

IoT Based Automatic Speed Control Using QR Scanner or GPS

Tejas Nanasaheb Rahane, Sakshi Vikram Shelke, Shravani Sambhaji Hinge

Undergraduate Student, Electronics & Telecommunication Engineering, Jaihind College of Engineering Kuran, Maharashtra, India,

Abstract- Overspeeding is one of the major causes of road accidents, injuries, and loss of lives. The proposed Automatic Speed Control Using QR Scanner and GPS system aims to improve road safety by automatically controlling vehicle speed in speed-restricted areas. QR codes placed on roads contain the permitted speed limit for specific locations such as school zones, hospitals, construction areas, speed breakers and hilly roads. An onboard QR scanner reads the QR code when the vehicle enters a restricted zone. GPS provides location information, and a microcontroller processes the collected data. The processed speed-limit information is then sent to the Engine Control Unit (ECU), which automatically adjusts the vehicle speed according to the specified limit. The system reduces the need for manual speed control and helps vehicle maintain safe speeds in critical areas. It can also support smart-city traffic management and improve overall transportation safety. However, regular maintenance of QR codes and scanning devices is required, and performance may be affected by poor weather, low light, or damaged QR codes. Overall, the proposed system provides a practical approach to automatic speed regulation by combining QR scanning and GPS technology, contributing to safer and smarter transportation.

Keywords— Automatic Speed Control, QR Scanner, Engine Control Unit (ECU), GPS.

I. INTRODUCTION

We see nowadays more accident are happen, whats their reason? Their reason is overspeeding and manual enforcement. Road safety is the important concern, especially in places such as school zones, hospitals, construction areas, sharp turns, hilly roads and accident areas. In these areas, driving faster than allowed speed can increase the chance of accidents and injuries. Normally, drivers have to notice speed-limit boards and but cannot control speed according to this. Sometimes signs may be missed, damaged or difficult to read. Our project aims to reduced this problem by developing an Automatic Speed Control Using QR Scanner and GPS.

In this system, QR codes are placed at selected road locations such as no network areas also placed in the instead of speed breakers with store the speed limit of that particular area. When vehicles comes near the QR code, the onboard scanner reads the information and sends it to the microcontroller. The

GPS modules help identify the vehicles location and verify the corresponding zones. The system the compares the vehicles current speed with the set limit speed for this particular area. If the vehicle is travelling faster than the allowed limit, the system can reduce the speed through the control mechanism and provide and alert to the driver using a display, buzzer or LED.

The main idea behind this project is to make speed control automatic, simple, and reliable. Since the speed information is stored in QR codes, the limit can change according to road conditions without making major changes to the vehicle hardware. GPS can also support location tracking and find current zone speed limit. In future, the system can connected with IoT or cloud platforms for monitoring, analysis and smart traffic management applications.

Overall, the proposed system combines QR technology, GPS, Microcontroller and automatic speed control to create a practical approach for safer and smarter transportation. The project is particularly aimed at improving speed compliance in

sensitive road zones while keeping the system economical and suitable for further development.

II. WORKING

The working begins when the vehicles onboard system receives data from the sensing and processing units. The QR scanner captures and decodes the available code, while the GPS module provides the corresponding positional data. These inputs are transferred to the microcontroller, which processes the received information and prepares the required parameters for the speed control decision. The controller also receives the vehicles current speed and continuously evaluates the incoming data.

After processing, the microcontroller determines the required control action based on the difference between the detected speed condition and the set limit speed. The output is then given to the actuator unit, which adjusts the vehicle drive mechanism. At the same time, the display and alert unit provides the required status information to the driver. The system continues this process repeatedly, allowing the controller to respond whenever the input conditions changes. This modular operation also makes it possible to test the prototype section-by-section before complete vehicle integration.

Advantages

- Helps vehicles stay within the speed limit.
- Reduces accidents in sensitive zones.
- Reduces Manual efforts of drivers.
- Adjusts the speed limit automatically according to the time.

Disadvantages

- More time consuming to reach destination.
- Required regular maintenance of QR code and scanning devices.
- May not work properly in bad weather, low light or if QR codes damaged.

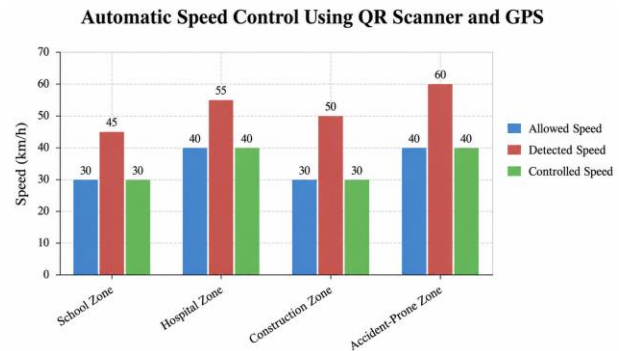


Chart -1: Speed Control in Different Road Zones



Figure 1: Automatic Speed Control System

Table -1: Component List

Sr. No.	Component	Quantity
1.	ESP32 Development Kit	1
2.	QR Code Scanner (GM 65)	1
3.	GPS Module (NEO 6M)	1
4.	L298N Motor Driver	1
5.	DC Geared Motor (With Wheels)	4
6.	12V Battery Pack	1
7.	Buck Converter (LM2596)	1
8.	OLED Display (0.96" 12C)	1
9.	Buzzer	1
10.	LED's (Green,Yellow,Red)	3
11.	Push Button	1
12.	ON/OFF Switch	1
13.	Jumper Wires	As Required

III. CONCLUSION

In this project, we developed an Automatic Speed Control System using QR Scanner and GPS for managing vehicle speed in different road zones. The system uses QR codes for speed-limit information, GPS for location and ESP32 for processing and control. The prototype also includes a display, buzzer and LED's for basic status indication. The system can be improved further with better sensors, IOT connectivity, and more accurate speed control. Overall, the project helped us understand the practical use of electronics and programming for road safety.

REFERENCES

1. O. M. J. Carsten and F. N. Tate, "Intelligent speed adaptation: Accident savings and cost-benefit analysis," *Accident Analysis & Prevention*, vol. 37, no. 3, pp. 407–416, 2005, doi: 10.1016/j.aap.2004.02.007.
2. K. L. Young, M. A. Regan, T. J. Triggs, K. Jontof-Hutter, and S. Newstead, "Intelligent speed adaptation—Effects and acceptance by young inexperienced drivers," *Accident Analysis & Prevention*, vol. 42, no. 3, pp. 935–942, 2010, doi: 10.1016/j.aap.2009.10.013.
3. A. Hazoor, A. Terrafino, L. L. Di Stasi, and M. Bassani, "How to take speed decisions consistent with the available sight distance using an intelligent speed adaptation system," *Accident Analysis & Prevention*, vol. 174, Art. no. 106758, 2022, doi: 10.1016/j.aap.2022.106758.
4. A. Hazoor, A. Terrafino, L. L. Di Stasi, and M. Bassani, "Intelligent speed adaptation for visibility technology affects drivers' speed selection along curves with sight limitations," *Journal of Traffic and Transportation Engineering (English Edition)*, vol. 11, no. 1, pp. 16–27, 2024, doi: 10.1016/j.jtte.2023.02.005.
5. A. Hazoor, A. Terrafino, L. L. Di Stasi, and M. Bassani, "An integrated intelligent speed adaptation system for enhanced driver assistance, driving performance and safety," *Transportation Engineering*, vol. 22, Art. no. 100407, 2025, doi: 10.1016/j.treng.2025.100407.