real time with REST API integration to backend
- Automatic event logging

Firebase

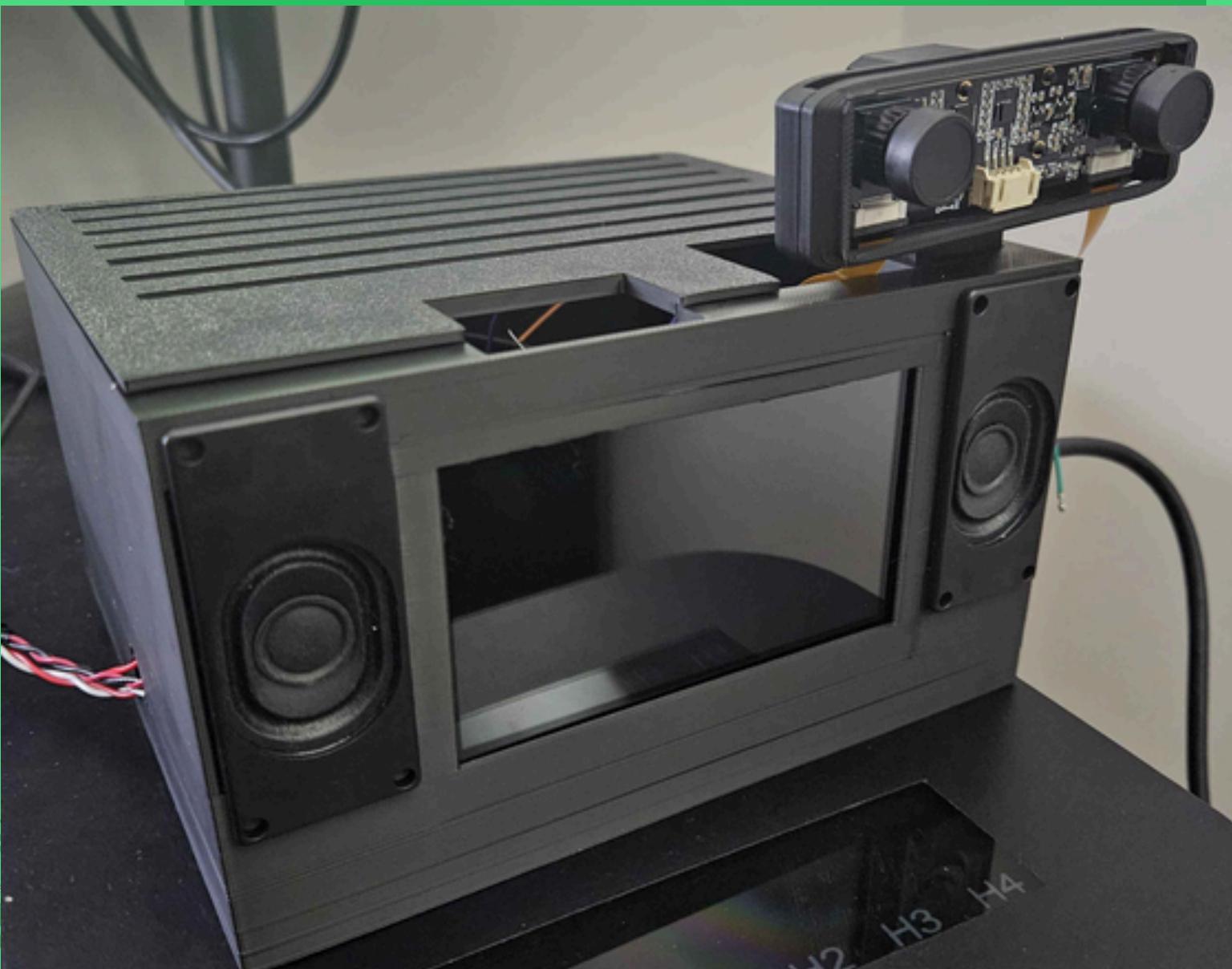
- Users, drivers, and events have their own collection
- Events are linked to their respective driver
- Each driver is associated to a user

AI Model

- **Base model: YOLOV11**
- **Dataset of 9120 photos**
- **Procedure**
 - **Clean images**
 - **Create landmarks**
 - **Fine-tune**



Hardware/CAD Design



GitHub Snapshot

Display-UI Public
Repository for the Screen
TypeScript 0 0 0 0 Updated yesterday

HW-main Public
Repository for the jetsons software
C++ 0 0 0 0 Updated 2 days ago

AdminDashboard-main Public
Repository for the website
JavaScript 0 MIT 0 0 Updated 2 days ago

Green-Tea Public
Repository for ML model
Python 0 0 0 0 Updated last week

Mango Public
For course deliverables
0 0 0 0 Updated 2 weeks ago

DevUtils Private
Shell 0 0 0 0 Updated on Sep 29

Mint-chocolate-chip Public
a repository for CAD designs
0 0 0 0 Updated on Mar 31



Spaces

DriveSense ...

Summary Timeline Backlog **Board** List Forms </> Development </> Code Security Releases Deployments Archived work items

Search board Filter

BACKLOG TO DO IN PROGRESS 2 DONE +

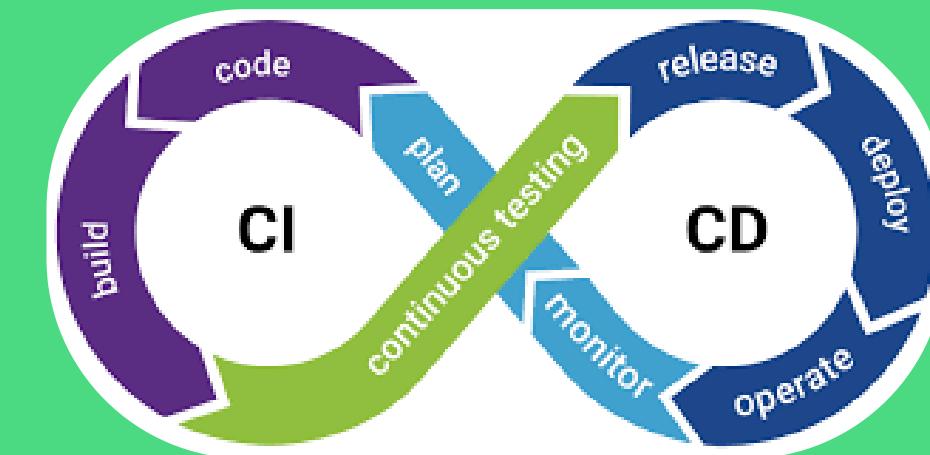
+ Create

Final project demonstration
FINAL PRESENTATIONS - TERM 2
LOC-135

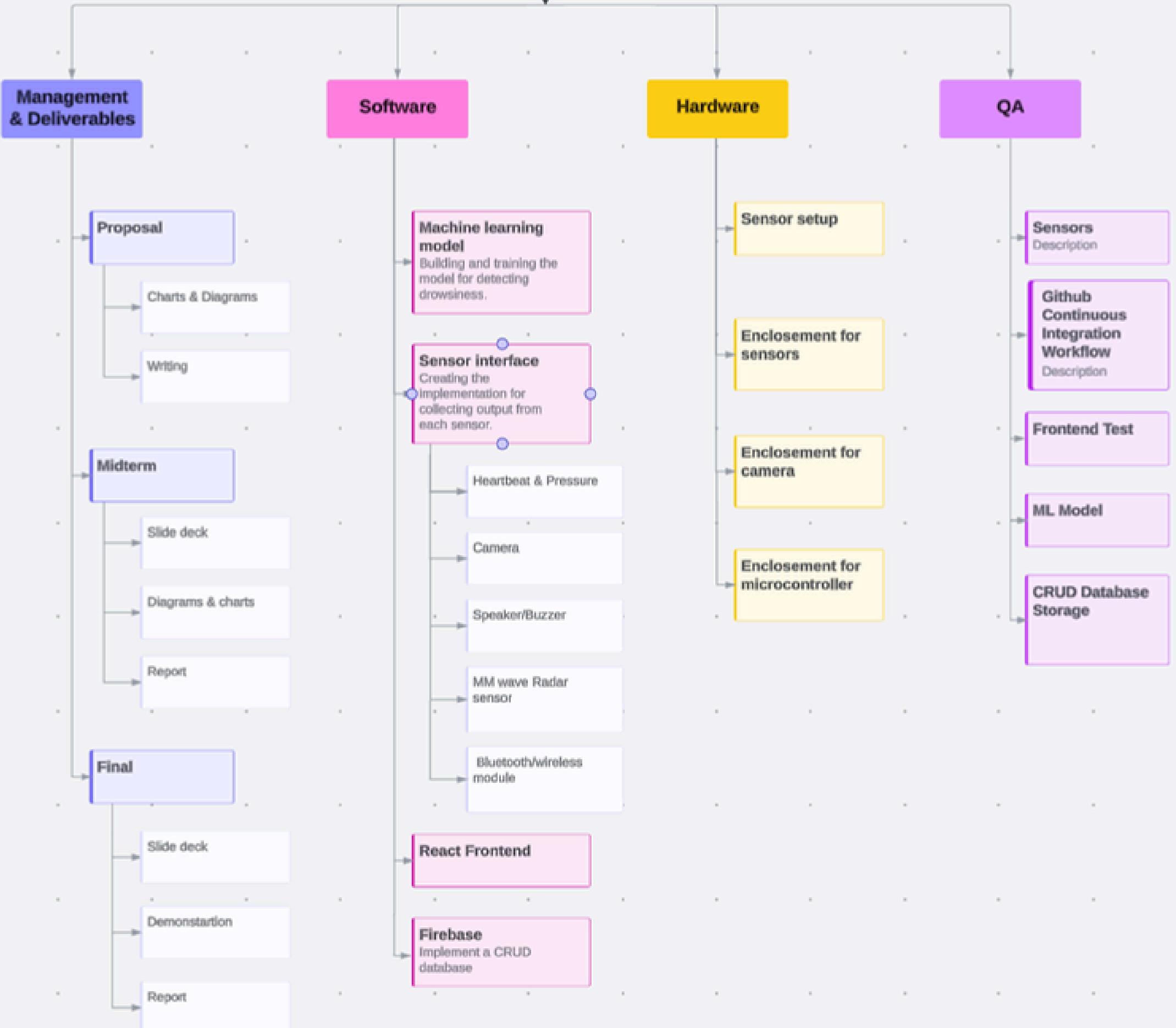
Final Project Report - Term 2
FINAL PRESENTATIONS - TERM 2
LOC-39

Agile Management Board - JIRA

[Jira Board Link](#)



CEG 4913: Capstone II

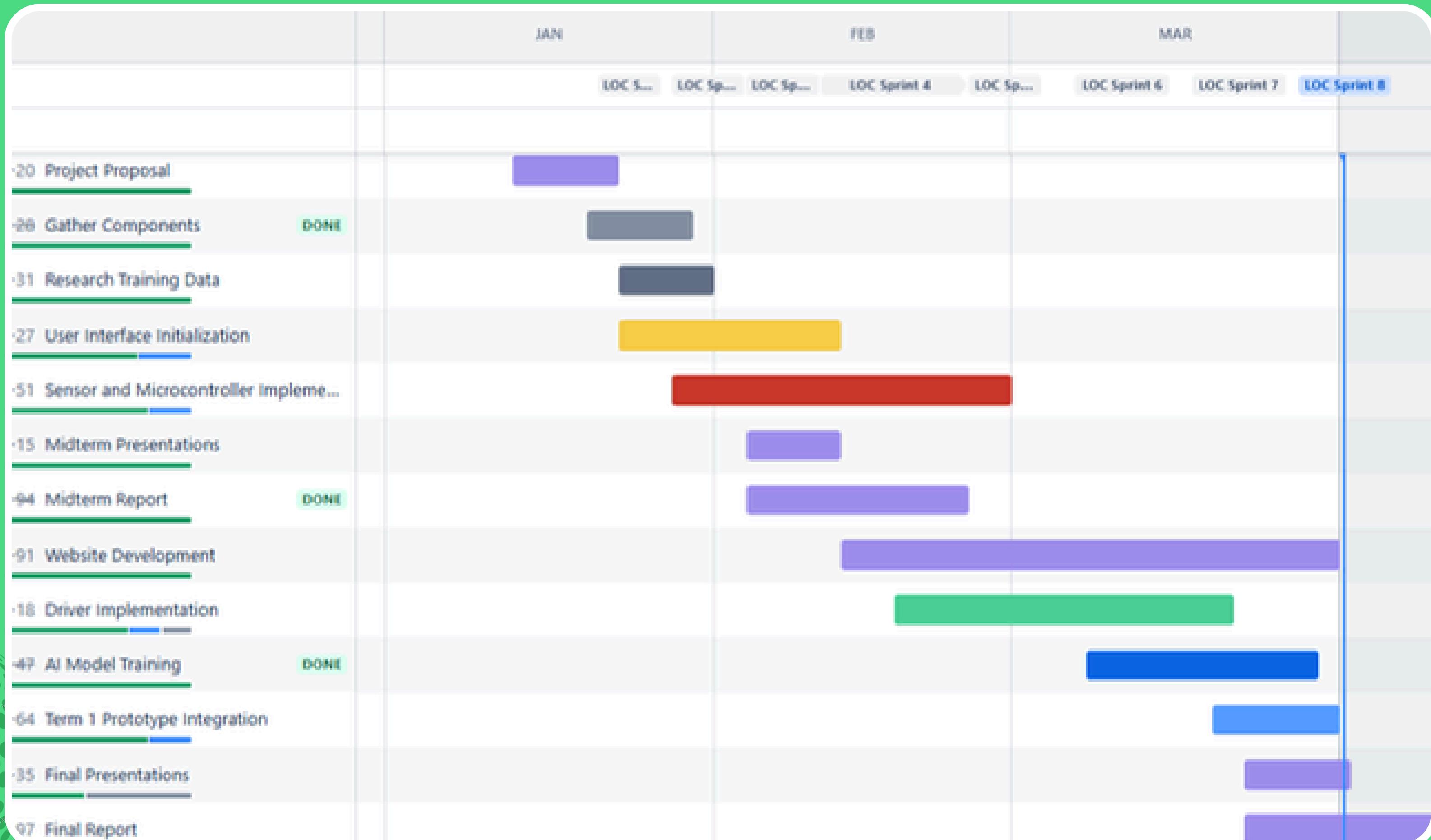


Work Breakdown Structure - WBS



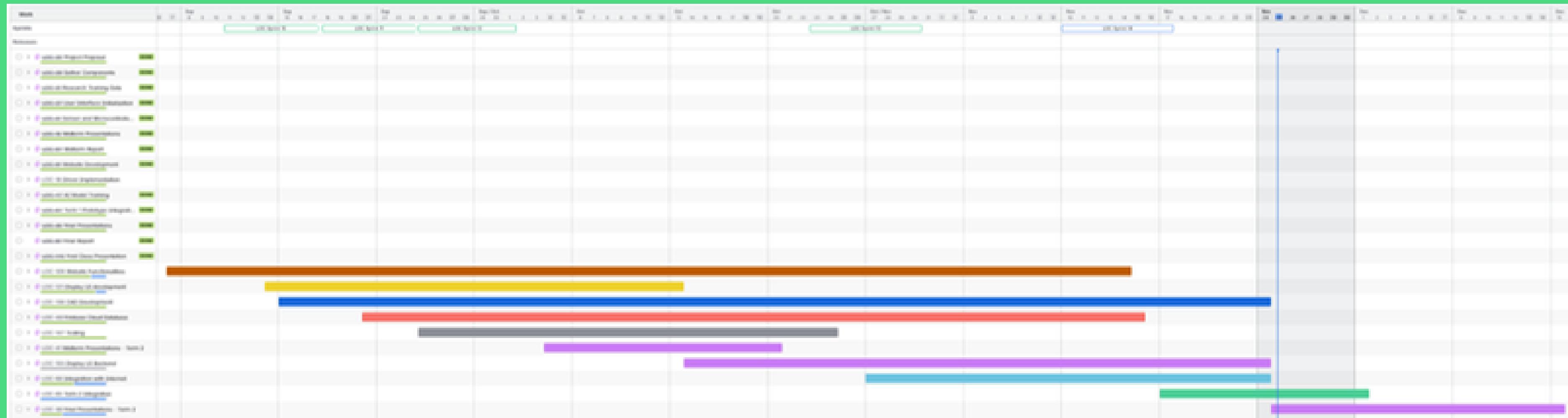
GANTT CHART

Gantt Chart Link



GANTT CHART

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Team Contributions Overview

Tasks

Screen User Interface and Real Time Data Manipulation

Database Manipulation and AI Model

Website and Backend Integration

Website & AI Model

Microcontroller and Sensor Implementation

CAD Design & CI/CD Implementation

Team member(s)

Hajer Fguir

Saurav Guduru

Kevin Dang

Keith Tran

Aaditya Shah

Abdullah Ramadan



DRIVEMODE
PRESENTED BY LOCKEDIN LTD.

THANK YOU !