OVERSEE- AN AI based Driver State Monitoring System

SYSTEM DEVELOPMENT REPORT

GOLF – SECTION A

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Platforms used:

Raspberry pi: The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It can also plug with a LCD touch screen and can operate without any external mouse or keyboard. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python.

GitHub: GitHub, Inc. is a provider of Internet hosting for software development and version control using Git. It offers the distributed version control and source code management functionality of Git, plus its own features.

PyCharm: PyCharm is an integrated development environment used in computer programming, specifically for the Python language.

Google Collab: Collaboratory, or "Collab" for short, is a product from Google Research. Collab allows anybody to write and execute arbitrary python code through the browser, and is especially well suited to machine learning, data analysis and education.

Visual Code Studio: Visual Studio Code is a freeware source-code editor made by Microsoft for Windows, Linux and macOS. Features include support for debugging, syntax highlighting, intelligent code completion, snippets, code refactoring.

Front end:

1. **Hyper Text Markup Language (HTML):** Hyper Text Markup Language (HTML) is the backbone of any website development process. A markup language indicates text can be turned into images, tables, links, and other representations. It is the HTML code that provides an overall framework of how the site will look.
2. **Cascading Style Sheets (CSS):** CSS controls the presentation aspect of the site and allows your site to have its own unique look. It does this by maintaining style sheets which sit on top of other style rules and are triggered based on other inputs, such as device screen size and resolution.
3. **JavaScript**: JavaScript is an event-based imperative programming language that is used to transform a static HTML page into a dynamic interface. JavaScript code can use the Document Object Model (DOM), provided by the HTML standard, to manipulate a web page in response to events, like user input.
4. **Flask:** Flask is a micro web framework written in Python. It is classified as a microframework because it does not require particular tools or libraries. It has no database abstraction layer, form validation, or any other components where pre-existing third-party libraries provide common function.

Backend:

OpenCv: OpenCV is a library of programming functions mainly aimed at real-time computer vision. Originally developed by Intel, it was later supported by Willow Garage then Itseez. The library is cross-platform and free for use under the open-source Apache 2 License.

DLib: DLib is an open source C++ library implementing a variety of machine learning algorithms, including classification, regression, clustering, data transformation, and structured prediction. DLib also features utility functionality including Image Processing. Dlib is much accurate as compared to OpenCV Haar based face detector.

Imutils: Imutils are a series of convenience functions to make basic image processing functions such as translation, rotation, resizing, skeletonization, and displaying Matplotlib images easier with OpenCV and both Python 2.7 and Python 3.

Pygame: Pygame is a free and open-source cross-platform library for the development of multimedia applications like video games using Python. It uses the Simple DirectMedia Layer library and several other popular libraries to abstract the most common functions, making writing these programs a more intuitive task.

FaBo9Axis_MPU9250: It is a Python library for calibrating and retrieving acce lerometer, magnetometer, and gyroscope data from the MPU9250 9-
Axis sensor.

Pyrebase: Pyrebase is a Python interface to Firebase's REST API. In layman's terms, it allows one to use. Python to manipulate one’s Firebase database.

Firebase: Firebase is a Google-backed application development software that enables developers to develop iOS, Android and Web apps. Firebase provides tools for tracking analytics, reporting and fixing app crashes, creating marketing and product experiment. OverSee use firebase to store the driver's current states and pass those values in the webapp interface.

Scenario 1:

Mr. Kabir a truck driver, had all night duty yesterday. He had to deliver raw material to a factory. Due to this covid-19 situation, the schedules are quite hectic. So, next morning one of his co-workers is sick so he has to do his job as a replacement. His owner has set an AI based driver state monitoring device in the car. After driving for a while, Mr. Kabir was very drowsy due to lack of sleep. His face features are captured through the camera, and so his drowsiness is detected. An alarm went off and he was alerted by this. So, he took parked the truck and took rest for some time. Then he was quite refreshed again, and started his journey.

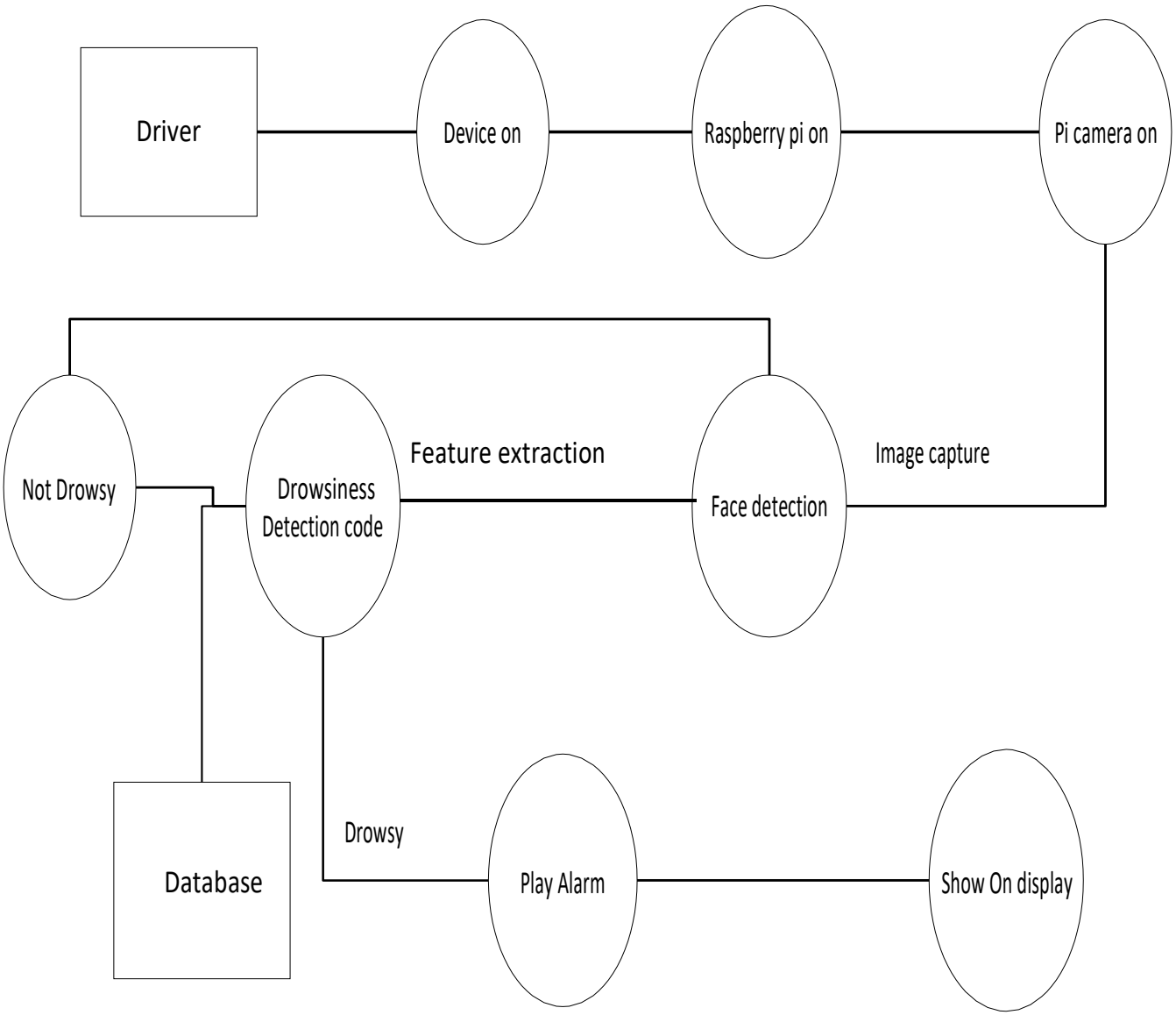
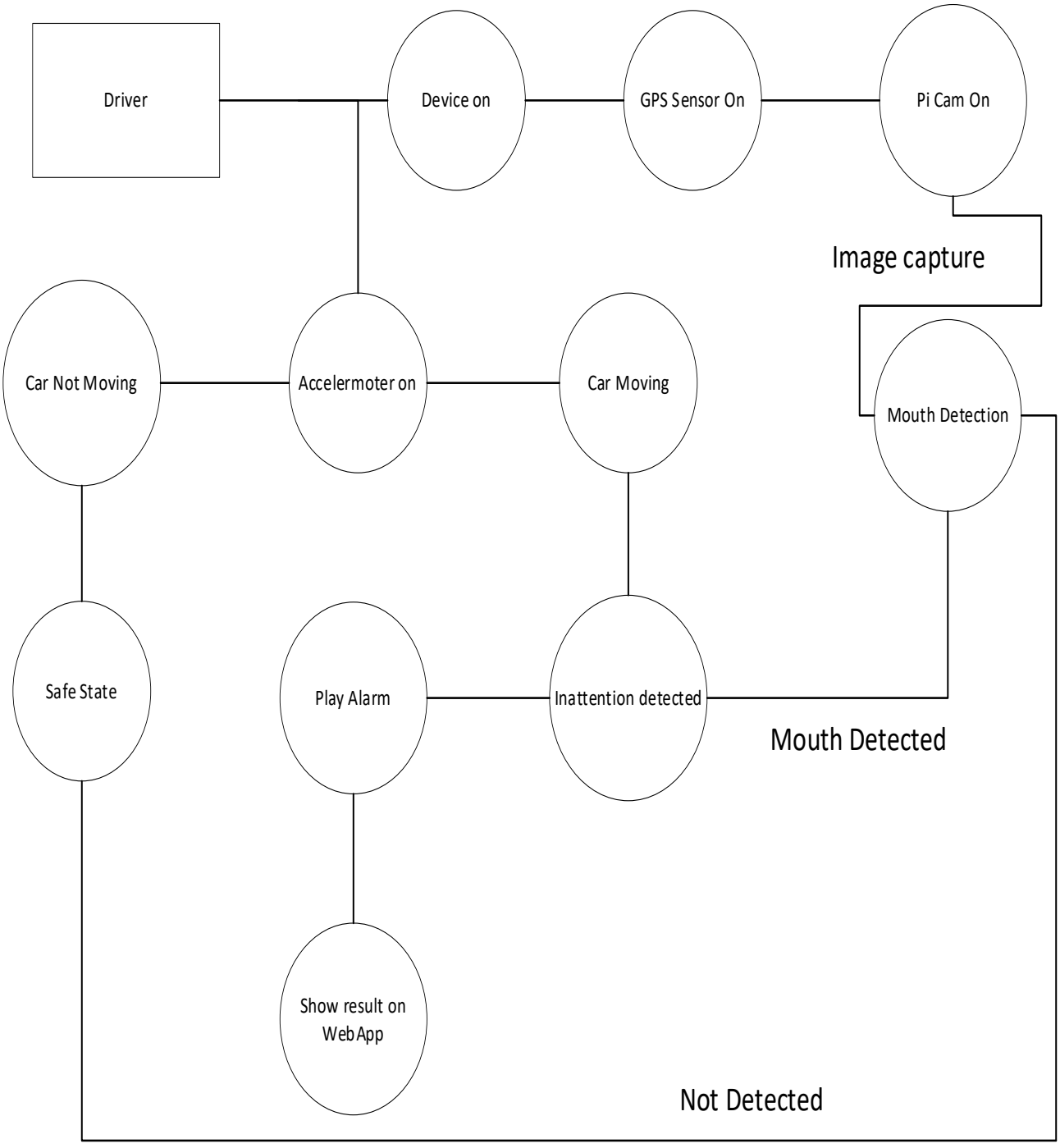


Fig: DFD of scenario 1

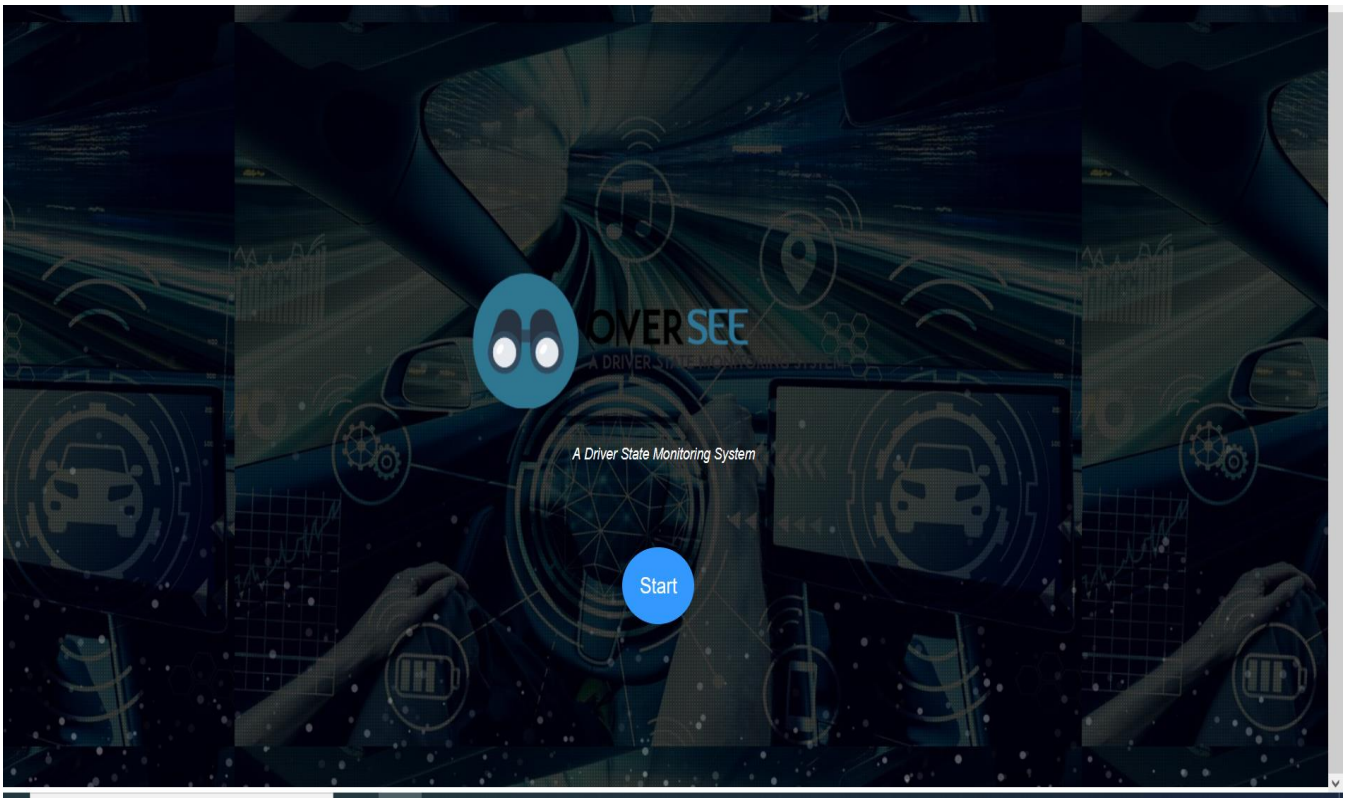
Scenario 2:

Mr. Shakib is very careful when it comes to his family's and own safety. He's also very cautious about road safety and traffic rules. That's why he had set oversee- an AI based driver state monitoring device in the car. One morning when he was driving his daughter to school, he had lot of phone calls coming due to some emergency at work. So, he was carried away for a bit and started talking on phone for some time. Oversee has a talking detection feature. He was talking continuously which is quite risky in roads of Dhaka. So, his talking was detected for a certain time and it alarm buzzed and alerted him that he was inattentive. So, Mr. Shakib parked the car, finish talking on phone then again started his journey.

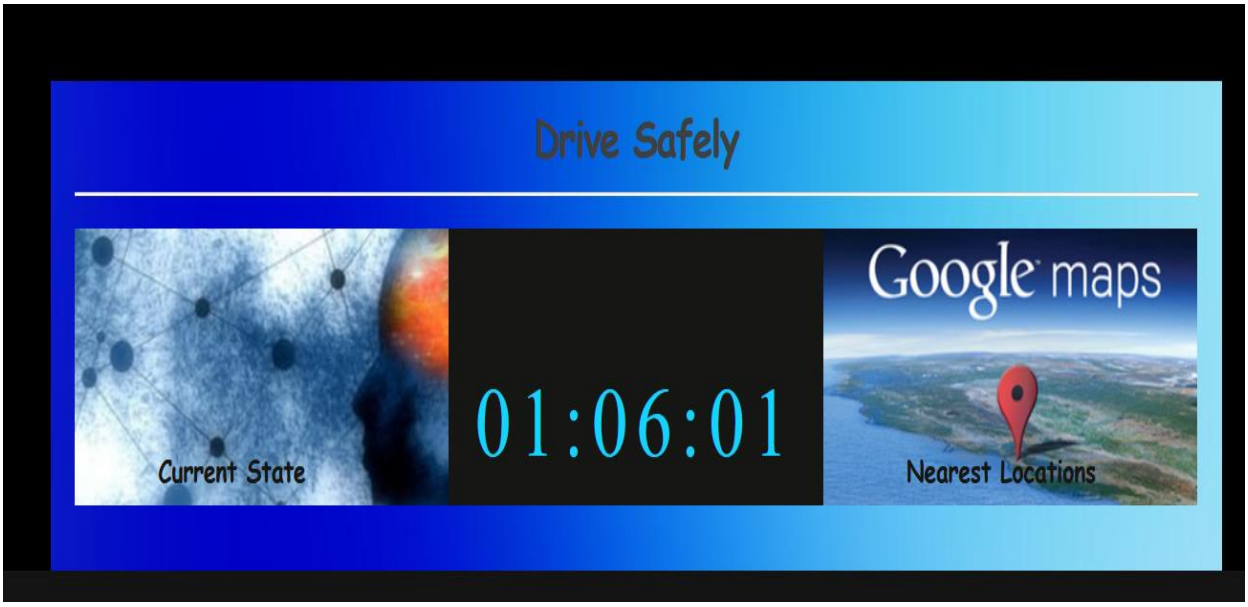

Driver
Device on
GPS Sensor On
Pi Cam On
Image capture
Car Not Moving
Accelermoter on
Car Moving
Mouth Detection
Safe State
Play Alarm
Inattention detected
Mouth Detected
Show result on Web App
Not Detected

Ui snapshots:

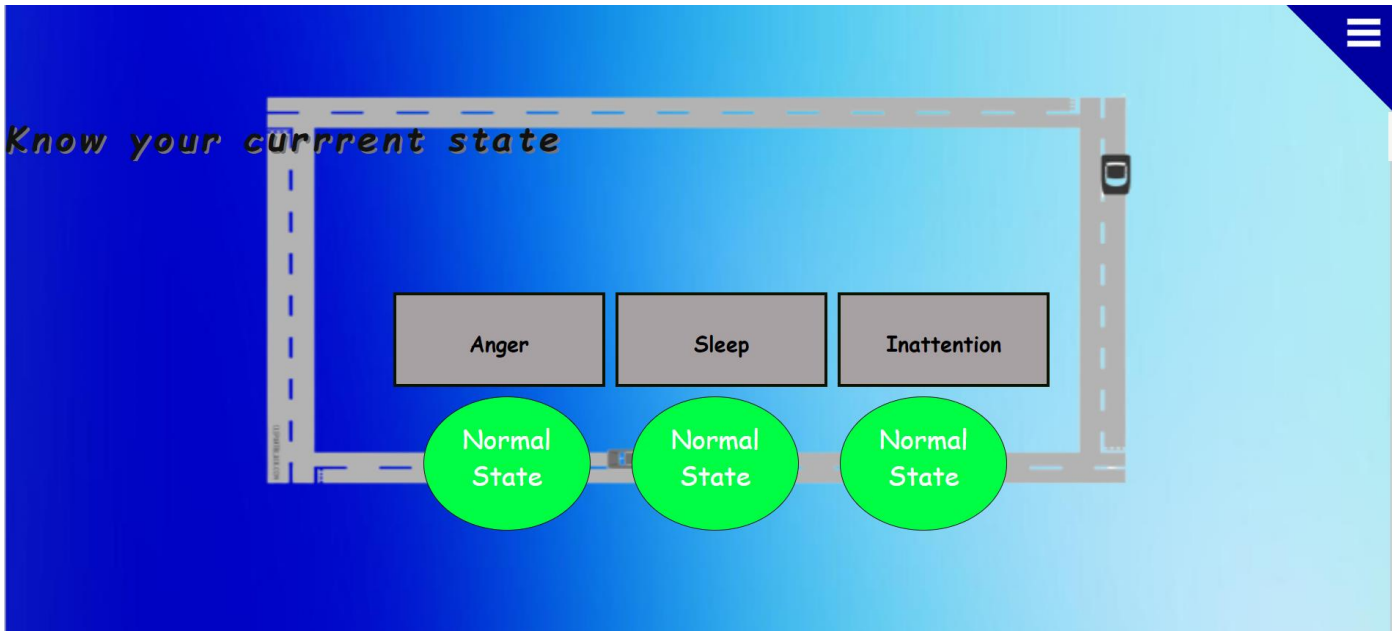
This is the **homepage**:



Navigation page: driver can select option to check his/her emotional state or nearby location.



Current State Page: Showing current state and camera extracting feature.



Showing current location and nearby restaurants: