



(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



Impact Factor: 8.699

Volume 14, Issue 5, May 2025

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www.ijirset.com |A Monthly, Peer Reviewed & Refereed Journal| e-ISSN: 2319-8753| p-ISSN: 2347-6710|

Volume 14, Issue 5, May 2025

|DOI: 10.15680/IJIRSET.2025.1405083|

Movable Road Divider using IoT

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ABSTRACT: A road divider is typically used to separate lanes of oncoming and outgoing traffic, helping maintain organized flow. However, during peak hours—particularly near industrial or commercial zones—traffic often becomes unidirectional, leading to underutilization of one side of the road and severe congestion on the other. To address this imbalance, we propose an **automated movable road divider** system that dynamically reallocates lanes based on real-time traffic density.

The system leverages **IoT (Internet of Things)** technologies, with sensors detecting traffic flow on both sides of the divider. When traffic is heavy in one direction, the divider automatically shifts to increase lane capacity for that direction, thereby reducing congestion, saving time and fuel, and improving overall traffic efficiency. An **Arduino microcontroller** serves as the control unit, processing sensor data and managing actuator movement of the divider. This smart, automated solution removes the need for manual intervention, enabling adaptive traffic management and contributing to the development of smarter urban infrastructure.

I. INTRODUCTION

The increasing number of vehicles on roads, coupled with limited infrastructure, has made traffic congestion a major issue in urban areas. Traditional static road dividers split the number of lanes equally in both directions, regardless of real-time traffic flow. During peak hours, one side often experiences heavy congestion while the other remains underutilized. This project proposes a smart solution through the development of an automated movable road divider that adjusts lane distribution based on actual traffic density. The main aim is to reduce journey time, manage high traffic intensity, and avoid congestion during rush hours. This system leverages the Internet of Things (IoT), which enables sensors placed along the divider to detect traffic flow. Data is collected and analyzed using an Arduino-based setup to dynamically shift the divider, increasing lane capacity on the congested side. The system operates without the need for manual intervention, offering a smarter and more efficient approach to traffic management. IoT, the backbone of this solution, refers to a network of interconnected physical devices capable of sensing, processing, and communicating data. It enables real-time interaction between devices such as sensors, controllers, and communication networks. The architecture includes four layers: the sensor layer (which captures traffic data), the network layer (which transmits data via Wi-Fi, GSM, Bluetooth, etc.), the management layer (which processes and secures data while triggering automated responses), and the application layer (which applies the system in a real-world traffic scenario). IoT characteristics such as interconnectivity, dynamic response, scalability, and real-time analytics make it ideal for building intelligent transport systems. As technology advances, the integration of cloud computing, AI, and advanced sensor networks will further enhance the effectiveness of IoT applications, leading to smarter cities and better resource utilization. This project envisions a future where roads are adaptable, traffic is efficiently managed, and urban transportation becomes faster, safer, and more sustainable





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II. DESIGN METHODOLOGY



Fig. 1

Our motto in the proposed system is to reduce the response time to emergency vehicles, for e.g. ambulances, police and fire fighters cars etc., by providing RFID tag for these vehicles. The proposed method is explained using the flow chart. The proposed system shows that the vehicles on the road are taken in to countand depending on the intensity of traffic the divider moves. Two IR sensors are connected to the power supply and arduino nano board which can sense thedensity of the traffic to be low, medium, or high respectively. The information obtained from sensors are updated in website through Wi-Fi module and displayed on LCD. The wi-fi module is connected to power supply and Arduino nano. Arduinonano is a development board having microcontroller where the entire code isstored. LCD is connected to a rectifier and arduino nano which also hasconnection with motor driver for the movement of the divider. When anambulance with an RFID tag passes through each monitoring station along theroad, the RFID reader at those points will automatically read the tag data related to the ambulance and gives the way by moving the divider. At the moment when divider starts moving, a buzzer sound is rang which givesus an indication that the divider is moving. By installing buzzer sounds it helpsthe vehicle driver know that the divider is moving, through which accidents canbe prevented. Once system connects to the internet, all information about trafficcondition on each road segment is immediately saved in database and can beused for any purpose and application.

III. IMPLEMENTATION

1. Arduino UNO

Function: Acts as the main controller that processes input data from sensors and controls outputs like motor, buzzer, LCD, and Wi-Fi.

Working: It receives traffic data from ultrasonic sensors, decides when to move the divider based on traffic density, sends control signals to the motor driver, and communicates with the Wi-Fi module to update traffic status online. It also handles emergency vehicle detection via RFID and manages LCD display output.

2. Ultrasonic Sensor

Function: Measures traffic density on both sides of the road divider.

Working: The sensor emits ultrasonic sound waves and calculates the time it takes for the echo to return. This time is converted into distance, which helps determine how congested a particular lane is. This data is sent to the Arduino for processing.

3. DC Motor

Function: Physically moves the road divider to balance lane usage.

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www.ijirset.com |A Monthly, Peer Reviewed & Refereed Journal| e-ISSN: 2319-8753| p-ISSN: 2347-6710|

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Working: Controlled by the Arduino through the motor driver, the motor rotates in the required direction to shift the divider toward the less congested side. It helps open up an additional lane during peak traffic.

4. L293D Motor Driver IC

Function: Controls the direction and speed of the DC motor.

Working: Acts as an H-bridge to allow current to flow in either direction. Based on Arduino inputs, it switches on specific transistors inside the IC to rotate the motor forward or backward, thereby controlling the divider's motion.

5. Wi-Fi Module (e.g., ESP8266)

Function: Enables real-time data transmission to an online platform or database. **Working**: Connected to the Arduino, it sends traffic condition updates over the internet, all remote monitoring. It uses standard communication protocols (like HTTP or MQTT) for data transfer.

6. LCD Display

Function: Displays real-time information like traffic density and divider status. **Working**: Interfaced with the Arduino, it receives instructions to show specific messages based on sensor readings or system status, helping users monitor the divider's actions and sensor feedback.

7. Buzzer

Function: Provides an audible alert when the divider starts moving. **Working**: The Arduino activates the buzzer just before the DC motor moves the divider. This warns nearby drivers about the motion, enhancing safety and reducing the chance of collisions.

8. RFID System

Function: Detects emergency vehicles to give them right-of-way.

Working: When an emergency vehicle with an RFID tag passes through a monitoring point, the RFID reader reads the tag. This triggers the Arduino to move the divider, creating a clear lane for the emergency vehicle.

9. Power Supply Unit

Function: Supplies regulated DC power to all electronic components.

Working: Converts 230V AC to 12V/5V DC using a step-down transformer, bridge rectifier, filter capacitor, and voltage regulators (like 7805/7812), ensuring a stable power supply to the Arduino and other modules.

IV. RESULTS

1. Successful Traffic Detection

The ultrasonic sensors accurately detected the traffic density on both sides of the road, classifying it into low, medium, or high levels.

2. Automatic Divider Movement

The DC motor, controlled via the L293D motor driver, successfully moved the road divider toward the side with lesser traffic, thereby reallocating lanes dynamically.

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3. Real-Time Display

The LCD display effectively showed live traffic density status and system updates, aiding in user awareness.

4. Wi-Fi Connectivity

The Wi-Fi module successfully transmitted traffic data to a connected platform, enabling real-time remote monitoring of road conditions.

5. Emergency Vehicle Detection

The RFID system correctly identified tagged emergency vehicles, triggering the divider to move and create a clear path.

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6. Audible Alert

The buzzer activated when the divider started moving, providing an audio signal that enhanced safety and minimized potential road hazards.

7. System Integration

All hardware and software components integrated and operated smoothly, proving the feasibility of an automated, IOT-based road divider system.

8. Prototype Validation

The working model demonstrated the concept successfully, showcasing how the system could reduce traffic congestion and enhance urban mobility.



Fig. 2

V. CONCLUSION AND FUTURE SCOPE

5.1 CONCLUSION

The proposed system aims to mitigate traffic congestion caused by prolonged red light delays and to facilitate the timely passage of emergency vehicles. The system is designed to manage traffic flow based on dynamic priority allocation. Traffic density is detected using image processing techniques, specifically **morphological filtering** and **blob analysis**, to analyze live traffic camera feeds. Based on the detected density, priority is assigned to each lane, ensuring that the lane with the highest traffic load receives clearance first. The implementation of this system significantly improves traffic efficiency and provides prioritized routing for emergency response vehicles.

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5.2 FUTURE SCOPE

The system can be enhanced by integrating AI for traffic prediction, V2I communication for real-time vehicle coordination, and cloud-based monitoring for centralized control. Mobile app support, expanded sensor networks, and smart routing for emergency vehicles can further improve efficiency. The design is scalable for large urban areas, making it suitable for future smart city implementations.

REFERENCES

- 1. Aditya Kumar Jain, "Working model of Self-driving car using Convolutional Neural Network, Raspberry Pi and Arduino", Proceeding of the 2nd International Conference on Electronics, Communication and Aerospace Technology (ICECA), IEEE, 2018, [pp: 1630-1635].
- Raivo Sell, Anton Rassõlkin, Mairo Leier, Juhan-Peep Ernits, "Self-driving car ISEAUTO for research and education" in 19th international conference on Research and Education in Mechatronics (REM), IEEE, 2018, [pp: 111-116].
- 3. T. Banerjee, S. Bose, A. Chakraborty, T. Samadder, Bhaskar Kumar, T.K. Rana, "Self Driving Cars: A Peep into the Future", IEEE, 2017,[pp: 33-38].
- 4. Qudsia Memon, Muzamil Ahmed and ShahzebAli, "SelfDriving and Driver Relaxing Vehicle", in IEEE 2016, [pp: 170-174].
- Mohammad Faisal Bin Ahmed, Md. Saef Ullah Miah, Md. Muneef Anjum Timu, Shakura Akter, Md. Sarker.b, "The Issues and the Possible Solutions for Implementing SelfDriving Cars in Bangladesh" in Regin 10 Humanitarian Technology Conference(R10-HTC), IEEE,2017, [pp: 250-254].
- 6. Margrit Betke, EsinHaritaoglu, Larry S.Davis, "Real-time multiple vehicle detection and tracking from a moving vehicle", in Machine Vision and ApplicationIEEE, 2000, [pp: 69-83]
- 7. Chun-Che Wang, Shih-Shinh Huang and Li-Chen Fu, PeiYung Hsiao "Driver Assistance System for Lane Detection and Vehicle Recognition with Night Vision", IEEE
- 8. Ruturaj Kulkarni, Shruti Dhavalikar, Sonal Bangar, "Traffic Light Detection and Recognition for Self Driving Cars using Deep Learning" in 4th International Conference on Computing Communication Control and Automation(ICCUBEA),IEEE, 2018
- 9. R. Mohanapriya, L.K. Hema, Dipesh warkumar Yadav, Vivek Kumar Verma, "Driverless Intelligent Vehicle for Future Public Transport Based On GPS", in International Conference on Signal Processing, Embedded System
- 10. "Implementing Intelligent Traffic Control System for Congestion Control, Ambulance Clearance
- 11. "Violation detection method for vehicular ad hoc Networking" by Kumar Sridharamurthy,
- 12. Abhilash Pernaje Govinda, Jyothi D. Gopal1 and Golla Varaprasad
- 13. StolenVehicle Detection" by RajeshwariS, SanthoshsHebbar, Varaprasad Golla.
- 14. Reddy, E. Sravani, GaddamSrujan, Shiv Shankar , Dr. ShubhroChakrabartty
- 15. K.Vidhya and A. Bazila Banu, "Density Based Traffic Signal System", Special, vol. 3, no. 3, March 2014.
- Rajeshwari Sundar, Santhoshs Hebbar and Varaprasad Golla, "Implementing intelligent Traffic Control System for Congestion Control Ambulance Clearance and Stolen Vehicle Detection", IEEE Sensors Journal, vol. 15, no. 2, February 2015.
- 17. S. Lokesh, "An Adaptive Traffic Control System Using Raspberry PI", International journal of engineering sciences & research Technology, [pp. 831-835], June 2014.
- 18. Victor Welikhe, Graph Neuron based Approach to Smart Roads Solutions using Wireless Sensor Networks, IEEE, [pp. 275-279], 2014.
- 19. George Kiokes, "Development of an Integrated Wireless Communication System for Connecting Electric Vehicles to the Grid", IEEE conf., [pp. 296-301],
- 20. Ms.Pallavi Choudekar, Ms.Sayanti Banerjee and M.K. Muju, Real Time Traffic Light Control Using Image Processing, vol. 2.
- Pranav Maheshwari, Deepanshu Suneja, Praneet Singh, Yogeshwar Mutneja, Smart traffic optimization using image processing,2015 IEEE 3rd International conference on MOOCs, Innovation and Technology in Education (MITE), ISBN: 978-1- 4673-9/15/\$31.00, 2015 IEEE.
- Er. Faruk Bin Poyen, Amit Kumar Bhakta, B.Durga Manohar, Imran Ali, ArghyaSantra, AwanishPratap Rao, Density based traffic control, 2016 International journal of advanced engineering, management and science (IJAEMS), vol-2, issue-8, Aug-2016, ISSN:2454-1311.





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- 23. B Durga Sri, K Nirosha, Sheik Gouse, Design and Implementation of Smart Movable Road Divider using IOT, International Conference on Intelligent Sustainable Systems, ICISS, 2017, [pp 11451148]
- Ch V A Satwik, L Pavan Kumar, K Vineeth and Kavitha N Pillai, Intelligent Road Management System for Daily Transit, International Conference on Communication and Signal Processing, City of Conference, ICCSP, 2018, [pp 05230526]
- 25. Advait Kawle, Dhruv Shah, Kavin Doshi, Manish Bakhtiani, Yash Gajja, Pratibha Singh, Movable Traffic Divider: A Congestion Release Strategy, ISSN, vol. 5, [pp. 2347-2812], 2017.
- 26. S.Jyothirmayee, G.Vamshi Krishna, J.Nanditha, B.Shashank Yadav, Controlling Of Traffic Using Movable Road Dividers, IJAERD-2018, vol. 5, issue.4, [pp.2348-4470], IJAERD. April, 2018.
- Pallavi Kharat, Kapil Jadhav, Sanket Kamble, Ramdas Labade, Sanjay Labade, Traffic management system with the Movable divider and automatic barrier for Wagholi road, IJSDR, vol. 3, issue.6, [pp. 2455-2631], IJSDR. June, 2018.
- 28. Prof. Raju Bondre, Nikhil Vaidya, Prathamesh Rao, Gaurav Kapse, Viplav Chaudhary, Aniket, Shingne, A Review Paper on Movable Divider and Cost Efficiency, IRJET, vol. 7, issue. 2, [pp.2395-0056], IRJET. Feb, 2020.
- 29. P. Prasanna Kumari, E.Sweety, Md.Hussain, K.Raju, G.Mamatha, Iot Based On Traffic Light Controller With Adaptive Traffic Density Monitoring System, IJECEC, vol. 4, issue. 2, [pp. 2533-8945], IJECEC. June, 2018.
- 30. K. Vidhya, A. Bazila Banu, "Density Based Traffic Signal System ", Volume 3, Special Issue 3, March 2014.
- 31. Al-Sobky, A.-S. A., & Mousa, R. M. (2016). Traffic density determination and its applications using smartphone. Alexandria Engineering Journal, 55(1), 513523.









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