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ADVANCED DRIVER SUPPORT SYSTEM

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Contents

ABSTRACT

This project introduces an AI-powered device that enhances driving safety using a Raspberry Pi and camera. Key features include automatic headlight dimming to reduce glare, dashcam functionality for incident documentation, and Traffic Light Approach Speed Alerts. The system adapts to weather conditions by adjusting high beams and includes Emergency Stop Video Transmission for critical situations. Overall, it significantly improves nighttime driving safety and convenience.

INTRODUCTION

Why Do We Need Advanced Driver Support System?

As drivers face increasing challenges on the road-such as complex traffic patterns, unpredictable weather, and potential distractions safety and support systems have become essential. Our Advanced Driver Support System is designed to make driving not only safer but also more intuitive.

What Does the Advanced Driver Support System offer?

Our Advanced Driver Support System is designed to address these challenges head-on. By integrating a suite of intelligent features, this system enhances visibility, improves , optimizes speed management, and bolsters emergency responsiveness.

How will this System impact Road Safety?

By focusing on critical aspects of driving,such as headlight control, and real time video transmission during emergencies, Our system aims to prevent accidents and ensure drivers are better equipped to handle unforeseen situations.

PROBLEM DEFENITION

Night time driving and adverse weather conditions pose significant safety risks, as many vehicles lack intelligent systems to adjust headlights and manage high beams automatically. Additionally, the absence of real-time video recording and emergency sharing limits security. This project aims to develop a Raspberry Pi-based solution that enhances vehicle visibility, alerts drivers to lane departures, and provides real-time video monitoring, all while ensuring compliance with regulations and community acceptance for improved road safety.

OBJECTIVES

• Adjust headlights based on light conditions.

• Manage high beams based on weather.

• Record real-time video for security.

• Share video footage in emergencies

.• Notify optimal speeds when approaching traffic lights.

PAPER 1: AUTOMATIC HEADLIGHT BEAM CONTROLLER

METHODOLOGY:

- **LDR Sensor:** Detects light from oncoming vehicles.
- **Microcontroller (PIC):** Receives data from LDR and converts analog signals to digital.
- **Relay Circuit:** Switches headlights from high to low beam based on sensor input.

PAPER 1: AUTOMATIC HEADLIGHT BEAM CONTROLLER

Advantages:

- **Cost-effective:** Suitable for low-cost cars.
- **Safety:** Reduces night-time accidents by preventing glare
- **Easy Installation:** Can be added to existing vehicles.

PAPER 1: AUTOMATIC HEADLIGHT BEAM CONTROLLER

Disadvantages:

- **Power Dependency:** Requires continuous power supply.
- **Interference:** Streetlights and tail lamps may cause false switching.
- **Threshold Complexity:** Difficult to set correct light intensity threshold.

PAPER 2: Video-based traffic monitoring at day and night

AUTHORS

Kostia Robert

SUMMMARY

The study presents a new framework for video-based vehicle detection and tracking, designed to operate effectively both during the day and at night. It utilizes a hierarchical approach that focuses on detecting specific vehicle features, such as headlights and windshields, to enhance accuracy and robustness against environmental challenges. The proposed methodology demonstrates improved performance with high detection rates in various lighting conditions, addressing common issues faced by traditional vehicle detection methods.

PAPER 2: Video-based traffic monitoring at day and night

METHODOLOGY:

- **Calibration:** Initial setup to align detection parameters.
- **Pre-processing:** Image enhancement techniques to improve input quality.
- **Feature Extraction:** Identifying key characteristics of vehicles.
- **Tracking:** Following detected vehicles over time to maintain accuracy.

PAPER 2: Video-based traffic monitoring at day and night

Advantages:

- **Improved Accuracy:** Enhanced detection rates through hierarchical processing
- **Nighttime Detection:** Effective identification of vehicles using headlights and windshields.
- **Real-time Processing:** Capable of processing video feeds in real-time.

PAPER 2: Video-based traffic monitoring at day and night

Disadvantages:

•**Environmental Sensitivity**: Performance may degrade in adverse weather conditions.
•**Computational Cost**: High processing power required for real-time analysis.

•**False Positives**: Potential for misidentifying non-vehicle objects.

PAPER 3: Kalman filtered GPS accelerometer-based accident detection and location system a low-cost approach

AUTHORS

Md. Syedul Amin, Mamun Bin Ibne Reaz, Mohammad Arif Sobhan Bhuiyan and Salwa Sheikh Nasir

SUMMARY

The study proposes a low-cost accident detection and location system utilizing cheap ADXL345 accelerometers and a GPS receiver. The system integrates accelerometer and GPS data using a Kalman filter to accurately detect accidents and determine their location, even during GPS signal outages. The research communication emphasizes the potential life-saving impact of an automated accident detection and location system.

PAPER 3: Kalman filtered GPS accelerometer-based accident detection and location system a low-cost approach

METHODOLOGY:

- **Accelerometer Integration:** Utilizes ADXL345 accelerometers to detect sudden deceleration indicative of an accident.

- **GPS Integration:** Integrates GPS data with accelerometer data using a Kalman filter to correct errors and determine accurate accident locations.

- **Field Testing**: Demonstrates the correct functioning of the accident detection algorithm and location system during GPS outages.

PAPER 3: Kalman filtered GPS accelerometer-based accident detection and location system a low-cost approach

Advantages:

- **Cost-Effective:** Utilizes low-cost accelerometers and GPS receivers.
- **Automated Detection:** Provides automated accident detection and accurate location, potentially saving lives.
- **GPS Outage Resilience:** Capable of functioning accurately even during GPS signal outages.

PAPER 3: Kalman filtered GPS accelerometer-based accident detection and location system a low-cost approach

Disadvantages:

- **Limited Annotated Data:** Availability of annotated data for diverse scenarios may be limited.
- **False Alarms:** May have a false alarm rate, potentially leading to unnecessary alerts.
- **Performance Dependency:** The system's performance may be limited by the accuracy of the detection model.

PAPER 4: Design and Development of an Automatic Automobile Headlight Switching System

AUTHORS

O. Akinsanmi, A.D. Ganjang, H. U. Ezea

SUMMMARY

This paper presents a system for automatically switching vehicle headlights between high and low beams to reduce glare during night driving. The system uses a light-dependent resistor (LDR) to detect oncoming vehicles and adjusts the headlight accordingly, improving road safety.

PAPER 4: Design and Development of an Automatic Automobile Headlight Switching System

METHODOLOGY:

- **Vehicle Detection:** An LDR senses the intensity of oncoming headlights.

- **Headlight Switching:** A relay switches between high and low beams based on the LDR's input.

- **Circuit Design:** A simple electronic circuit is used, including resistors, transistors, and diodes to control the switching.

PAPER 4: Design and Development of an Automatic Automobile Headlight Switching System

Advantages:

- **Glare Reduction:** Reduces glare during night driving for improved visibility
- **Driver Convenience:** Automated headlight control minimizes driver distraction.
- **Simple and Affordable Design:** The system is cost-effective and easy to implement.

PAPER 4: Design and Development of an Automatic Automobile Headlight Switching System

Disadvantages:

- **Partial Glare Control**: May not fully eliminate glare when one vehicle uses a low beam and the other uses a high beam.
- **Limited to Specific Vehicles:** Only effective for vehicles with dual headlamps.

PAPER 5: A Real Time Accident Detection Framework for Traffic Video Analysis

AUTHORS

Hadi Ghahremannezhad, Hang Shi, and Chengjun Liu

SUMMMARY

This study presents a real-time accident detection framework for traffic video analysis. The system detects single-vehicle traffic accidents, specifically when a vehicle crashes into a roadside object. Using techniques such as traffic region detection, motion tracking, and first-order logic, the framework can identify sudden changes in vehicle direction and speed to detect accidents in real time.

PAPER 5: A Real Time Accident Detection Framework for Traffic Video Analysis

METHODOLOGY:

- **Traffic Region Detection:** Estimates road boundaries using vehicle motion to create a cumulative foreground mask.
- **Direction Estimation:** Tracks vehicle movement and estimates the direction for each road section.
- **Accident Detection:** Uses first-order logic to identify accidents based on rapid changes in speed, direction, and collisions with roadside objects.

PAPER 5: A Real Time Accident Detection Framework for Traffic Video Analysis

Advantages:

- **Real-Time Detection:** Can alert authorities immediately upon detecting an accident.
- **Precision:** Detects accidents involving single vehicles, minimizing false alarms.
- **Applicability:** Effective for real traffic video analysis from highway cameras.

PAPER 5: A Real Time Accident Detection Framework for Traffic Video Analysis

Disadvantages:

- **Dataset Limitation**: Limited to single-vehicle accidents, reducing its applicability for complex multi-vehicle incidents.
- **Real-World Challenges:** May be less effective in varied traffic environments or poor video quality conditions.

COMPARISON TABLE

Paper	Problem Statement	Methodology	Advantages	Disadvantages	Inference
Lane-Change Detection Based on Vehicle-Trajectory Prediction	Reduce false alarms during lane changes caused by zigzag driving.	Uses sensors to track vehicle positions and Support Vector Machine (SVM) for predicting trajectory and driving intention.	Reduces false alarms, improves accuracy, allows early detection.	Requires further real-world testing, and has long computation time.	Useful for improving the accuracy of lane-change detection systems but requires more real-world validation.
Automatic Headlight Beam Controller	Prevent accidents caused by headlight glare during night driving.	Uses an LDR sensor to detect oncoming vehicles and automatically switch between high and low beams with a microcontroller and relay circuit.	Cost-effective, improves safety, and easy to install.	Power dependency, interference from streetlights, and difficulty in setting the light intensity threshold.	Offers a low-cost solution for headlight dimming but requires precise calibration to avoid false switching.
Computer Vision-Based Accident Detection for Autonomous Vehicles	Detect accidents in real-time from dashcam footage.	Uses Mask R-CNN and centroid tracking to detect vehicle accidents by analyzing speed, trajectory, and vehicle overlap.	Early detection, versatile under various conditions, and high accuracy.	High false alarm rate (34.44%) and limited dataset availability.	Promising for real-time accident detection but requires improvement to reduce false alarms.
Video-Based Traffic Monitoring at Day and Night	Improve vehicle detection under different lighting conditions.	Uses a hierarchical approach to detect specific vehicle features (e.g., headlights, windshields), with pre-processing and real-time tracking for accurate detection.	High detection rates, effective in both day and night, and real-time processing.	Degraded performance in adverse weather and high computational cost.	Reliable for traffic monitoring but needs optimization for real-world challenges like bad weather.

COMPARISON TABLE

Paper	Problem Statement	Methodology	Advantages	Disadvantages	Inference
Kalman Filtered GPS Accelerometer-Based Accident Detection and Location System	Provide a low-cost accident detection and location system that works even during GPS outages.	Combines accelerometer data with GPS using a Kalman filter to improve accident detection accuracy.	Cost-effective, automated detection, and resilient during GPS signal outages.	Limited dataset availability, potential false alarms, and system performance dependent on sensor accuracy.	Effective low-cost system, especially in areas with poor GPS signals, but needs more robust testing.
A Real-Time Accident Detection Framework for Traffic Video Analysis	Detect accidents in real-time from traffic video footage.	Uses traffic region detection, motion tracking, and first-order logic to identify accidents based on rapid changes in speed and direction.	Real-time detection, precision for single-vehicle accidents, and applicable for highway cameras.	Limited to single-vehicle accidents and less effective in complex traffic environments.	Accurate for certain accident types but not adaptable to multi-vehicle scenarios.
Design and Development of an Automatic Automobile Headlight Switching System	Automatically switch headlights to reduce glare during night driving.	Utilizes an LDR sensor to detect oncoming vehicles and a relay system to control the switch between high and low beams.	Reduces glare, driver convenience, and simple design.	Only partially controls glare and works only for vehicles with dual headlamps.	Effective for glare control but limited in applicability for vehicles without dual headlamps.
Robust Lane Detection and Tracking in Challenging Scenarios	Detect and track lane boundaries in difficult scenarios like merging lanes or worn road markings.	Uses advanced classifiers, image rectification, particle filtering, and RANSAC algorithms to track lanes.	Handles complex lane scenarios, real-time, and highly accurate.	Struggles with low-quality images and detecting lanes in shadows or with road imperfections.	A powerful solution for lane detection but needs improvement in low-visibility situations.

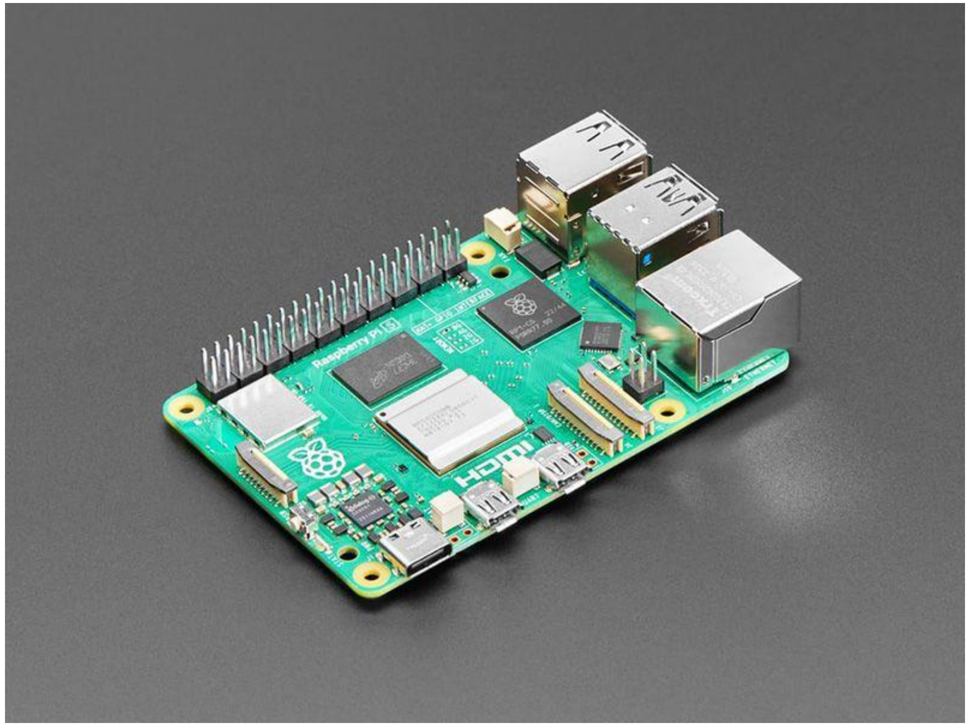
COMPARISON TABLE

Paper	Problem Statement	Methodology	Advantages	Disadvantages	Inference
Lane change detection and tracking for a safe-lane approach in real time vision based navigation systems	Lane detection systems enhance vehicle safety by using cameras to detect lane boundaries in real-time.	Utilize image processing techniques like 3D road recognition and stereo mapping for edge detection and lane tracking.	Real-Time Detection, Adaptability, Vehicle-State Integration,	Lighting Sensitivity, Curved Roads, Cost,	The review highlights the strengths and limitations of lane detection systems for improving autonomous driving.
Design and implementation of automatic headlight dimmer for vehicles using light dependent resistor (ldr) sensor	An automatic headlight dimmer system uses an LDR sensor to detect oncoming lights, switching to low beam to reduce glare and enhance safety.	LDR sensors convert light intensity to an electrical signal, processed by a microcontroller to dim headlights. Matlab simulates the system, and Keil programs it.	Safety Improvement, Automation, Cost-Effective,	Limited Detection, Environmental Factors,.	The review highlights LDR sensors in enhancing vehicle safety and suggests areas for improvement.
Vision-Based On-Road Nighttime Vehicle Detection and Tracking Using Taillight and Headlight Features	The paper details a method for nighttime vehicle detection using taillight and headlight features, achieving 97.22% accuracy and processing at 0.01 seconds per frame.	It identifies red and white components from video input, applying a double threshold for segmentation and using a centroid tracking algorithm for movement detection.	High Accuracy, Real-Time Processing, Adaptability, Versatility,	Nighttime Only, Occlusion Issues, Poor Performance in Adverse Weather,	Nighttime Only, Occlusion Issues, Poor Performance in Adverse Weather,
Automatic Brake Assist during Traffic Light/ Sign Detection	The paper presents a system for automatic braking during traffic light/sign detection using computer vision and sensors to prevent accidents.	Combines camera vision, radar sensors, and CNNs to detect signs and obstacles, processing data through a Raspberry Pi for automatic braking or speed regulation.	Enhances Safety, Automatic Speed Regulation, Pedestrian Protection, Driver Assistance,	False Braking Risk, High Complexity and Cost, Weather Performance Issues,	The system improves safety through automatic braking but faces challenges with detection accuracy and implementation.

COMPARISON TABLE

Paper	Problem Statement	Methodology	Advantages	Disadvantages	Inference
Smart Adaptive Headlight System for Vehicles Using Image Processing	Traditional headlights can cause glare to other drivers, reducing road safety.	Uses image processing to detect incoming traffic and adjust headlight intensity accordingly.	Improves night driving safety, Adaptive to traffic, Reduces glare.	Computational cost, Requires camera accuracy.	Enhances visibility and safety by adjusting light beams dynamically.
Real-Time Vehicle Collision Avoidance System Using Deep Learning and Computer Vision	Real-time collision risks are difficult to assess manually while driving.	Uses deep learning models and computer vision to detect objects and predict collision risks.	Accurate detection, Real-time response, Reduces accidents.	High processing power needed, Sensor limitations.	Effective in preventing accidents using AI-based visual interpretation.
Night-Time Vehicle Detection Using YOLO and Thermal Imaging	Night-time vehicle detection is challenging due to low visibility.	Uses YOLO for object detection and thermal imaging for better visibility in dark.	Works in low-light, Fast and accurate, Can detect heat signatures.	Cost of thermal cameras, Model training complexity.	Strong solution for night-time vehicle detection with high accuracy.

SETTING UP RASBERRY PI



- Raspberry Pi 5B features a faster processor, enhanced GPU for dual 4K support, and PCIe connectivity in a compact board.
- We choose raspberry pie cause it’s small, and its integrated GPU ensures fast image processing

SETTING UP RASBERRY PI: *Challenges Faced*

Difficult to set up in car.

Solution :

- **Power bank**

Common power banks offer 5V 3A, but the Pi needs 5V 5A, and 5V 5A power banks are expensive.

- **Power supply**

An easy choice and versatile, though it needs recharging and is costly.

- **Car socket pin plug adapter**

Not versatile, slightly pricy, and not effective.

- **5V buck converter**

Converts car 12V to 5V; it’s cheap and efficient when used with the car cigarette socket.

HEADLIGHT DETECTION

Headlight detection uses sensors to monitor ambient light and automatically adjust the headlights for optimal visibility. This system dynamically switches between low and high beams or fine-tunes the beam angle to suit changing conditions—such as dusk, night, or sudden brightness—enhancing driver safety and reducing glare for oncoming traffic.

HEADLIGHT DETECTION: *Working*

1. Capture Video Frames

•The camera continuously captures frames.

•Each frame is resized to speed up processing.

2. Convert to Grayscale

•The frame is converted from color to black & white (grayscale).

•This simplifies brightness detection by using a single color channel.

3. Apply a Mask (Focus on Important Area)

•A trapezoid-shaped mask is applied to concentrate on the area where headlights typically appear.

•Areas outside the mask are ignored, reducing unnecessary processing. .

HEADLIGHT DETECTION: *Working*

4. Blur the Image to Reduce Noise

- The frame is slightly blurred to smooth out small, irrelevant details.
- This helps in detecting only significant shapes like headlights.

5. Detect Bright Objects

- A brightness threshold is applied to separate bright areas (potential headlights) from the dark background.
- Only the very bright parts are retained for further analysis.

6. Find Headlight Shapes (Contours)

- The program identifies bright shapes in the frame.
- It checks if the shape is of an appropriate size (neither too small nor too big) to be considered a headlight.

HEADLIGHT DETECTION: *Working*

7. Prevent False Detections (Cool down System)

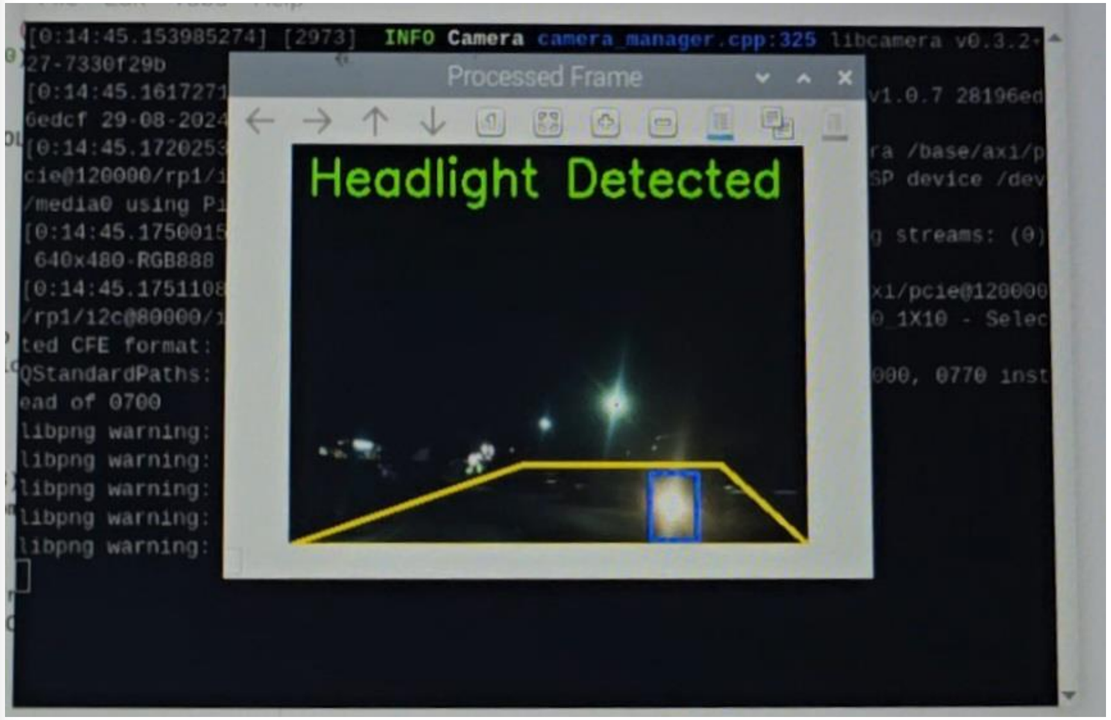
- A timer is used to avoid repeatedly detecting the same headlight.
- If headlights were detected less than 0.5 seconds ago, the system pauses detection momentarily.

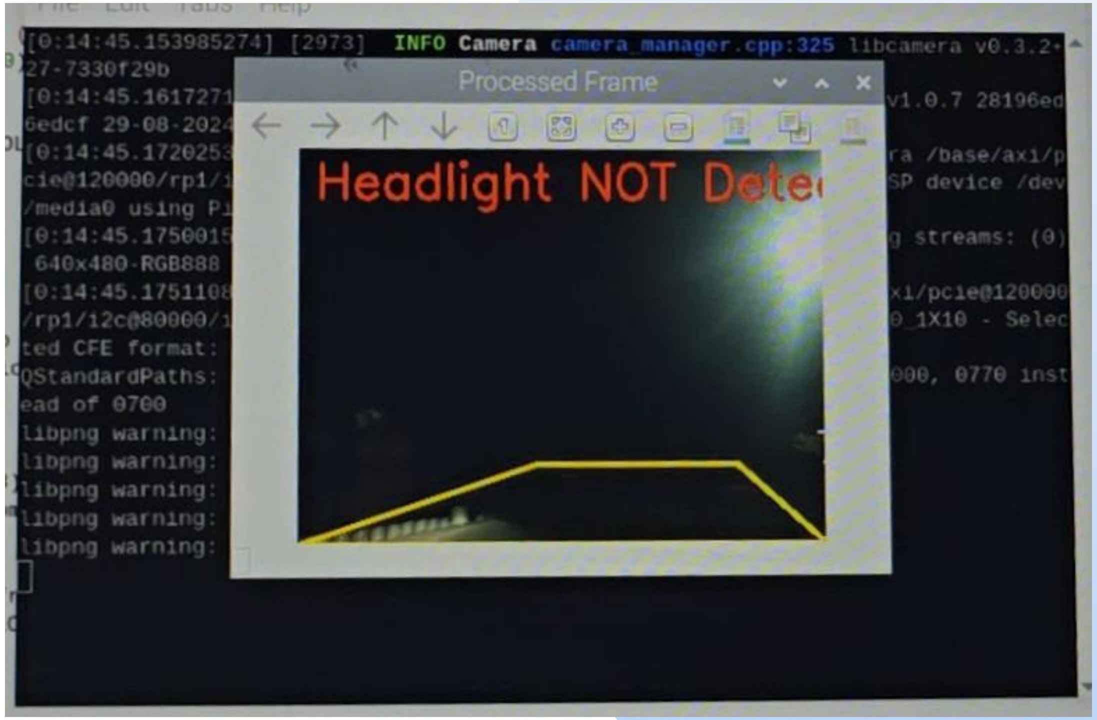
8. Show Warning Message on the Screen

- When a bright headlight is detected, the screen displays “Headlight BRIGHT”.
- The message disappears after a short period if no bright light is detected

HEADLIGHT DETECTION: *Working*

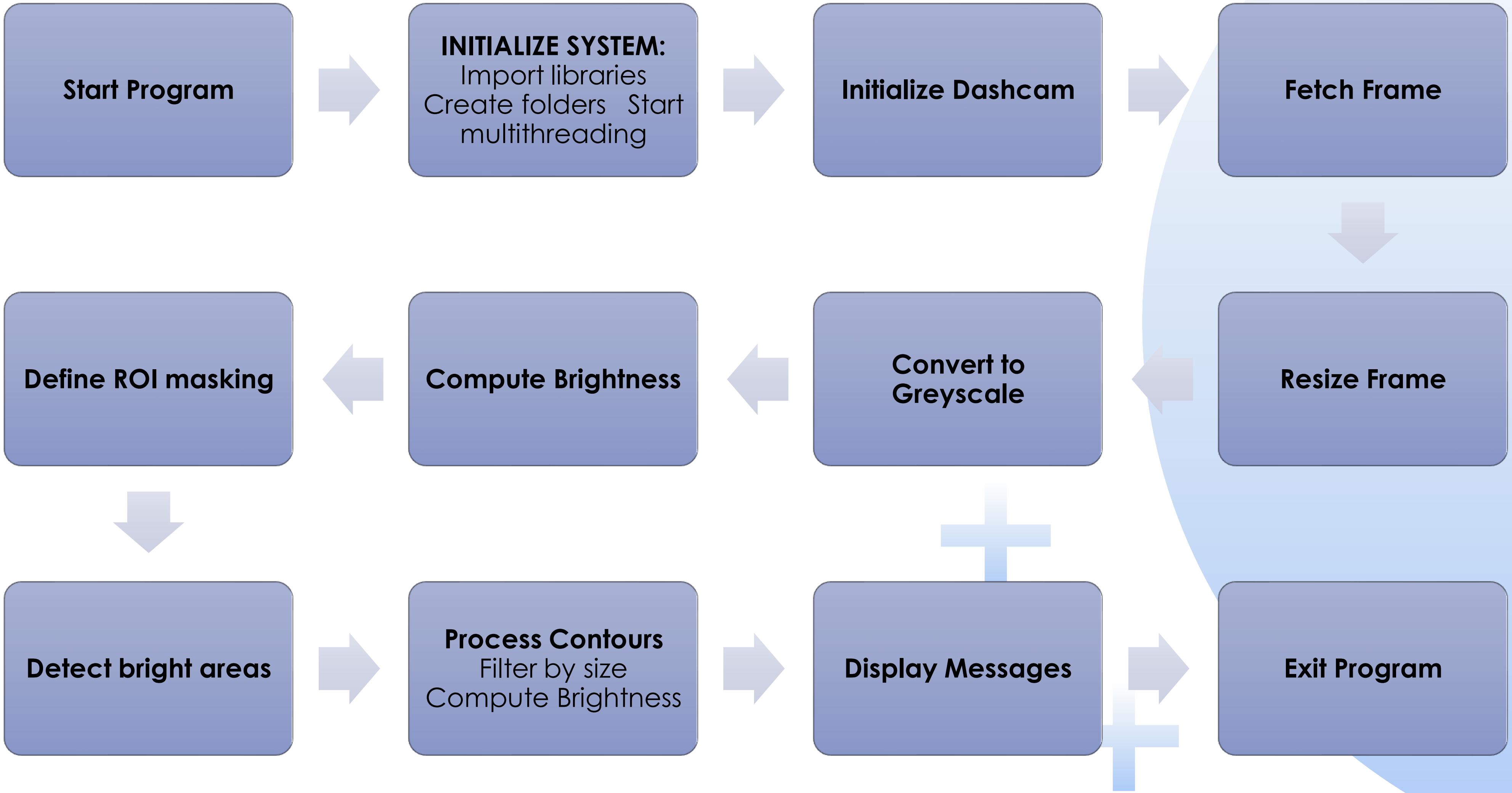
HEADLIGHT DETECTION: *Working*





HEADLIGHT DETECTION : *Working*

HEADLIGHT DETECTION : *Flow Chart*



HEADLIGHT DETECTION: *Challenges Faced*

1) Unwanted Noise (Street Lights, Shop Lights, etc.)

Problem:

Unwanted noise from external light sources can interfere with headlight detection.

Solution:

Apply a blur, convert the frame to black & white, and decrease the resolution to reduce noise.

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2) High Memory Usage in Video Processing

Problem:

Processing high-resolution video consumes a lot of memory.

Solution:

Decreasing the resolution not only reduces unwanted noise but also speeds up processing by lowering memory usage.

HEADLIGHT DETECTION: *Challenges Faced*

3) False Detection

Problem:

Street lights and similar bright sources can be falsely identified as headlights.

Solution:

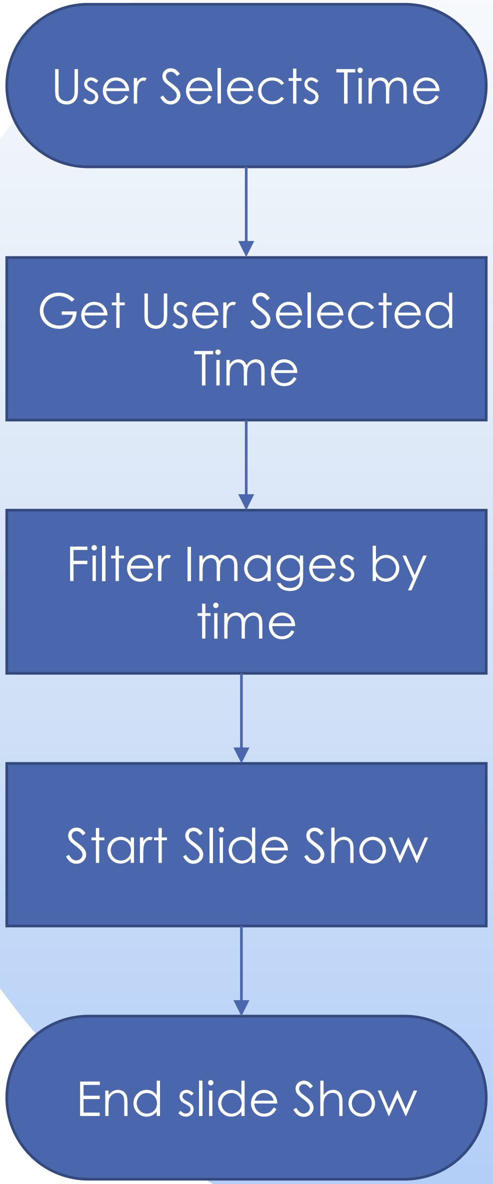
Use a region of interest to filter out most street lights.If an area is overly bright (indicating headlights aren't needed), then even if those regions are detected, the headlights are kept dimmed.

DASHCAM

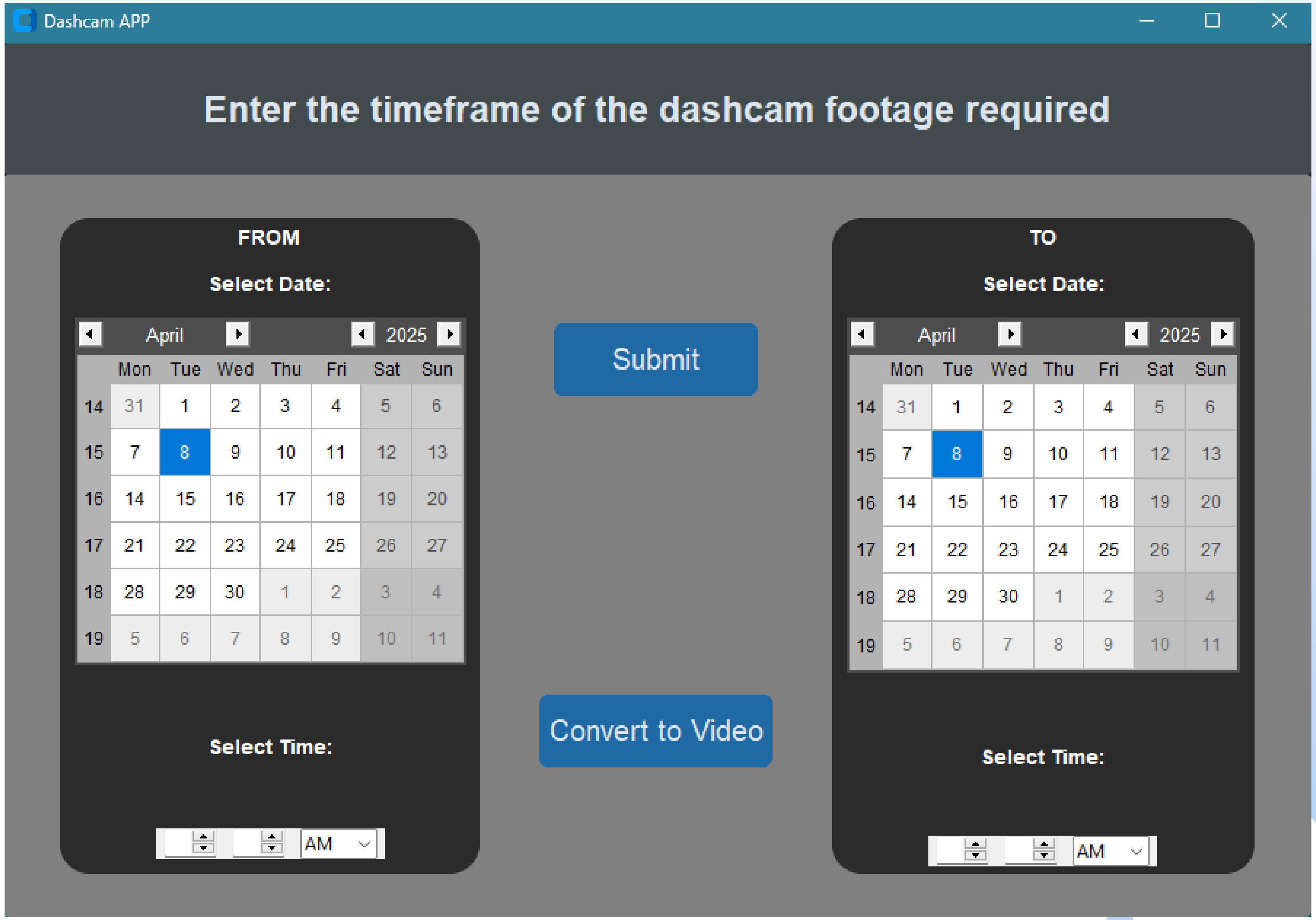
A Dashcam facility is an in-car video recording system that continuously captures footage of the road. It helps document events like accidents or unexpected incidents by providing valuable evidence for insurance claims or legal purposes.

DASHCAM: *Working*

- The system captures frames from the camera and saves them in a specific location.
- The user selects a "From" and "To" date-time to view the video.
- The system filters images based on their creation time.
- The filtered images are displayed one by one in order as a video
- The process stops after all images have been shown.



DASHCAM: *Working*



DASHCAM: *Challenges Faced*

Problem:

- Simultaneous video detection and image processing while receiving camera frames is highly resource-intensive.

- Converting video frames to formats like MP4 demands significant processing power, which can slow down the Raspberry Pi.

DASHCAM: *Challenges Faced*

Solution:

- **Frame Saving as Images**: Instead of real-time video conversion, frames are saved as individual images, reducing processing load.

- **GUI for Access:** A graphical user interface (GUI) is developed that allows users to select a date and time to filter and view the saved images, eliminating the need for extra video processing.

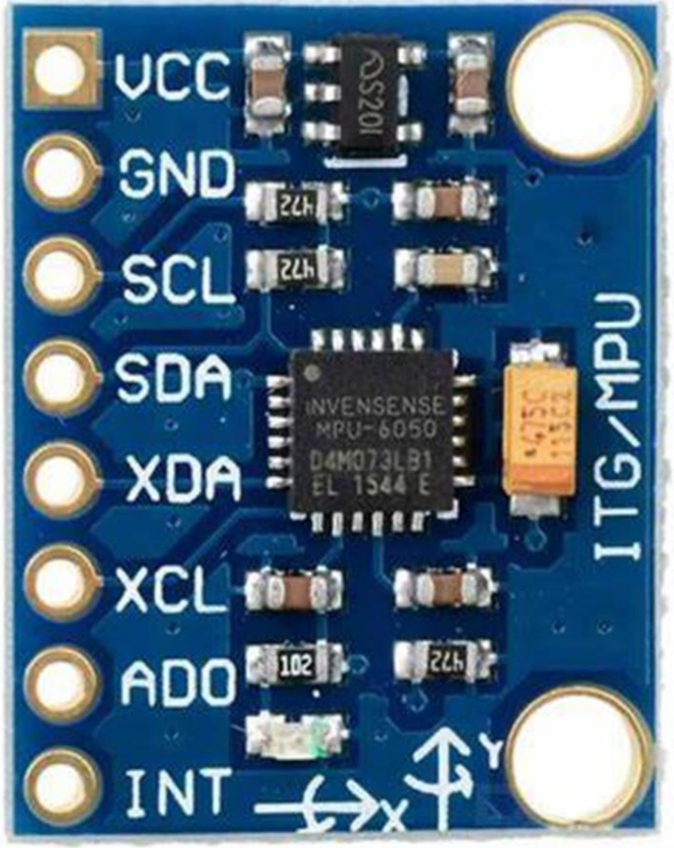
- **Multi-threading:** The task of saving frames is handled in a separate thread, ensuring that video detection and image processing continue smoothly without performance degradation.

ACCIDENT DETECTION

Accident detection uses the MPU6050 sensor to monitor sudden movements. It measures g-force in real time, detecting impacts or free falls based on set thresholds. If abnormal values are detected, the system alerts possible accidents.

SL NO	G FORCES	ACCIDENT SEVERITY
1	4 – 20g	Mild Accident
2	20 – 40g	Medium Accident
3	40+g	Severe Accident

Ref: Design And Realization Of Accelerometer Based Transportation System Thresholds g-forces for Accident Detection



ACCIDENT DETECTION: *Working*

1. **Initialize the Sensor**

• The MPU6050 sensor is activated using I2C communication.

2. Read Raw Data from Accelerometer

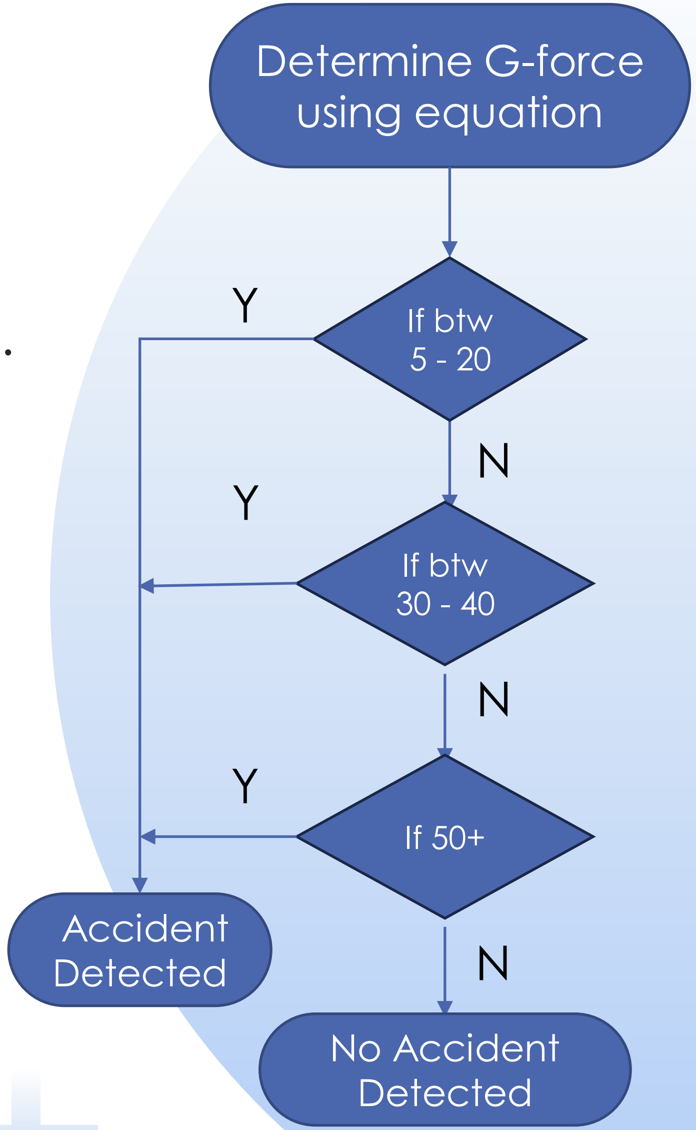
• The sensor provides acceleration values for the X, Y, and Z axes.

• These values are converted into g-force using a sensitivity scale of 16384 LSB/g.

3. Calculate Total G-Force

• The overall g-force is determined using the formula:

$$g_{total} = \sqrt{g_x^2 + g_y^2 + g_z^2}$$



ACCIDENT DETECTION: *Working*

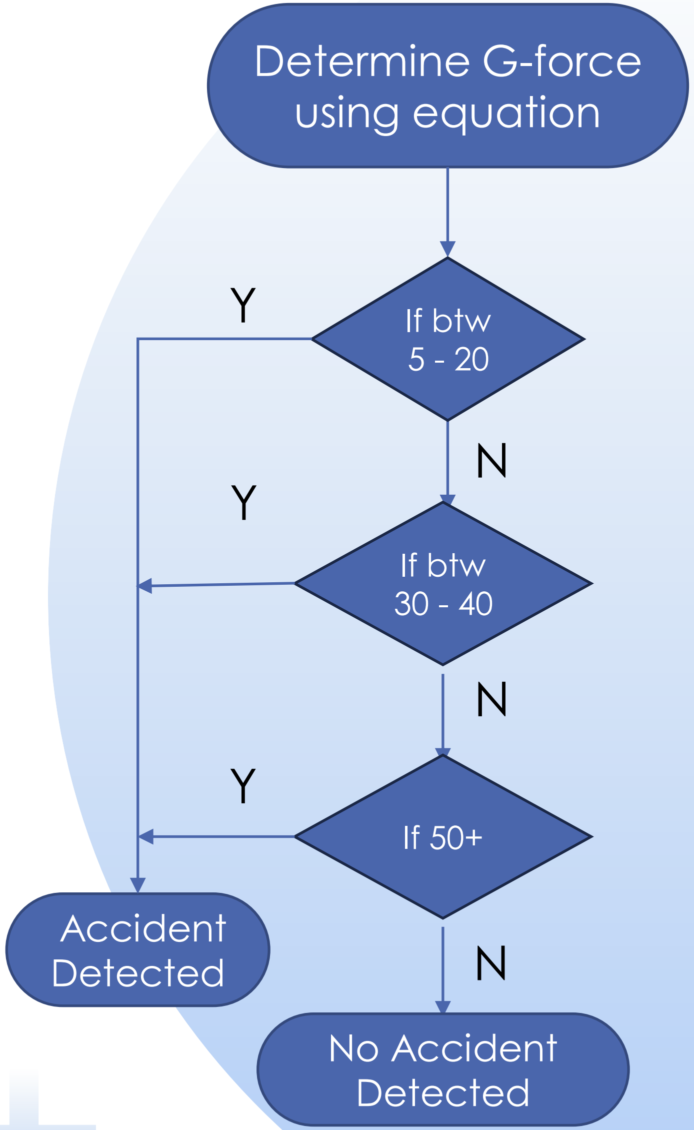
4. Monitor and Compare G-Force Values

•The program tracks maximum and minimum g-force values and updates them every second.

5. Conditional Outputs Based on G-Force:

If value of gforce is :

- 0 g: No accident.
- 5 - 20 g: Mild accident.
- 30 - 40 g: Medium accident.
- 50+ g: Severe accident.



ACCIDENT VIDEO REPORTING

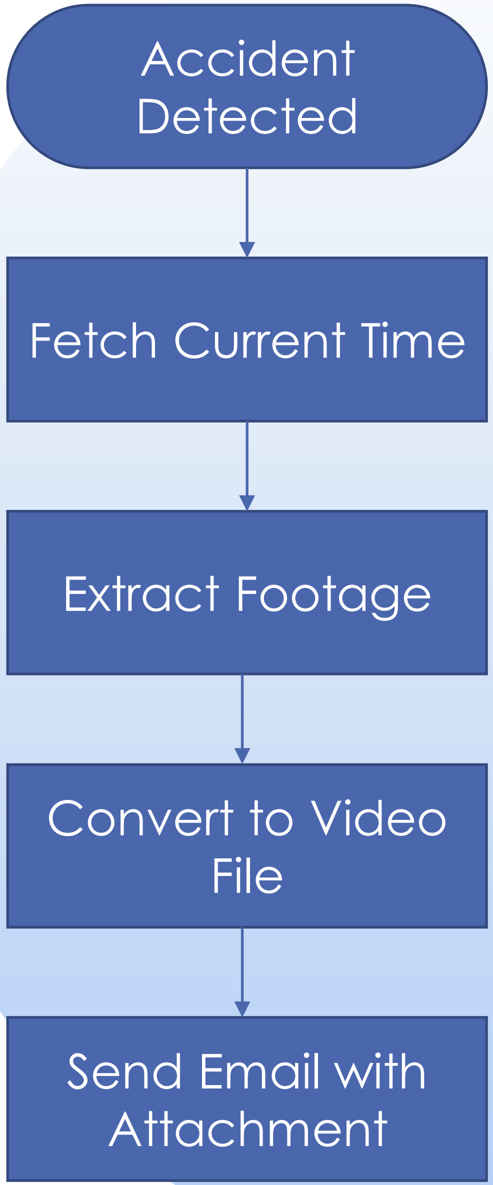
Working:

1. Accident Detection

- The MPU6050 sensor continuously monitors acceleration.
- If a sudden impact or high G-force is detected, an accident is identified.

2. Fetch Current Time

- The system records the exact time of the accident.



ACCIDENT VIDEO REPORTING

Working:

3. Extract Relevant Footage

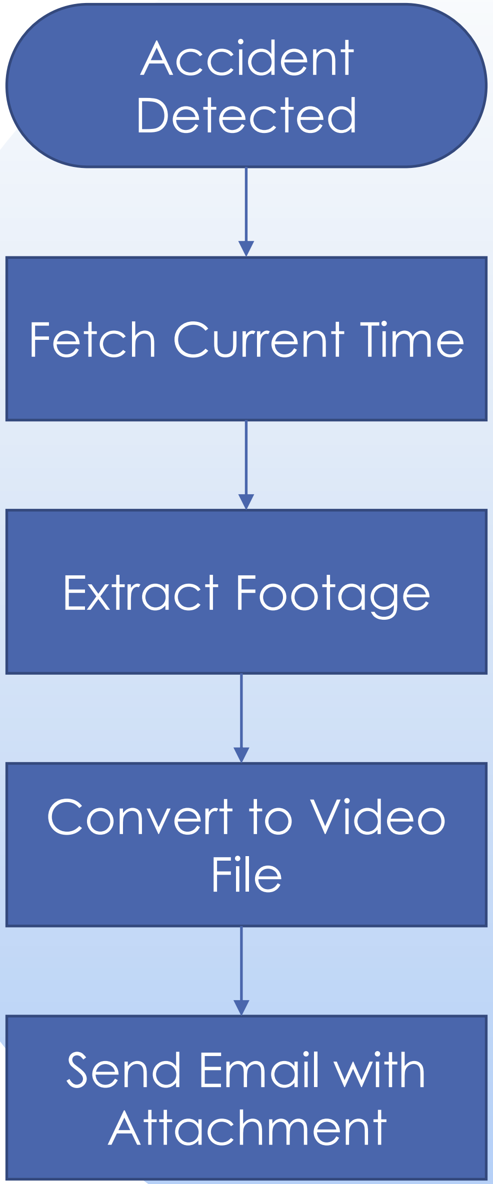
- Dashcam footage is retrieved, starting from 3 minutes before the incident

4.Convert to Video File

- The extracted footage is compiled into a single video file.

5.Send Video via Yagmail

- The video is attached to an email.
- The email is automatically sent to the relevant contacts using Yagmail.



TRAFFIC LIGHT DETECTION SYSTEM

A traffic light monitoring system uses GPS to track a vehicle's location and speed. It checks for nearby traffic lights and warns if the speed exceeds 60 km/h. The system updates every second for real-time monitoring.

TRAFFIC LIGHT DETECTION SYSTEM: *Working*

1. **Load Traffic Light Coordinates**

•Reads a file (traffic_lights.txt) containing GPS locations of traffic lights.

•Stores them as latitude-longitude pairs in a list.

2. **Open GPS Connection**

•Connects to the Neo 6M GPS module via a serial port (/dev/ttyAMA0).

•Reads live GPS sentences from the module.

TRAFFIC LIGHT DETECTION SYSTEM: *Working*

3. Get Live GPS Data

- Continuously reads GPS data.
- Extracts latitude, longitude, and speed.
- Converts speed from knots to km/h.

4. Check for Nearby Traffic Lights

- Compares the vehicle's current location with stored traffic light locations.
- If within 300 meters, the traffic light is detected.

TRAFFIC LIGHT DETECTION SYSTEM: *Working*

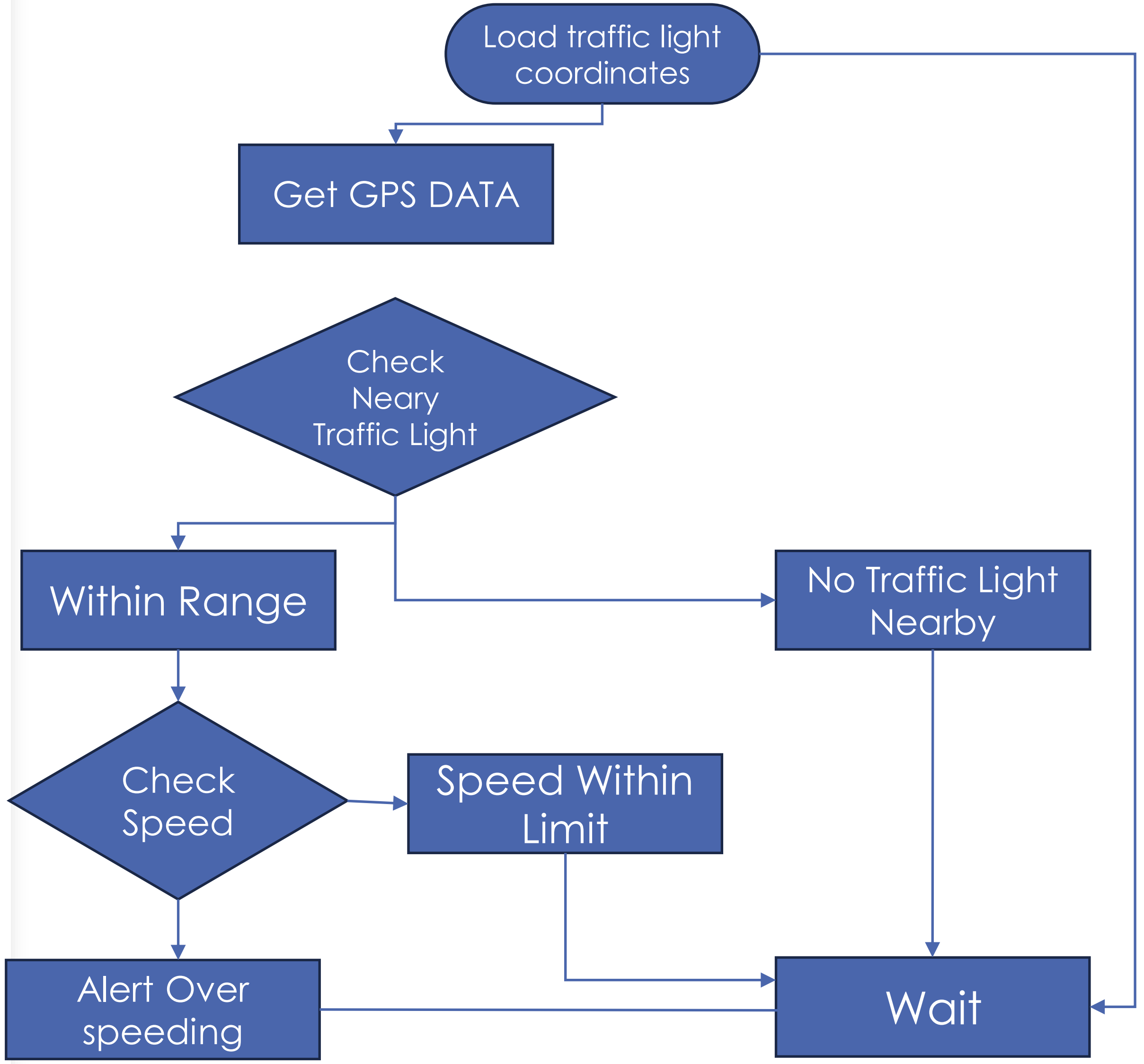
5. Monitor Speed

- If near a traffic light, the system checks speed
- Above 60 km/h: Displays "Over speeding! Slow down!"
- Within limit: Shows ☑ "Speed is within limit."

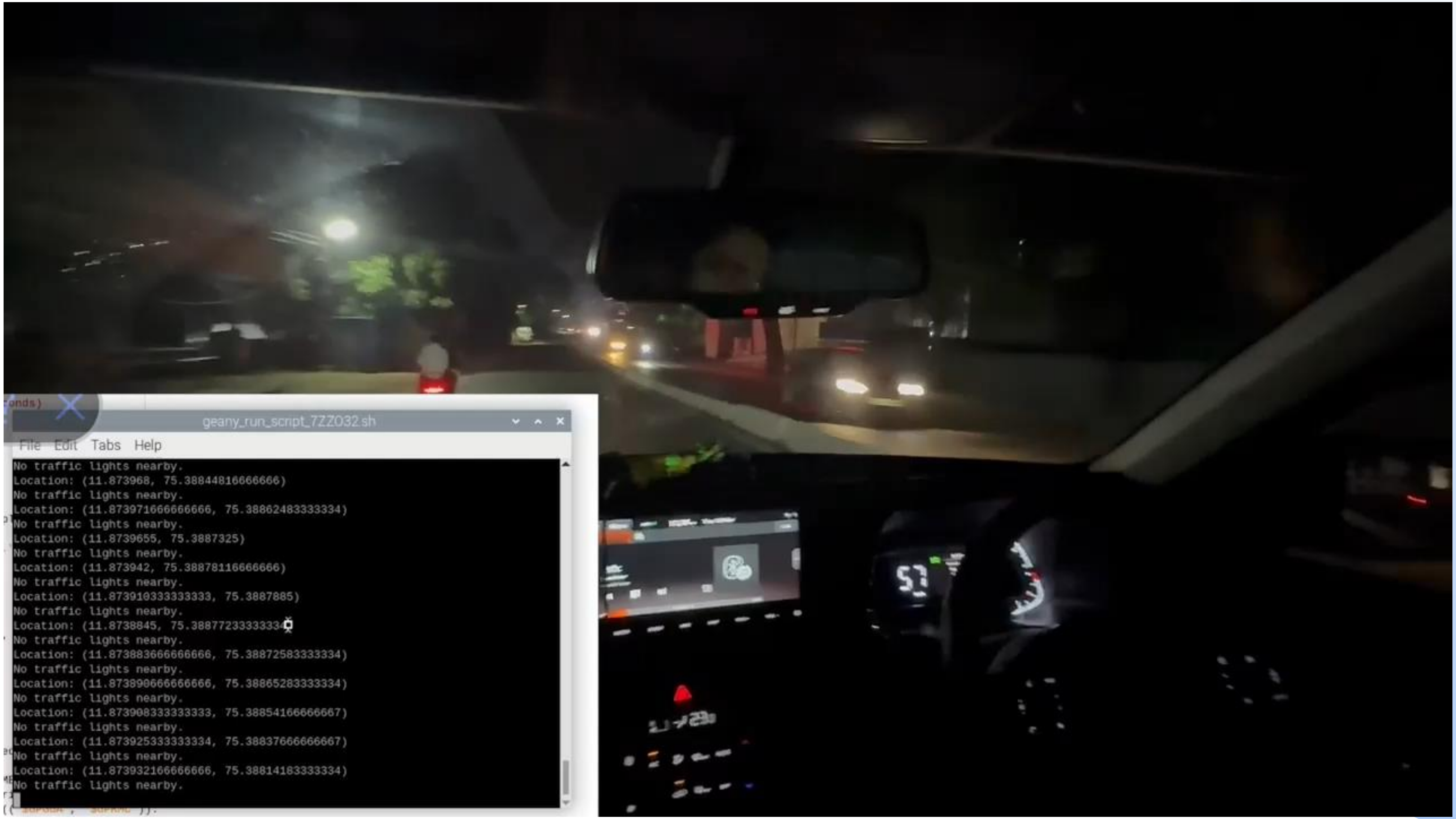
6. Continuous Tracking

- Repeats the process every 1 second to optimize CPU usage.
- Runs continuously until the user presses Ctrl+C.

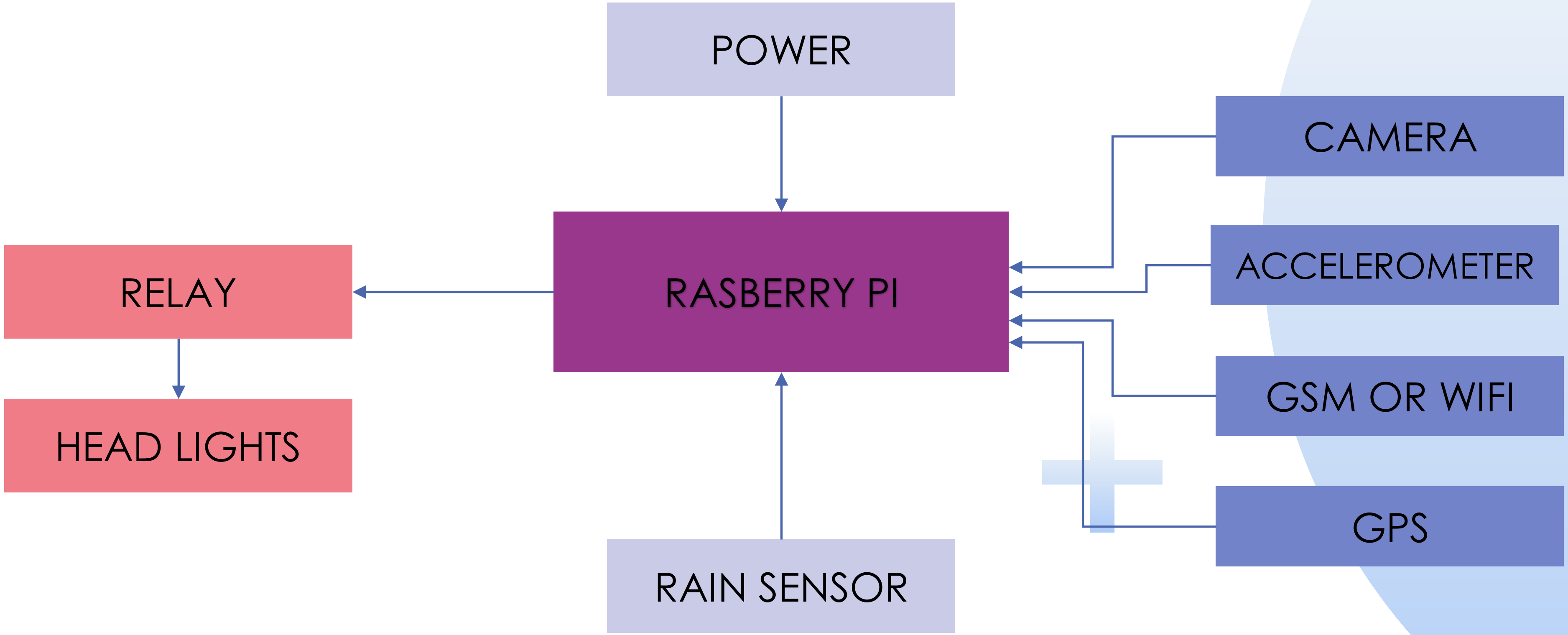
TRAFFIC LIGHT DETECTION SYSTEM: *Flow Chart*



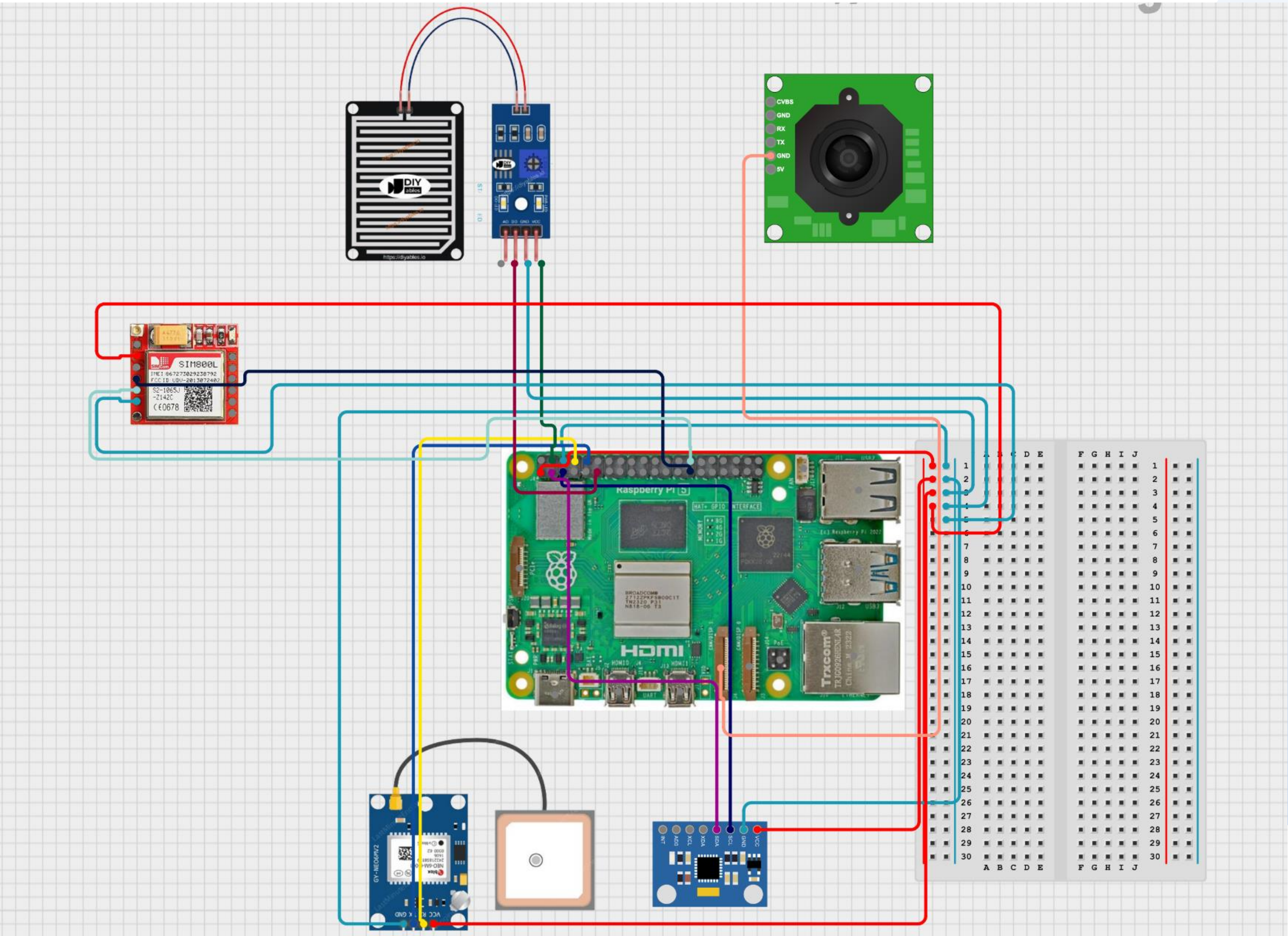
TRAFFIC LIGHT DETECTION SYSTEM



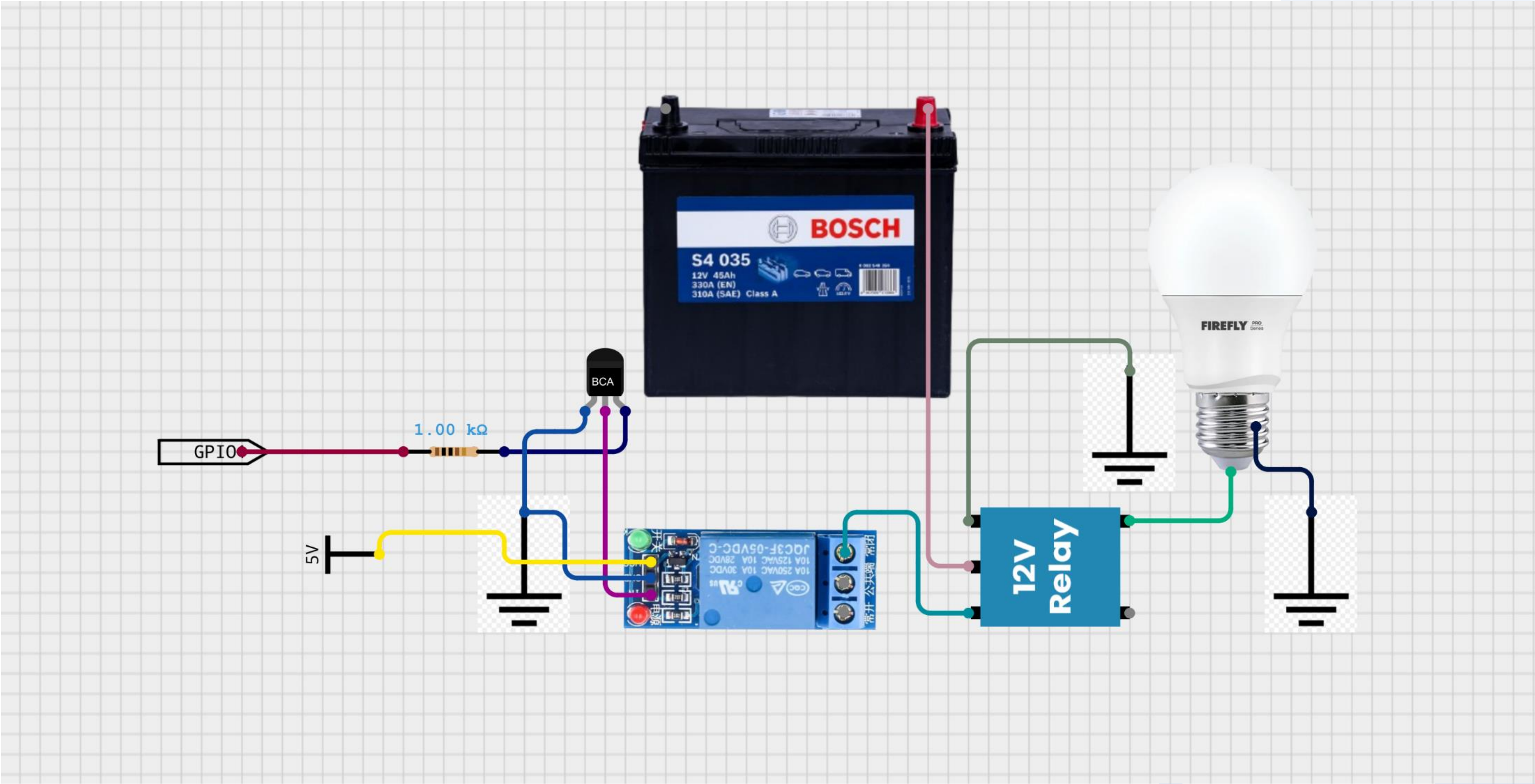
CIRCUIT DIAGRAM: *Internal*



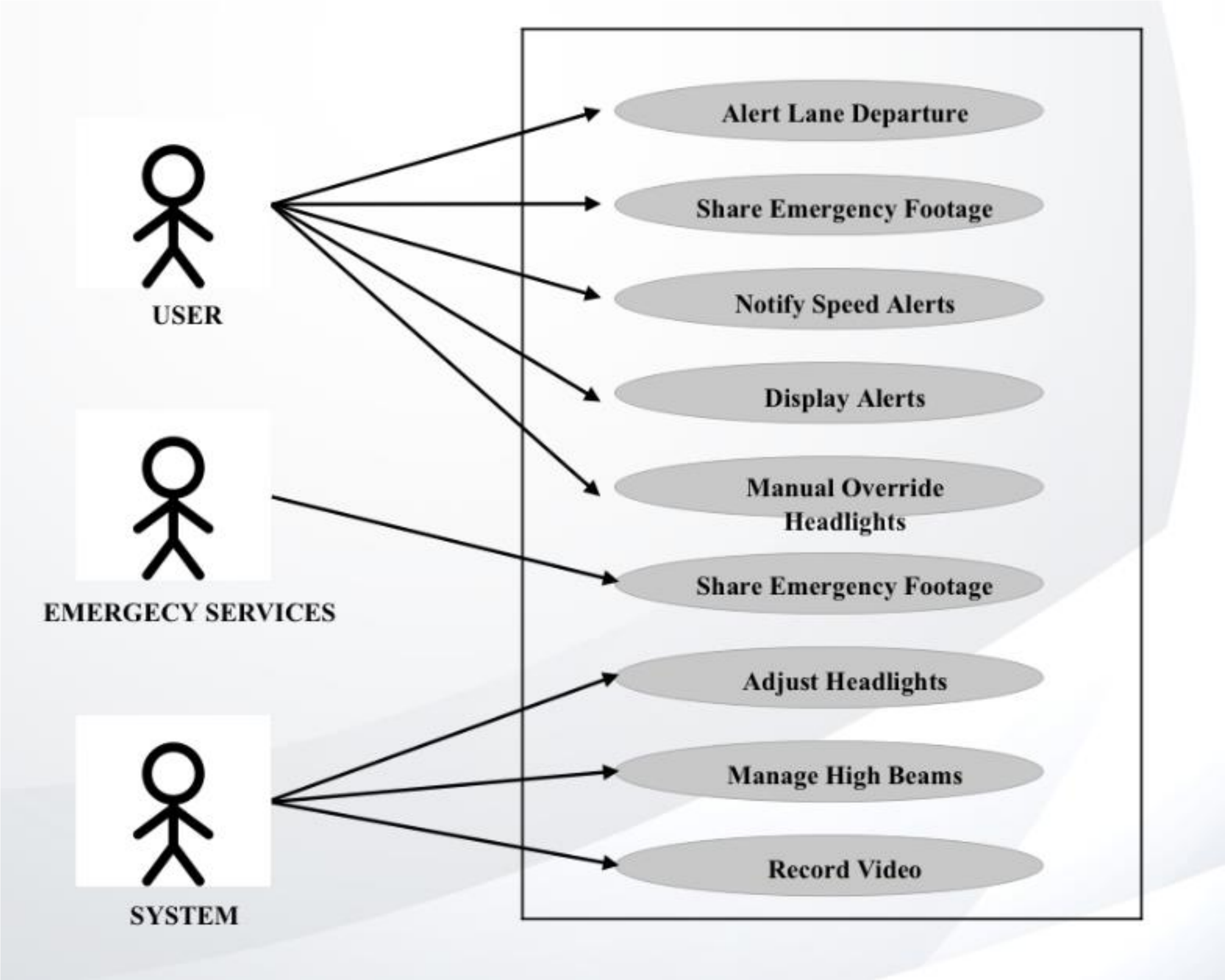
CIRCUIT DIAGRAM: *Internal*



CIRCUIT DIAGRAM: *External*



USE CASE DAIGRAM



FUTURE SCOPE

1) Smart Dashboard – Touchscreen interface, GPS speed display, OBD-II diagnostics.

2) Security & Surveillance – Dashcam recording, motion detection alerts, GPS tracking.

3) Smart Automation – Remote engine start, automatic window control, voice commands.

4) Entertainment & Connectivity – Music streaming, WiFi hotspot, car-to-home IoT.

CONCLUSION

In conclusion, the Advanced Driver Support System is designed to significantly enhance road safety and improve the overall driving experience. With features such as automatic headlight dimming to reduce glare and continuous dashcam functionality for crucial evidence in case of incidents, our system addresses the common challenges drivers face today. By integrating these intelligent technologies, we aim to minimize accidents and empower drivers to navigate unforeseen situations with confidence. We appreciate your attention and look forward to your questions and insights!

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Thank you