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An IOT Based Vehicle Theft Detection and Remote Engine Locking System

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Abstract: ***An IoT based vehicle theft detection and remote engine locking system is GSM (Global System for Mobile Communication) technology that helps the users to identify the vehicle in the theft mode and allow you to use the controlling mechanism technique. These days, there are a ton of cars being stolen. It's a big problem because crime rates are going up, and it's making it harder to keep vehicles safe. Criminals are becoming smarter and have reached the stage of applications present against the vehicles safety system. Vehicle theft has become a considerable issue which should be traced and prevented. The new system solves many problems and is affordable. Also the proposed system reducing complications by making use of some high priced products like ignition key, microcontroller. In the proposed method, we include an additional feature where controlling mechanisms remotely lock the vehicle engine and prevent theft. In proposed technique, user can start/stop the vehicle either by using the ignition key, which tracks exact location of the vehicle using the application. This paper talks about a great anti-theft system for vehicles. It uses Global Positioning System(GPS),Global System for Mobile Communication(GSM),and Biometrics technologies(i.e fingerprint) to find the vehicle and confirm the owner's identity.***

Fingerprint device captures the fingerprints and matches the distinctiveness of every print scan by the device and compares it to the one keeps in its module or native system database.

Keywords: GPS, GSM, Location identification, Theft alert, vehicle tracking, Vehicle theft detection, Remote engine locking system etc.

I. INTRODUCTION

Vehicle theft has become a significant problem that people all around the world are currently dealing with. The issue of vehicle theft has increased rapidly, mostly at parks. To prevent theft and quickly catch anyone trying to steal or damage our vehicles, we need a theft alert system that helps vehicle owners stay on top of security. The theft alert system used GPS (Global Positioning System) and GSM (Global System for Mobile) which are placed in vehicle to communicate with vehicle's owner mobile phone. In GSM technology, the communication build either by an SMS or calling but we prefer the communication via SMS (between owner's mobile phone and GSM). It's like your car sending a text message to your phone to tell you everything that's happening with it. So, if something unusual is going on with your vehicle, you'll know about it right away. The GPS technology is used here to provide the exact location of vehicle to the vehicle's owner It means that if someone tries to steal our vehicles without permission, we can use GPS technology to quickly find out where the theft is happening and catch the thief easily.

In this system we are going to use two keys to open the vehicle lock, one is the owner's key and other is direct key. The owner uses the owner key, while an unauthorized person uses the direct key. If someone tries to use the key without permission, an alarm goes off and makes a beeping sound to let you know a thief is detected. At the same time a warning SMS is sent by GSM to registered mobile number of the vehicle's owner.

After receiving the message, the vehicle's owner sent a message to remotely locked the engine, after that the engine is turning off and the motor of the vehicle cannot start without permission of password. In this way, an IOT based vehicle theft detection and remote engine locking system helps in preventing the criminals from stealing vehicles.

II. LITERATURE SURVEY

This system is designed to stop theft by using a special setup with GPS and GSM technology built into it. [3] The user can track the position of targeted vehicles on Google map. Using GPS locator, the target current location is determined and sent, along with various parameters received by vehicle's data port, via Short Message Service (SMS) through GSM network to a GSM modem which is like a little device that can send and receive messages, and it's controlled by a board called ARDUINO UNO. [3] The hardware and software of the GPS and GSM network were developed. The proposed GPS/GSM based System has the two parts, first is a mobile unit and another is controlling station.

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In [1], a vehicle tracking model is designed which works as an anti-theft system. An AT89C51 microcontroller is interfaced serially with GSM and GPS. The system continuously monitors the vehicle and reports the status of the vehicle on demand.
Everything in the system, like how it works inside, how it talks to other devices, and how it sends and receives information, is all running smoothly. So, all the important parts of the system are doing their job well. These results are compatible with GPS technologies. In, a vehicle tracking system is an electronic device, installed in a vehicle to enable the owner or a third party to track the vehicle's place. This paper suggests creating a system to track vehicles. It will use GPS (like what's in your phone for maps) and GSM (like what your phone uses to make calls and send texts) technologies to do this job.
In [4], the authors have proposed a plan of action to be informed about the vehicle using GSM technology. The vehicle can be protected from theft and accidents by switching off the ignition of the engine. AVR AT-Mega is used as the microcontroller.
The [2] talks about how to track and lock vehicles using GPS and GSM technology. When the vehicle is handled by an authorized person, the system is in sleep mode whereas if any interruption is sensed by IR Sensor then it sends a message to the microcontroller about the location of the vehicle.

III. PROBLEM STATEMENT

The Problem statement of this project is that, once the vehicle is being stolen, the owner of that vehicle cannot track and lock their vehicle. The chances to get their vehicle back are very rare and it is very difficult to get that vehicle back. It's really hard to find a vehicle if there's no evidence to help track it down. So, this system will track and monitor the vehicle's exact location using the android application and remotely locking the engine of vehicle. Vehicle tracking system has been nominated as one of the best tracking systems for the losses of the vehicle. GPS tracking uses a system that helps you find the real location of something, like a car or a phone. So, we make use of GPS and android based smart phones for improving this system.

IV. EXISTING MODEL

The existing technology mainly uses alarms or beepers and biometrics to the detect the theft in vehicle. The price of these commercially available products are very high. Using a buzzer will help the owner of the vehicle to prevent theft in nearby parking condition. If the vehicle is parked far away it becomes very difficult to prevent the theft and hence using buzzers is not effective technique to prevent our vehicle from the theft. In existing systems the fuel lines are cut off as soon as theft is detected, this might be dangerous at times.

A. Drawbacks Of Existing Model

In existing system we can only detect if the vehicle is stolen but cannot lock the vehicle and any person with the ignition key can start the vehicle. It costs a lot of money and isn't something everyone can afford.

V. PROPOSED SYSTEM

1) The system being developed uses a fingerprint scanner for verifying the identity of vehicle users. It does this by comparing the captured fingerprint with fingerprints stored in the system's database.
2) The GPS receiver gathers information about the location of the vehicle, including latitude, altitude, and its position along the route.
3) This information can be sent to the user's mobile device through the GSM network.

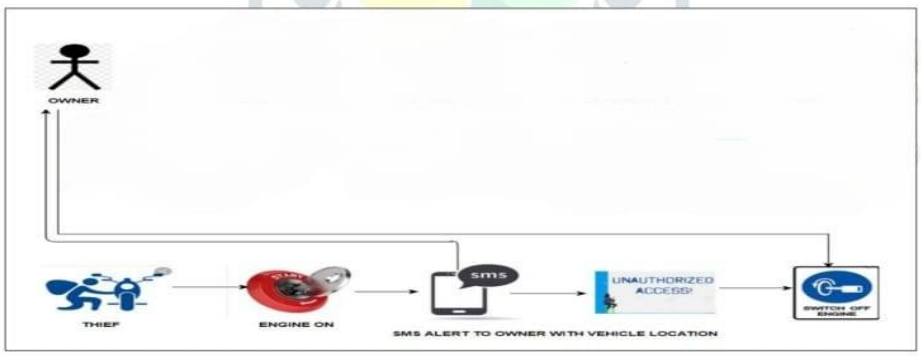


Fig 1. Proposed System Architecture

VI. HARDWARE REQUIREMENTS

A. *Arduino IDE*

The Arduino IDE is a tool that lets you write and work with C/C++ code to handle the information gathered from the sensors. The Arduino IDE is used to write a code in C or C++.



Fig 2. Arduino IDE

B. *Fingerprint Sensor*

A fingerprint sensor device is linked to an Arduino Uno board. Fingerprint sensor is operated by an Arduino uno board in this setup. Users can save their fingerprint data onto the ATmega2560 microcontroller using the Arduino IDE.



Fig 3. Fingerprint Sensor

C. *GPS*

GPS stands for Global Positioning System. GPS module is a navigation process that monitors the precise location of the device or a location. GPS enable us to pinpoint the exact position of the gadget which reducing the risk of robbery.



Fig 4. GPS

D. *GSM*

GSM stands for Global System for Mobile Communication. To transmit and receive information on a cell phone is easier by using GSM module. The GSM module has an antenna for accepting network signals through the user's mobile phone. To communicate with the microcontroller, this GPS system is set up with AT instructions. It uses Transmitter (TX) and Receiver (RX) pins for serial communication. AT instructions are used to check the status of the SIM card, the strength of the signal, and whether there's a connection.



Fig 5. GSM

E. Relay

A relay is an electrically operated switch. A lot of relays use a magnet to turn a switch on or off. Relays are used when there necessary to control a circuit by a separate low signal, or when there are several circuits must be controlled by one signal.



Fig 6. Relay

F. Microcontroller

Microcontrollers play very important role in an IoT-based vehicle theft detection & remote engine locking system. They are also called as the "brains" of the system, responsible for interfacing with sensors, collecting data, processing information, and controlling the IoT devices.



Fig 7. Microcontroller

G. LCD Display

An LCD display shows the messages sent from a distant place. The LCD module displays alphanumeric, kana (Japanese characters) and symbols. It has 16 pins, including 8 for data, 3 for controlling it, 2 for power, 1 for contrast adjustment, and 2 for connecting the backlight LED. The data and control pins are linked to the microcontroller.

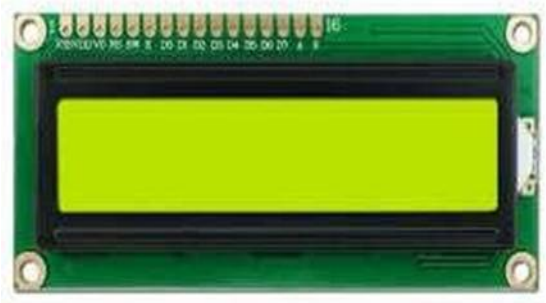


Fig 8. LCD Display

VII. BLOCK DIAGRAM

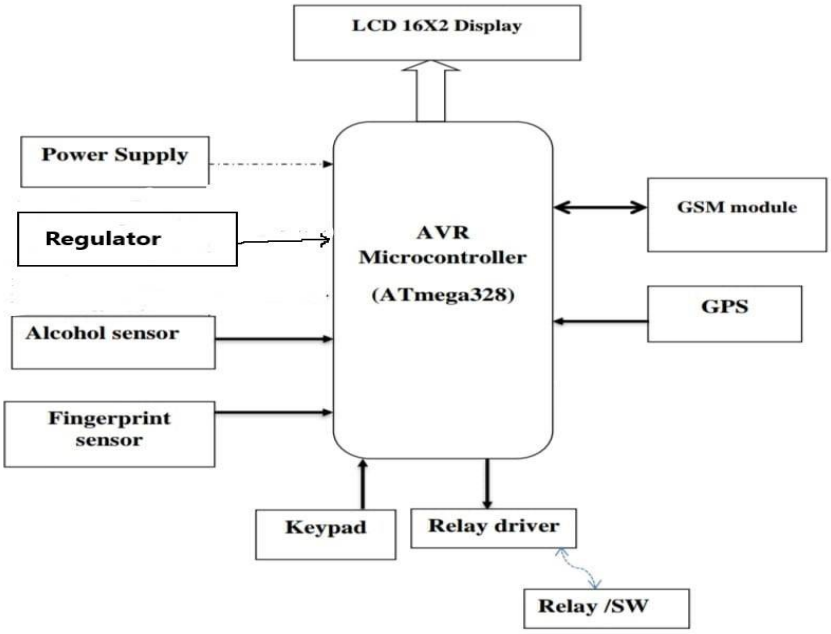


Fig 9. Block Diagram

VIII. SCHEMATIC DIAGRAM

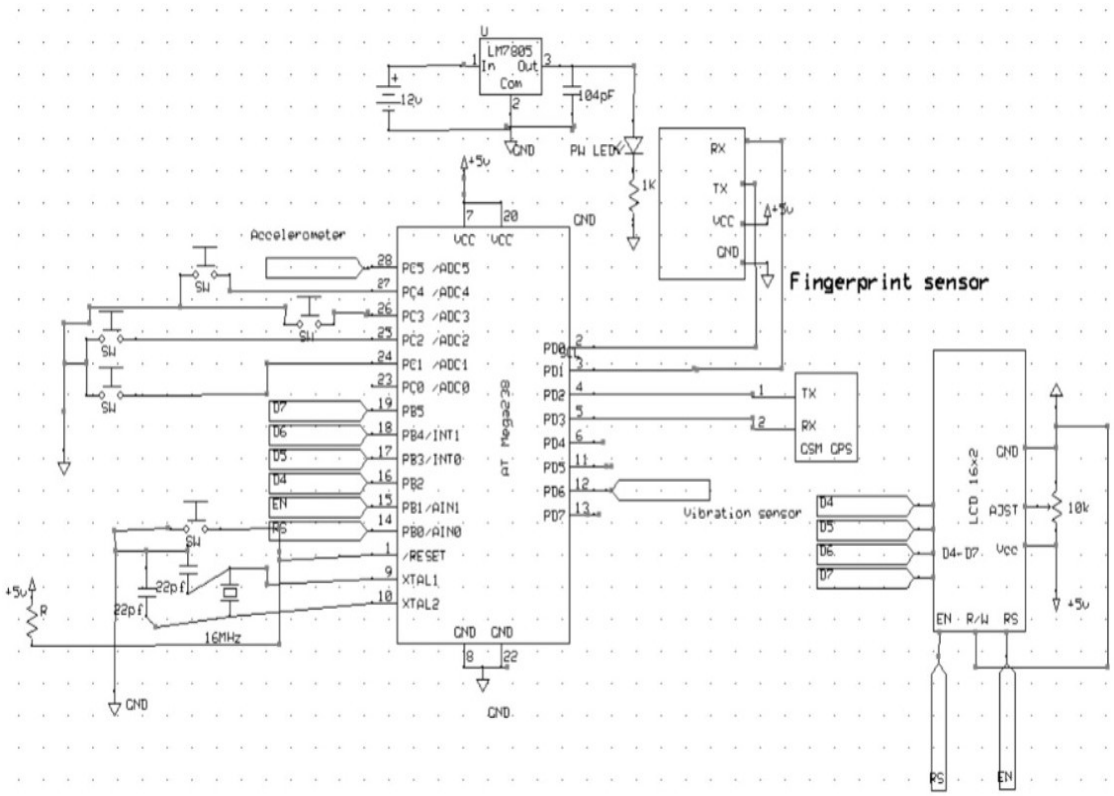


Fig 10. Schematic Diagram

IX. EFFORT ESTIMATE TABLE

	Task Name	Q3			Q4			Q1			Q2		
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
1	Requirement Gathering												
2	Literature Survey												
3	Mathematical Modeling												
4	Feasibility Testing												
5	UML Diagrams												
6	Database Design												
7	GUI Design												
8	Functionality Implementatic												
9	Testing												
10	Reporting												

Table 1. Effort Estimate Table

X. GRAPH OF YEARLY INCREASING IN VEHICLE THEFT

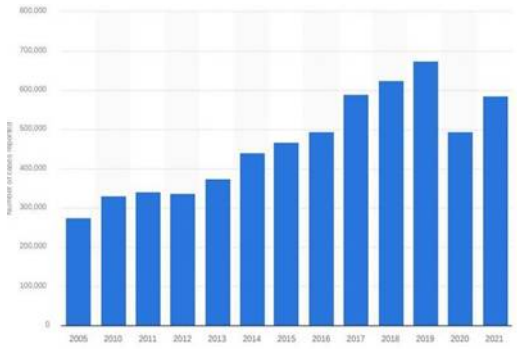


Fig 11. Graph Of Yearly Increasing In Vehicle Theft

XI. RESULT & IMPLEMENTATION

The outcome and execution of the project involve creating a system that uses IoT technology to detect vehicle theft, alcohol presence, and enable remote engine locking.

In simpler terms, we've developed a setup that can detect if someone is trying to steal a vehicle, detect alcohol in the vehicle, and allow the owner to lock the engine remotely.

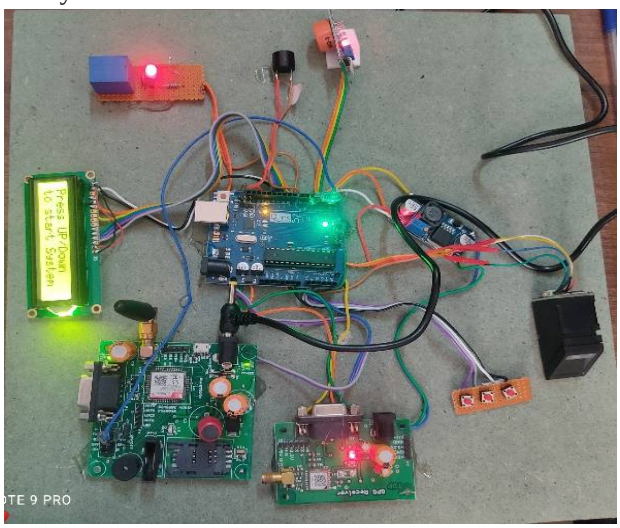


Fig 12. Kit Representation

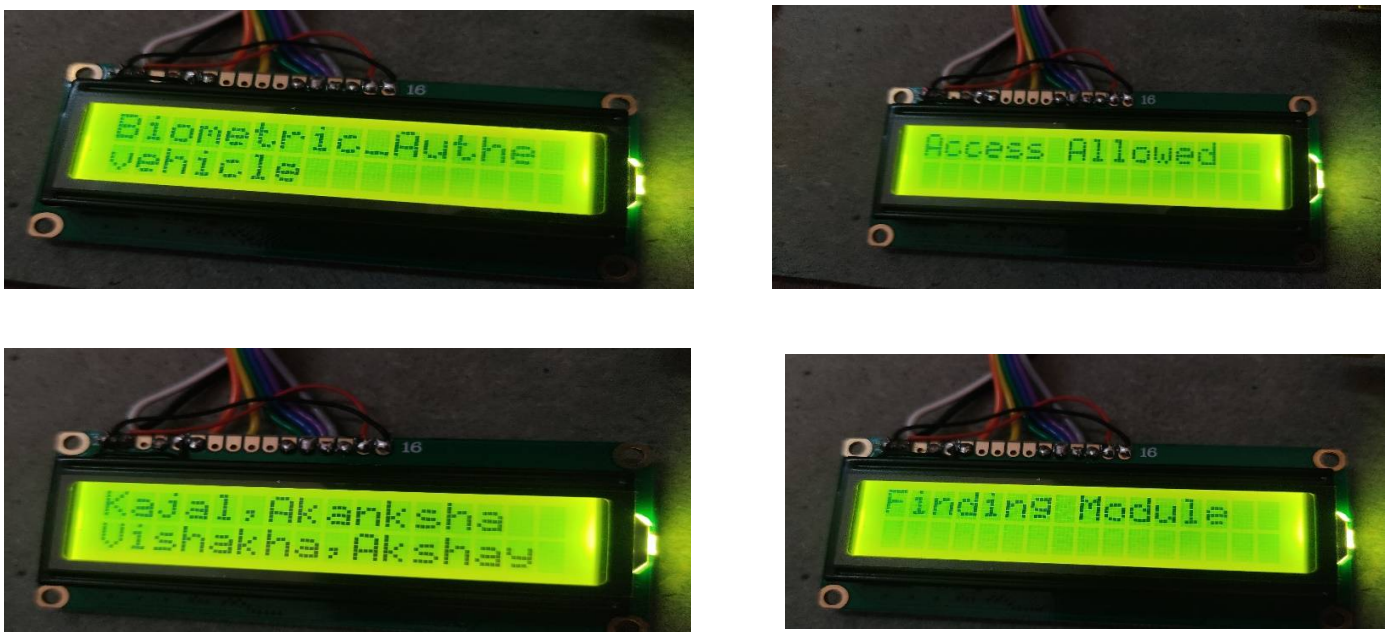


Fig 13. Overview Of The Project

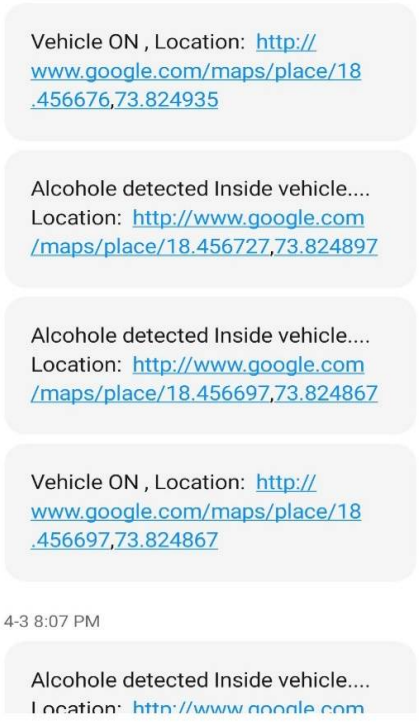


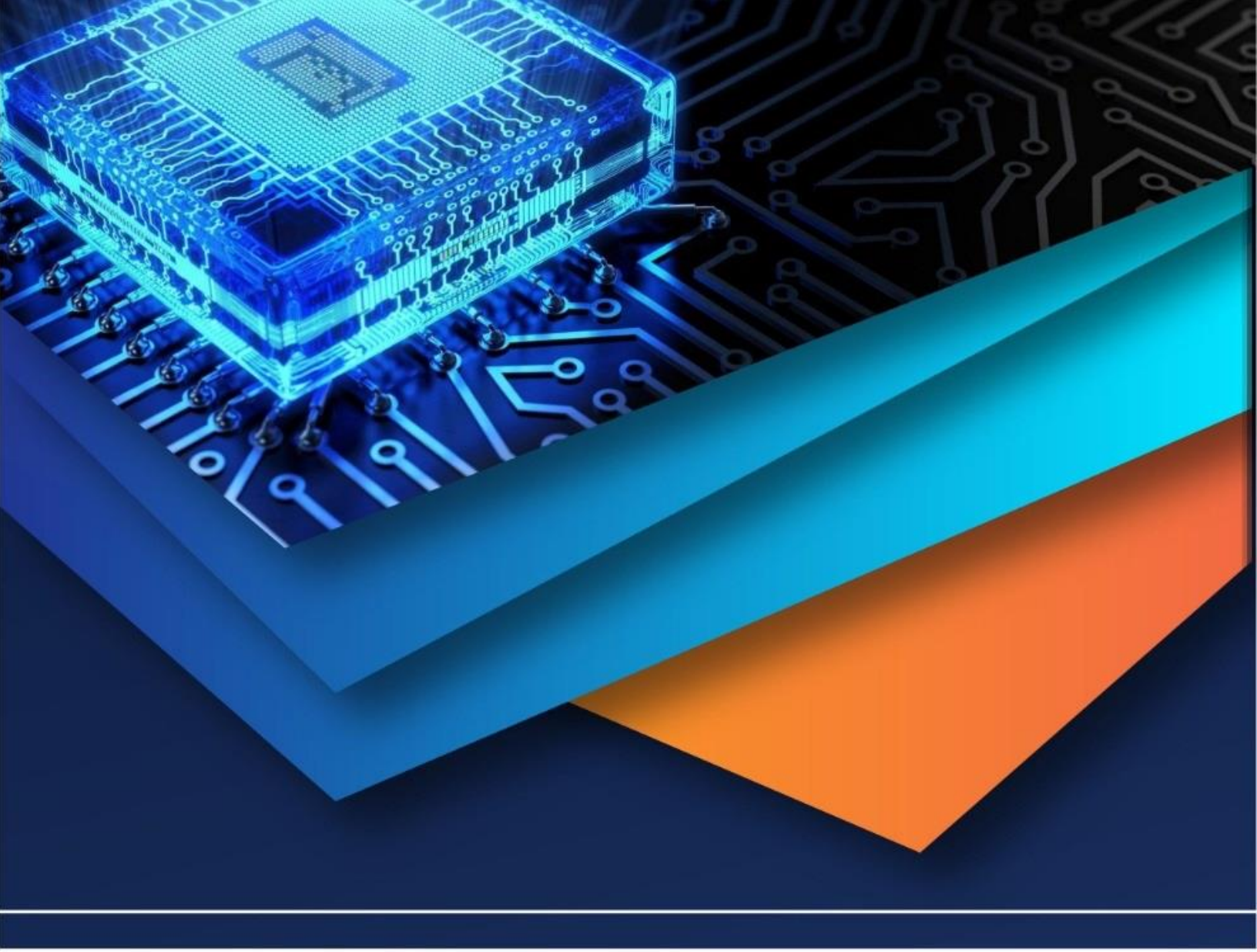
Fig 14. SMS Received By Owner

XII. CONCLUSIONS

The main goal of this project is to make sure that vehicles are safe and secure. Since security is really important these days, our system is designed to keep vehicles safe and quickly detect theft, all at a low cost. The main purpose of this project is to prevent vehicle theft and to lock the engine. The proposed system mainly aims to provide a low-cost theft detection system. Also the proposed system aims to safeguard their vehicle from theft.

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