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# Vehicle Theft Control and Accident Location Intimation Through SMS And Image Capturing

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# ABSTRACT-

Over the last few years, the spate of auto thefts and accidents on the road has posed serious questions about the safety of roads and cars. The necessity of a wise, advanced system that can provide solutions for both these problems has become more important than ever. This project suggests an extensive embedded solution named" Vehicle Theft Control and Accident Location Intimation through SMS and Image Capturing", which takes advantage of the capabilities of microcontroller- based automation, wireless communication, and real-time data acquisition technologies to protect vehicles and human life.

The system to be designed involves using a microcontroller as the processing unit, which is interfaced with a GPS module, GSM modem, vibration/impact sensors, and an on board camera The main goal of the system is two-fold: unauthorized vehicle entry (theft) prevention and the immediate notification of emergency contacts in case of an accident. If the system finds unusual vibrations (that of a crash) or illegal ignition, it activates the GPS module to get the actual location of the vehicle.

This location and a pre- defined alert message are sent immediately to the registered owner or emergency services through the GSM module via SMS. At the same time, the on-board camera is turned on to take one or more pictures of the surrounding environment or the involved persons. These photographs can act as valuable visual proof in theft or accident cases.

In addition, the system can be expanded to include in mobilization of vehicles, so that the owner can disable the ignition system remotely in the event of verified theft. The installation is cost-efficient and can be applied to existing as well as new vehicles. This solution not only provides vehicle security but also enhances emergency response times, possibly saving lives and assisting law enforcement with precise, real-time data .In general, the combination of GPS-GSM communicationandon-lineimageacquisitionintooneplatformisaprofoundleap in the field of intelligent vehicular technology, serving larger purposes of smart transportation systems as well as public safety.

Keywords: Vehicle theft control, Accident Location Intimation, SMS Notification System, Image Capturing Module, GPS Tracking Integration.

# **INTRODUCTION:**

With more cars on the road, there has been a growing increase in vehicle crimes and accidents on the road. Cases of car thefts and delayed responses to accidents have become commonplace, particularly on city streets and rural areas where they can be closely monitored. Simple security systems such as alarms and manual locks are not strong enough to ward off sophisticated and new car theft methods. Furthermore, in case of accidents, victims don't receive timely assistance because there are no mechanisms to send immediate alerts. To address these challenges, our project proposes a smart, automatic mechanism named

"Vehicle Theft Control and Accident Location Intimation using SMS and Image Capturing." This solution is based on microcontrollers and aims to provide enhanced security for vehicles and prompt response in the event of accidents. The system is constructed utilizing major hardware components like a GPS module, GSM modem, vibration/impact sensors, and real-time image-capturing camera. These elements collaborate with each other in a synchronized manner to track the vehicle environment, identify any unauthorized entry or crashes, and automatically notify the vehicle owner and emergency contacts

**Key Features of the System:** Theft Detection and Prevention: The system continuously monitors for unauthorized access or ignition attempts. If any suspicious activity is detected, it immediately sends an SMS alert to the registered owner.

1. Accident Detection: Equipped with vibration or impact sensors, the system can detect sudden collisions or accidents and initiate emergency

2. Location Tracking: Upon detecting an unusual event (like theft or an accident), the system fetches the real-time GPS location of the vehicle and includes it in the alert messages.

**3. Image Capturing:** In case of emergencies or unauthorized access, the system activates a camera to capture images, providing visual evidence of the situation.

4. **Remote Alerts:** Automated SMS notifications are sent to multiple pre-configured mobile numbers, ensuring that help can be arranged quickly, even if the owner is unreachable.

An additional component, the IRF520 speed controller, is used to control motor speed in scenarios like automated locking, alarms, or triggering emergency response actions.

## BLOCK DIAGRAM



#### ESP32 Microcontroller

Acts as the central control unit. It gathers data from all sensors and modules, makes decisions based on programmed logic, and triggers appropriate responses.

## **Push Button**

Serves as a simple user interface to manually interact with the system-for example, to activate or reset certain functions.

## GPS Module (NEO 6M)

Provides +6 real-time location tracking of the vehicle. The GPS coordinates can be used to monitor the vehicle's position and are crucial for theft recovery or accident location intimation.

#### **PIR Sensor**

Detects motion near the vehicle. If unexpected movement is detected, the system can trigger alerts or activate the camera to capture evidence.

#### **Camera Module**

Captures images of the surroundings or driver during critical events like unauthorized access or accidents, providing visual evidence that is sent to the vehicle owner.

#### ADXL345 Accelerometer

A 3-axis motion sensor used to detect unusual tilts, movements, or impacts-helpful for identifying accidents or aggressive driving behavior.

## 16x2 LCD Display

Provides a textual interface to display system status, sensor readings, or alerts, offering real-time feedback to the user.

## Buzzer

Emits audible sounds to alert the driver or nearby individuals about detected issues such as high alcohol levels, motion detection, or accident alerts.

Enables wireless communication by sending SMS alerts or even making calls to the vehicle owner or emergency contacts during theft or accident

#### Methodology:

System centered on an ESP32 microcontroller, suggesting a multi-faceted project likely involving monitoring, communication, and control. ESP32 acts as the central processing unit, receiving input from various sensors and peripherals and controlling output devices. A Push Button provides manual input for user interaction; while a GPS NEO 6M module enables location tracking. A PIR Sensor detects motion, potentially triggering other actions like capturing an image with the Camera. An Alcohol Sensor likely measures alcohol levels, and an ADXL345 is a three-axis accelerometer that can detect tilt and movement for output and display, an LCD 16\*2 provides a textual interface to show readings or system status. A Buzzer can generate audible alerts. Communication capabilities are provided by a GSM SIM 800 module, enabling wireless data transmission and potentially SMS or calls.

Finally, an IRF520 Speed Controller is connected to a Motor, indicating the system can control the speed of a motor, perhaps for movement or some other mechanical action. In operation, the ESP32 continuously monitors the sensors. For instance, if the PIR sensor detects motion, the ESP32 might trigger the camera to capture an image and potentially send a notification via the GSM module. If the alcohol sensor detects a certain level, the buzzer might sound, and a warning could be displayed on the LCD. The GPS module provides location data, which could be logged or transmitted. The push button allows for user-initiated actions The accelerometer data could be used to detect tampering or changes in orientation. The ESP32 processes all this information and controls the LCD, buzzer, GSM module, and motor speed controller based on its programmed logic. This integrated system suggests applications in areas like security.

#### Working:

## Vehicle Theft Control

The device uses sensors like vibration or infrared sensors to track unauthorized entry or movement of the vehicle. When it detects unusual activity, it automatically sends an SMS message to the owner's cellular phone. The owner then responds by sending a pre-programmed SMS command that immobilizes the vehicle's engine, blocking any further unauthorized use.

#### Accident Location Intimation

In the event of a collision, sensors detect the impact and trigger the system. The GPS module determines the vehicle's exact location using satellite signals. The system then sends an SMS containing the GPS coordinates to emergency contacts, including family members, the police station, and nearby hospitals, ensuring prompt assistance.

## **Components used:**

## 1. ESP32 MICROCONTROLLER



Fig.2:ESP32 MICROCONTROLLER

The ESP32 is a highly capable and flexible microcontroller created by express if Systems Frequently used in IoT and embedded systems. It boasts a dual-core 32-bit Xtensa® LX6Processor with speeds up to 240 MHz and includes built-in Wi-Fi and Bluetooth (both classic and BLE), making it perfect for wireless communication projects. This microcontroller offers an extensive range of peripherals, such as GPIOs, UART, SPI, I2C, PWM, ADCs, DACs, touch sensors, and timers, allowing seamless integration with different sensors, actuators, and modules. It also supports deep sleep and light sleep modes for efficient power usage in battery-operated devices. Thanks to its strong performance, energy efficiency, and reliable connectivity, the ESP32 is a popular choice for smart home automation, including voice-controlled gadgets, remote monitoring.

## 2. ADXL345



Fig.3: ADXL345

The ADXL345 is a 3-axis digital accelerometer that measures acceleration in the X, Y, and Z directions. It is small, low-power, and highly sensitive, making it ideal for applications like motion detection, tilt sensing, vibration monitoring, and gesture recognition. Resolution is from 10-bit or 13-bit (depending on configuration), Interface I<sup>2</sup>C or SPI digital communication, Power Consumption is extremely low, Output Data Rate is Up to 3200 Hz and Operating Voltage is from 1.8V to 3.6V (typically powered at 3.3V). Built-in Features are Tap/double-tap detection, Free-fall detection and Motion and inactivity detection.

## 3. GSM SIM 800



Fig.4: GSM Sim 800

The SIM 800 is a quad-band GSM/GPRS module developed by SIM Com, used to enable cellular communication in embedded systems like Arduino, ESP32, and Raspberry Pi projects. It is a popular choice in IoT and embedded systems due to its compact size, low cost, and full support for voice, SMS, and internet data services over mobile networks.

#### 4. NEO-6M GPS CHIP



Fig.5: Neo-6M GPS Chip

The NEO-6M is a high-performance GPS (Global Positioning System) receiver module developed by u-box. It is widely used in embedded systems and IoT applications for obtaining accurate location, speed, and time data via satellite signals. Satellite System is GPS, Position Accuracy is ~2.5 meters (open sky) Update Rate is up to 5 Hz, Communication Interface is UART (Serial), Power Supply is from 3.0V to 5.0V (internally regulated), Antenna is External ceramic patch antenna and Backup Battery Keeps RTC and satellite data for faster TTFF

## 5. SWITCH PUSH



Fig.6: SWITCH PUSH

A push button switch is a simple, momentary mechanical device used to make or break an electrical connection when pressed. It is commonly used in electronic circuits for user inputs such as starting, resetting, or toggling functions. The switch is usually configured as SPST (Single Pole Single Throw). There is two main types that are normally open (NO) and Normally Closed (NC). NO type completes the circuit when pressed, while NC type breaks the circuit when pressed. Mechanical bouncing can cause false signals, so debouncing (in software or hardware) is often needed.

# 6. IRF 520 MOSFET DRIVER MODULE



Fig.7: IRF 520 MOSFET

The IRF520 is an N-channel MOSFET (Metal-Oxide-Semiconductor Field-Effect Transistor) widely used in electronic circuits for switching and amplification applications. It is designed to handle relatively high currents and voltages, with a drain-source voltage ( $V_DS$ ) rating of up to 100V and a continuous drain current ( $I_D$ ) of up to 9.2A. The IRF520 is often used for switching inductive loads such as motors, solenoids, and relays, as well as in power supply circuits. Being a MOSFET, it is controlled by voltage applied to the gate, with low gate-source voltage required for switching.

## 7. GEARED MOTOR



Fig.8: GEARED MOTOR

A geared motor is an electric motor that has an integrated gearbox or gear mechanism to reduce the motor's speed and increase torque output. By combining the motor with a gear reduction system, it allows for greater control over the motor's speed and force, making it ideal for applications that require high torque at low speeds. The gearbox typically consists of gears that reduce the RPM (revolutions per minute) of the motor, thus increasing the torque while maintaining a stable power output.

## 8. 16x2 LCD



Fig.9:16x2 LCD

A 16x2 LCD display is a widely used alphanumeric display module that can show 16 characters per line on 2 lines, making it suitable for displaying simple text and data in embedded systems. Each character is displayed in a 5x8 pixel matrix, and the display can show letters, numbers, and some custom characters. It typically uses the \*HD44780 controller\*, which makes it easy to interface with microcontrollers like Arduino or Raspberry Pi using either 4-bit or 8-bit data communicate

## 9. PASSIVE INFRARED SENSOR



Fig10.: PASSIVE INFRARED SENSOR

A Passive Infrared (PIR) sensor is an electronic device used to detect motion by measuring changes in infrared radiation levels in its environment. It works by detecting the heat emitted by objects, particularly warm bodies like humans and animals. PIR sensors contain a sensor element (usually a pyro-electric sensor) that is sensitive to infrared radiation. When a person or object moves in front of the sensor, it detects the change in infrared radiation, triggering an output signal. PIR sensors are commonly used in security systems, lighting control, and automatic door openers due to their ability to detect movement without emitting any signals themselves, making them energy-efficient and cost-effective.

## **APPLICATIONS:**

## 1. Vehicle Theft Prevention and Tracking

- The system continuously monitors the vehicle's location using GPS.
- If the vehicle moves out of a defined area (geo-fence) or experiences unauthorized movement, it sends immediate alerts to the owner, enabling fast action to prevent theft.

## 2. Accident Detection and Emergency Alerts

- Using sensors like accelerometers, the system detects sudden impacts or accidents.
- It sends SMS notifications to the owner, emergency contacts, or authorities, including the vehicle's exact location and images, ensuring a quick response.

#### 3. Geo-Fencing for Unauthorized Movement

- A geo-fence is created around the vehicle's usual location or route.
- If the vehicle exits the fenced area, an SMS alert with real-time location is sent to the owner, helping to catch potential theft or misuse.

#### 4. Automatic Image Capture during Incident

- The vehicle's cameras automatically capture images or videos in the event of an accident or unusual activity.
- These visuals are sent to the owner or emergency contacts to provide instant, actionable information about the situation.

#### 5. Fleet Management for Businesses

Businesses with a fleet of vehicles can use the system to monitor their vehicles in real time.

# **CONCLUSION:**

The vehicle theft control and accident location intimation system integrate advanced technologies like GPS tracking, geo-fencing, impact sensors, and onboard cameras to enhance vehicle security and safety. It allows vehicle owners to monitor their vehicles in real-time, providing immediate alerts if the vehicle is stolen or moves outside a predefined area. In case of an accident, the system automatically detects impacts and sends SMS notifications with the exact location and images, enabling faster emergency response. Geo-fencing ensures that unauthorized movement triggers alerts, while automatic image capture during incidents provides valuable evidence for insurance claims and legal purposes.

This system is particularly beneficial for fleet management, enabling businesses to monitor multiple vehicles, track driver behavior, and ensure the safety of their operations. Additionally, the system streamlines the insurance claim process by providing real-time data and visual evidence, reducing the chances of disputes. While offering significant security benefits, it also emphasizes the importance of compliance with legal and privacy standards. Overall, this technology empowers vehicle owners, businesses, and authorities to act swiftly, improving safety, minimizing risks, and increasing the chances of recovering stolen vehicles or providing timely assistance in emergencies

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