International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Issue: 6 Volume No.8 November - December – 2024
DOI:10.46647/ijetms.2024.v08i06.008 ISSN: 2581-4621

IOT BASED SECURITY ALERT SYSTEM FOR VEHICLES

K Avinash Babu[1], G Eswara Rao[2], Dr.G. Aparna[3], N. Sowmya[4]
[1]Research scholar, Department of ECE, Mahatma Gandhi University, Nalgonda,Telangana State, India
[2] Professor, Department of ECE, VITAM, Berhampur
[3] R&D Head, Pentagon Rugged Systems (India) Pvt Ltd, Bright Square 4th Floor, #7-1-71/H Dharamkaram Road, Ameerpet, Hyderabad-500016, Telangana State, India
[4]Intern, Pentagon Rugged Systems (India) Pvt Ltd, Bright Square 4th Floor, #7-1-71/H Dharamkaram Road, Ameerpet, Hyderabad-500016, Telangana State, India

Abstract:
According to the National Crime Records Bureau (NCRB), just 32,826 of the 122,367 two-wheelers that were stolen in India in 2011 were recovered, indicating that vehicle theft has become more common. Police and owners have little options when cars are taken from parking lots or streets and swiftly hidden, disassembled, or sold in nearby areas. In order to prevent theft and improve safety, this study suggests a cutting-edge car security system that combines GPS and GSM technology. In the event of theft or an accident, the system uses GPS to track the location of the car and GSM to send alerts. Other features include a paint spray system to identify and discourage thieves, an electric shock mechanism on the steering wheel, and cutoffs for the ignition and gasoline supply. The technology ensures immediate assistance in the event of an accident by providing the GPS coordinates and car number to the local police and the owner's family. This all-encompassing strategy prioritizes human life and improves vehicle security by providing quick responses in an emergency.
Keywords: Vehicle security, GPS tracking, GSM communication, Theft prevention, Accident alert system, Ignition cutoff.

I. INTRODUCTION

In present days the rate of accidents can be increased rapidly. Due to employment the usage of vehicles like cars, bikes can be increased, because of this reason the accidents can be happened due to over speed. People are going under risk because of their over speed, due to unavailability of advanced techniques, the rate of accidents can't be decreased. To reduce the accident rate in the country this paper introduces a optimum solution. Automatic alert system for vehicle accidents is introduced; the main objective is to control the accidents by sending a message to the registered mobile using wireless communications techniques. When an accident occurs at a city, the message is sent to the registered mobile through GSM module in less time. Arduino is the heart of the system which helps in transferring the message to different devices in the system. Vibration sensor will be activated when the accident occurs and the information is transferred to the registered number through GSM module. GPS system will help in finding the location of the accident spot. The proposed system will check whether an accident has occurred and notifies to nearest medical centers and registered mobile numbers about the place of accident using GSM and GPS modules. The location can be sent through tracking system to cover the geographical coordinates over the area. The accident can be detected by a vibration sensor which is used as major module in the system[1]

International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Issue: 6 Volume No.8 November - December – 2024
DOI:10.46647/ijetms.2024.v08i06.008 ISSN: 2581-4621

II. LITERATURE SURVEY

To protect the vehicle and tracking so many advanced technologies are available in now a days. In olden days the information of accident can be transferred, but the place of accident spot cannot be identified. In any vehicle airbags are designed, air bags are used for security and safety travels[2]. The air bag system was introduced in the year of 1968. • TPMS is system designed to control the pressure inside the pneumatic tires on vehicles that provides different operating conditions such as a lower tire pressure is desired in order to maximize traction, maneuvering through challenging terrain, pulling a heavy load out of an incline at slow speeds, crawling out of soft dirt. The pressure ranges from 15 to 45 PSI. • Many other systems have been proposed to deduce the accident. The existing system deals with two sensors where MEMS sensor is used to detect the angle and vibration sensor is used for detection the change in the vehicle. • The other existing system uses IOT and cloud computing system. Where the vehicle detection id done through SVM (support vehicle machine) that is developed by Ant Colony Algorithm (ACA). Here IOT will monitor the vehicles using magneto resistive sensors. The main aim of this project is to differentiate the accidents which took place in traffic and at no traffic place. • Existing system also provides the location of the accident using Atmega 328 Microcontroller and RF transmitter and receiver. The information is send to the saved mobile numbers[3].

III. RELATED WORK

The main objective of this project is to send an auto-generated SMS to the owner of the vehicle about any unauthorized entry. An advantage of this project is that the owner of the vehicle can also send back the SMS, which will deactivate the ignition of the vehicle. As the crime rate is increasing day by day, vehicle theft , accident, driver sleep control system is essential for every vehicle. In this project, if an unauthorized person tries to steal the vehicle, the microcontroller gets an interrupt through a switch mechanism which is connected to the system. Then, immediately it commands the GSM modem to send an SMS.

The vehicle owner receives the SMS that his vehicle is stolen. Then he can send back an SMS to the GSM modem to stop the engine. Here, the GSM modem, GPS modem is interfaced with the Cortex m3, that receives the message, the O/P of which activates a mechanism that deactivates the ignition of the vehicle resulting in stopping the vehicle. This project uses a lamp to specify the ON/OFF condition of the vehicle.

Therefore, the owner of the vehicle from anywhere can deactivate the engine of the vehicle. Further, this proposed system can be developed by interfacing a GPS, which will give the exact location of the vehicle in terms of longitude and latitude. Further, this data can be sent to the vehicle owner through an SMS who can enter these values on google maps to get the vehicle location.

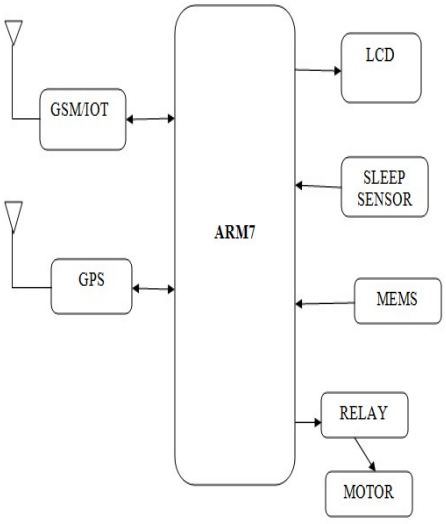

Fig 1. Proposed Block Diagram

DOI:10.46647/ijetms.2024.v08i06.008 ISSN: 2581-4621

A. CORTEX M3

The Cortex-M3 processor is specifically developed to enable partners to develop high performance low-cost platforms for a broad range of devices including microcontrollers, automotive body systems, industrial control
systems and wireless networking and sensors. Arm Design Start provides the fastest, simplest, no-risk route to custom silicon success.

✓ Design the most optimal System-On-Chip with a processor that has the perfect balance between area, performance and power with comprehensive system interfaces and integrated debug and trace components.

✓ Develop solutions for a large variety of markets with a full-featured Armv7-M instruction set that has been proven across a broad set of embedded applications.

✓ Capture a worldwide experienced developer base to accelerate adoption of new Cortex-M3 powered products and leverage the available extensive knowledge base to reduce support costs.

✓ Achieve exceptional 32-bit performance with low dynamic power, delivering leading system energy efficiency due to integrated software controlled sleep modes, extensive clock gating and optional state retention.

Powerful debug and non-intrusive real-time trace

Comprehensive debug and trace features dramatically improve developer productivity. It is extremely efficient to develop embedded software with proper debug.

Memory Protection Unit (MPU)

Software reliability improves when each module is allowed access only to specific areas of Memory required for it to operate. This protection prevents unexpected access that may overwrite critical data.

Integrated nested vectored interrupt controller (NVIC)

There is no need for a standalone external interrupt controller. Interrupt handling is taken care of by the NVIC removing the complexity of managing interrupts manually via the processor.

Thumb-2 code density

On average, the mix between 16bit and 32bit instructions yields a better code density when compared to 8bit and 16bit architectures. This has significant advantages in terms of reduced memory requirements and maximizing the usage of precious on-chip Flash memory.

B. GSM

GSM (Global System for Mobile communications) is an open, digital cellular technology used for transmitting mobile voice and data services. GSM supports voice calls and data transfer speeds of up to 9.6 kbit/s, together with the transmission of SMS (Short Message Service). GSM operates in the 900MHz and 1.8GHz bands in Europe and the 1.9GHz and 850MHz bands in the US. The 850MHz band is also used for GSM and 3G in Australia, Canada and many South American countries. By having
harmonized spectrum across most of the globe, GSM's international roaming capability allows users to access the same services when travelling abroad as at home. This gives consumers seamless and same number connectivity in more than 218 countries.

GSM is mainly built on 3 building blocks as shown in below figure

- GSM Radio Network – This is concerned with the signaling of the system. Hand-overs occur in the radio network. Each BTS is allocated a set of frequency channels.

International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Issue: 6 Volume No.8 November - December – 2024
DOI:10.46647/ijetms.2024.v08i06.008 ISSN: 2581-4621

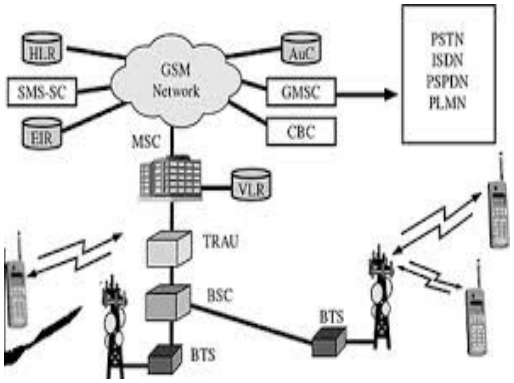

Fig 2. Building blocks of GSM

- GSM Mobile switching Network – This network is concerned with the storage of data required for routing and service provision.
- GSM Operation and Maintenance – The task carried out by it include Administration and commercial operation , Security management, Network configuration, operation, performance management and maintenance tasks.

C. GPS

The Global Positioning System (GPS) is a U.S. space-based radio navigation system that provides reliable positioning, navigation, and timing services to civilian users on a continuous worldwide basis -- freely available to all. For anyone with a GPS receiver, the system will provide location and time. GPS provides accurate location and time information for an unlimited number of people in all weather, day and night, anywhere in the world.

The GPS is made up of three parts:

1. Satellites orbiting the Earth
2. Control and monitoring stations on Earth
3. The GPS receivers owned by users.

GPS satellites broadcast signals from space that are picked up and identified by GPS receivers. Each GPS receiver then provides three-dimensional location (latitude, longitude, and altitude) plus the time.

1. SPACE SEGMENT

- 24+ satellites
- 20,200 km altitude
- 55 degrees inclination
- 12 hour orbital period
- 5 ground control stations
- Each satellite passes over a ground monitoring station every 12 hours

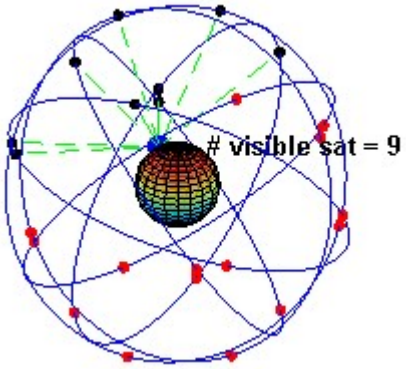

Fig 3. Continuity Sensor

International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Issue: 6 Volume No.8 November - December – 2024
DOI:10.46647/ijetms.2024.v08i06.008 ISSN: 2581-4621

IV. INTERNET OF THINGS

The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much WiFi-ability as a WiFi Shield offers (and that's just out of the box)! The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community.

Fig 4. Internet of things Interfacing

This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime. Its high degree of on-chip integration allows for minimal external circuitry, including the front-end module, is designed to occupy minimal PCB area. The ESP8266 supports APSD for VoIP applications and Bluetooth co-existence interfaces; it contains a self-calibrated RF allowing it to work under all operating conditions, and requires no external RF parts.

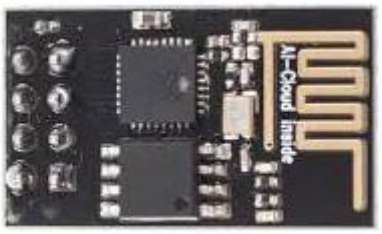

Fig 5. ESP8266 IOT module

There seems to be three ways of using this module, in order of increasing complexity:
1. Sending it AT commands from a computer via an USB to serial adapter. This is mostly useful for testing and setup.
2. Interfacing with cortex M3 or any other micro controller and using this board as a peripheral.
3. Programming the module directly and use its GPIO pins to talk to your sensors, eliminating the need for a second controller.

V. RESULT ANALYSIS

After you create a
Thing Speak channel, you can write data to the channel, process and view the data with MATLAB® code, and react to the data with tweets and other alerts. The typical Thing Speak workflow lets you:
1. Create a Channel and collect data
2. Analyze and visualize the data
3. Act on the data using any of several Apps.

International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Issue: 6 Volume No.8 November - December – 2024
DOI:10.46647/ijetms.2024.v08i06.008 ISSN: 2581-4621

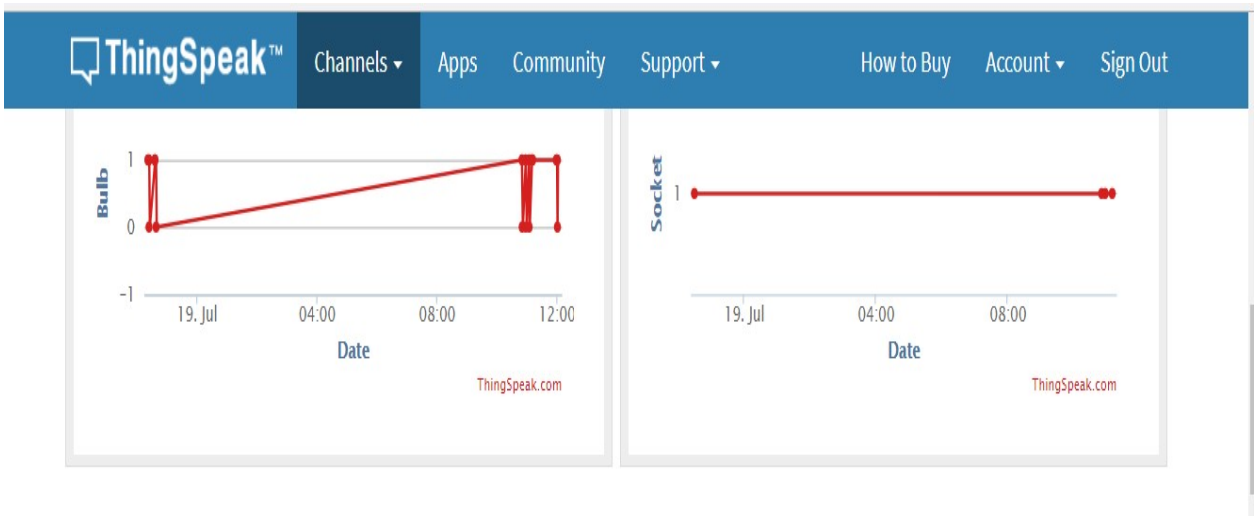

Fig 6. Graphical representation of output

VI. CONCLUSION

In this paper, we have proposed a novel method of vehicle tracking with security alert and locking systems used to track the theft vehicle by using GPS and GSM technology. This system puts into the sleeping mode vehicle handled by the owner or authorized persons; otherwise goes to active mode. The mode of operations changed by persons or remotely. When the theft identified, the responsible people send SMS to the micro controller, then issue the control signals to stop the engine motor. After that all the doors locked. To open the doors or to restart the engine authorized person needs to enter the passwords. In this method, easily track the vehicle place and doors locked..

References

[1] Chen, H., Chiang, Y. Chang, F., H. Wang, H. (2019). To ward Real-Time Precise Point Positioning: Differential GPS Based on IGS Ultra Rapid Product,SICE Annual Conference, The Grand Hotel, Taipei, Taiwan August 18- 21.

[2] Asaad M. J. Al-Hindawi, Ibrahim Talib, Experimentally Evaluation of GPS/ GSM Based System Design",Journal of Electronic Systems Volume 2 Number 2 June 2018

[3] Vikram Ku lkarni & Viswaprakash Babu, "embedded smart car security system on face detection', special issue IJCCT, ISSN(Online) :2231-0371,ISSN(Print):0975- 7449,volume-3, issue-1

[4] Kai-Tai Song, Chih-Chieh Yang, of National Chiao Tung University, Taiwan, "Front Vehicle Tracking Using Scene Analysis", Proceedings of the IEEE International Conference mechatronics & Automation 200

[5] Chen Peijiang, Jiang Xuehua, "Design and Implementation of Remote monitoring system based on GSM," vol.42, pp.167-175. 2018.

[6] Albert alexe,Ezhilarasie,"Cloud computing Based Vehicle Tracking Information Systems", ISSN: 2229 - 4333 (Print) | ISSN: 0976 - 8491 (Online) IJCST Vol. 2, Issue 1, March 2017

[7] R.Ramani, S.Selvaraju, S.Valarmathy, R.Thangam B.Rajasekaran, "water-level mon itor for bore well and water tank based on GSM", International Journal of engineering science and technology (IJEST), ISSN: 0975-5462, volu me4-N0:10, october2012

[8] Kunal Maurya , Mandeep Singh, Neelu Jain, "Real Time Vehicle Tracking System using GSM and GPS Technology- An Anti-theft Tracking System," International Journal of Electronics and Computer Science Engineering. ISSN 2277-1956/V1N3-1103- 1107

[9] W. Li, T. Logenthiran, V. T. Phan, and W. L. Woo, "Implemented iot based self-learning home management system (shms) for singapore," IEEE Internet of Things Journal, pp. 1–1, 2018.

DOI:10.46647/ijetms.2024.v08i06.008 ISSN: 2581-4621

[10] R. C. Luo, C.-C. Yih, and K. L. Su, "Multisensor fusion and integration: approaches, applications, and future research directions," IEEE Sensors journal, vol. 2, no. 2, pp. 107–119, 2002.