**Project Title:** Driver Sleep Detection and Emergency Alert System

**Abstract:**

Driver fatigue is one of the leading causes of road accidents. This project introduces an intelligent driver sleep detection and alert system using ESP8266, GPS, SIM800L, and Blynk. The system detects motion using an IR sensor and determines inactivity as an indicator of potential drowsiness. If sleep is suspected, a buzzer is activated to wake the driver. If the driver remains unresponsive, the system sends the current GPS location to a designated emergency contact via SMS and initiates a phone call using the SIM800L module. Additionally, a manual emergency button allows the driver to send an alert at any time.

**Components Required:**

* NodeMCU ESP8266 Wi-Fi Module
* IR Motion Sensor
* TinyGPS++ Module (Neo 6M)
* SIM800L GSM/GPRS Module
* Buzzer
* LEDs
* Emergency Push Button
* Jumper Wires
* Power Supply (Battery or USB)

**Software Requirements:**

* Arduino IDE
* Blynk IoT Platform (App and Web Dashboard)
* TinyGPS++ Library
* Blynk Library

**System Architecture:**

1. **Motion Detection:** IR sensor continuously monitors the driver's movement.
2. **Sleep Detection Logic:** If no motion is detected for more than 10 seconds, it assumes the driver may be asleep.
3. **Buzzer Alarm:** Initially, a buzzer is turned on for 5 seconds to wake the driver.
4. **No Response Condition:** If the IR sensor still detects no motion after the buzzer alert, emergency procedures are initiated.
5. **Emergency Communication:**
   * GPS location is fetched and sent via Blynk notification.
   * SMS and call are triggered using SIM800L.
6. **Manual Emergency Button:** Allows driver to manually initiate the emergency protocol.

**Circuit Description:**

* **IR Sensor:** Connected to D4. Outputs HIGH on no motion, LOW on motion.
* **Buzzer:** Connected to D7. Sounds on sleep detection.
* **SIM800L:** Connected using SoftwareSerial on D8 (RX) and D3 (TX).
* **GPS Module:** Connected using SoftwareSerial on D2 (RX) and D1 (TX).
* **Emergency Button:** Connected to D0 with pull-up configuration.
* **Sleep Status LED:** Connected to D6.

**Working Procedure:**

1. System starts and connects to Wi-Fi and Blynk.
2. IR sensor monitors for movement.
3. If no movement is detected for 10 seconds:
   * LED indicates sleep.
   * Buzzer rings for 5 seconds.
   * If still no motion:
     + GPS location is sent via Blynk.
     + SMS is sent with Google Maps link.
     + A call is placed to the registered number.
4. Emergency push button can trigger the same process anytime manually.

**Alerts Sent:**

* **Blynk Notification:** Via log event to dashboard.
* **SMS:** Text message with location link.
* **Call:** Automatic dialing using SIM800L.

**Use Case Scenarios:**

* Highway truck drivers
* Long-distance public transport drivers
* Taxi drivers working night shifts

**Advantages:**

* Real-time monitoring
* Immediate response system
* Easy to use and install
* Low cost and scalable

**Future Scope:**

* Integration with car’s ECU to control speed during drowsiness
* Facial recognition for better accuracy
* Cloud data logging and analytics
* AI-based drowsiness detection

**Conclusion:**

The Driver Sleep Detection and Emergency Alert System is a proactive solution to reduce road accidents caused by fatigue. Using simple sensors and modules, the system provides a reliable, low-cost method for real-time detection and emergency alerting. With further enhancements, it can become a vital safety component in all vehicles.

**References:**

* Blynk IoT Platform
* Arduino IDE Documentation
* TinyGPS++ Library
* SIM800L AT Commands Manual