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AUTOMATIC SPEED BREAKER USING IOT

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Abstract: The project's idea is that there will be an automated speed breaker on time demand and emergency vehicles as needed. Means when the speed breaker is not required on the highway, it disappears and the road gets smooth. When necessary the breaker comes from the ground and starts to operate at slowing vehicle speed. We use a hemicylindrical sheet metal breaker that is connected to the traditional screw jack to apply the principle. Therefore, when necessary, it is rotated in the direction of the clock and rotates in the direction of the anti-clock and is flat and combines with flat road when required. In this device, we use a transmitter and receiver for radio frequency. The emergency vehicle identification device. Keypad is used to manually control the configuration of the speed breaker. The internet of things will be best at this project, which enables the control of the speed breaker online portal.

Keywords: Smart Transportation, Urban Mobility, Vehicle Speed Reduction, Real-time Control Internet Connectivity, Sensor Integration, Safety Infrastructure, Smart Cities, Traffic Flow Optimization

I. INTRODUCTION

India has the world's second largest road network as a developing country. Almost 97,991 km was provided by national highways over a total length of 5 million km of road network. Because of its sheer magnitude, the Indian government already faces a great challenge to provide a world class path. A person on average spends from 30 to two hours a day driving anywhere. That's about 360 hours in one year. Imagine what type of stress the individual places on his body and unnecessary burden. Given all this, roads are India's biggest mode of transport. Nearly 90% of transport by passenger and industry is done through roads. The fast-growing population raises traffic, and good traffic management is very necessary for safety and also decreases travel time.

The solution that is now available every day and that is widely used is a nice, but not the best solution. In short, all vehicles are collectively liable and the path dangerous or accessible. When heavy cars and small vehicles are slowed down, more time is needed to regain their previous speed by vehicles as traffic increases. Slowspeed cars also get shocks and noise that they are not deserving of. Internet of Things (IoT) is now a critical subject in the technology industry, software engineering, policy and has become important news in both print media and social media. This technology is implemented in a wide variety of networked devices, systems and sensors using advancements in computing power, declining electronics, and networks to manage original competences that are not possible previously. Day by day new topics and analysis on IoT issues abundance of conferences, studies and articles and discussion of the IoT

II. LITERATURE REVIEW

The speed has become an important factor in human life in the fast changing world. There are two viewpoints in the world of rapid speed, one is sustaining pace and the other is also maintaining safety media. There is a common practice of having concrete speed breakers on the road for safety purposes, to avoid road accidents. They're found solid all the time on the road in the case of traditional concrete speed breakers. Such types of speed breakers are very effective on the road but also cause a great change in vehicle performance at the same time. The example diagram of such traditional speed breaker for concrete is (Fig. 1). And why don't we have such a speed breaker that can lower the speed and keep the vehicle running. That is why, according to the specifications, there is a need for an automated breaker on time requests. Means when there is no need for the speed breaker on the road, it disappears from the road and the road becomes smooth, and when a need occurs then the breaker emerges from the ground on the road and starts working with slowing vehicle speed.

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2.1 REVIEW

[1] Vamsee Krishna Kiran M commented that when the user uses the Google maps, an android service begins in the background. The device collects speed breaker latitude and longitude data The proposed system is built in such a way that speed breakers don't need any person to tell. When a consumer encounters a speed breaker the sudden amplitude shift is noted.

[2] Shivam Gaikwad explains to develop Today's traffic safety solution requires all cars to slow down without realizing the speed of the ongoing vehicle, which raises the traffic issue. To prevent this, the device must work according to the speed of the car. In this assembly, the bumps of the smart speed breaker lower into the road surface is elevated above the physical residue.

[3] Dr.Raafiya Gulmeher addressed that Smart Speed Breaker system with IOT that will surface and only display if the speed of the vehicle is greater than those limits. Arduino board activates a motor to surface the speed breaker mechanism for control of the speed breaker, for use of RTC in real time. The Arduino board sends a signal to the buzzer to start the beep sound to warn the driver according to the speed and distance of the breaker.

[4] Ajay S addressed that to have an automatic speed breaker on time demand according to the specifications The breaker disappears when there is no need for a speed breaker and when there is a need then the breaker comes on the road by spinning itself and begins to work slowing the vehicles speed. In implementing this definition, we use a hemicylinder speed breaker made from iron

[5] M. Suresh discusses that the ambulance does not decrease the speed in order to save the patient from injury. As the ambulance approaches the speed breaker, the motor rotates after getting the signal. The speed breaker is flat. The speed breaker returns to normal after the speed programmed in the Arduino. The proximity sensor is located to avoid the rotation in the exact speed breaker location. The control circuit consists of Arduino, which processes the RF signal and transmits it to the RF receiver via the RF transmitter. The RF transmitter circuit shall be placed on the ambulance. The speed breaker lets the ambulance reduce speed, but this new flat speed breaker device plays a major role in protecting human lives by making the speed breaker flat.

2.2 STATISTICS

Anyone who's driven on Indian roads should know this: the subcontinent's speed breakers can be harmful. Such undulating contraptions, usually unmarked and dreadfully built, can easily rattle bones and car chassis contort. They can be deadly too. Indian speed breakers are each year responsible for more than 10,000 deaths. The nation already has one of the world's deadliest road networks, with 400 deaths a day–or around one death every four minutes. In an answer to a parliamentary query last week, India's minister for junior roads, Pon Radhakrishnan, received a comprehensive breakdown of road deaths caused by speed breakers. In 2015, 11,084 individuals died as a result of speed breakers, according to government reports. The rate of fatality was only slightly reduced at 11,008 in 2014. This is obviously not a regional issue, given that states across northern and southern India are the biggest contributors to fatalities related to speed breakers. "Ministry bans building speed breakers on National Highways," Radhakrishnan said in his written response. However, often illegal speed breakers are installed by local people. They are withdrawn when and when the road authorities inform them of them.

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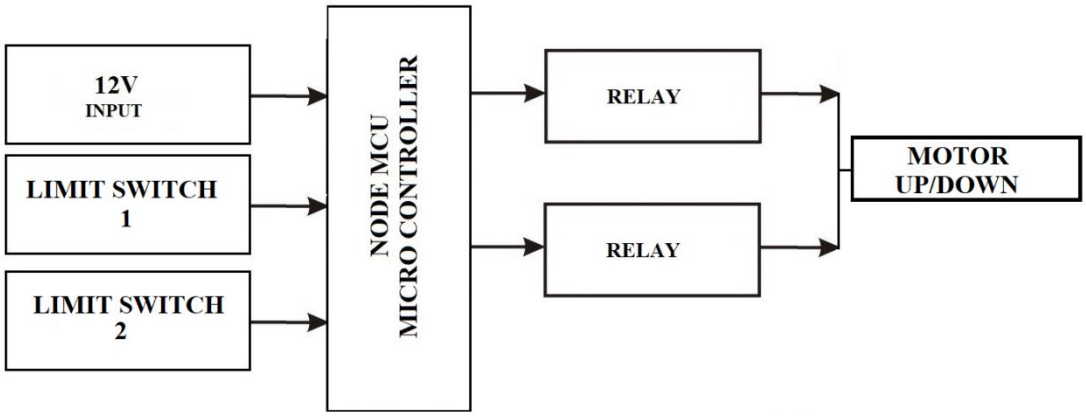
Unless the speed breakers are not illuminated so it may not be apparent at night, and the cars may be mistakenly hurt by driving over it. Each vehicle is expected to break its speed to safely cross the breaker. It is a big downside for emergency services.

III. DRAWING FOR AUTOMATIC SPEED BREAKER USING IOT



IV. WORKING PRINCIPLE

This system is mainly used to control the vehicle speed. This system is arranged with mechanical equipments. When the switch is switched ON the power supply is given to the motor. The motor shafts are connected with the screw rod to rotate the screw rod. When the screw rod rotates it start to push the speed breaker setup in upward direction since it is located at the top of the speed brake set up. Whenever we need the speed brake set up, switch on the motor to lift the jack. The above working process operated through the electric drive.

V. ADVANTAGES

Increased Safety: The primary advantage of an IoT-based automatic speed breaker system is that it can help increase safety on the roads. The system can detect the speed of the vehicle and automatically slow it down if it exceeds the speed limit. This can prevent accidents caused by overspeeding and help reduce the number of fatalities on the road.

Lower Maintenance Costs: With an IoT-based automatic speed breaker system, there is no need for physical speed breakers, which can be expensive to install and maintain. The system is designed to work seamlessly with existing road infrastructure and can be easily upgraded or modified without disrupting traffic flow.

Reduced Traffic Congestion: The system can help reduce traffic congestion by automatically slowing down vehicles that are approaching a crowded area or intersection. This can help improve traffic flow and reduce the time that drivers spend waiting in traffic.

Improved Fuel Efficiency: When a vehicle is slowed down automatically by the speed breaker system, it consumes less fuel. This can lead to improved fuel efficiency and reduced carbon emissions.

Data Collection: An IoT-based speed breaker system can collect data on vehicle speeds, traffic patterns, and other important information that can be used to improve road safety and traffic management. This data can be 222nalysed to identify areas where accidents are more likely to occur and to develop strategies for preventing them.

VI. APPLICATIONS

Highways and Expressways: Automatic speed breaker systems can be installed on highways and expressways to regulate the speed of vehicles. This can help prevent accidents caused by overspeeding and ensure that drivers are driving within the speed limits.

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School Zones: An automatic speed breaker system can be installed in school zones to slow down vehicles and improve the safety of children walking to and from school.

Residential Areas: In residential areas, speed breaker systems can help reduce the speed of vehicles and improve the safety of pedestrians and cyclists.

Industrial Areas: In industrial areas, where heavy vehicles are often used, automatic speed breaker systems can help regulate their speed and prevent accidents caused by overspeeding.

Emergency Vehicles: Automatic speed breaker systems can be programmed to allow emergency vehicles such as ambulances, fire trucks, and police cars to pass through without slowing down. This can help ensure that emergency services can reach their destination quickly and safely.

Toll Booths: Automatic speed breaker systems can be installed near toll booths to ensure that vehicles slow down before reaching the toll plaza. This can help prevent accidents caused by overspeeding and improve the flow of traffic.

VII. CHALLENGES

Reliability: Ensuring the reliability of the IoT components, such as the NodeMCU, limit switches, and relays, is crucial for the continuous and safe operation of the speed breaker system. Any malfunction or failure in these components could compromise road safety and traffic management.

Power Supply: Providing a stable and continuous power supply to the speed breaker system, especially in outdoor environments, can be challenging. Adequate measures, such as backup power sources or solar panels, may be necessary to ensure uninterrupted operation.

Network Connectivity: Dependence on internet connectivity for remote monitoring and control via the Blynk application introduces challenges related to network stability and coverage, particularly in remote or rural areas with limited connectivity.

Mechanical Wear and Tear: The moving parts of the speed breaker system, including the 12V DC motor and mechanical linkage, are subject to wear and tear over time. Regular maintenance and periodic inspections are essential to prevent mechanical failures and ensure the system's longevity.

Cybersecurity Risks: IoT devices are vulnerable to cybersecurity threats, including unauthorized access, data breaches, and cyberattacks. Implementing robust security measures, such as encryption and authentication protocols, is essential to protect sensitive data and prevent system tampering.

Regulatory Compliance: Compliance with local regulations and standards governing road safety and traffic management is critical. Ensuring that the automatic speed breaker system meets regulatory requirements and obtains necessary approvals is essential for its deployment and operation.

User Acceptance: User acceptance and adoption of the automatic speed breaker system may pose a challenge, particularly if motorists are unfamiliar with IoT technology or resistant to change. Effective communication and public awareness campaigns may be needed to educate users about the benefits and functionality of the system.

VIII. PRACTICAL CHALLENGES

Cost-Effectiveness: Balancing the initial cost of the system, including the heat exchanger, PCM container, and control system, with the long-term energy savings is crucial for ensuring economic feasibility.

Installation and Maintenance: Developing user-friendly installation and maintenance procedures is essential for widespread adoption and ensuring the long- term performance and reliability of the system.

User Acceptance: Educating homeowners about the benefits, limitations, and operational requirements of PCM-based WHR systems is crucial for fostering user acceptance and encouraging adoption.

Market Availability: Ensuring the availability of high-quality PCMs, efficient heat exchangers, and qualified installers is essential for wider adoption and market penetration of PCM-based WHR systems.

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IX. EXPECTED OUTCOME

The expected outcome of implementing an automatic speed breaker system using IoT technology, including NodeMCU, limit switches, a 12V DC motor, 2 relays, and the Blynk application, includes:

Improved Road Safety: The automatic speed breaker system will contribute to reducing vehicle speeds in areas where speeding is prevalent, thereby lowering the risk of accidents and enhancing road safety for both motorists and pedestrians.

Efficient Traffic Management: By automatically regulating vehicle speeds, the system helps maintain a smoother flow of traffic and reduces congestion, leading to improved traffic efficiency and reduced travel times.

Remote Monitoring and Control: The integration with the Blynk application enables remote monitoring and control of the speed breaker system, allowing authorities to efficiently manage traffic flow and respond to changing conditions in real-time.

Enhanced User Experience: Users benefit from the convenience of remote operation and status monitoring through the Blynk application, providing a seamless and user-friendly experience.

Cost-Efficient Solution: The use of IoT technology allows for the implementation of an intelligent speed breaker system at a relatively low cost compared to traditional traffic management solutions, making it an attractive option for municipalities and transportation agencies.

Demonstration of IoT Capabilities: The implementation of the automatic speed breaker system serves as a practical demonstration of the capabilities of IoT technology in enhancing transportation infrastructure and improving road safety.

X. CONCLUSIONS

In conclusion, the implementation of an automatic speed breaker system using IoT technology, including NodeMCU, limit switches, a 12V DC motor, 2 relays, and the Blynk application, offers significant potential benefits for traffic management and road safety. By integrating IoT capabilities, the speed breaker can be remotely controlled and monitored, providing greater flexibility and efficiency in its operation. The use of limit switches ensures precise control over the speed breaker's raising and lowering mechanisms, enhancing its reliability and effectiveness in slowing down vehicles. Through the Blynk application, users can easily interface with the speed breaker system, allowing for convenient remote operation and real-time status monitoring. This not only enhances user experience but also enables quick response to changing traffic conditions or emergency situations.

The implementation of an automatic speed breaker system represents a proactive approach to addressing road safety concerns, particularly in areas prone to speeding or accidents. By automatically regulating vehicle speed, the system helps mitigate the risk of accidents and reduces the severity of collisions, thereby enhancing overall road safety.

Furthermore, the integration of IoT technology into traffic management infrastructure demonstrates the potential for innovation and modernization in urban transportation systems. As cities continue to evolve and grow, smart solutions like automatic speed breakers contribute to creating safer, more efficient, and sustainable urban environments.

In conclusion, the automatic speed breaker system leveraging IoT technology holds promise for improving road safety, enhancing traffic management, and advancing urban mobility in the modern era. Continued research, development, and implementation of such intelligent transportation solutions are essential for creating safer and more livable cities in the future.

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