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COLLEGE OF ENGINEERING
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Thalavapalayam, Karur – 639 113.

A Minor Project Report on

Speed Braker Indication System

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BONAFIDE CERTIFICATE

Certified that this Report titled **"SPEED BREAKER INDICATION SYSTEM"** is the Bonafide work of **NANDHA KISHORE S (927622BEE076), NISHAN S (927622BEE078), SAHITHYA S (927622BEE091), SIBERAJ V S (927622BEE109)** who carried out the work during the academic year (2024-2025) under my supervision. Certified further that to the best of my knowledge the work reported herein does not form part of any other project report.

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Submitted for Minor Project III (18EEP301L) viva-voce Examination held at M Kumarasamy College of Engineering, Karur-639113 on ………………...

DECLARATION

We affirm that the Minor Project III report titled "**SPEED BREAKER INDICATION SYSTEM "** being submitted in partial fulfillment for the award of **Bachelor of Engineering in Electrical and Electronics Engineering** is the original work carried out by us.

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VISION AND MISSION OF THE INSTITUTION

VISION

- ✓ To emerge as a leader among the top institutions in the field of technical education

MISSION

- ✓ Produce smart technocrats with empirical knowledge who can surmount theglobal Challenges.
- ✓ Create a diverse, fully engaged, learner - centric campus environment toprovide Quality education to the students.
- ✓ Maintain mutually beneficial partnerships with our alumni, industry andProfessional associations.

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

VISION

To produce smart and dynamic professionals with profound theoretical and practical knowledge comparable with the best in the field.

MISSION

- ✓ Produce hi-tech professionals in the field of Electrical and ElectronicsEngineering by inculcating core knowledge.
- ✓ Produce highly competent professionals with thrust on research.
- ✓ Provide personalized training to the students for enriching their skills.

PROGRAMME EDUCATIONAL OBJECTIVES(PEOs)

- ✓ **PEO1:** Graduates will have flourishing career in the core areas of Electrical Engineering and allied disciplines.
- ✓ **PEO2:** Graduates will pursue higher studies and succeed in academic/research careers.
- ✓ **PEO3:** Graduates will be a successful entrepreneur in creating jobs related toElectrical and Electronics Engineering /allied disciplines.
- ✓ **PEO4:** Graduates will practice ethics and have habit of continuous learning fortheir success in the chosen career.

PROGRAMME OUTCOMES(POs)

After the successful completion of the B.E. Electrical and Electronics Engineering degree program, the students will be able to:

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/Development of solutions:

Design solutions for Complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct Investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The Engineer and Society: Apply reasoning in formed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.

PO7: Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and Teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multi-disciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi-disciplinary environments.

PO12: Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES(PSOs)

The following are the Program Specific Outcomes of Engineering Students:

- **PSO1:** Apply the basic concepts of mathematics and science to analyses and design circuits,controls, Electrical machines and drives to solve complex problems.
- **PSO2:** Apply relevant models, resources and emerging tools and techniques to provide solutions to power and energy related issues & challenges.
- **PSO3:** Design, Develop and implement methods and concepts to facilitate solutions for electrical and electronics engineering related real-world problems.

Abstract (Key Words)	Mapping of POs and PSOs
Road Safety, Timely Alerts, Traffic Accidents, Gradual Deceleration, Smart Road Infrastructure	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO11, PSO1, PSO2, PSO3.

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LIST OF ABBREVIATION

S.NO	ABBREVIATION	EXPANSION
1	EM – 18	EM-18 RFID Reader Module
2	IoT	Internet of Things
3	RFID	Radio Frequency Identification
4	UNO	Unità Numerica Ottenuta (Italian for "One Numeric Unit")

ABSTRACT

The goal of the Speed Breaker Indication System is to improve road safety by providing drivers with timely alerts about upcoming speed breakers, particularly in areas where visibility is low or signage is inadequate. Sudden braking due to unanticipated speed breakers can lead to traffic accidents, vehicle wear, and disruptions to smooth driving. This system, therefore, focuses on reducing these issues by using sensors and real-time alerts to notify drivers in advance, allowing them to slow down smoothly and safely.Speed breakers, though essential for controlling vehicle speeds in high-risk areas like schools, pedestrian crossings, and accident-prone zones, can be problematic when drivers are caught off-guard. Unexpectedly encountering a speed breaker often results in abrupt braking, which not only increases the chance of rear-end collisions but also affects the vehicle's braking system and suspension over time. Poor lighting, adverse weather, or the lack of proper road markings can further exacerbate these issues, making it difficult for drivers to see speed breakers until the last moment. The Speed Breaker Indication System addresses these challenges by providing early warnings, which not only improve driver response times but also enhance the overall safety and flow of traffic. The system operates by detecting speed breakers through advanced sensors that are either embedded in the roadway infrastructure or integrated into vehicles. Upon detection, the system sends real-time notifications to the driver through the vehicle dashboard or a connected mobile application. These alerts enable drivers to prepare for a gradual deceleration well before reaching the speed breaker, allowing for smoother navigation of the obstacle. Additionally, the system is designed to work across a variety of terrains and conditions, from urban roads with high traffic density to rural and suburban areas where visibility and signage are often limited.

Keywords: Speed Breaker Indication System, Road Safety, Timely Alerts, Visibility, Sudden Braking, Traffic Accidents, Real-time Notifications, High-Risk Zones, Rear-End Collisions, Traffic Flow, Road Infrastructure.

CHAPTER 1
LITERATURE REVIEW

1.1 Road Safety and Speed Breakers

Source:

Elvik, R., & Vaa, T. (2004). "**The Handbook of Road Safety Measures**."

Inference:

In this comprehensive study, Elvik and Vaa discuss the effectiveness of speed breakers in mitigating accidents in high-risk areas, such as school zones and pedestrian crossings. They highlight the hazards posed by poorly marked or unexpected speed breakers, which can lead to sudden braking and rear-end collisions. The authors emphasize that inadequate visibility and unclear road signage increase the risk of accidents. This research supports the need for an indication system that provides drivers with advance warnings about speed breakers, allowing for smoother deceleration and reducing the likelihood of abrupt stops.

1.2 Real-Time Notification Systems in Transportation

Source:

Papadimitratos, P., et al. (2009). **"Vehicular Communication Systems: An Evolutionary Approach."**

Inference:

Papadimitratos and colleagues explore the role of vehicle-to-everything (V2X) communication technologies in enhancing driver awareness through real-time notifications. They note that timely alerts about road conditions and hazards empower drivers to react quickly and effectively to changing circumstances. The authors argue that such systems can significantly reduce the risk of sudden maneuvers that often lead to accidents. This source reinforces the idea that implementing a real-time alert system for speed breakers could enhance road safety by providing drivers with essential information to maintain smooth driving patterns and prevent collisions.

1.3 Sensor Technology for Road Infrastructure

Source:

Wang, Y., et al. (2006). "**Advanced Sensors for Real-Time Road Infrastructure Monitoring.**"

Inference:

In this research, Wang et al. examine various sensor technologies, including inductive loop sensors, radar, and LiDAR, for their effectiveness in detecting road conditions and obstacles. They highlight the potential of these sensors to provide accurate and timely data for traffic management. The authors conclude that integrating advanced sensor technology into speed breaker detection systems could significantly enhance their reliability and accuracy. By employing these sensors, the Speed Breaker Indication System could deliver precise alerts to drivers, thus improving road safety and reducing the incidence of accidents caused by sudden braking.

1.4 Smart Infrastructure and Connected Road Systems

Source:

Zheng, Y., et al. (2020). **"Smart Infrastructure and Transport Management Systems."**

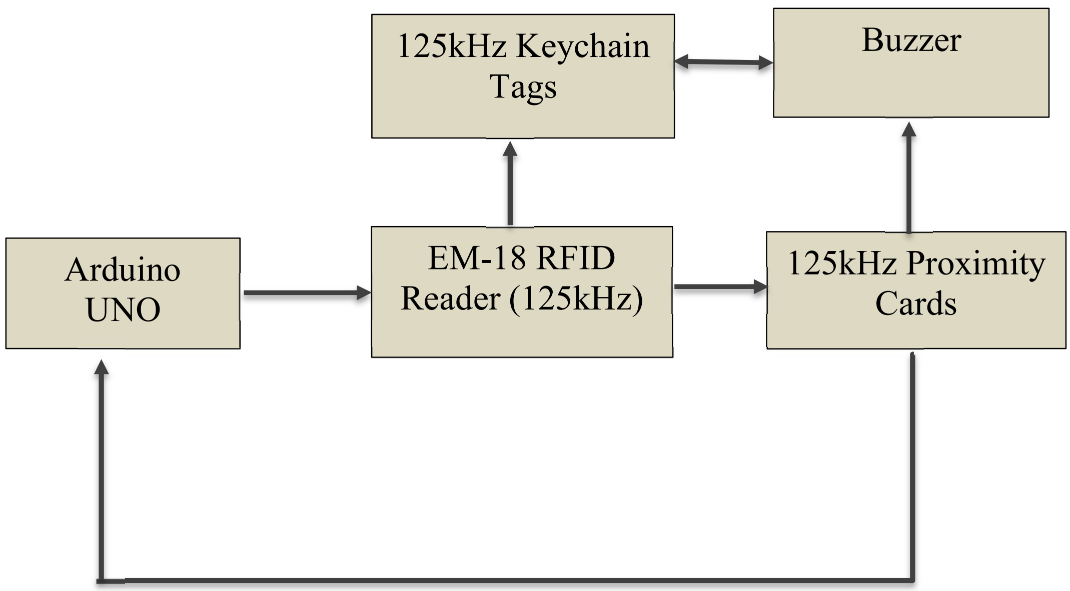
Inference:

Zheng and colleagues discuss the impact of connected road systems on traffic safety and management. They emphasize that intelligent transportation systems (ITS) facilitate real-time communication between vehicles and infrastructure, significantly improving driver awareness and safety. The authors advocate for integrating these systems to provide timely updates on road conditions and hazards. This source suggests that situating the Speed Breaker Indication System within a connected infrastructure could expand its effectiveness, allowing alerts to be shared across a broader network and enhancing overall road safety for all drivers in the area.

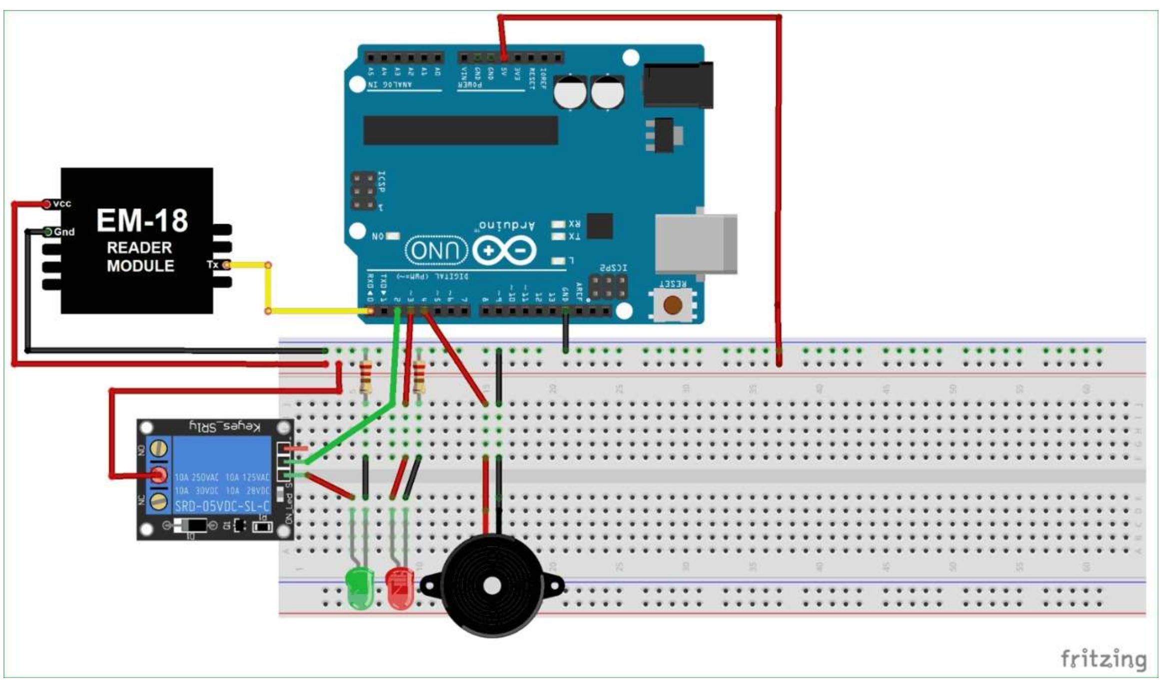
CHAPTER 2

PROPOSED METHODOLOGY

2.1 BLOCK DIAGRAM



2.2 Circuit Diagram



2.3 Project Kit

Fig 2.3 Project Kit with RFID Tag

Fig 2.3 Project Kit

EM-18 RFID Reader (125kHz)

The EM-18 reader module has an internal antenna that creates an electromagnetic field at 125 kHz. When an RFID tag enters this field, the reader powers the tag, allowing it to transmit its unique identification data back to the EM-18 module. The module then decodes this data and sends it to a connected microcontroller, such as an Arduino, for processing.

Fig 2.4 EM-18 RFID READER

ARDUINO UNO

The Arduino UNO operates by running code uploaded from the Arduino IDE, which controls its ATmega328P microcontroller to process inputs and produce outputs. Once powered on, the board executes the code starting with the setup() function, followed by the loop() function, which runs repeatedly. Digital pins can detect on/off signals, while analog pins read varying voltages, allowing for interaction with sensors and switches. Based on the inputs, the Arduino can control devices like LEDs, motors, and relays through its digital and PWM pin**s.**

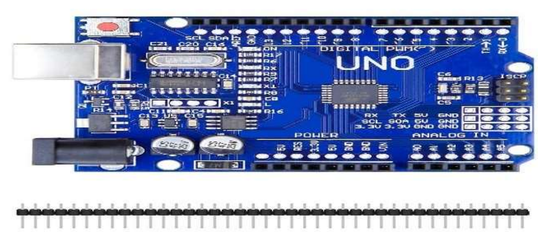


Fig 2.5 ARDUINO UNO

Jumper Wires

Jumper wires are flexible, insulated wires used in electronics to make quick, temporary connections between components, often on breadboards or microcontroller setups. Available in male-to-male, male-to-female, and female-to-female types, they enable easy linking between boards, sensors, and modules. The wires usually come in various colors, which helps in organizing circuits and identifying connections at a glance. Male-to-male wires are ideal for breadboard use, male-to-female wires connect modules directly to boards, and female-to-female wires link components with male pins. Essential in prototyping and educational projects, jumper wires allow rapid setup and adjustment of circuits without soldering.

Fig 2.6 JUMPER WIRES

125kHz RFID Keychain Tags

125kHz RFID keychain tags are small, durable tags embedded with a unique identification code, used in RFID-based systems for identification, access control, and asset tracking. These tags operate at a frequency of 125kHz, making them compatible with RFID readers like the EM-18. Each tag contains a microchip and antenna that transmit the stored ID code when it comes within range of an RFID reader's electromagnetic field. Since they are passive tags, they don't require a power source, drawing energy from the reader's signal to send their data. Compact and easy to carry, they are commonly used in security systems, time-attendance systems, and personal identification applications, where they provide quick, contactless access by simply bringing the keychain close to an RFID reader.

Fig 2.7 RFID KEYCHAIN TAG

Buzzer

A buzzer is a small device that creates sound when powered, often used to provide alerts or feedback in electronic circuits. There are two types: active buzzers, which generate sound with a simple power connection, and passive buzzers, which require an oscillating signal to produce a tone. Active buzzers are easier to use, while passive buzzers offer more control over sound frequency. Widely used in alarms, timers, and Arduino projects, buzzers connect to a microcontroller output pin and can be programmed to turn on or off as needed for notifications or alerts.

Fig 2.8 BUZZER

Breadboard

A breadboard is a versatile, reusable platform for prototyping electronic circuits without the need for soldering. It features a grid of holes connected in rows and columns, allowing easy insertion of components such as resistors, capacitors, and microcontrollers. The central area, known as the "breadboard area," is where most components are placed, while the outer rails typically serve as power and ground connections. Breadboards come in various sizes, making them suitable for both small and large projects. They are particularly popular among beginners because they enable quick adjustments and modifications to circuits. This flexibility and ease of use make breadboards essential tools for testing and developing electronic designs, fostering experimentation and learning in electronics.

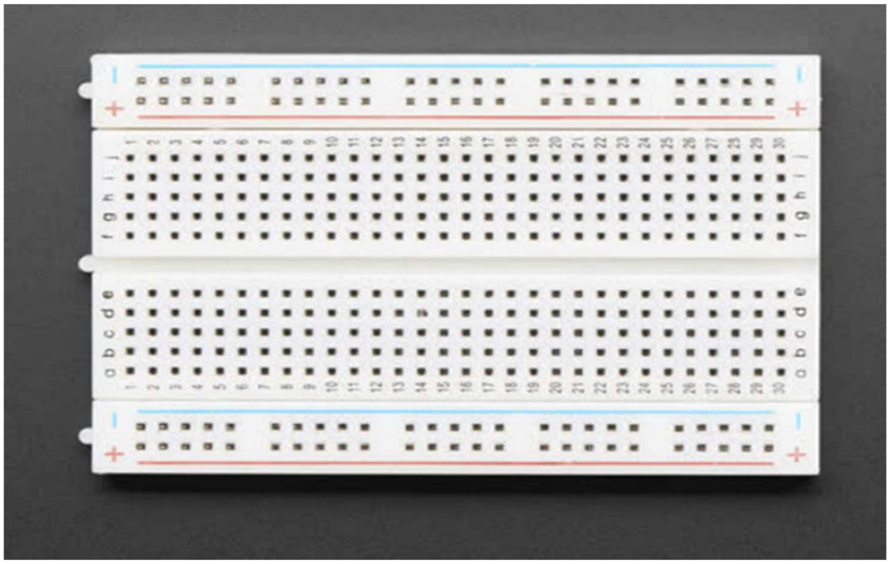


Fig 2.9 BREAD BOARD

2.3 Description

The Speed Breaker Indication System utilizes an EM-18 RFID Reader Module (125kHz) in conjunction with 125kHz RFID keychain tags to enhance road safety near speed breakers. In this setup, vehicles are equipped with RFID keychain tags that are detected by the EM-18 RFID reader positioned at a specific distance from the speed breaker. When a tagged vehicle approaches, the RFID reader activates, sending a signal to an Arduino Uno microcontroller.The Arduino processes this signal and triggers a buzzer to emit an audible warning sound, alerting the driver to slow down. To facilitate connections between the components, jumper wires are used to connect the RFID reader, buzzer, and Arduino, allowing for quick adjustments and modifications. The entire system is built on a breadboard, which provides a flexible and reusable platform for assembling the electronic circuit without soldering.

In addition to the basic functionality, the system can be programmed to adjust the warning distance based on vehicle speed, ensuring that drivers receive timely alerts. The use of RFID technology enables reliable detection of vehicles, even in adverse weather conditions. The buzzer can be customized to produce varying tones or patterns to convey different messages, enhancing driver awareness.
This combination of technologies not only improves safety but also provides data collection capabilities, allowing traffic management authorities to analyze traffic patterns and vehicle speeds. By fostering better awareness of road conditions, the Speed Breaker Indication System significantly reduces the risk of accidents, ultimately contributing to safer driving environments in urban areas and high-traffic zones.

2.4 COST ESTIMATION

Table 2.1 COST ESTIMATION

S.NO	COMPONENT	QUANTITY	COST
01	Microcontroller	1	800
02	RFID System	1	400
03	Buzzer	1	50
04	Breadboard	1	300
05	Enclosure	1	200
04	Additional components	As required	100
		Total	1850

CHAPTER 3

CONCLUSION

The Speed Breaker Indication System utilizing RFID technology represents a significant advancement in road safety and traffic management. By detecting vehicles equipped with RFID keychain tags and providing timely auditory warnings through a buzzer, the system alerts drivers to slow down as they approach speed breakers, thereby reducing the risk of accidents. The integration of components like the EM-18 RFID Reader, Arduino Uno, and supporting hardware ensures a flexible and easily modifiable prototype suitable for various environments. This project not only addresses immediate safety concerns but also paves the way for future innovations such as data analytics for traffic patterns and mobile app connectivity. Its scalability allows for broader applications, including school zones and pedestrian crossings. Ultimately, the system exemplifies how technology can be leveraged to create safer roads and foster responsible driving behavior, making a meaningful impact on reducing traffic-related incidents and enhancing public safety as communities grow and evolve.

Future Scope

1. **Integration with Smart Traffic Systems**: The system can be integrated with existing smart traffic management systems, allowing for real-time monitoring and adjustments based on traffic flow and vehicle speed. This integration could lead to more responsive traffic signals and better overall management of road safety.

2. **Data Analytics and Reporting**: By incorporating data logging capabilities, the system can collect information on vehicle speed, frequency of alerts, and traffic patterns. Analyzing this data can help authorities make informed decisions about traffic control measures, speed breaker placement, and road safety improvements.

3. **Mobile App Connectivity**: Developing a mobile application that connects with the RFID system could allow drivers to receive alerts on their smartphones, providing an additional layer of warning before they approach speed breakers. This feature could enhance driver awareness and encourage safer driving practices.

4. **Expansion to Other Traffic Management Applications**: The technology used in this system could be adapted for other traffic management purposes, such as detecting school zones, pedestrian crossings, and construction areas. It could also be used in parking management systems to monitor available spaces.

5. **Incorporating Advanced Sensors**: Future versions of the system could integrate additional sensors, such as cameras or LIDAR, to provide a more comprehensive understanding of road conditions. These sensors could enhance vehicle detection accuracy and provide insights into driver behavior.

6. **Solar-Powered Solutions**: To enhance sustainability, the system could be designed to operate on solar power, making it energy-efficient and suitable for remote areas where electrical infrastructure may be lacking.

REFERENCES

1. Ravi, K., & Gupta, A. (2018). "RFID-Based Smart Traffic Management System," Journal of Computer Networks and Communications, Vol. 2018, Article ID 1569732.

2. Singh, R., & Kumar, A. (2019). "Smart Traffic Management System using Arduino and RFID," International Journal of Recent Technology and Engineering (IJRTE), Vol. 8, No. 4, November 2019.

3. Bansal, P., & Dhir, A. (2017). "An Intelligent Traffic Management System Using RFID Technology," International Journal of Advanced Research in Computer Science and Software Engineering, Vol. 7, Issue 3, March 2017.

4. Ghosh, S., & Paul, S. (2016). "Design and Implementation of Smart Traffic Management System Using RFID and IoT," International Journal of Computer Applications, Vol. 139, No. 11, April 2016.

5. Kumar, V., & Singh, S. (2022). "Smart Road Safety System Using RFID Technology," International Journal of Research in Computer Applications and Robotics, Vol. 10, No. 4, April 2022.