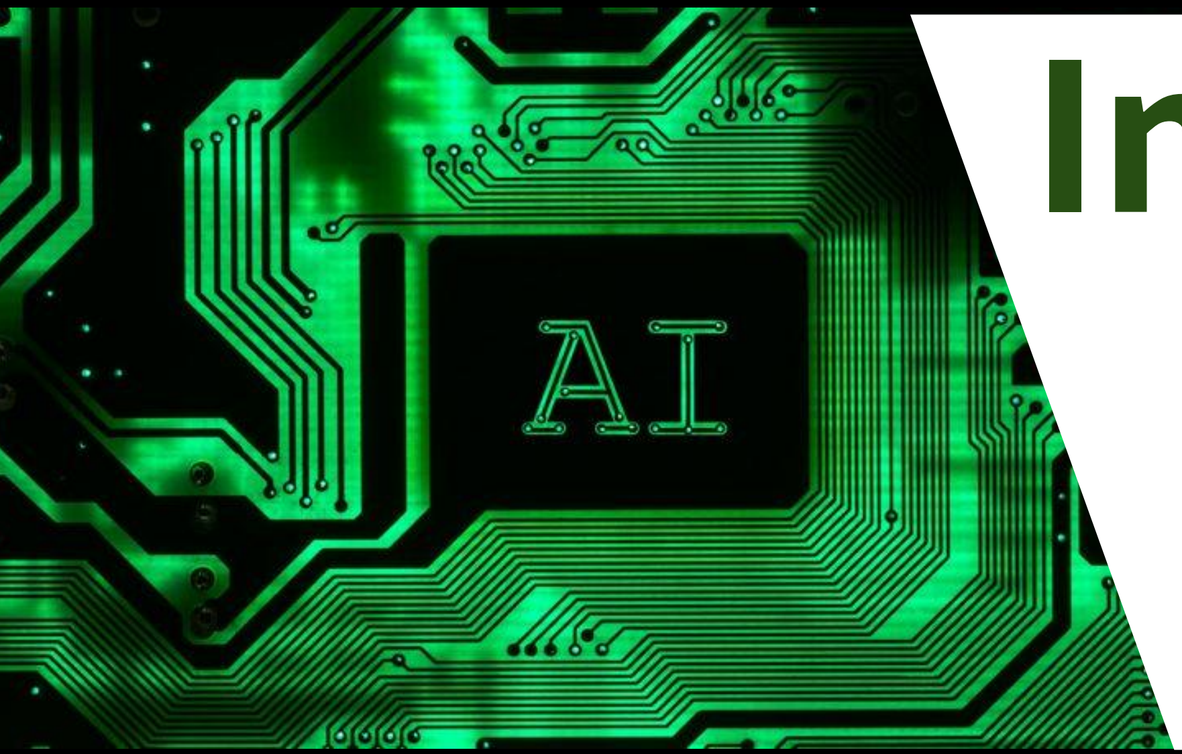
IFS DriverAlert



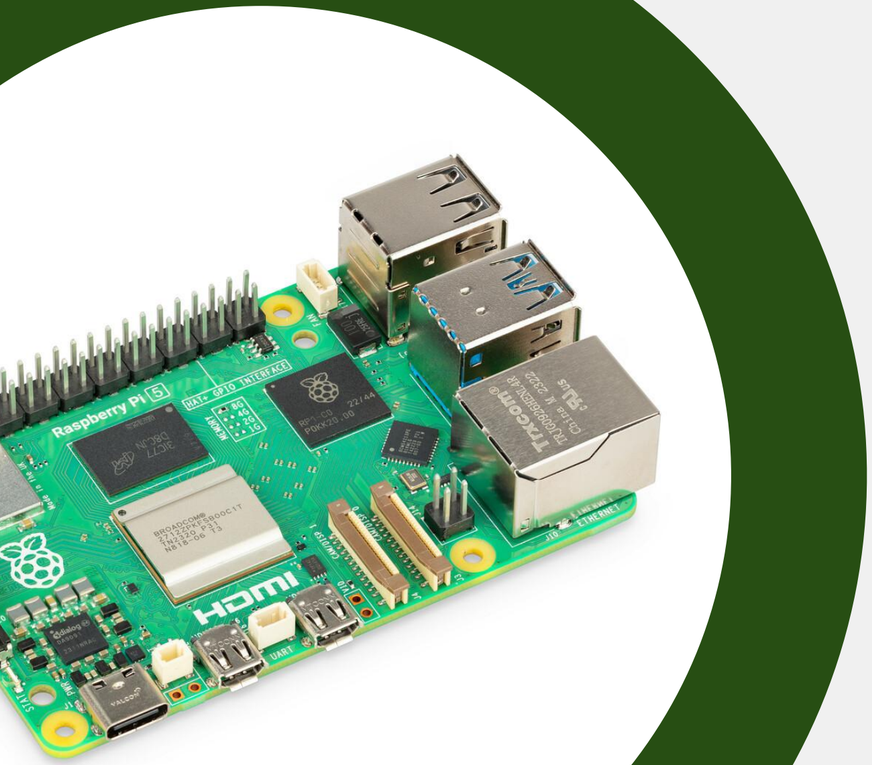
Intelligent Focus System

Feras Aljoudi

Ihab Mohamad

Seonyu Park

Quick Overview



What We Showed Last Scrum:

- Our detection system alerts when detecting drowsiness (eye closure, yawning).
- Two detection methods: Model-based (TfLite) and real-time (MediaPipe).
- Live demo of both methods.

Feedback & Concerns from Last Scrum:

- What if the driver looks left or right for too long or turns their head and close their eyes?
- Testing the system with different people.
- Testing the system in a car.

Project Enhancements

Enhancement: Added “Looking away” detection as an extra measure to identify drowsiness more effectively.

Implementation:

- We track the eyebrow position relative to face width using MediaPipe.
- If this ratio changes significantly for 3 continuous seconds, we trigger an alert for looking away.

Importance:

- Prevents cases where a driver turns their head and close their eyes, which could indicate drowsiness.
- Enhances safety by ensuring the system detects actual distractions, not just closed eyes and yawning.
- 3 seconds helps differentiate between normal driving actions (e.g., shoulder check) and looking away for too long.

Consequences of Detecting Looking Away

Real-world scenarios:

- What if drivers look left or right for valid reasons:
  - Checking for traffic at an intersection.
  - Stopping at a drive-thru.

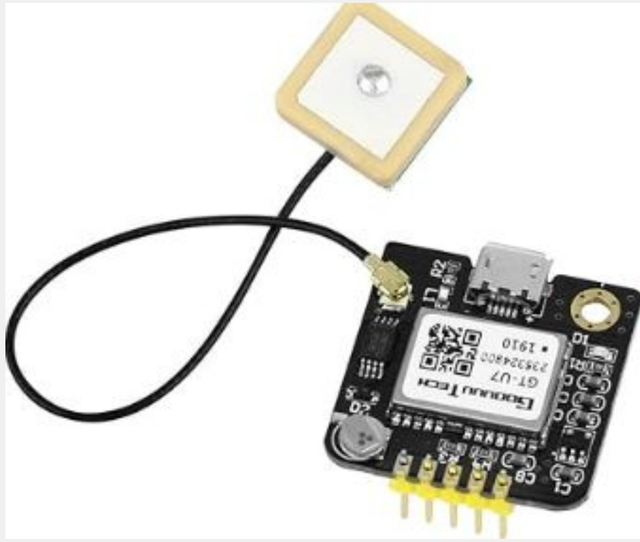
The challenge:

- The system triggered alerts when it shouldn’t, which will cause unnecessary warnings.

Our solution:

- We adjusted the system to activate only when the car is driving.

NEO-6M GPS



What is NEO-6M GPS?

A low-power GPS module that provides data such as location, speed, date and time using satellite signals.

How it is used?

- Reads real-time GPS data using a serial port.
- Extracts the speed information from the $GPVTG sentence, which contain the speed, in the GPS signal.
- Checks if the car’s speed is above or below 19 km/h to determine if the detection system should be active.

Why we used It?

- Maintaining our project requirement of having offline solution.
- Prevent false alerts when the car is stopped.

Handling GPS Limitations

The Challenge:

- What if the GPS module doesn’t detect speed?
  - Ex. driving in a tunnel where GPS signals are weak.

Our Solution (Two-State Switch):

- **Auto Mode:** System turns on when speed is above 19 km/h and turns off otherwise.
- **On Mode:** System stays active at all times, useful in GPS-limited areas.

Additional Feature:

- If Auto Mode is selected but GPS is unavailable, the system plays an audio reminder every 10 minutes recommending manual activation.

Demo of Different Drivers

Demo of Speed Detection

Key Insights from Demo

1st video (Demo of Different Drivers):

- Confirmed the detection works on different people.
- Confirmed the detection works with and without glasses.
- Tested with sunglasses to confirm that even if eye detection fails, the system continues detecting yawning and looking away without stopping.
- Confirmed the detection works in both daylight and nighttime conditions.

2nd video (Demo of Speed Detection):

- Confirmed the system accurately detects car speed using GPS.
- Evaluated the accuracy and response time of speed detection.
- Confirmed the GPS module works reliably even when placed inside the car glove box.

Future Work

- Run the detection system on speed detection.
- Update/complete Software/Hardware diagrams.
- Update/complete code testing.
- Update/complete testing documents.
- Complete the hardware structure.
- Complete user manual.
- GitHub documentation.

Thank you