PANIMALAR
ENGINEERING COLLEGE
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A Christian Minority Institution
(JAISAKTHI EDUCATIONAL TRUST)
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Department of Computer Science and Engineering

AUTOMATIC SPEED CONTROL IN SCHOOL AND COLLEGE ZONES

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Introduction

- Automatic Vehicle Speed Control (AVSC) is a technology that can automatically adjust the speed of a vehicle. AVSC can be particularly useful in private zones, such as industrial sites, campuses, and residential areas, where the speed limits are lower than on public roads and the risk of accidents is higher.
- AVSC systems can be based on various technologies, such as GPS, radar, LIDAR, and RFID. In this project, we propose an AVSC system that uses RFID cards and readers to detect the speed of vehicles and adjust it accordingly.
- The proposed AVSC system consists of several components, including RFID cards, RFID readers, microcontroller units (MCUs), actuators, and a web-based interface. The RFID cards are attached to the vehicles and contain unique identification numbers that are read by the RFID readers placed at strategic locations.
- The MCU processes the data from the RFID readers and sends commands to the actuators that control the speed of the vehicles. The web-based interface allows the system administrators to monitor and control the system remotely.

Objectives

- To develop a system that ensures safe driving within private zones.
- To automatically detect the speed of vehicles using RFID technology.
- To control the speed of vehicles using an automatic speed control system.
- To reduce the number of accidents caused due to over speeding.
- To minimize the risk of pedestrian accidents within private zones.
- To provide an effective and efficient solution for speed control in private zones.
- To reduce the need for manual monitoring and control of vehicle speeds.
- To improve the overall safety and security of private zones.
- To facilitate the smooth and efficient movement of vehicles within private zones.

Literature Review

S.NO	TITLE	AUTHOR	YEAR
1.	Embedded Vehicle Speed Control and Over-Speed Violation AlertUsing IoT	Ashok Reddy K, Saakshi Patel	2019
2.	Predictive Speed Control for Automated Vehicles in Urban Areausing Speed Zones	Peter Szilassy, Balazs Nemeth and Peter Gaspar	2020
3.	Real Time Automatic Speed Control Unit for Vehicles	S Arun Prakash, Aravind Mohan R, Rahul M Warrier, R ArunKrishna, Sooraj Bhaskar A, Aswathy K Nair	2018

S.no	TITLE	AUTHOR	YEAR
4	Simulation of automatic vehicle speed control by transponder-equipped infrastructure	Dominique Gruyer, Sébastien Glaser, Benoit Vanholme, Bertrand Monnier.	2019

Problem Statement

- Private zones such as university campuses, industrial areas, and residential neighborhoods have been facing challenges in managing vehicle speeds within their premises.
- Over-speeding in these private zones has been a major cause of accidents and fatalities. Despite the installation of speed limit signs, some drivers still exceed the set limits, putting the safety of pedestrians and other road users at risk.
- Traditional methods of controlling speed in private zones, such as the use of speed bumps and humps, have proven to be ineffective in regulating vehicle speeds.
- These methods have also been associated with increased vehicle maintenance costs and discomfort for passengers.

Existing System

- In existing system, there is no automatic speed control. Currently, private zones rely on traditional methods of controlling vehicle speeds such as the use of speed bumps, humps, and road markings.
- However, these methods have proven to be ineffective in regulating vehicle speeds, leading to over-speeding and accidents.
- The Zones are also not been indicated in the existing model and the lack of automatic zone recognition system.
- The use of speed bumps and humps has been associated with increased vehicle maintenance costs and discomfort for passengers.
- The discomfort experienced by passengers can lead to reduced ride comfort, increased fuel consumption, and increased wear and tear on vehicle suspension systems.
- In some private zones, speed limit signs have been installed to regulate vehicle speeds. However, these signs have proven to be ineffective in regulating vehicle speeds as some drivers still exceed the set limits.

DISADVANTAGES OF EXISTING SYSTEM

- Reliance on Driver Compliance: The use of speed limit signs relies on driver compliance, which is not always guaranteed. Some drivers tend to ignore speed limit signs, leading to over-speeding and accidents.

- Ineffective in Regulating Vehicle Speeds: The traditional methods of controlling vehicle speeds, such as speed bumps, have proven to be ineffective in regulating vehicle speeds in private zones. Drivers tend to speed up after passing these obstructions, leading to over-speeding and accidents.

- Speed control is essential in vehicles but lacks in the existing system

Proposed System

- The proposed system for Automatic Vehicle Speed Control in Private Zones utilizes RFID technology to control vehicle speeds within safe limits
- The Components involved in this system are :-

- RFID Cards
- RFID Reader
- Adruino Microcontroller
- DC Motors
- Power Board , Buzzer Sound & Bluetooth device

ADVANTAGES OF PROPOSED SYSTEM

- Improved Safety: The system ensures that vehicles remain within safe limits, reducing the risk of accidents and fatalities caused by over-speeding in private zones.
- Real-time Monitoring: The system provides real-time monitoring of vehicle speeds in private zones, making it easier to detect over-speeding and take appropriate action to prevent accidents.
- Reduced Discomfort to Passengers: The system does not rely on the use of speed bumps and humps, reducing discomfort to passengers and minimizing wear and tear on vehicle suspension systems.
- Improved Efficiency: The system reduces the time and effort required to control vehicle speeds in private zones, improving the efficiency of the process.
- Cost-effective: The system is cost-effective compared to traditional methods of controlling vehicle speeds in private zones, such as the use of speed bumps and humps

Development Environment

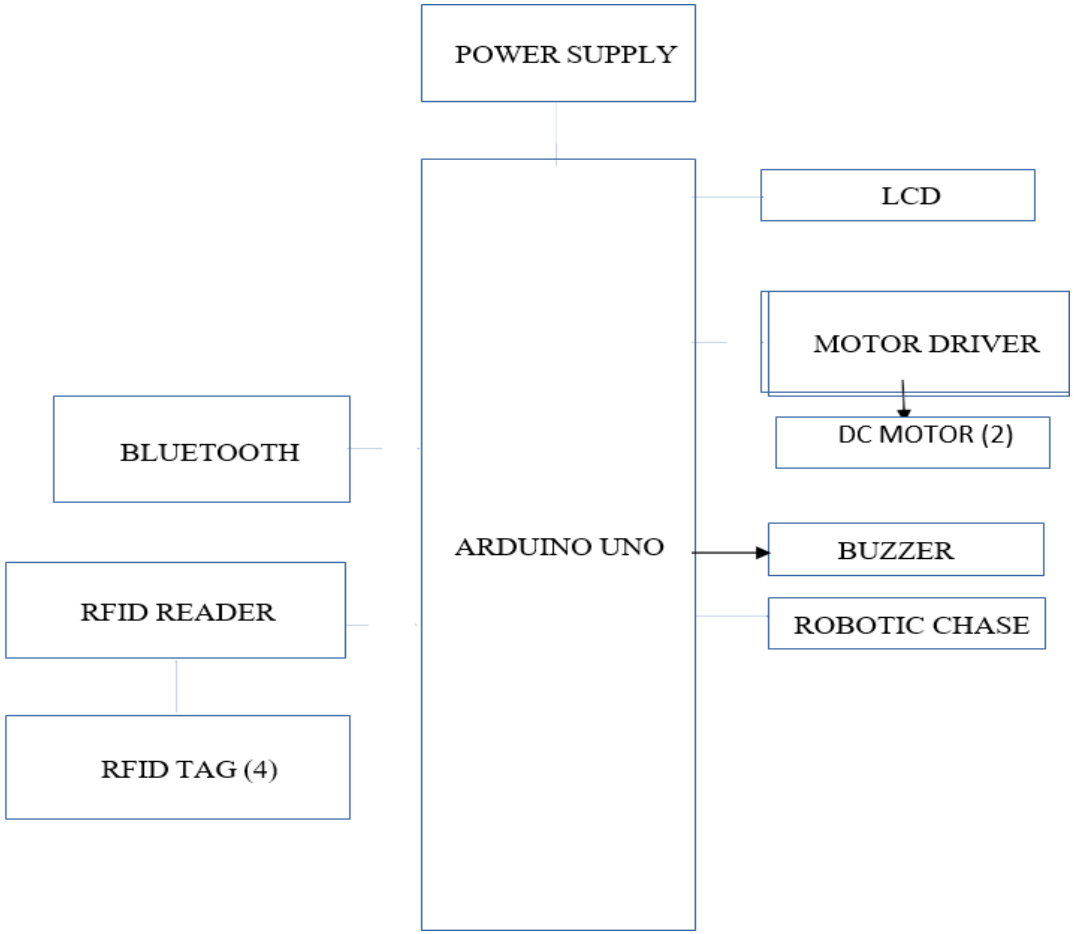
HARDWARE REQUIREMENTS:

- RFID Reader
- RFID Cards (4)
- Adruino UNO Microcontroller
- Power Supply Unit
- Cables and Connectors
- Display Unit
- Mounting Plate
- DC Motors
- Wheels

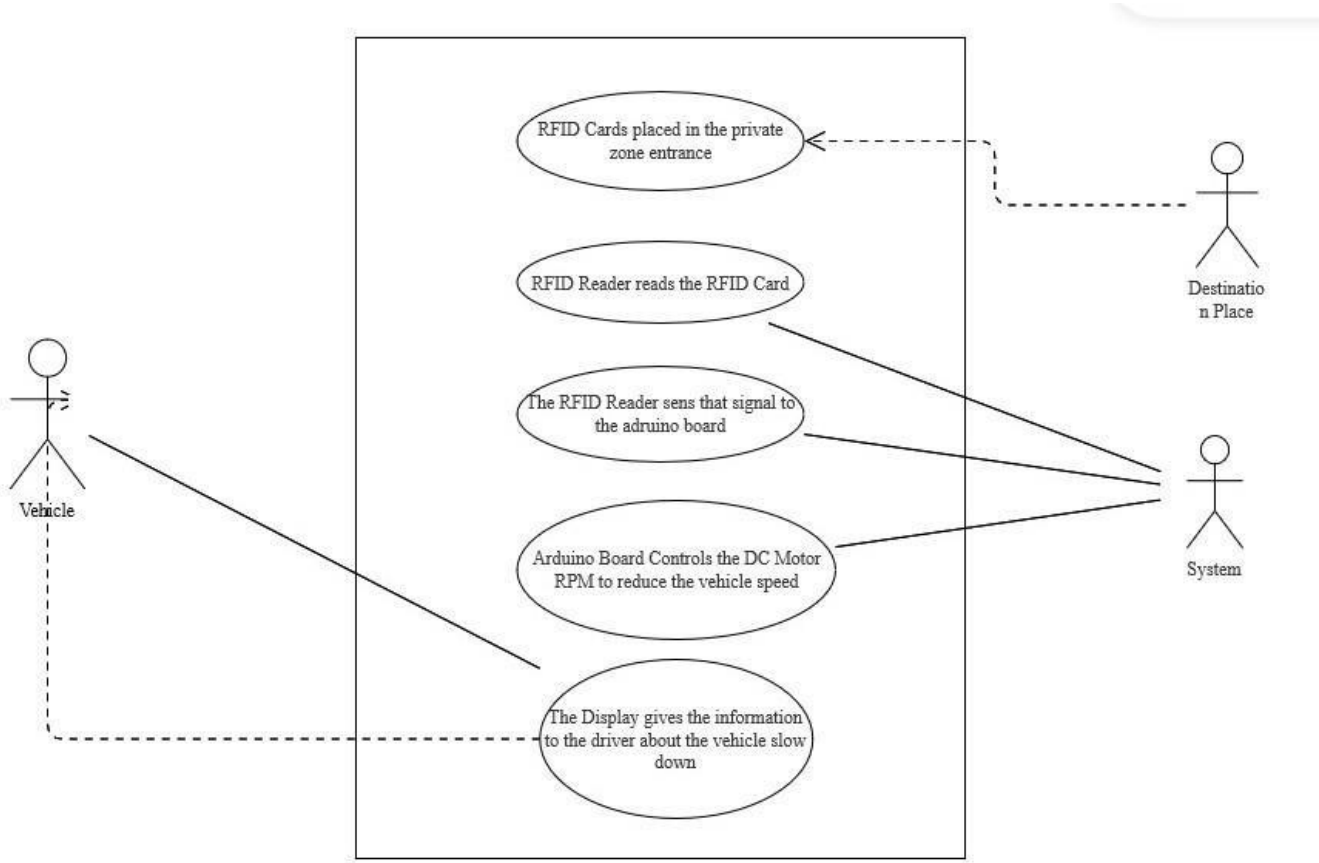
SOFTWARE REQUIREMENTS:

- Operating System : Windows 11 (64 bit)
- Software : Adruino IDE
- Language : C

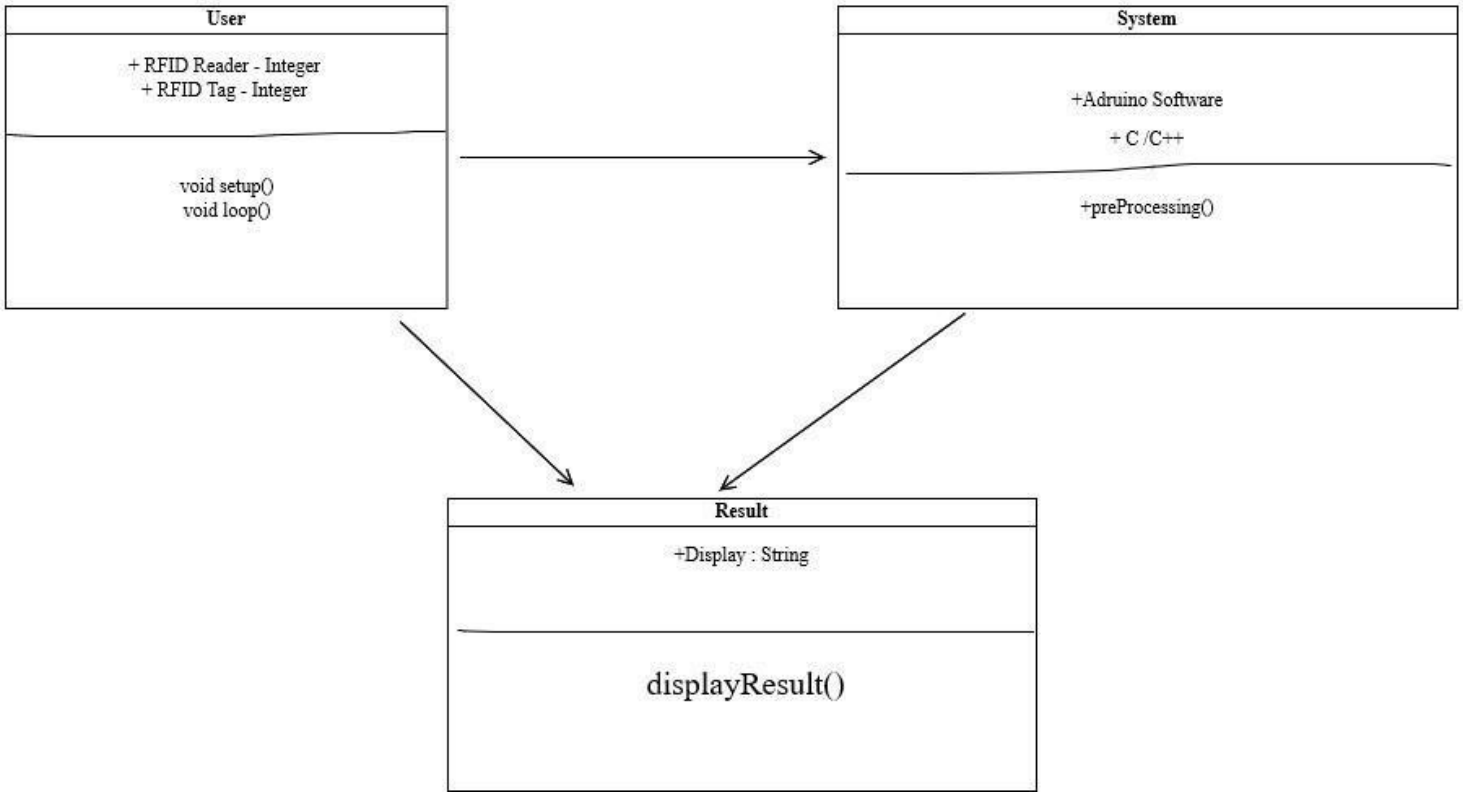
System Architecture



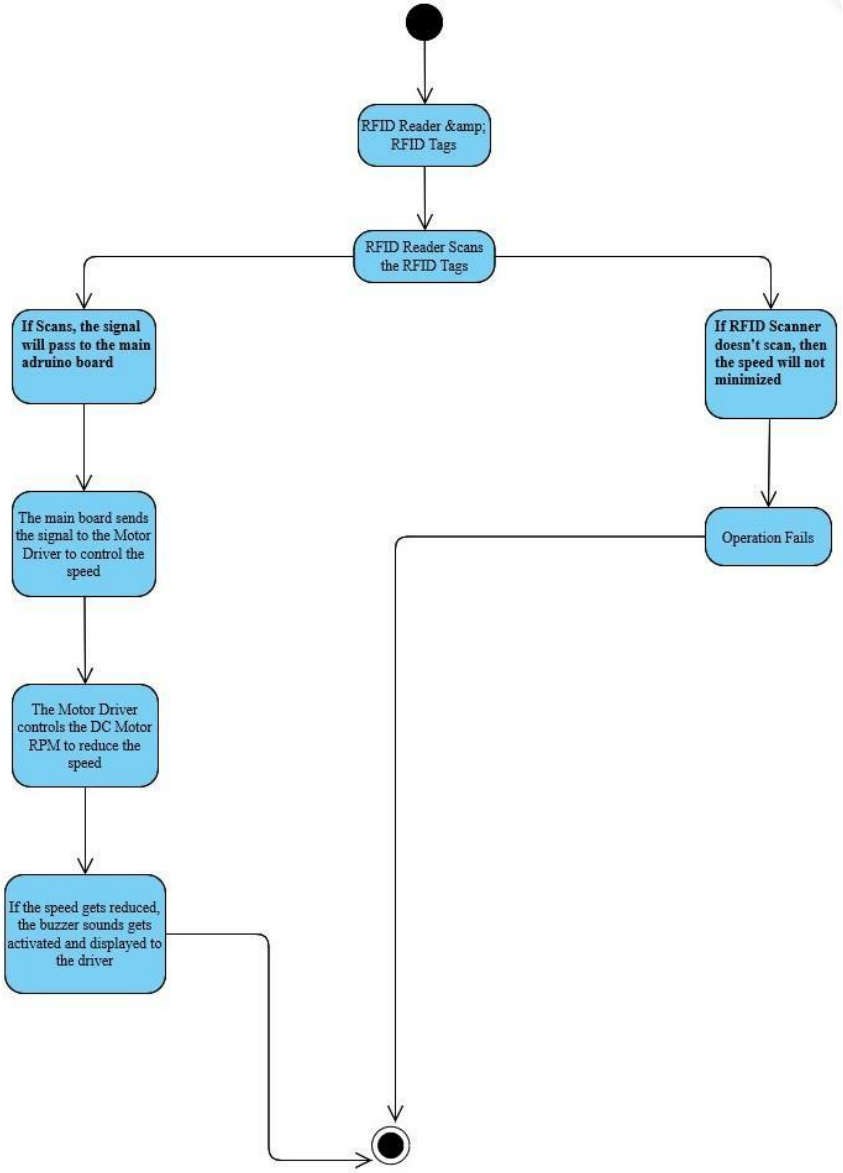
USE CASE DIAGRAM



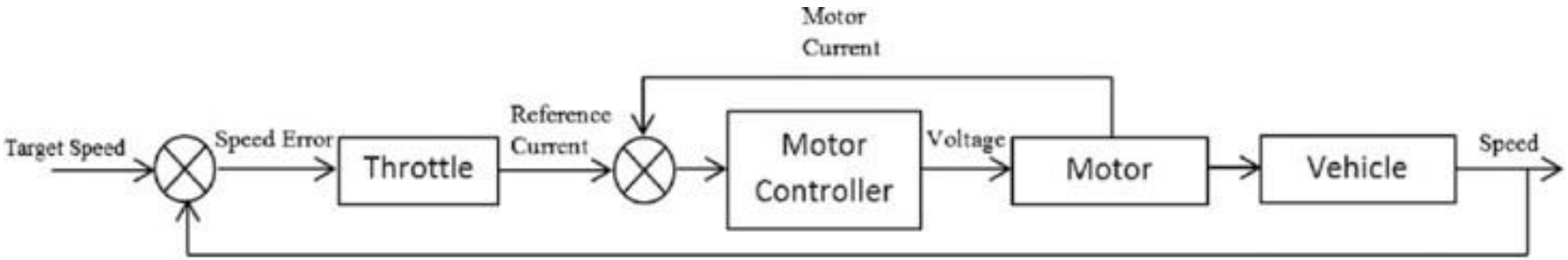
Class diagram :



Activity diagram :



STATE CHART DIAGRAM



Module Description

MODULES :

- Design and Development
- Installation of RFID Reader and Cards
- Integration of IoT Platform
- Testing and Calibration
- Deployment

MODULE EXPLANATION:

1.DESIGN AND DEVELOPMENT :

- The system architecture is designed, which involves selecting the hardware components such as RFID readers, RFID cards, and IoT platform, and designing the software algorithms that will regulate the speed of vehicles in private zones.
- The software is developed, which involves writing the code for the algorithms and integrating the different components of the system. This includes developing the user interface, data management systems, and communication protocols.

2. INSTALLATION OF RFID READERS AND CARDS :

- RFID readers are installed at the entry points of the private zone, and RFID cards are installed in the vehicles.
- The RFID readers and cards use radio frequency signals to communicate with each other and transmit data, such as the speed of the vehicle and the vehicle's identity. During installation, the RFID readers are strategically placed to ensure that they can detect the RFID cards in the vehicles as they enter and exit the private zone.
- The RFID cards are installed in the vehicles in a location that is easily accessible and visible to the RFID reader.

3. INTEGRATION OF IOT PLATFORM:

- IoT platforms allow for real-time monitoring and control of the system, enabling system operatorsto remotely monitor and manage the system. During integration, the IoT platform is connected to thesystem's hardware and software components, such as the RFID readers and cards, data management system, and communication protocols.
- This allows for real-time data collection, analysis, and management, providing system operators with a comprehensive overview of the system's performance.

4. TESTING AND CALIBRATION:

- Testing involves evaluating the system's performance under different conditions, such as varyingspeeds and different types of vehicles, to ensure that the system accurately detects the RFID cards and regulates the speed of the vehicles. The testing also involves evaluating the system's communication protocols and data management capabilities.
- Calibration involves adjusting the system's settings and parameters to ensure that it is functioning optimally. This may include adjusting the sensitivity of the RFID readers, adjusting the speed limits within the private zone, and configuring the communication protocols.

5. DEPLOYMENT:

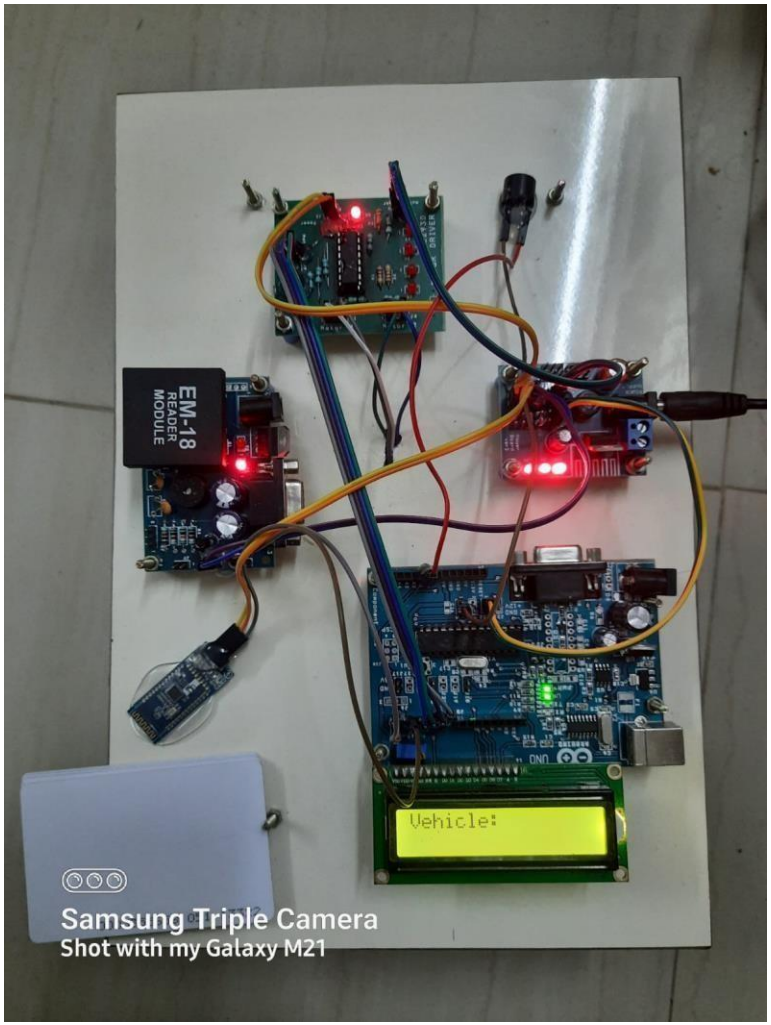
- The deployment process typically involves working closely with the private zone owner or operator to ensure that the system is installed and configured to meet their specific requirements. This may involve conducting a site survey to assess the private zone's layout and identify any potential obstacles or challenges.
- Once the system is deployed, it undergoes rigorous testing and calibration to ensure that it is functioning correctly and effectively regulating the speed of vehicles within the private zone. System operators are trained on how to use and manage the system, including monitoring and analyzing the system's data and making adjustments as necessary.
- After deployment, the system is monitored and maintained on an ongoing basis to ensure that it is functioning correctly and meeting the requirements of the private zone owner or operator. This may involve conducting routine maintenance and software updates, as well as responding to any issues or concerns that arise.

Testing

Testcase ID	Testcase/ Action to be performed	Expected Result	Actual Result	Pass/Fail
1	Alarm test : Test the system's ability to trigger an alarm when a vehicle exceeds the speed limit within the private zone.	Alarm will be buzzered	As Expected	PASS
2	RFID reader test: Test the functionality of the RFID reader to ensure that it can accurately detect and read the RFID tags attached to the vehicles passing through the private zone.	RFID card will be read by RFID Reader	As Expected	PASS

Screenshots

Hardware Implementation



Conclusion

- In conclusion, the implementation of an Automatic Vehicle Speed Control system using RFID technology and IoT can be a promising solution to regulate the speed of vehicles in private zones. The proposed system aims to provide a safer and more efficient driving environment, reducing the risk of accidents and ensuring compliance with speed limits.
- The system utilizes RFID technology to detect the presence of RFID cards installed in vehicles and IoT technology to remotely monitor and control the system's performance. The use of an embedded system provides real-time processing and regulation of vehicle speed, ensuring the system's reliability and accuracy.
- Although the implementation of such a system involves significant initial costs, the long-term benefits in terms of increased safety and efficiency can outweigh the initial investment. Overall, the Automatic Vehicle Speed Control system has the potential to make private zones safer for drivers and pedestrians, reducing the number of accidents and improving traffic flow.

Future Enhancement

- Integration with Traffic Management Systems: The system can be integrated with traffic management systems to provide a more comprehensive solution for managing traffic flow in private zones. This can include the use of cameras and sensors to detect traffic congestion and adjust speed limits accordingly.
- Integration with Emergency Services: The system can be integrated with emergency services such as ambulance and fire departments, enabling them to access real-time information about the location and speed of vehicles in private zones.
- Integration with Autonomous Vehicle Technology: The system can be integrated with autonomous vehicle technology to provide a more advanced solution for regulating the speed of autonomous vehicles in private zones. This can involve the use of advanced algorithms and machine learning techniques to optimize the speed and safety of autonomous vehicles.

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THANK YOU!