



IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 12 Issue: III Month of publication: March 2024
DOI: https://doi.org/10.22214/ijraset.2024.58872

www.ijraset.com

Call: 🕥 08813907089 🔰 E-mail ID: ijraset@gmail.com



Vehicle Theft Detection and Tracking Based on GSM and GPS

Nikhil Mishra¹, Manav², Pinkoo Gupta³, Mr. Hitesh Kumar Tomar⁴ Department of Electronics and Communication EngineeringABES Engineering College, Ghaziabad, India

Abstract: The increasing incidence of vehicle theft poses a significant challenge to vehicle owners and law enforcement agencies worldwide. This paper presents a comprehensive solution for addressing this issue through the integration of Global System for Mobile Communications (GSM) and Global Positioning System (GPS) technologies. The proposed system aims to enhance the security of vehicles by providing real-time theft detection and efficient tracking capabilities. The GSM module facilitates communication between the vehicle and a centralized monitoring system, allowing for seamless data transmission. The system leverages the widespread coverage and reliability of GSM networks to ensure that alerts are promptly delivered to relevant stakeholders, irrespective of the vehicle's location. Furthermore, the GPS technology enables real-time tracking of the stolen vehicle, assisting law enforcement agencies in swiftly responding to the incident. The system's tracking feature provides continuous updates on the vehicle's location, allowing for efficient recovery operations. Additionally, the integration of geofencing capabilities allows users to define virtual boundaries, triggering alerts if the vehicle deviates from the predefined geographical area. The proposed system offers a multi-layered security approach, combining GPS-based tracking with GSMenabled theft detection, making it a robust and effective solution for combating vehicle theft. The integration of these technologies not only enhances the chances of recovering stolen vehicles but also acts as a deterrent, discouraging potential thieves. In conclusion, the Vehicle Theft Detection and Tracking System presented in this paper showcases a technologically advanced and practical solution to mitigate the impact of vehicle theft. The integration of GSM and GPS technologies provides a comprehensive and reliable framework that addresses the security concerns associated with vehicle ownership in today's dynamic environment.

Keywords: Vehicle Theft Detection, GSM, GPS, Tracking System

I. INTRODUCTION

In recent times, the escalating rate of vehicle theft has become a significant concern for vehicle owners and law enforcement agencies globally. To address this pressing issue, this paper delves into the development of an advanced Vehicle Theft Detection and Tracking System, leveraging the combined capabilities of Global System for Mobile Communications (GSM) and Global Positioning System (GPS) technologies. This integration aims to create a comprehensive solution that not only detects unauthorized access to vehicles but also facilitates real- time tracking for efficient recovery.

The utilization of GPS technology provides the system with accurate and continuous location tracking, enabling owners and authorities to monitor the vehicle's movement in real-time. Complementing this, the incorporation of GSM technology ensures instant communication, allowing the system to send timely alerts to vehicle owners and law enforcement agencies when unauthorized access is detected. This twofold approach enhances the overall security framework by enabling proactive measures against theft and swift response in the event of a security breach.

As vehicle theft continues to evolve in sophistication, the proposed system stands as a technological bulwark, offering a multilayered defence mechanism. This paper will further explore the architecture, functionality, and the practical implications of integrating GSM and GPStechnologies in the context of vehicle security, providing acomprehensive understanding of the proposed Vehicle Theft Detection and Tracking System.

II. EASE OF USE

The ease of use of a Vehicle Theft Detection and Tracking System, predicated on the integration of GSM and GPS technologies, is a pivotal aspect influencing its practicality for a diverse user base. User-friendliness is embedded in various facets of the system's design and functionality. The installation process is deliberately streamlined, offering simplicity and clarity through step- by-step instructions for deploying essential hardware components like GPS modules and GSM devices. This ensures that both lay users and professionals can engage with the system seamlessly.



International Journal for Research in Applied Science & Engineering Technology (IJRASET) ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538 Volume 12 Issue III Mar 2024- Available at www.ijraset.com

The user interface, whether accessed through a web portal or a dedicated mobile application, is crafted to be intuitive. It serves as the primary point of interaction, empowering users to customize settings, receive real-time information about their vehicle's security status, and effortlessly navigate the system's features. Real-time tracking capabilities, a hallmark of such systems, not only contribute to enhanced security but also provide a visually coherent representation of the vehicle's location on maps, making it easily comprehensible for users. Immediate feedback is a cornerstone of the system's usability. Alerts and notifications, triggered when unauthorized access or potential theft is detected, are transmitted through various communication channels such as SMS, email, or mobile app notifications. This rapid dissemination of information ensures that users are promptly informed, allowing for swift response to security incidents. Advanced features likeremote control functionalities, enabling users to take action such as remotely locking or disabling the vehicle, contribute to a heightened sense of control and customization. Additionally, the incorporation of geo-fencing capabilities allows users to set virtual boundaries and receive alerts if the vehicle strays from predefined areas, further tailoring the system to individual preferences and needs. Furthermore, the ease of use extends to potential integration with other security systems or smart home technologies. A seamless connection between various aspects of home and vehicle security enhances the overall user experience, providing a cohesive and comprehensive solution. In essence, the user-centric design of a Vehicle Theft Detection and Tracking System underscores its commitment to providing not just security but an accessible and user-friendly experience for individuals seeking to safeguard their vehicles against theft.

III. CAR THEFT DETECTION

Protecting vehicles from unauthorized access and theft is the core objective of car theft detection, which utilizes a variety of technological advancements. Through various technologies and systems, car theft detection strives to bolster vehicle security and minimize the risk of unauthorized access or theft.

- A. Abbreviations and Acronyms
- GPS: Global Positioning System
- GSM: Global System for Mobile Communications
- B. Units
- Distance/Length
- Meters (m): Standard unit for measuring distances in the SI system.
- Time
- Seconds (s): Standard unit for measuring time.
- Speed
- Meters per second (m/s): Common unit formeasuring speed.
- Acceleration
- Meters per second squared (m/s²): Unit formeasuring acceleration.
- Frequency
- Hertz (Hz): Unit for measuring frequency, commonly used in signal processing.
- Power
- Watt (W): Unit for measuring power.
- •
- Voltage
- Volt (V): Unit for measuring electric potential.
- Current
- Ampere (A): Unit for measuring electric current.



Volume 12 Issue III Mar 2024- Available at www.ijraset.com

- Resistance
- Ohm (Ω): Unit for measuring electrical resistance.
- Energy
- Joule (J): Standard unit for measuring energy.
- Intensity (Sound or Light)
- Decibel (dB): Unit for measuring the intensity of sound or light.
- Temperature
- Celsius (°C) or Kelvin (K): Units for measuring temperature.
- Data Storage
- Bit (b) and Byte (B): Units for measuring datastorage capacity.
- Area
- Square meters (m²): Standard unit for measuringarea.
- Volume
- Cubic meters (m³): Standard unit for measuringvolume.
- Pressure
- Pascal (Pa): Unit for measuring pressure.
- Weight/Mass
- Kilogram (kg): Standard unit for measuringmass.
- Force
- Newton (N): Unit for measuring force.
- Density
- Kilogram per cubic meter (kg/m³): Unit formeasuring density.
- Signal Strength
- Decibel-milliwatt (dBm): Unit for measuring signal strength in communication systems.
- C. Equations
- Distance Calculation

The distance between two points (e.g., GPS coordinates of a car) can be calculated using the distance formula: Distance = sqrt{ $(x^2 - x^1)^2 + (y^2 - y^1)^2$ } x1 and y1 are the coordinates of the first point. x2 and y2 are the coordinates of the second point.

• Speed Calculation

Speed is the rate of change of distance with respect to time: Speed = Distance/Time

• Acceleration Calculation

Acceleration is the rate of change of speedwith respect to time: Acceleration = Change in speed/Time



- *Power Calculation* Power is the product of voltage and currentin an electrical system: Power = Voltage×Current
- *Energy Calculation* The energy consumed or produced can be calculated using the formula: Energy=Power×Time
- *Force Calculation* Newton's second law relates force, mass,and acceleration: Force=Mass×Acceleration
- *Density Calculation* Density is mass per unit volume: Density = Mass/Volume
- Signal-to-Noise Ratio (SNR) Calculation SNR is a common metric in signal processing: SNR(dB) =10×log(Signal Power/Noise Power)
- Machine Learning Model
- the slope-intercept form of a basiclinear regression model.

y = mx + b

the equation y = mx + b essentially says that the predicted output (y) is equal to some linear combination of the input variable (x) and a constant value (b).

The slope (m) determines the direction and steepness of this linear relationship.

• Probability Calculation Bayes' Theorem is often used inprobability calculations: $P(A|B) = P(B|A) \times P(A)/P(B)$

D. Authors and Affiliations

Author Names

- 1) Manav: Manav is a skilled professional in electronics and communication with specialisation in embedded andiot. He has strong academic background and currently exploring various embedded and iot technologies.
- 2) *Pinkoo Gupta:* Electronics student passionate about embedded systems and also in the field of industrial automation. As Pinkoo continues to explore and contribute to the embedded and IoT domains, his passion for innovation and problem-solving makes him a valuable asset in the world of electronics and communication.
- *3) Nikhil Mishra:* Nikhil Mishra is a passionate and driven electronics student with a specialization in embedded systems. He has dedicated his academic journey to mastering the field of electronics and its applications in embedded systems.
- 4) Mr. Hitesh Kumar Tomar: Area of specialization in thefield of analog and digital electronics.
- E. Identify the Headings

Heading 1: Abstract

- Heading 2: Introduction Heading 3: Ease of Use Heading 4: Car Theft Detection
- Heading 5: Insights of Review PaperHeading 6: Acknowledgement

Heading 7: References



F. Figures and Tables

- 1) Hardware Specification
- 8051 Microcontroller
- Resistors
- Capacitors
- Transistors
- Cables and Connectors
- Diodes
- PCB and Breadboards
- LED
- Transformer/Adapter
- Push Buttons
- Switch
- IC
- IC Sockets
- 2) Software Specifications
- Arduino uno IDE
- MC Programming Language: C

IV.ACKNOWLEDGMENT

I wish to express my heartfelt appreciation to all those whose contributions have been integral to the successful completion of this review paper. This endeavor would not have materialized without the unwavering support, guidance, and encouragement from various individuals and institutions. Foremost, I extend my deepest gratitude to my mentor, Mr. Hitesh Kumar Tomar, whose invaluable mentorship and constant support have been pivotal throughout this project. Their expertise, constructive feedback, and dedicated involvement have significantly shaped the direction and enriched the quality of this work. I am immensely grateful to Pinkoo Gupta and Nikhil Mishra for their insightful feedback and engaging discussions, which have undeniably enhanced the depth and breadth of this review. Additionally, I extend my thanks to ABES Engineering College for fostering an enriching academic environment and providing essential resources crucial for the completion of this project. Finally, I extend my heartfelt gratitude to my family and friends for their unwavering support and understanding during the research process. Their encouragement and patience have been a source of immense strength. This project stands as a testament to the valuable collaborative efforts that have transformed it into a reality, marking a significant learning experience for which I am truly thankful.

International Journal for Research in Applied Science & Engineering Technology (IJRASET)

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538

Volume 12 Issue III Mar 2024- Available at www.ijraset.com

REFERENCES

- Kumar, P., Singh, V., & Singh, D. (2016). "Vehicle Theft Detection and Tracking System Using GPS and GSM." International Journal of Advanced Research in Computer Science and Software Engineering
- [2] IEEE Xplore: Search for articles related to "Vehicle Theft Detection, GPS, and GSM" in IEEE journals like IEEE Transactions on Vehicular Technology or IEEE Transactions on Intelligent Transportation Systems.
- [3] Deshpande, P., Shaikh, S., & Patil, S. (2017). "Vehicle Theft Detection and Tracking System Using GPS and GSM." International Journal of Advanced Research in Computer Engineering & Technology (IJARCET), 6(3), 1072-1077.
- [4] Gupta, S., Sharma, A., & Kumar, A. (2018). "Real-Time Vehicle Tracking and Theft Detection Using GPS and GSM Technology." International Journal of Innovative Research in Computer and Communication Engineering(IJIRCCE), 6(5), 5258-5265.
- [5] Z. Ding, J. Li, and D. Sun. (2017). "Design and Implementation of Vehicle Anti-Theft Tracking System Based on GSM and GPS." International Journal of Control and Automation.
- [6] R. S. Mangrulkar and R. B. Shelke. (2013). "Vehicle Theft Detection and Tracking System using GPS and GSM." International Journal of Scientific and Research Publications.

45.98

IMPACT FACTOR: 7.129

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 🕓 (24*7 Support on Whatsapp)