CEG 4912 -

Computer Engineering Design Project I

MIDTERM PRESENTATION:

Winter 2025 - University of Ottawa

Group 3

MEET OUR TEAM

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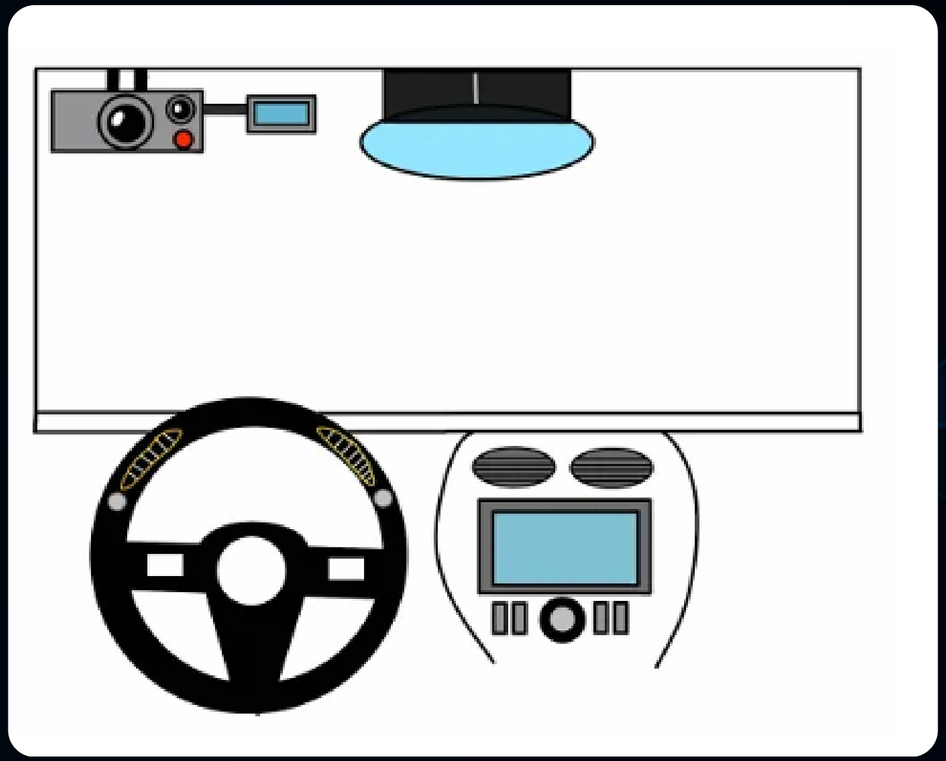
uOttawa

PROJECT DESCRIPTION

The primary goal of our project is to develop a driver alert system that can be mounted into any vehicle to monitor and assess the driver's attentiveness in real-time. Using various sensors, cameras, and software, the system will detect drowsiness.



REQUIREMENTS

Functional Requirements

- The system must detect when the driver is drowsy.
- The system must alert the driver if drowsiness is detected.
- The system should notify a third party if it detects that the driver is drowsy.
- The system should store all logs/event details in the cloud.
- The system should retrieve logs from the cloud for third-party access upon request.
- The system should display information about the driver to any third parties.
- The user must authenticate the system to their user management account
- The user interface must contain an embedded video for every major event that occurs
- The system must allow the user to immediately reach out to the emergency contact
- The user must be able to dismiss alerts.

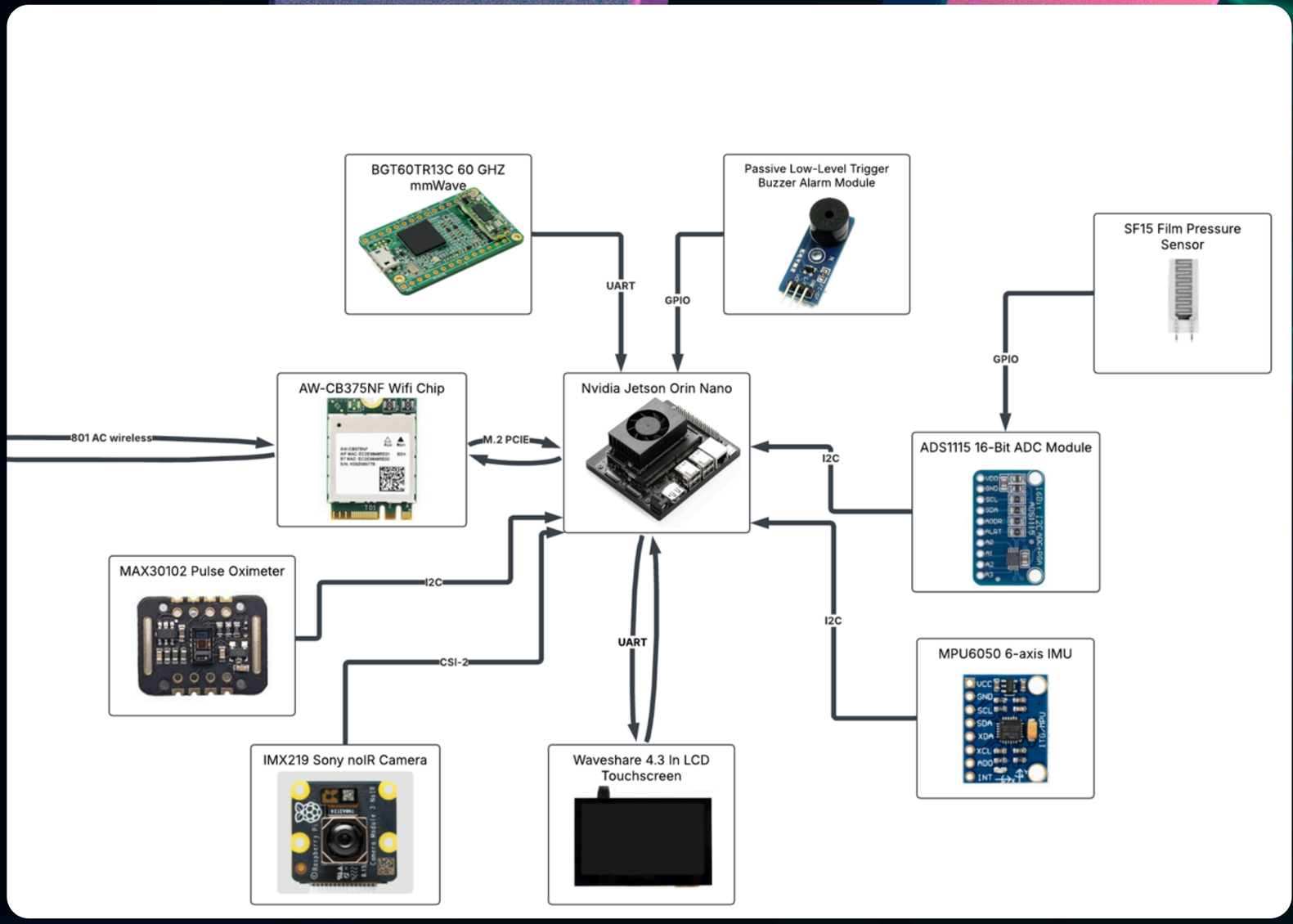
REQUIREMENTS CTD.

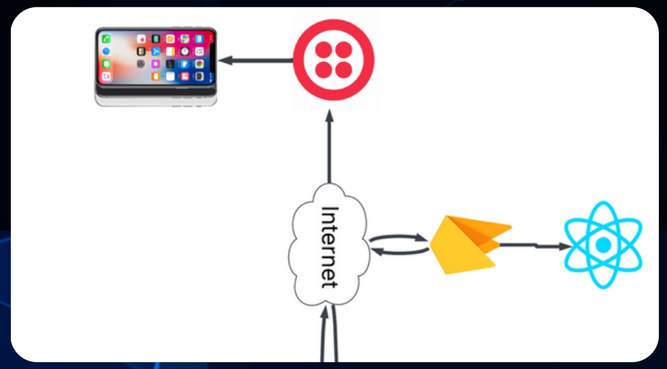
Non-Functional Requirements

- The internal system should be protected.
- The internal system should be hidden from the user.
- The system should be easy to install.
- The software UI should be simple to navigate.
- The system’s UI should use O-Auth to allow users to log in.
- The system emergency contact feature should notify the contact within 2 seconds.

HARDWARE ARCHITECTURE

- Single Board Computer (SBC)
- Analog Digital converter (ADC)
- Bluetooth/Wireless module
- MM wave Radar sensor
- Pulse Oximeter sensor
- noIR Camera
- IMU sensor
- Flexible pressure sensor
- LCD Touch Screen
- Speaker/Buzzer

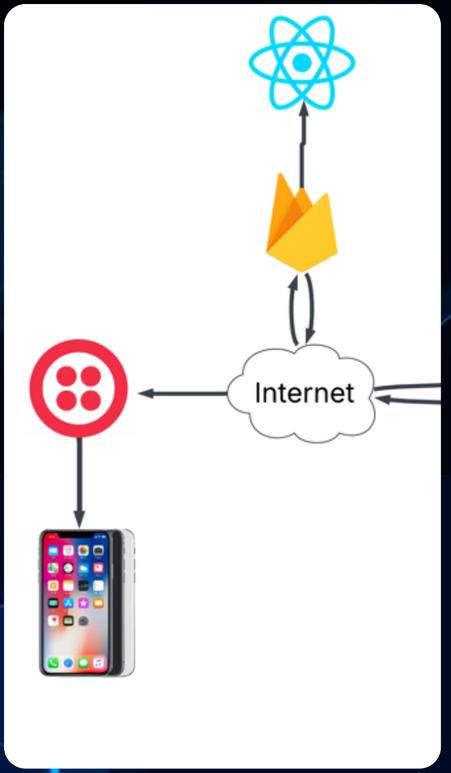




SOFTWARE ARCHITECTURE

Software Components

- AI/ML computer vision facial scanning
- Storage Bucket Cloud database
- React Frontend and GUI
- Embedded sensor drivers and communication protocols



Sensor
8MP noIR Camera

AI/ML Model
Pytorch

Outputs

- LCD Screen running GUI in QT or React Naitive
- Tone generator Controlling Buzzer

Sensors/Inputs

- Bluetooth/Wireless module
- 60 GHz MM wave Radar sensor
- Pulse Oximeter sensor
- 6 axis IMU sensor
- Flexible pressure sensor

Microcontroller

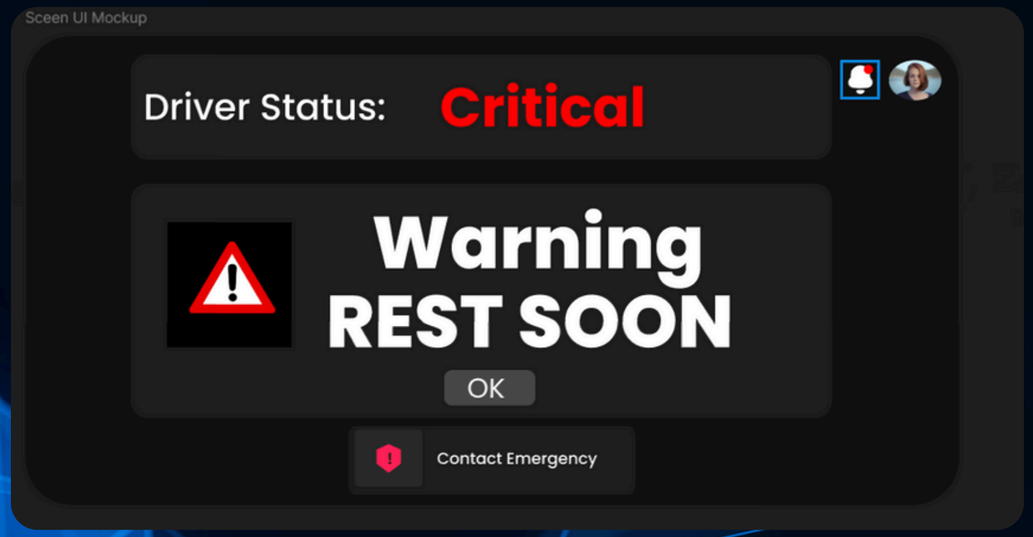
- C++ and Python in a Linux environment
- I2C, UART, and SPI

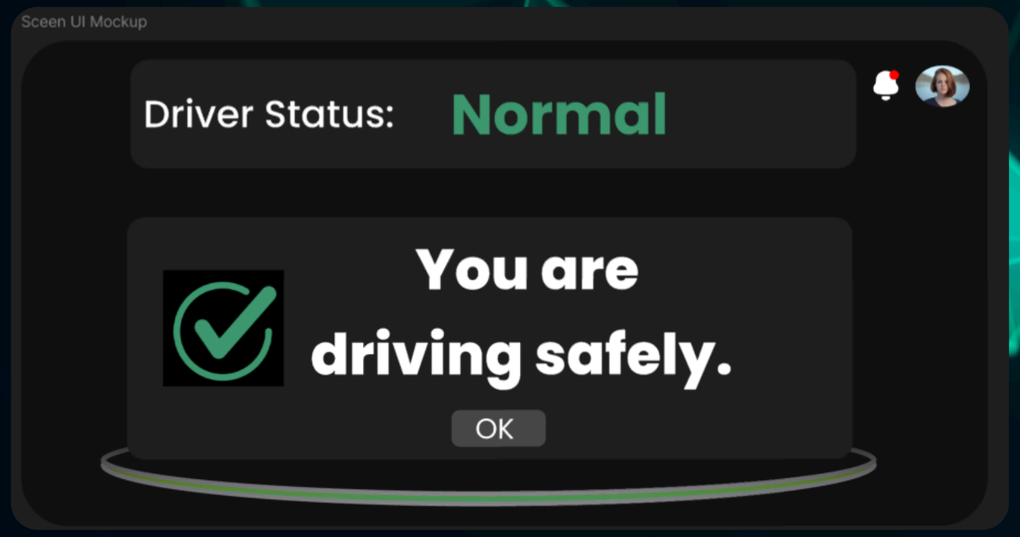
Cloud Storage
Google Firebase

Webpage
React

ADMIN WEBSITE

MOCK UI DRAWING FOR THE SMALL EMBEDDED SCREEN





CAD DESIGN

- Jetson Nano Orin Case
- Screen Case Cover
- Sensor Box Case
- Camera Windshield Mount
- Steering Wheel Sensor Mount

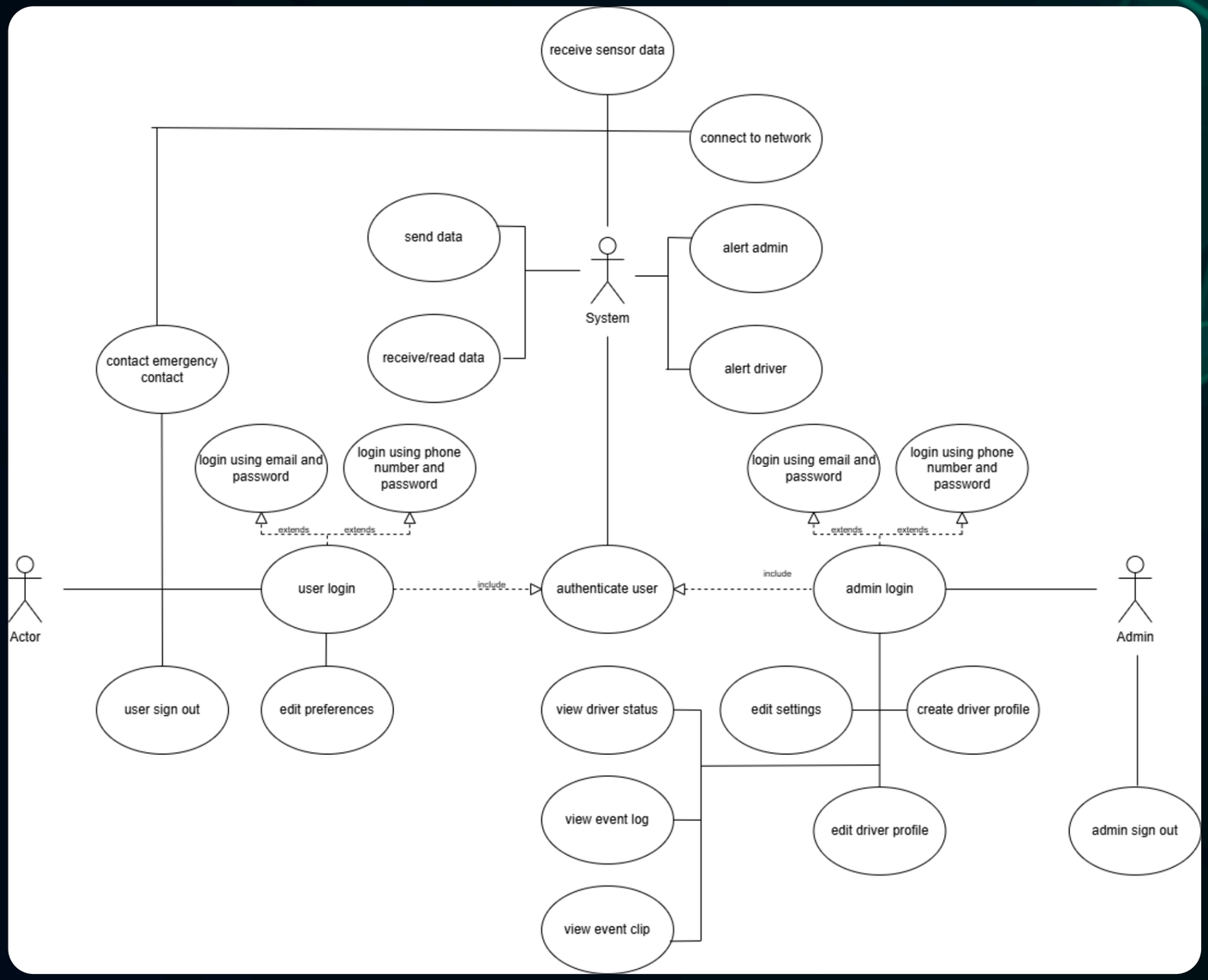
USE CASE DIAGRAM

Driver:

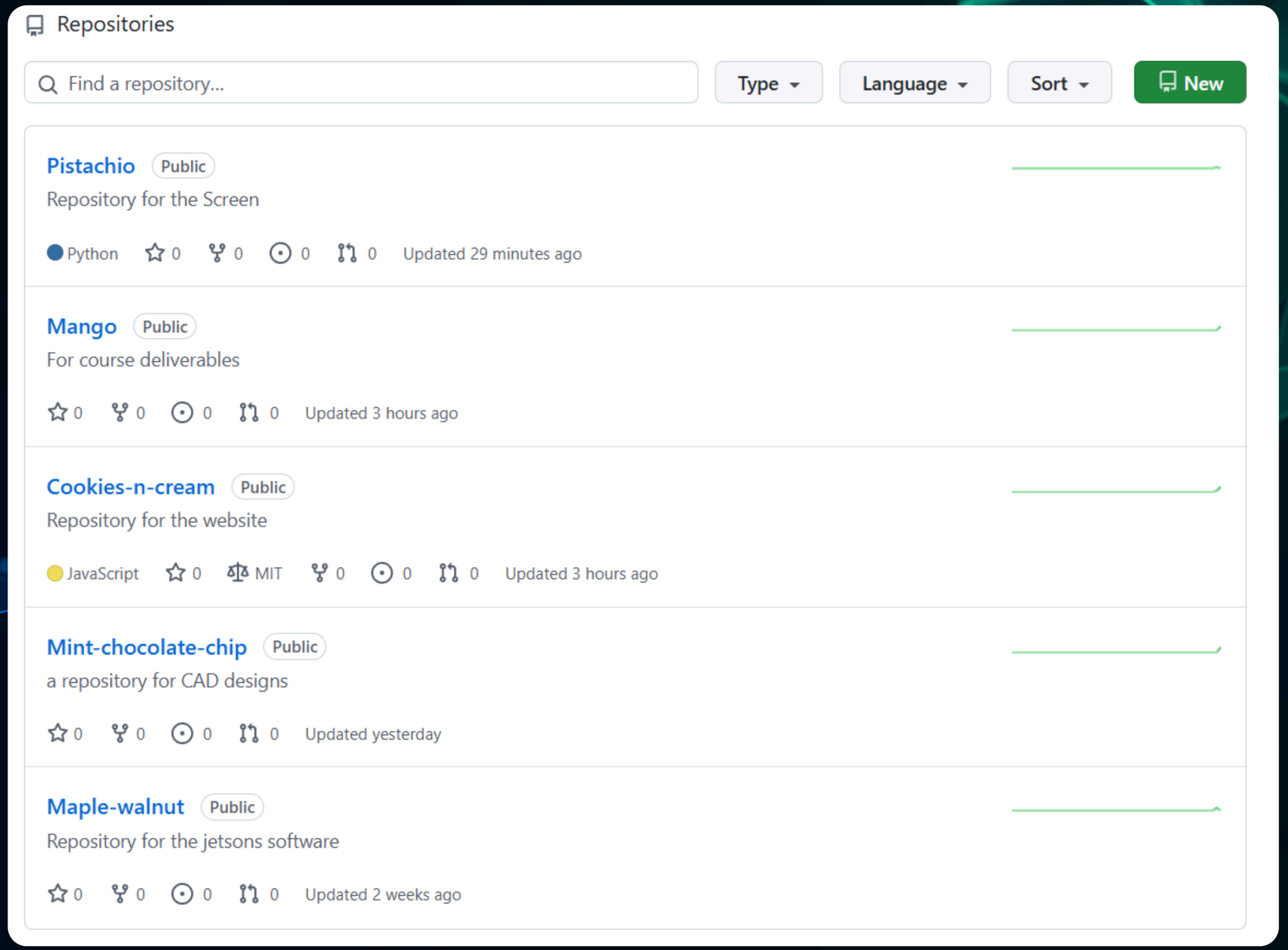
- Driver Sign In
- Driver Sign Out
- Contact Emergency Contact

Admin:

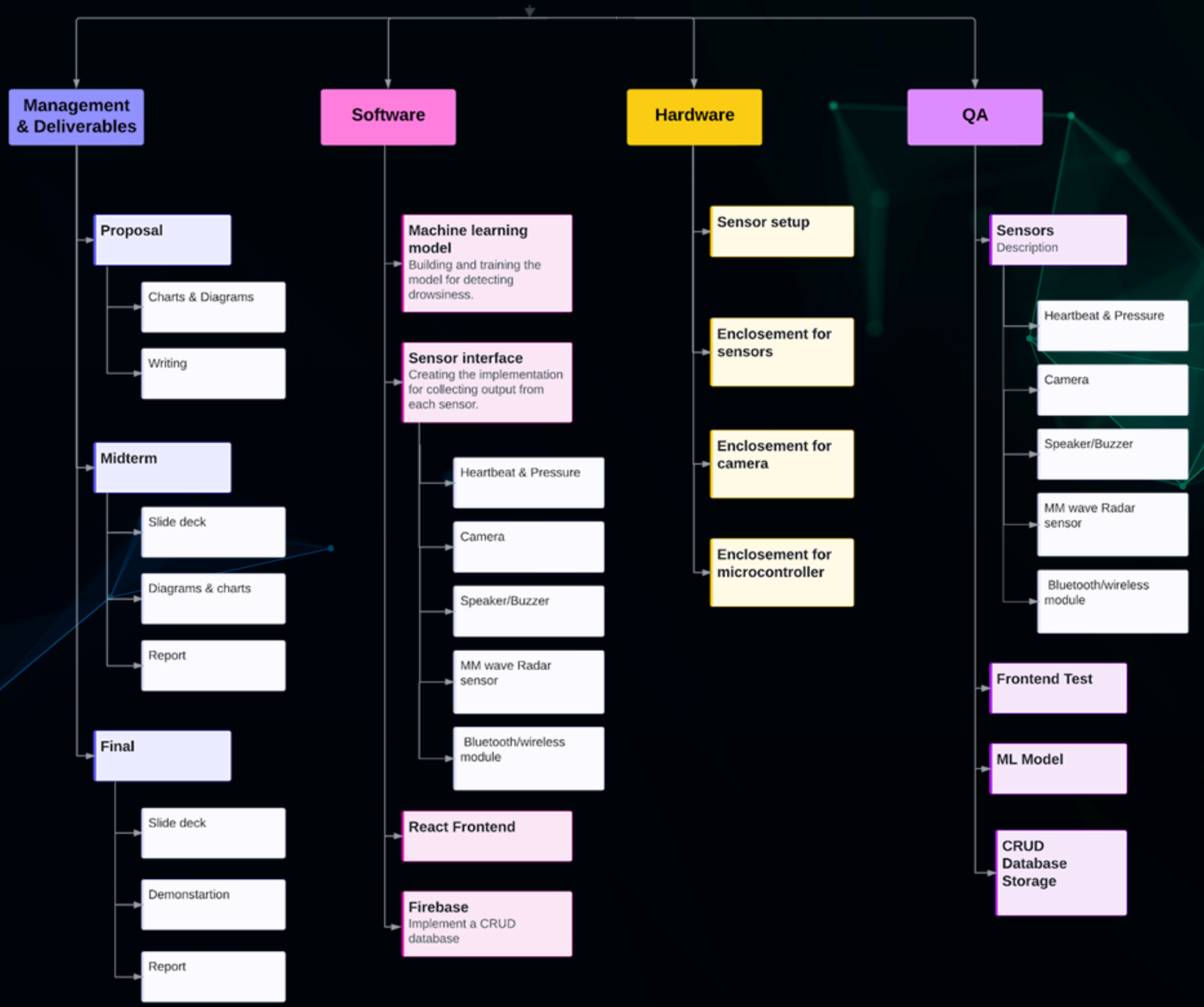
- Admin Sign In
- Admin Sign Out
- Edit Driver Profile
- Edit Settings
- Create Driver Profile
- View Driver Status
- View Event Log
- View Event Clip



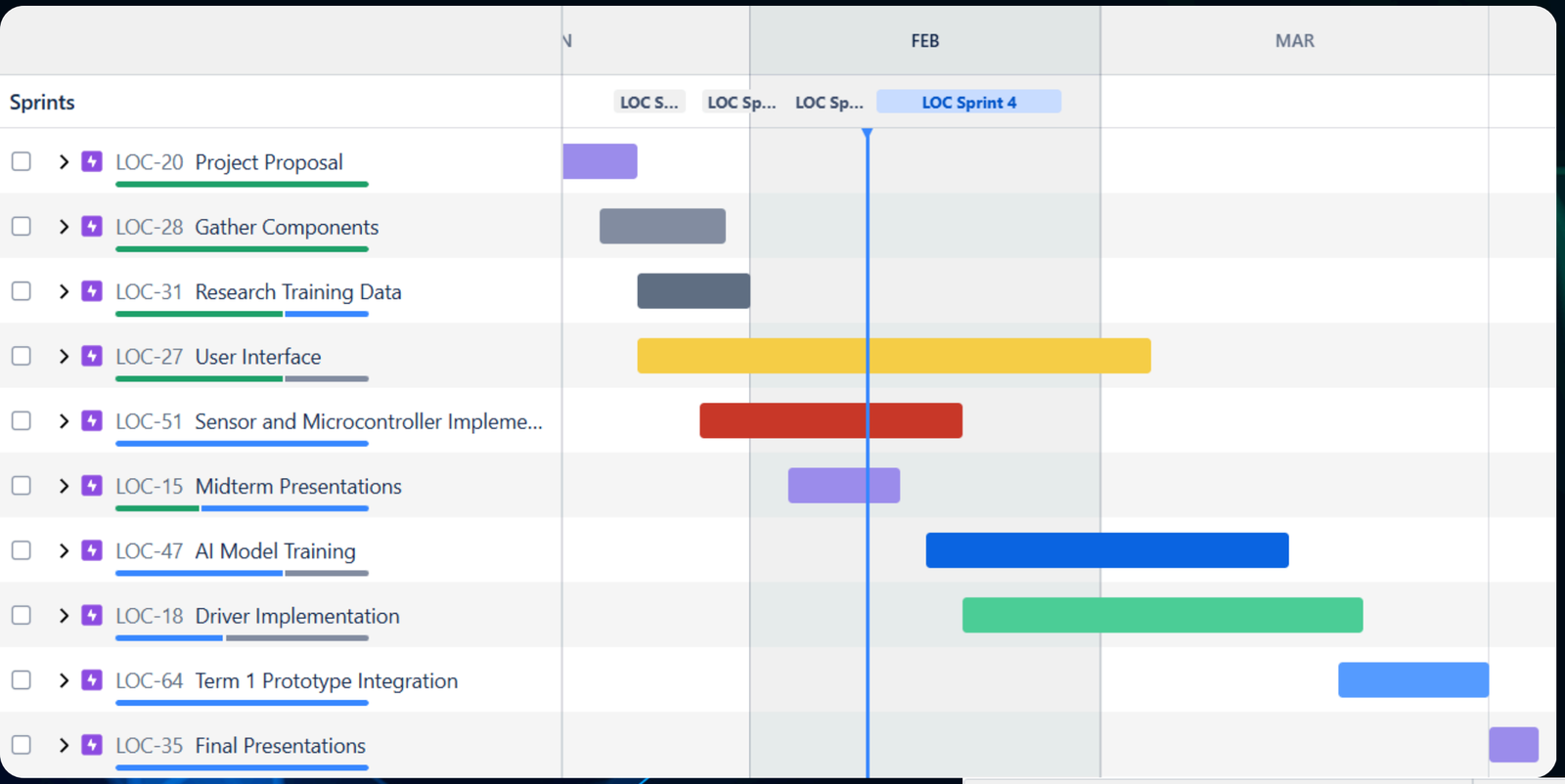
GITHUB SNAPSHOT



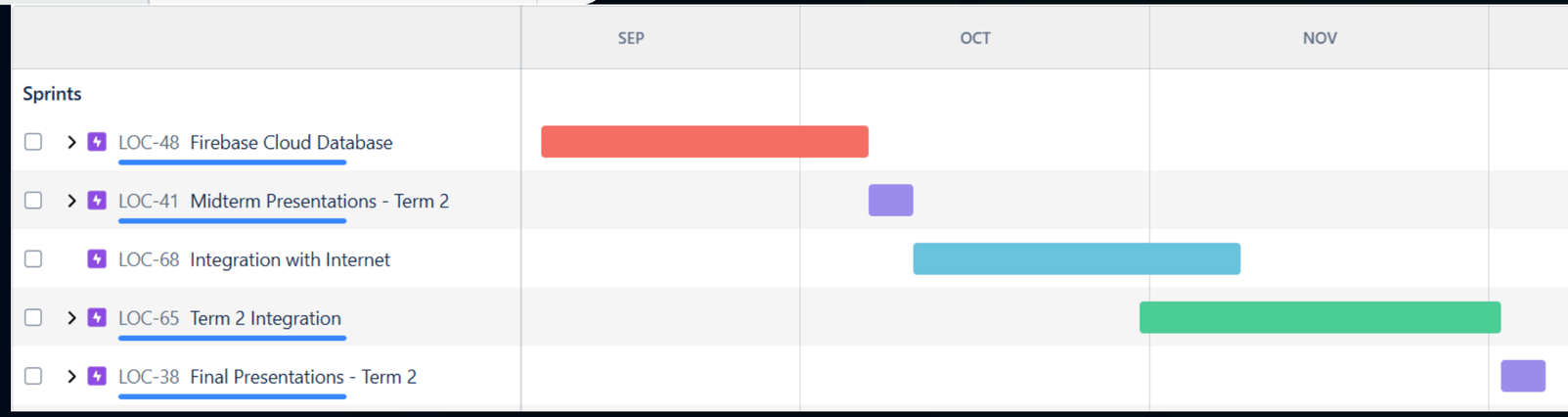
WORK BREAKDOWN STRUCTURE (WBS)



GANTT CHART



[Gantt Chart Link]



AGILE MANAGEMENT BOARD (JIRA)

LOC Sprint 4

Search | AR KD AS KT SG | Epic | GROUP B

BACKLOG 18

- Set up camera integration — DRIVER IMPLEMENTATION — LOC-24
- Create a driver for MM Wave Radar Sensor — DRIVER IMPLEMENTATION — LOC-26
- Screen UI Implementation — DRIVER IMPLEMENTATION — LOC-29
- Final Presentation Slide Deck — FINAL PRESENTATIONS — LOC-36
- Final Project Report — FINAL PRESENTATIONS — LOC-37
- Final Project Report - Term 2

TO DO 6

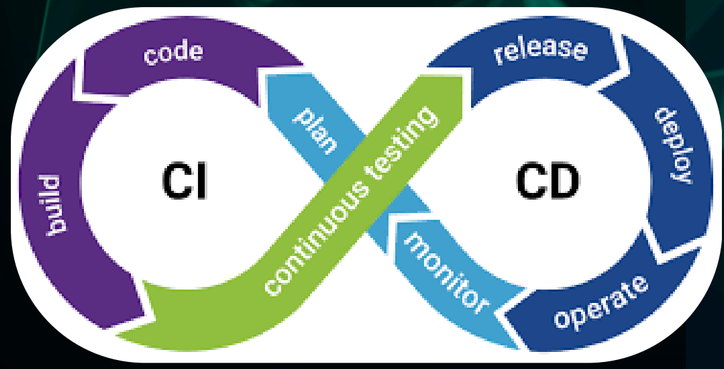
- Research methods to train AI model — AI MODEL TRAINING — LOC-62 — AS
- Create a driver for a heartbeat sensor — DRIVER IMPLEMENTATION — LOC-19
- Create a driver for sound buzzer — DRIVER IMPLEMENTATION — LOC-23
- Create a driver for the pressure sensor — DRIVER IMPLEMENTATION — LOC-21
- Create a driver for the screen — DRIVER IMPLEMENTATION — LOC-30

IN PROGRESS 8

- Midterm Project Report — MIDTERM PRESENTATIONS — LOC-17 — KT
- Firebase video research and other cloud research — LOC-79 — SG
- Find models; whats out there? — RESEARCH TRAINING DATA — LOC-76 — KT
- Sensor Setup — SENSOR AND MICROCONTROLLER IMPLE... — LOC-56
- Sensor Casings — SENSOR AND MICROCONTROLLER IMPLE... — LOC-57 — AR
- MCU Casing CAD — SENSOR AND MICROCONTROLLER IMPLE...

DONE 3

- Register Borrowed Components — GATHER COMPONENTS — ~~LOC-32~~ — AS
- Implement Landing Page — USER INTERFACE — ~~LOC-44~~ — KD
- Implement Dashboard — USER INTERFACE — ~~LOC-45~~ — KD



[JIRA BOARD LINK]

PROJECT PROGRESS

Task	Status	Team member(s)
User Interface	In progress	Hajer Fguir & Kevin Dang
Hardware Equipment	Implemented	Aaditya Shah
Sensors Testing	In progress	Keith Tran
Firebase Manipulation	In progress	Saurav Guduru
Sensor Implementation	In progress	Abdullah Ramadan & Aaditya Shah
Microcontroller Implementation	In Progress	Abdullah Ramadan & Aaditya Shah
CAD Design and Printing	In progress	Abdullah Ramadan

THANK YOU!