

Automatic Vehicle Speed Controller In Prohibited Zone

Submitted in partial fulfillment of the requirements for
the award of Bachelor of Engineering Degree in Electronics
and Communication Engineering

By

POOLA CHAITHANYA (Reg no:39130352)
SAI MANIKANTA REDDY (Reg no:39130370)



**DEPARTMENT OF ELECTRONICS AND
COMMUNICATIONENGINEERING**

SCHOOL OF ELECTRICAL AND ELECTRONICS

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

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**JEPPIAAR NAGAR, RAJIV
GANDHI SALAI, CHENNAI -
600119**

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SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

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Accredited with “A” grade by NAAC

Jeppiaar Nagar, Rajiv Gandhi Salai, Chennai – 600 119

www.sathyabama.ac.in



**DEPARTMENT OF ELECTRONICS AND COMMUNICATION
ENGINEERING**

BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of SAI MANIKANTA REDDY (39130370) and POOLA CHAITHANYA (39130352) who carried out the project entitled “**AUTOMATIC VEHICLE SPEED CONTROLLER IN PROHIBITED ZONE**” under my supervision from June 2022 to April 2023.

Internal Guide

Dr.T. BERNATIN, M.E., Ph.D.

**Head of the Department
Dr. T. Ravi, M.E., Ph.D.**

21.04.2023

Submitted for Viva voce Examination held on _____

Internal Examiner

External Examiner

DECLARATION

We P. CHAITHANYA (39130352) and SAI MANIKANTA REDDY (39130370) here by declare that the Project Report entitled “Automatic Vehicle Speed Controller in Prohibited zone”. done by us under the guidance of **Dr.T.BERNATIN,M.E,Ph.D.** Dept. of Electronics and CommunicationEngineering, SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY, CHENNAI, is submitted in partial fulfillment of the requirements for the award ofBachelor of Engineering degree in Electronics and Communication Engineering.

DATE: 21.04.2023

PLACE: Chennai

The image shows two handwritten signatures in black ink. The top signature is for P. Chaithanya and the bottom signature is for Sai Manikanta Reddy. Both signatures are fluid and cursive.

Signature of candidate

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ABSTRACT

As far as automobiles are concerned, safety is very important to reduce the occurrence of accidents in speed restricted zones. It minimizes the loss of property and life. According to the recent surveys, in the past few years, an accident near the school zones have increased tremendously, because of their hurry to get the targeted place soon. Therefore, controlling vehicle speed has been a crucial issue to be considered. This project aims to give a practical, compact and simple design to develop an automatic vehicle speed control system, which has to be quickly get implemented in school zones to reduce the number of accidents. This automated speed controlling system is built using the microcontroller-based platform of the Arduino board.

The speed control system for a vehicle describes a method for regulating the velocity of a vehicle based on its current speed and external factors such as road conditions, traffic density, and weather conditions. The system uses sensors and algorithms to gather data and calculate the optimal speed for the vehicle to travel safely and efficiently. The proposed speed control system aims to reduce accidents, improve fuel efficiency, and provide a comfortable ride for passengers. The abstract may also discuss the potential applications of the speed control system in different types of vehicles, such as cars, buses, and trains, and its impact on transportation systems and the environment. Here the Arduino is programmed in such a way that, the prescribed speed limit was corporate in the transmitter unit which transmits the signals, and it was received by the receiver in the vehicle using Zigbee wireless communication technology and the speed of the vehicle was automatically controlled by the input signals by the receiver, with the help of speed encoder sensor. Once this technique was implemented the accidents will be reduced on a larger rate, and also reduce the nuisance by some drivers.

KEYWORDS:

Speed Controller, Zigbee technology, Rtc module, Arduino uno

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CHAPTER 1

INTRODUCTION

Speed control of vehicles in prohibited zones is an essential aspect of road safety. Prohibited zones are areas where vehicles are not allowed to travel at certain speeds due to safety concerns. These zones may be designated as school zones, residential areas, or construction sites, among others. The need for speed control in these areas arises from the increased likelihood of accidents and the potential for injury or death. One of the primary reasons for speed control in prohibited zones is to protect pedestrians. These areas are often densely populated with people who are walking, playing, or engaging in other activities. Drivers must slow down and pay attention to their surroundings to prevent accidents. In school zones, for instance, children are often crossing the road and playing near the street. It is, therefore, necessary to control the speed of vehicles in these areas to minimize the risk of accidents.

Another reason for speed control in prohibited zones is to minimize the amount of noise pollution generated by vehicles. Areas such as residential neighborhoods or hospital zones require low noise levels to ensure that residents or patients are not disturbed. Speed control measures such as speed bumps or speed cameras can help to reduce the noise generated by vehicles. Speed control measures can also help to reduce fuel consumption and emissions. Vehicles that are driven at high speeds consume more fuel and produce more emissions. In areas where speed limits are strictly enforced, drivers are likely to drive at slower speeds, which reduces fuel consumption and emissions. This, in turn, contributes to a cleaner environment and reduced air pollution. Various techniques can be used to control the speed of vehicles in prohibited zones. These include speed cameras, speed bumps, rumble strips, chicanes, and road narrowing, among others. Speed cameras are automated systems that capture images of vehicles exceeding the speed limit. Speed bumps are physical barriers that force drivers to slow down. Rumble strips are grooves cut into the road surface that create a noise and vibration when driven over. Chicanes are a series of obstacles placed on the road to force drivers to slow down, and road narrowing involves reducing the width of the road to slow traffic. In conclusion, speed control of vehicles in prohibited zones is an essential aspect of road safety. It protects pedestrians, minimizes noise pollution, reduces fuel consumption and

emissions, and contributes to a cleaner environment. Various techniques can be used to control the speed of vehicles in these areas, and it is crucial to enforce speed limits to ensure that drivers comply with the regulations. It is the responsibility of every road user to observe speed limits and ensure the safety of all.

1.1 OBJECTIVE

The objective of speed control in prohibited zones is to ensure the safety of pedestrians and other road users by reducing the speed of vehicles in areas where there is an increased risk of accidents. This includes areas such as school zones, residential neighbourhoods, construction sites, and hospital zones, among others

1.2 PROBLEM STATEMENT

The problem with speed control in prohibited zones is that some drivers fail to comply with the speed limits, putting pedestrians and other road users at risk of accidents. The consequences of speeding in these areas can be severe, including injuries, fatalities, and property damage. Despite the enforcement of speed limits and the use of various speed control measures, some drivers continue to exceed the speed limit, leading to a higher likelihood of accidents. Additionally, the installation of speed control measures such as speed bumps and road narrowing can sometimes cause inconvenience to drivers, leading to dissatisfaction and resistance to the implementation of these measures.

1.3 TARGET SPECIFICATIONS

compliance with speed limits: The primary target specification for speed control in prohibited zones is to ensure that drivers comply with the posted speed limits. This can be achieved through effective enforcement mechanisms, such as speed cameras and police presence, and by educating drivers on the importance of speed control in these areas.

Reduction in accidents: The ultimate target specification for speed control in prohibited zones is to reduce the number of accidents and fatalities that occur in these areas. This can be achieved through the use of various speed control measures, such as speed bumps and road narrowing, which force drivers to slow down and pay more attention to their surroundings.

Minimization of noise pollution: In areas where noise pollution is a concern, such as residential neighborhoods and hospital zones, the target specification for speed control is to reduce the amount of noise generated by vehicles. This can be achieved

by using speed control measures that force drivers to slow down, such as speed bumps and chicanes.

Reduction in fuel consumption and emissions: Another target specification for speed control in prohibited zones is to reduce fuel consumption and emissions by encouraging drivers to drive at slower speeds. This can be achieved through the use of speed control measures and by educating drivers on the benefits of eco-friendly driving practices.

Increased satisfaction of road users: The target specification for speed control measures is to ensure that they do not cause inconvenience or dissatisfaction among road users, such as drivers and residents. Speed control measures should be designed to minimize inconvenience and maximize safety, and road users should be educated on their benefits and necessity in prohibited zones.

1.4 RESEARCH AND DEVELOPMENT

Research and development for speed control in prohibited zones can involve several areas, such as:

Technology development: This includes the development of new and innovative speed control technologies, such as advanced speed cameras, intelligent speed adaptation (ISA) systems, and vehicle-to-vehicle communication (V2V) systems. These technologies can help improve compliance with speed limits and reduce the risk of accidents in prohibited zones.

Human factors research: Human factors research can help understand the behavior of drivers and other road users in prohibited zones. By studying factors such as attention, perception, and decision-making, researchers can develop more effective speed control measures that account for human behavior.

Materials development: Developing new materials for speed control measures, such as speed humps and chicanes, can help improve their durability, reduce noise pollution, and minimize discomfort for drivers.

Data analysis: Analyzing data on accidents, traffic flow, and driver behavior in prohibited zones can help identify areas where speed control measures are most needed and evaluate the effectiveness of existing speed control measures.

Public awareness campaigns: Public awareness campaigns can help educate drivers and other road users on the importance of speed control in prohibited zones. These campaigns can promote safe driving behaviors, encourage compliance with

speed limits, and raise awareness about the benefits of speed control measures. Overall, research and development in these areas can help improve the effectiveness of speed control measures in prohibited zones, reduce the risk of accidents, and promote safer driving behaviors.

1.5 EMBEDDED SYSTEM IMPLEMENTATION

Introduction:

Traffic signal control is another area where embedded systems can play a critical role in enforcing speed limits. These systems can adjust the timing of traffic signals to help enforce speed limits and improve traffic flow. The embedded system can also communicate with other systems, such as traffic management systems and V2I communication systems, to receive real-time updates on traffic conditions and adjust traffic signals accordingly. This can help prevent accidents and improve overall traffic safety. Vehicle-to-vehicle (V2V) communication systems use embedded systems to allow vehicles to communicate with each other in real-time. This can help enforce speed limits by allowing vehicles to receive alerts when they enter a prohibited zone or when they are traveling above the speed limit. The embedded system can also communicate with other systems, such as traffic management systems and V2I communication systems, to provide real-time updates on traffic conditions and speed limits. V2V communication systems have been shown to improve road safety by reducing the risk of accidents caused by speeding.

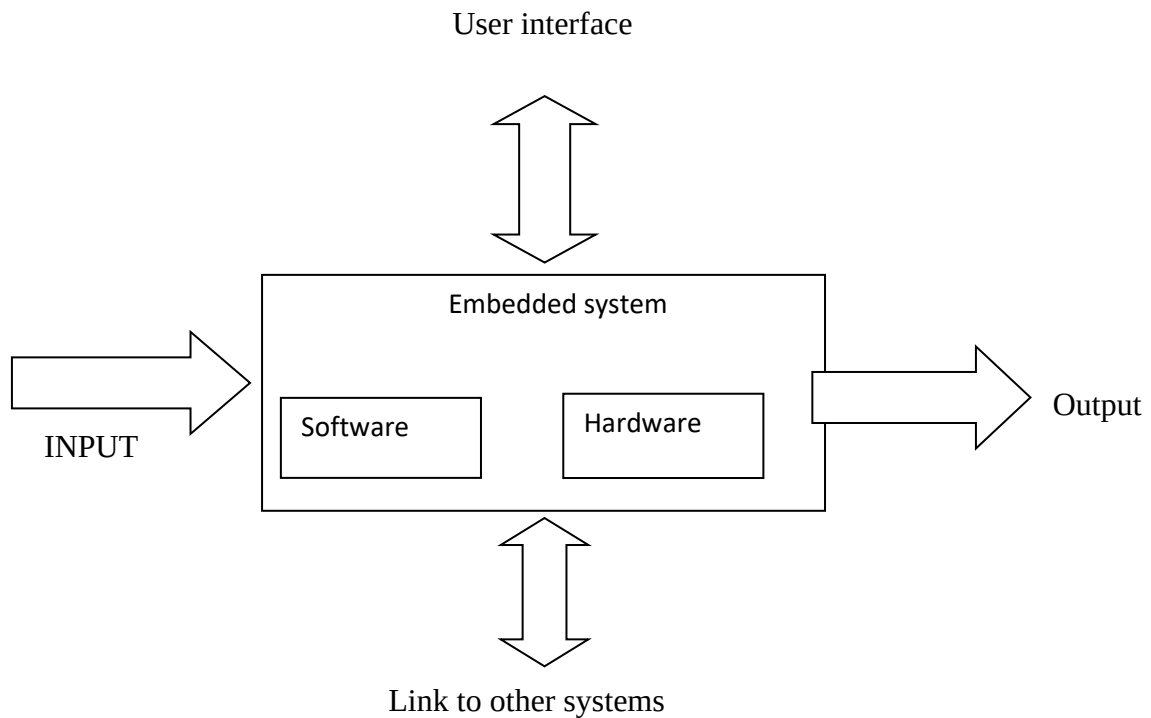


Fig 1.1 Embedded Block Diagram

1.5.1 EMBEDDED SYSTEM AND HARDWARE:

Embedded systems and software play a critical role in implementing speed control measures in prohibited zones. Here are some examples of embedded systems and software used in prohibited zones:

- Zigbee Module
- RTC Module
- Microcontroller
- Motor Driver
- Sensors
- Power Supply
- Display Unit

CHAPTER-2

LITERATURE REVIEW

2.1 LITERATURE INTRODUCTION

Speed control in prohibited zones is a critical issue that has gained significant attention from researchers and policymakers around the world. Speeding is a major cause of road accidents and fatalities, and it poses a significant threat to public safety, especially in areas where there are strict speed limits or where pedestrian and cyclist traffic is high. Therefore, speed control in prohibited zones has been the subject of numerous research studies, and various technological solutions have been proposed to address this issue. The literature on speed control in prohibited zones is vast and covers a wide range of topics related to road safety, traffic management, and engineering. Several studies have focused on the impact of speed limits on road safety and the effectiveness of different speed control measures. For example, a study conducted by the National Highway Traffic Safety Administration (NHTSA) in the United States found that reducing speed limits on rural highways led to a significant reduction in fatalities and injuries. In addition to speed limits, several studies have also examined the use of various technological solutions to control vehicle speed in prohibited zones. For example, intelligent speed adaptation (ISA) systems have been proposed as an effective way to control vehicle speed in prohibited zones. These systems use GPS and other technologies to determine the speed limit of the road and adjust the vehicle speed accordingly. Another approach to speed control in prohibited zones is the use of embedded systems, such as the use of Zigbee and RTC modules. These systems use wireless communication and real-time clock modules to ensure that vehicles do not exceed the speed limit in prohibited zones. The literature on embedded systems and software used in speed control is vast and covers a wide range of topics related to system architecture, design, and implementation.

2.2 REVIEWS OF AUTOMATIC VEHICLE SPEED CONTROL SYSTEM

Amulya A.M, et.al, in 2018[1] has presented to avoid the collision of the vehicle due to its over speed in the speed restricted zones by automatically. This can be done through the embedded systems and the RF transmitter and receiver modules. When the vehicle enters the speed, the restricted area driver has to reduce the speed of

the vehicle manually. If the driver did not slow down the vehicle, the electronic controller would take the lead to control and reduce the speed of the vehicle by receiving the signal from the transmitter in that zone. By that received signal, the Arduino microcontroller would process to give a signal to the motor to control the speed. Here mainly they use the RF transmitter and receiver to identify the restricted

Vishal B. Niranjana, et.al, in 2017[2] has explained the working of their system in three different zones where the speed wants to reduce automatically by using Zigbee technology. They are Normal zone, silence zone, speed limit zone. The speed is reduced by reversing the motor rotating direction through the microcontroller 8051. The Zigbee transmitter is placed at that zone for example hospital while the vehicle reached that area the signal is received by the Zigbee receiver in the vehicle. The speed of the vehicle is compared with the determined speed in that area. If speed is higher for that zone the microcontroller takes in action to reduce the speed of the vehicle and if it is silence zone it disables to make a horn.

Amar Narayan, et.al, in 2016[3] has explained to control the speed of the vehicle to avoid the accidents in the hospital zone, curve roads and deep cuts due to over speed. This can be done with the ZigBee technology with the arm-7 microcontroller. The prescribed speeds at that zone are incorporated in the transmitter module and when the receiver in the vehicle senses the signal that arm-7 microcontroller would check whether the driver reducing the speed for a limited time. After the timer passes the limited time, the microcontroller makes the signal to reduce the speed of the motor, which makes the vehicle decelerate without the action of the driver

Gummarekula sattibabu et.al., in 2016[4] has explained that the Vehicle Speed control and monitor the zones with the help of the embedded systems and they designed to display the information on the dashboard about the zone. To achieve this they use two units, which are zone status transmitter unit and electronic display and control unit. Here if the sensible zone is detected by the receiver in a vehicle the signal processes in the controller and warns the driver by displaying it and gives a buzzer sound. There is a timer for driver action to decrease speed if the time passes then the vehicle automatically sets to desired predefined speed.

In Rubini, et al., in 2015 [5]has explained a system has an alerting, recording and reporting system for over speed violation management. The Zigbee transmitter sends the speed limit of the particular lane entered by the vehicle and also gives

alerts like “road works”, “steep slopes”, “school zone” in the form of acoustical messages and also in LCD. The receiver unit placed in the vehicle receives the messages and sends to the microcontroller. When speed of the vehicle nears the speed limit it displays the warning and if exceeds the limit, the microcontroller records the violated speed and time. The LCD displays the lane speed limit and shows the number of times, speed was violated. A GSM module sends message to the nearest traffic personnel immediately after a violation occurs. An authenticated device is also provided, which can be operated only by the traffic police in which he can retrieve the data stored at any time. Increase in the count of violation increases the penalty amount which can be collected in toll gates located nearby.

In S.P. Bunker, et al in 2014[6] has explained a real-time online safety prototype that controls the vehicle speed under driver fatigue. The purpose of such a model is to advance a system to detect fatigue symptoms in drivers and control the speed of vehicle to avoid accidents. The main components of the system consist of number of real time sensors like gas, eye blink, alcohol, fuel, impact sensors and a software interface with GPS and Google Maps APIs for location

In G. Sathya, et al in 2014[7] has explained with the help of “AARS using GPRS 3G TECHNOLOGY”. Through this, we can provide a smooth flow for the ambulance by controlling the traffic light according to the ambulance location to reach the hospital. The location of the ambulance can be easily identified with the help of the GPS unit installed in it. A controller in the traffic junction can automatically control the traffic flow and thus reduces the time delay taken by ambulance to the hospitals. The traffic junction band the ambulance will have GPRS 3G modem to communicate between them. The chances of misusing the ambulance can overcome with the help of an RFID tag given to the doctors in the respective hospitals so that the security can be attained. This scheme is helpful for the Traffic police to control the traffic thereby helping the patients who are facing emergency.

In S. Surya et al in 2013[8] has explained a real-time online safety prototype that controls the vehicle speed under driver fatigue. The purpose of such a model is to advance a system to detect fatigue symptoms in drivers and control the speed of vehicle to avoid accidents. The main components of the system consist of number of real time sensors like gas, eye blink, alcohol, fuel, impact sensors and a software interface with GPS and Google Maps APIs for location

In S. Martin et al in 2013 [9] has explained a real-time online safety prototype that controls the vehicle speed under driver fatigue. INTERNATIONAL JOURNAL OF ENGINEERING RESEARCH & TECHNOLOGY (IJERT) RTESIT, A system for vehicle over speed detection with SMS alert is presented [10]. It consists of a controller designed using Arduino Mega to monitor the location and speed of the vehicle obtained using a GPRS+GPS Quadband Module (SIM908), GSM antenna, GPS antenna and SIM card. If the vehicle presents in any of the defined regions, then the controller compares the speed of the vehicle with maximum allowable speed in that area. If over speeding is detected, a buzzer sound is generated from an active buzzer used in this system to alert the driver regarding exceeding the over speed.

2.3 LITERATURE CONCLUSION

In conclusion, the literature on speed control in prohibited zones highlights the importance of implementing effective measures to control vehicle speed in areas where speed limits are strictly enforced. The use of various technologies such as embedded systems, Zigbee, and RTC modules can be effective in reducing speeding and improving road safety. Automatic vehicle speed control systems have been found to significantly reduce the number of accidents caused by excessive speed, as well as improve traffic flow and reduce congestion. However, there are challenges associated with the implementation of these systems, including cost and accuracy in adverse weather conditions.

The public perception and acceptance of speed control measures are also critical factors in the success of these measures. Therefore, it is essential to consider public awareness, enforcement policies, and the impact of speed control measures on travel time and traffic flow. Continued research and development are necessary to address the challenges associated with speed control in prohibited zones and make these measures more effective and affordable. Policymakers and transportation professionals must consider the findings of existing literature when implementing speed control measures to ensure that they are effective, cost-efficient, and acceptable to the public. Overall, the literature on speed control in prohibited zones highlights the importance of promoting road safety through effective speed control measure

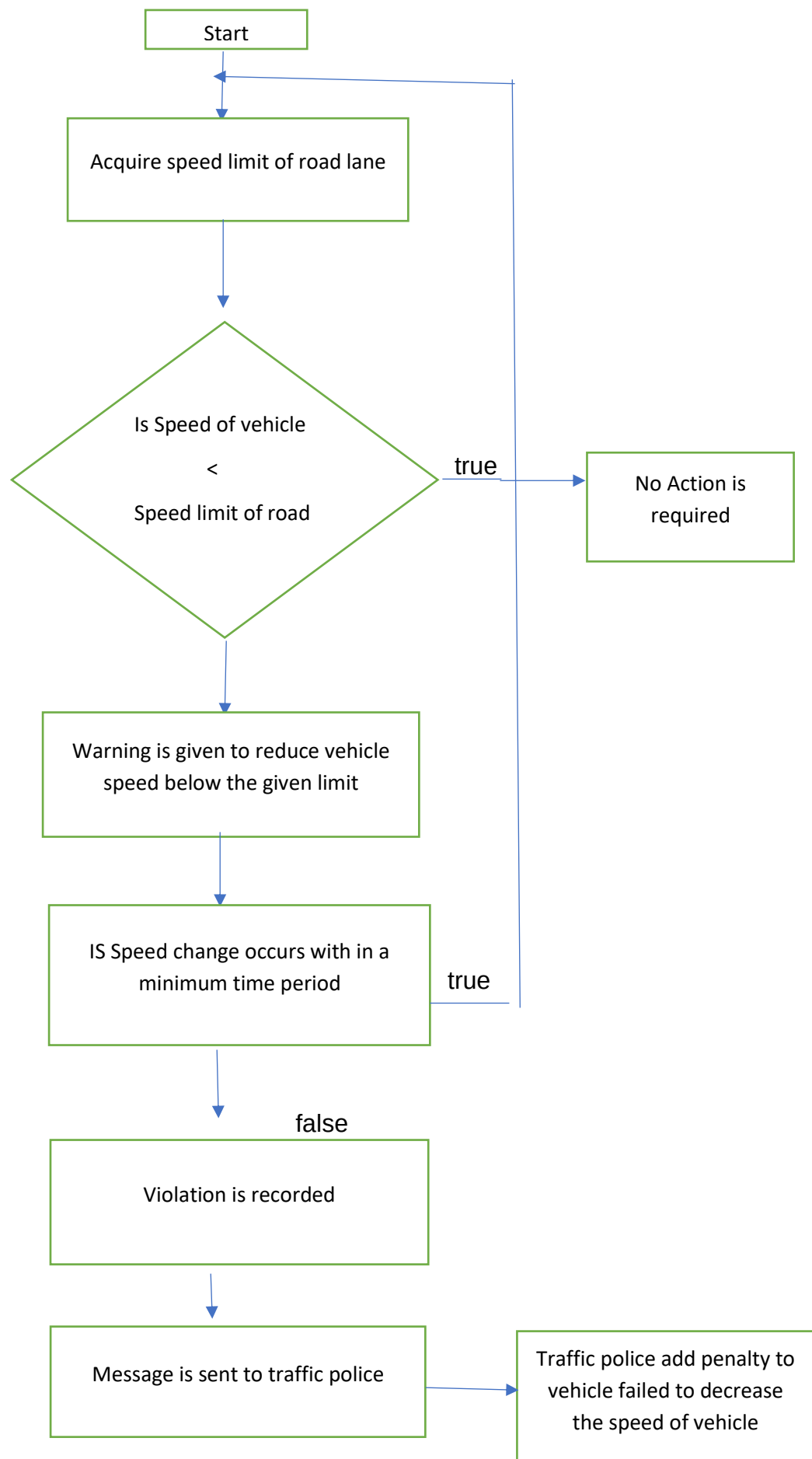
CHAPTER-3

SYSTEM ANALYSIS

3.1 EXISTING METHOD

Public places such as school, hospital, and work or accident zone have warning sign and messages displayed on a pillar or road sign poles. It has to be followed by the vehicle driver according to the traffic rules. The driver might not be aware about the sign or intentionally doesn't follow. It results in violation of the rule and occasionally in accident. A system has an alerting, recording and reporting system for over speed violation management. The Zigbee transmitter sends the speed limit of the particular lane entered by the vehicle and also gives alerts like "road works", "steep slopes", "school zone" in the form of acoustical messages and also in LCD. The receiver unit placed in the vehicle receives the messages and sends to the microcontroller. When speed of the vehicle nears the speed limit it displays the warning and if exceeds the limit, the microcontroller records the violated speed and time. The LCD displays the lane speed limit and shows the number of times, speed was violated. A GSM module sends message to the nearest traffic personnel immediately after a violation occurs. An authenticated device is also provided, which can be operated only by the traffic police in which he can retrieve the data stored at any time. Increase in the count of violation increases the penalty amount which can be collected in toll gates located nearby.

Fig.3.1 Existing Method Block Diagram



3.2 PROPOSED SYSTEM

In this automatic vehicle speed control system, When the vehicle enters the speed limiting zone the transmitter block starts to work and transmit the signal to the vehicle receiver which is placed in the vehicle, the Zigbee receiver which is connected with microcontroller process the signals and compares the speed of vehicle with the predefined speed of that particular zone. The Arduino Uno was used as a controller that two-controller were used here one for transmitter control and other for the receiver and other actions to take place based on the program set up in the controller. The transmitter circuit is powered by dc battery is enough for the working of Zigbee which is placed near the restricted zones. The driver of the vehicle will be warned to reduce the speed by giving warning alerts through visual or audible alerts for reducing the speed manually by the driver. If the speed of the vehicle is less than the predefined speed programmed in the microcontroller no action takes place. If the speed of the vehicle is greater than the predefined speed then the microcontroller controls the speed of the vehicle motor by sending a signal to the motor driver in it and the motor driver used reduces the speed of the electric motor, if rpm of motor decreases which automatically reduces the speed of the vehicle in that particular zone.

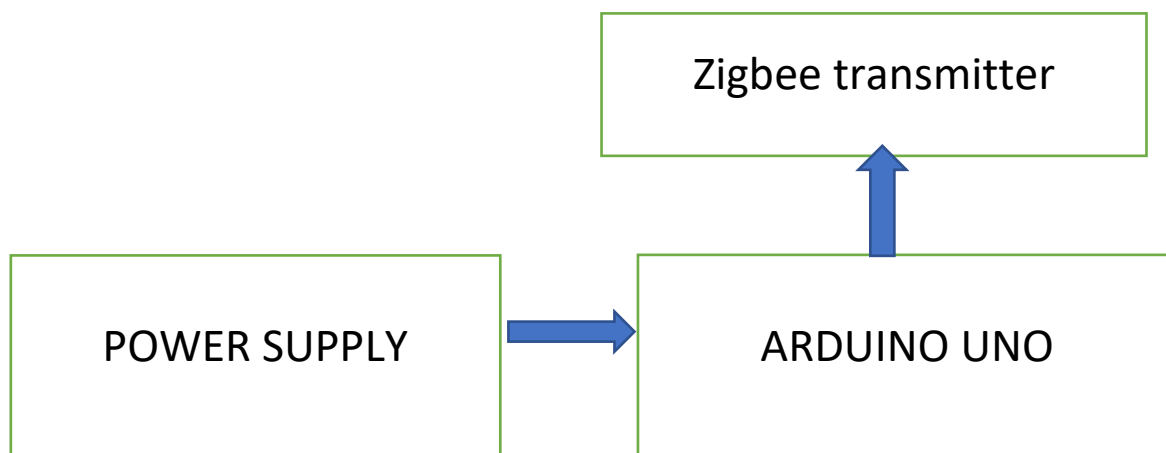
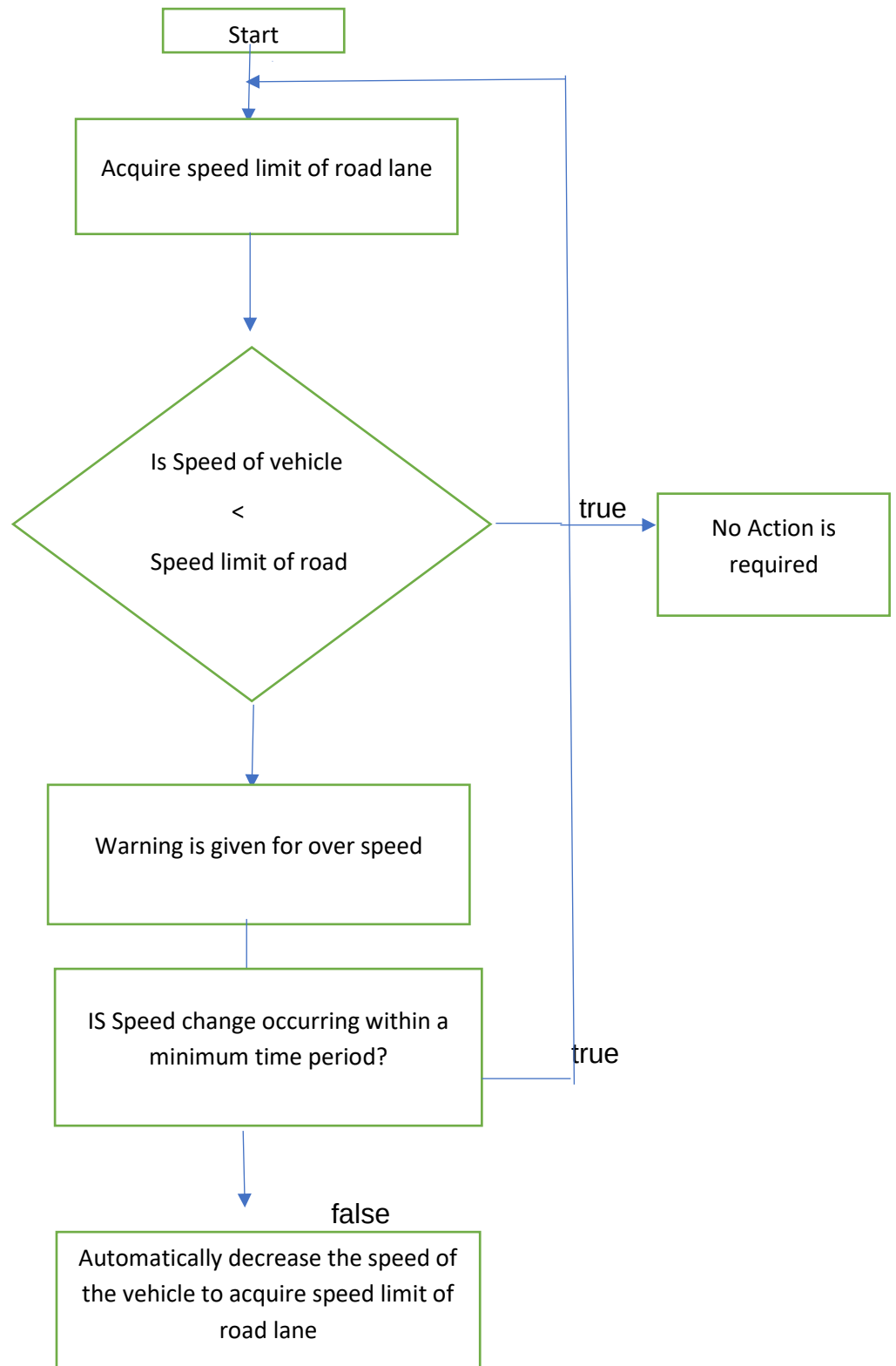


Fig 3.2 Proposed System Block Diagram



3.3 ADVANTAGES:

- This project decreases the rate of accidents in the highways and Ghats areas low cost and easy to implement.
- Can cover maximum area in a zone.
- This can be implemented with other wireless technologies for adding more stuff
- Low cost and easy to implement
- increased safety: Speed control can help prevent accidents and reduce the severity of any accidents that do occur. By keeping the vehicle at a steady speed, the driver can avoid sudden changes in speed that can cause loss of control or collisions.
- Better fuel efficiency: Maintaining a steady speed can improve fuel efficiency by reducing the need for frequent acceleration and deceleration. This can result in cost savings over time.
- Reduced wear and tear on the vehicle: Frequent acceleration and deceleration can put more strain on a vehicle's engine and brakes, leading to more frequent repairs and maintenance. Speed control can help reduce this wear and tear.
- Improved driving comfort: Maintaining a steady speed can make for a smoother and more comfortable driving experience, reducing driver fatigue and stress.
- Reduced emissions: By maintaining a steady speed, the engine can operate more efficiently, resulting in reduced emissions and a smaller carbon footprint.

CHAPTER-4

DESCRIPTION OF PROPOSED SYSYEM

Automatic vehicle speed control using time line components refers to the use of a time-based approach to control the speed of a vehicle. This involves setting specific time intervals during which the vehicle is expected to maintain a certain speed. The time intervals are determined by specific components, such as sensors and timers, that are integrated into the vehicle's control system. The basic idea behind this approach is to ensure that the vehicle is able to maintain a consistent speed over a predetermined period of time, thereby reducing the risk of accidents and improving overall safety. Here are some of the components that can be used in an automatic vehicle speed control system

SENSORS: These are the primary components used in measuring the vehicle's speed and acceleration. The most commonly used sensors are wheel speed sensors and accelerometers.

CONTROL UNIT: The control unit is responsible for processing the data received from the sensors and generating the control signals for the actuators.

ACTUATORS: These components are responsible for controlling the throttle, brakes, and transmission to adjust the vehicle speed as required.

MICROCONTROLLERS: These are small programmable computers that are used to control the operation of the speed control system.

DISPLAY UNIT: The display unit is used to provide feedback to the driver about the current speed and the status of the speed control system.

POWER SUPPLY: The power supply provides the necessary power to the various components of the speed control system.

COMMUNICATION NETWORK: In some advanced systems, a communication network is used to exchange information between different components of the speed control system and other systems in the vehicle.

TIME BASED ALGORITHM: These algorithms are used to predict the time required for the vehicle to reach a specific location, based on which the speed control system adjusts the vehicle's speed.

4.1 SELECTED METHODOLOGY

In modern times, the need for speed control is becoming increasingly important in various industries. This is particularly true in the field of automation, where machines and equipment need to operate at a specific speed to ensure optimal performance and safety. To achieve this, advanced technologies like Real-Time Clock (RTC) and ZigBee are being used to create a speed control system that can accurately regulate the speed of machines and equipment. The methodology for speed control using RTC and ZigBee involves several components that work together to ensure precise speed control. The first component is the Real-Time Clock, which is a device that keeps track of the current time and date. This device is used to provide accurate time information to the speed control system, which uses this information to calculate the speed of the machine or equipment. The second component is the ZigBee module, which is a wireless communication module that allows for the exchange of data between devices. This module is used to transmit speed control commands from the control system to the machine or equipment. The ZigBee module also receives data from the machine or equipment, such as speed and operational status, which can be used to fine-tune the speed control system. The third component is the speed control system itself, which is responsible for regulating the speed of the machine or equipment. This system uses the time information provided by the RTC and the speed data received from the ZigBee module to calculate the optimal speed for the machine or equipment. The speed control system then sends speed control commands to the machine or equipment through the ZigBee module to adjust the speed as needed.

Overall, the methodology for speed control using RTC and ZigBee offers several benefits over traditional speed control systems. One of the main advantages is the accuracy and precision of the speed control system. The Real-Time Clock provides accurate time information, which allows the speed control system to calculate the optimal speed for the machine or equipment with a high degree of accuracy. The use of ZigBee also allows for wireless communication between the speed control system and the machine or equipment, which eliminates the need for complex wiring and reduces the risk of interference.

Another benefit of this methodology is its flexibility and scalability. The use of wireless communication through ZigBee allows for the easy addition or removal of machines or equipment from the system. This makes it easy to expand the system as needed to accommodate changes in production or to add new machines or equipment to the system.

In conclusion, the methodology for speed control using RTC and ZigBee is an advanced and effective way to regulate the speed of machines and equipment. With its high accuracy, precision, flexibility, and scalability, this methodology is well-suited for use in a variety of industries and applications. By implementing this methodology, businesses can improve the safety and efficiency of their operations, while reducing the risk of downtime and costly repairs. The methodology for speed control using ZigBee and RTC module is a sophisticated system that provides accurate and precise speed control for machines and equipment. The system is designed to regulate the speed of the machines and equipment in real-time, ensuring that they operate at optimal speed for optimal performance and safety. This methodology comprises three main components: the Real-Time Clock (RTC) module, the ZigBee module, and the speed control system. The RTC module is a device that keeps track of the current time and date. It is used to provide the speed control system with accurate and precise time information, which is critical for calculating the speed of the machines and equipment. The RTC module ensures that the speed control system always has the correct time information, which is essential for maintaining precise speed control. The ZigBee module is a wireless communication module that allows the speed control system to communicate wirelessly with the machines and equipment. It is used to transmit speed control commands from the control system to the machines and equipment and receive data from them. The ZigBee module allows the speed control system to communicate with the machines and equipment remotely, eliminating the need for complex wiring and reducing the risk of interference. The speed control system is the core of the methodology for speed control using ZigBee and RTC module. It uses the time information provided by the RTC module and the speed data received from the machines and equipment via the ZigBee module to calculate the optimal speed for each machine and equipment. The speed control system then sends speed control commands to the machines and equipment via the ZigBee module to adjust their speed as needed.

The methodology for speed control using ZigBee and RTC module offers several advantages over traditional speed control systems. One of the main benefits is the high level of accuracy and precision that this system provides. The RTC module ensures that the system has the correct time information, which is critical for precise speed control. The use of the ZigBee module enables wireless communication between the speed control system and the machines and equipment, reducing the risk of interference and simplifying the system's installation.

Another advantage of this methodology is its flexibility and scalability. The use of the ZigBee module enables the easy addition or removal of machines and equipment from the system, making it simple to expand the system as needed to accommodate changes in production or add new machines and equipment. In conclusion, the methodology for speed control using ZigBee and RTC module is a sophisticated and effective system for regulating the speed of machines and equipment. With its high level of accuracy and precision, flexibility, and scalability, this methodology is ideal for use in a variety of industries and applications, where accurate and precise speed control is essential for optimal performance and safety. By implementing this methodology, businesses can improve the efficiency and safety of their operations while reducing downtime and costly repairs.

4.2 DESIGN OF PROPOSED MODULE

Designing a speed control system for a vehicle using time involves several steps, including selecting the appropriate components and designing the control algorithm. Here are the general steps involved in designing a time-based speed control system:

Identify the requirements: The first step is to identify the requirements for the speed control system. This includes the desired speed, the duration of the speed control, and any other relevant parameters.

Select the components: Based on the requirements, select the appropriate components for the speed control system. This includes the timer, control module, actuators, and human machine interface.

Design the control algorithm: The control algorithm is responsible for calculating the appropriate throttle and brake position to maintain the desired speed over the specified time period. The algorithm should take into account the vehicle's speed, acceleration, and deceleration characteristics, as well as the driver's input.

Implement the control algorithm: The control algorithm can be implemented using a microcontroller or a dedicated control module. The algorithm should be tested and validated to ensure that it meets the requirements.

Interface with the vehicle: The speed control system must interface with the vehicle's throttle and brake system. This can be done using electronic signals or mechanical linkages.**Implement the HMI:** The human machine interface is responsible for allowing the driver to set the desired speed and duration of the speed control. The HMI can be implemented using buttons, switches, or a touch screen.

Test and validate the system: The speed control system should be tested and validated to ensure that it meets the requirements and operates safely and reliably.

In summary, designing a speed control system for a vehicle using time involves selecting the appropriate components, designing the control algorithm, interfacing with the vehicle, implementing the HMI, and testing and validating the system. With proper design and implementation, a time-based speed control system can provide greater flexibility and control over the vehicle's operation. Designing a speed control system for a vehicle using time is an important area of research and development in the automotive industry. The use of time as a primary input parameter allows for greater control over the vehicle's speed, making it an attractive option for a variety of applications. In this essay, we will discuss the design of a time-based speed control system for a vehicle, including the selection of components and the design of the control algorithm.

The first step in designing a time-based speed control system is to identify the requirements of the system. This includes the desired speed and the duration of the speed control. Once the requirements have been established, the appropriate components for the system can be selected. The key components of a time-based speed control system are the timer, control module, actuators, and human machine interface (HMI). The timer is used to measure the elapsed time and provide input to the control module. The control module calculates the appropriate throttle and brake position to maintain the desired speed over the specified time period. The actuators adjust the throttle and brake position as necessary to maintain the desired speed. The HMI is used to allow the driver to set the desired speed and duration of the speed control.

The control algorithm is critical to the performance of the speed control system. The algorithm must take into account the vehicle's speed, acceleration, and deceleration characteristics, as well as the driver's input. The control algorithm can be implemented using a microcontroller or a dedicated control module. The algorithm should be tested and validated to ensure that it meets the requirements of the system.

The speed control system must interface with the vehicle's throttle and brake system. This can be done using electronic signals or mechanical linkages. The implementation of the HMI can be done using buttons, switches, or a touch screen. Once the system has been designed and implemented, it should be tested and validated to ensure that it operates safely and reliably. Testing should include a variety of scenarios, including highway driving and towing a trailer. The system should also be tested under different weather and road conditions. In conclusion, designing a speed control system for a vehicle using time involves the selection of appropriate components, the design of the control algorithm, and the implementation of the HMI. The system should be tested and validated to ensure that it meets the requirements and operates safely and reliably. A well-designed time-based speed control system can provide greater flexibility and control over the vehicle's operation, making it an attractive option for a variety of applications

4.3 DESCRIPTION OF SOFTWARE FOR IMPLEMENTATION AND TESTING OF THE PROPOSED MODEL

The software for implementation and testing for speed control using RTC and ZigBee is an essential component of the overall system. This software is responsible for communicating with the RTC and ZigBee modules, calculating the optimal speed for the machines and equipment, and sending speed control commands. In this essay, we will describe the software for implementation and testing for speed control using RTC and ZigBee.

The software for implementation and testing for speed control using RTC and ZigBee can be divided into several components, including:

User interface: The user interface is the component that allows users to interact with the system. It provides a graphical interface that displays the current speed, status of machines and equipment, and other critical information.

RTC module communication: The software communicates with the RTC module to obtain the current time and date, which is used to determine which machines and equipment need to be operational.

ZigBee module communication: The software communicates with the ZigBee module to send speed control commands to the machines and equipment.

Speed control algorithm: The speed control algorithm is the core of the software. It calculates the optimal speed for the machines and equipment based on various factors, such as the time of day, production schedule, and current operational status. The algorithm then sends speed control commands to the machines and equipment via the ZigBee module.

Data logging and analysis: The software logs all data and events for analysis and troubleshooting purposes. This feature allows the user to analyze the performance of the system and identify any issues or areas of improvement. During the implementation phase, the software team will develop and test the software components. The team will ensure that the software components communicate with each other correctly and that the algorithm provides accurate speed control commands. The team will also test the software for bugs, errors, and compatibility with the RTC and ZigBee modules. During the testing phase, the software team will test the complete system to ensure that it meets the defined requirements. The team will test the system with machines and equipment to ensure that it adjusts the speed correctly and operates safely. The team will also test the software for performance, reliability, and scalability.

In conclusion, the software for implementation and testing for speed control using RTC and ZigBee is critical to the system's overall performance and accuracy. The software communicates with the RTC and ZigBee modules, calculates the optimal speed for the machines and equipment, and sends speed control commands. The software must be accurate, efficient, and safe, ensuring that machines and equipment operate at the optimal speed and production remains efficient. During the implementation and testing phases, the software team will ensure that the software components communicate with each other correctly, and the algorithm provides accurate speed control commands. The team will also test the software for performance, reliability, and scalability.

Here's a basic software implementation for speed control using ZigBee and RTC modules: Install the Arduino IDE on your computer and connect an Arduino board to it. Connect the ZigBee module to the Arduino board using the UART interface. Connect the RTC module to the Arduino board using the I2C interface.

In the Arduino IDE, write a program to read the RTC module and obtain the current time. Write another program to read the speed sensor connected to the Arduino board and calculate the vehicle speed.

Write a program to adjust the speed of the vehicle based on the current time and the desired speed limit for the prohibited zone. Implement the ZigBee communication protocol to transmit the speed information from the Arduino board to a remote monitoring device. Use XCTU software to configure the ZigBee module for communication and test the wireless data transmission. Implement error handling and data validation in the Arduino code to ensure reliable operation of the system. Test the system in a real-world environment and optimize the performance based on the results. This is a very basic implementation, and you may need to modify it to suit your specific needs and requirements. For example, you may need to implement additional control algorithms, data logging, or user interfaces. Additionally, you may need to optimize the system for power consumption, reliability, and security. In recent years, there has been an increasing need for speed control systems to enhance safety in prohibited zones such as construction sites, school zones, and residential areas. One promising approach to implement speed control is through the use of wireless communication technologies such as ZigBee and real-time clock (RTC) modules. In this essay, we will discuss the software implementation of a speed control system using ZigBee and RTC modules. The first step in implementing the system is to install the Arduino Integrated Development Environment (IDE) on a computer and connect an Arduino board to it. The ZigBee module is then connected to the Arduino board using the UART interface, while the RTC module is connected using the I2C interface. The RTC module provides accurate timekeeping, which is essential for implementing time-based speed control algorithms. Once the hardware components are connected, the software implementation can begin. The first program to be written is one that reads the RTC module and obtains the current time. This information is critical for implementing time-based speed control. The next program to be written is one that reads the

speed sensor connected to the Arduino board and calculates the vehicle speed. This information is used to adjust the speed of the vehicle based on the current time and the desired speed limit for the prohibited zone.

To transmit the speed information from the Arduino board to a remote monitoring device, the ZigBee communication protocol is implemented. This protocol allows for wireless data transmission between devices and is commonly used in wireless sensor networks. The ZigBee module is configured using XCTU software to ensure reliable communication, and error handling and data validation are implemented in the Arduino code to ensure the system's reliability. Once the system is implemented, it is tested in a real-world environment to optimize its performance. Additional features such as data logging, user interfaces, and control algorithms can be implemented to enhance the system's functionality and ease of use.

In conclusion, speed control systems using ZigBee and RTC modules have great potential in enhancing safety in prohibited zones. The software implementation of such a system involves connecting the hardware components to the Arduino board, writing programs to read the RTC module and speed sensor, implementing ZigBee communication, and testing and optimizing the system's performance. With continued research and development, this technology can lead to safer roads and more efficient traffic management.

4.4 PROJECT MANGEMENT PLAN

Project management is an important aspect of any engineering project, including the development of an automatic vehicle speed control system using an RTC module and ZigBee. A well-executed project management plan can help ensure that the project is completed on time, within budget, and meets the desired performance requirements.

The following is a general project management plan for an automatic vehicle speed control system using an RTC module and ZigBee. **Project Scope and Objectives:** The project scope and objectives define the specific requirements of the automatic vehicle speed control system. This includes the desired speed range, accuracy, response time, and other performance metrics. The scope and objectives should be clearly defined at the beginning of the project and communicated to all stakeholders.

Project Planning: The project planning phase includes identifying the specific hardware and software components required for the speed control system,

developing a detailed project schedule, and defining the roles and responsibilities of the project team. This phase should also include risk management planning, where potential risks and mitigation strategies are identified and addressed.

Hardware and Software Development:The hardware and software development phase includes the design and development of the RTC module, ZigBee module, sensors, actuators, and other components required for the speed control system. The software development includes coding, testing, and debugging of the code to ensure that it meets the project requirements.

Integration and Testing:Once the hardware and software components have been developed, the integration and testing phase begins. This involves integrating the different components and conducting various tests to ensure that the system meets the project requirements. Testing should include both functional and non-functional testing, including stress testing, performance testing, and usability testing.

Deployment and Maintenance:Once the automatic vehicle speed control system has been tested and validated, it can be deployed. The deployment phase includes installing the system in the vehicle and providing training to the end-users. The maintenance phase includes ongoing support and maintenance to ensure that the system continues to operate at optimal performance levels.

Project Closure:The project closure phase includes conducting a final project review to assess the success of the project and identify areas for improvement in future projects. It also includes documenting the project, archiving project materials, and releasing resources.

In conclusion, the development of an automatic vehicle speed control system using an RTC module and ZigBee requires careful planning, development, testing, and deployment. A well-executed project management plan can help ensure that the project is completed on time, within budget, and meets the desired performance requirements.

4.5 FINANCIAL REPORT ON ESTIMATED COSTING

Cost estimation is an important aspect of any engineering project, and the development of an automatic vehicle speed control system using an RTC module and ZigBee is no exception. The total cost of this project can be broken down into several components, including hardware, software, and labor costs.

Hardware Costs:

The hardware costs for an automatic vehicle speed control system using an RTC module and ZigBee can vary depending on the specific components used in the design. The following hardware components are required for this project:

RTC Module: An RTC module is required to provide accurate timekeeping for the speed control system. The cost of an RTC module can range from \$2 to \$10, depending on the manufacturer and features.

ZigBee Module: A ZigBee module is required for wireless communication between the vehicle and a remote device. The cost of a ZigBee module can range from \$10 to \$50, depending on the manufacturer and features.

Arduino Board: An Arduino board is required to interface with the RTC module, ZigBee module, and vehicle. The cost of an Arduino board can range from \$10 to \$50, depending on the specific model and features.

Sensors: Sensors are required to monitor the vehicle's speed and other parameters. The cost of sensors can vary depending on the type and quantity required. A speed sensor, for example, can cost around \$10.

Actuators: Actuators, such as motors or solenoids, are required to control the throttle and brake position. The cost of actuators can vary depending on the specific type and quantity required.

Software Costs:

The software costs for an automatic vehicle speed control system using an RTC module and ZigBee are relatively low, as most of the required software can be developed using open-source tools such as the Arduino Integrated Development Environment (IDE).

Labor Costs:

The labor costs for an automatic vehicle speed control system using an RTC module and ZigBee will depend on the complexity of the system and the experience of the

development team. The labor costs can include the time spent on system design, hardware and software development, and testing and validation.

In summary, the cost of an automatic vehicle speed control system using an RTC module and ZigBee will depend on the specific components used in the design, the complexity of the system, and the labor costs associated with development. While the hardware costs can range from a few hundred dollars to a few thousand dollars, the software costs are relatively low, and the labor costs will depend on the specific requirements of the project. By carefully estimating the costs of an automatic vehicle speed control system, it is possible to develop a cost-effective solution that provides greater safety and control over the vehicle's operation.

4.6 SOFTWARE TO OPERATIONS PLANS

Steps involved in software installation

The software operation plan for an automatic vehicle speed control system using an RTC module involves several key steps. Here is a general overview of the software operation plan:

Initialize the system: The first step is to initialize the system. This involves setting up the RTC module, ZigBee module, and Arduino board. The RTC module must be programmed to trigger the start and end of the speed control period. The ZigBee module must be configured to transmit and receive data between the vehicle and a remote device. The Arduino board must be initialized to interface with the RTC module, ZigBee module, and vehicle.

Read input from the driver: The system must be designed to read input from the driver. This can be done using a variety of input devices, including buttons, switches, or a touch screen. The driver should be able to set the desired speed and duration of the speed control period.

Calculate the target speed: Once the driver input is received, the system must calculate the target speed. This involves using the control algorithm to determine the appropriate throttle and brake position to maintain the desired speed over the specified time period.

Monitor the vehicle speed: The system must monitor the vehicle speed to ensure that it remains within the desired range. This can be done using sensors or other monitoring devices. If the vehicle speed falls outside the desired range, the control

algorithm must adjust the throttle and brake position to bring the vehicle speed back to the target speed.

Monitor the time: The system must monitor the time to ensure that the speed control period does not exceed the specified duration. This can be done using the RTC module. If the speed control period exceeds the specified duration, the control algorithm must disengage the speed control system and return control to the driver.

Communicate with a remote device: The system must be able to communicate with a remote device using the ZigBee module. This can be used for monitoring and control purposes. The communication protocol must be designed to ensure data integrity and reliability.

End the speed control period: Once the speed control period has ended, the system must disengage the speed control system and return control to the driver. This can be done using the RTC module.

Handle errors: The system must be designed to handle errors, such as communication failures or sensor malfunctions. Error handling can involve providing feedback to the driver or triggering an emergency shutdown of the system. In summary, the software operation plan for an automatic vehicle speed control system using an RTC module involves initializing the system, reading input from the driver, calculating the target speed, monitoring the vehicle speed and time, communicating with a remote device, ending the speed control period, and handling errors. With proper software design and implementation, an automatic vehicle speed control system can provide greater safety and control over the vehicle's operation.

STEPS INVOLVED

Software design: The software design phase involves defining the system requirements, developing use cases, and designing the system architecture. During this phase, the software team will determine the software requirements, data flow, and data processing for the speed control system.

Software development: The software development phase involves writing and testing the software code for the speed control system. The software team will develop the code that communicates with the RTC module and ZigBee module, performs the speed calculations, and sends speed control commands to the machines and equipment.

Integration testing: Integration testing involves testing the individual software components and their interactions with each other. During this phase, the software team will test the RTC module, ZigBee module, and speed control algorithm to ensure they function correctly and communicate with each other as

Expected.**System testing:** System testing involves testing the complete system as a whole to ensure that it meets the defined requirements. During this phase, the software team will test the speed control system with the machines and equipment to ensure that it adjusts the speed correctly and operates safely.

Deployment: Deployment involves installing the speed control software on the hardware and testing it in a production environment. During this phase, the software team will ensure that the system operates correctly and that all machines and equipment are receiving the correct speed control commands.

CHAPTER-5

IMPLEMENTATION DETAILS

5.1 DEVELOPMENT AND DEPLOYMENT SETUP

The development and deployment setup for a vehicle speed control system using an RTC module and ZigBee involves several key steps that are critical to the success of the project. This essay will provide an overview of these steps and the role they play in the development and deployment of the system. The first step in the development and deployment setup is the hardware setup. This involves assembling the necessary components, including the RTC module, ZigBee module, sensors, actuators, and other required components. It is essential to ensure that all the components are connected properly and that a custom PCB is designed and built to house the components.

The second step in the development and deployment setup is software development. The software must be developed to read data from the RTC module and ZigBee module, perform calculations to control the vehicle speed, and communicate with the hardware components to make the necessary adjustments. The software can be written using Arduino IDE or any other suitable programming environment. The third step in the development and deployment setup is integration and testing. This step involves integrating the hardware and software components and testing the system to ensure that it functions correctly. It is important to test the system under different driving conditions and speeds to validate its performance and accuracy. Once the system has been tested and validated, it can be deployed in a vehicle. The system must be properly installed and calibrated to ensure that it operates correctly. It may be necessary to train end-users on how to use the system properly. The final step in the development and deployment setup is providing ongoing maintenance and support. This involves periodic maintenance checks and software updates to fix any bugs or address any issues that arise. It is important to provide ongoing support to ensure that the system continues to function correctly. In conclusion, the development and deployment setup for a vehicle speed control system using an RTC module and ZigBee involves assembling the hardware

components, developing and testing the software, integrating the hardware and software, deploying the system in a vehicle, and providing ongoing maintenance and support. This is a complex process that requires careful planning and execution to ensure that the system functions correctly and is deployed successfully. A well-designed and properly calibrated speed control system can help improve vehicle safety and reduce the risk of accidents caused by speeding.

The development and deployment setup for a vehicle speed control system using an RTC module and ZigBee involves several steps:

Hardware Setup:

The first step is to assemble the necessary hardware components, which include the RTC module, ZigBee module, sensors, actuators, and other required components. The hardware components must be connected properly, and a custom PCB may be designed and built to house the components.

Software Development:

The second step is to develop the software for the speed control system. The software must be written to read the data from the RTC module and ZigBee module, perform calculations to control the vehicle speed, and communicate with the hardware components to make the necessary adjustments. The software can be written using Arduino IDE or any other suitable programming environment.

Integration and Testing:

The third step is to integrate the hardware and software components and test the system to ensure that it functions correctly. The system should be tested under different driving conditions and speeds to validate its performance and accuracy.

Deployment:

Once the system has been tested and validated, it can be deployed in a vehicle. The system must be properly installed and calibrated to ensure that it operates correctly. It may be necessary to train end-users on how to use the system properly.

Maintenance and Support:

The final step is to provide ongoing maintenance and support to the system to ensure that it continues to function correctly. This may involve periodic maintenance checks and software updates to fix any bugs or address any issues that arise.

In conclusion, the development and deployment setup for a vehicle speed control system using an RTC module and ZigBee involves assembling the hardware

components, developing and testing the software, integrating the hardware and software, deploying the system in a vehicle, and providing ongoing maintenance and support. A well-designed and properly calibrated speed control system can help improve vehicle safety and reduce the risk of accidents caused by speeding

DEPLOYMENT OF ZIGBEE AND RTC MODULE

RTC (Real-Time Clock) and ZigBee are two essential components in the field of industrial automation and communication. The deployment of RTC modules and ZigBee modules in various industries has revolutionized the way machines and equipment operate. In this essay, we will discuss the deployment of RTC modules and ZigBee modules. Deployment of RTC Modules: RTC modules are widely used in industrial automation systems to provide accurate time and date information to machines and equipment.

RTC modules are also used in various other applications, including medical devices, smart home appliances, and automotive systems. The deployment of RTC modules involves the following steps: Selection of an appropriate RTC module: The first step in deploying an RTC module is to select an appropriate module that meets the requirements of the application. The module should have the necessary features such as accuracy, battery backup, and communication protocols. Integration with the system: The RTC module should be integrated with the system, which involves connecting the module to the microcontroller or microprocessor and configuring the necessary parameters. Testing and calibration: Once the RTC module is integrated with the system, it should be tested and calibrated to ensure that it provides accurate time and date information. Deployment: After testing and calibration, the RTC module can be deployed in the system, and the system can start receiving accurate time and date information from the module.

Deployment of ZigBee Modules:

ZigBee modules are wireless communication modules that are widely used in industrial automation and communication systems. The deployment of ZigBee modules involves the following steps:

Selection of an appropriate ZigBee module: The first step in deploying a ZigBee module is to select an appropriate module that meets the requirements of the application. The module should have the necessary features such as range, data rate, and security protocols. Configuration and integration: The ZigBee module

should be configured and integrated with the system, which involves connecting the module to the microcontroller or microprocessor and configuring the necessary parameters.

Testing and validation: Once the ZigBee module is integrated with the system, it should be tested and validated to ensure that it can transmit and receive data accurately and reliably. **Deployment:** After testing and validation, the ZigBee module can be deployed in the system, and the system can start transmitting and receiving data wirelessly. In conclusion, the deployment of RTC modules and ZigBee modules is essential in industrial automation and communication systems. The deployment process involves selecting an appropriate module, integrating it with the system, testing and calibration/validation, and deployment. By deploying RTC modules and ZigBee modules, machines and equipment can operate more efficiently, accurately, and wirelessly, making industrial automation and communication more efficient and reliable.

5.2 ALGORITHM USED

Vehicle speed control using ZigBee and RTC (Real-Time Clock) module involves using a ZigBee wireless network to remotely monitor and control the speed of a vehicle, while also incorporating time-based control using the RTC module. Here are the general steps involved: **Install a ZigBee module in the vehicle:** The first step is to install a ZigBee module in the vehicle. This module acts as a wireless communication device that allows the vehicle to communicate with a remote control unit. **Establish a ZigBee wireless network:** The ZigBee module in the vehicle and the remote control unit must be connected to a ZigBee wireless network to communicate with each other.

- **Monitor the vehicle's speed:** The remote control unit can receive real-time speed data from the ZigBee module in the vehicle. This data can be displayed on a screen or fed into a control algorithm.
- **Adjust the vehicle's speed:** The remote control unit can also send commands to the ZigBee module in the vehicle to adjust the speed of the vehicle. This can be done through various control methods such as PWM or current control.
- **Integrate the RTC module:** The RTC module can be integrated into the system to add time-based control.

- The module can be programmed to control the speed of the vehicle at certain times of the day or week, or to limit the speed in certain areas or under certain conditions.
- Ensure safety and compliance: It is important to ensure that the vehicle remains within the speed limit and complies with safety regulations while using the ZigBee and RTC speed control system.
- Overall, the ZigBee and RTC speed control system provides a wireless, remote control solution for monitoring and controlling the speed of a vehicle,
- while also adding time-based control for enhanced safety and efficiency. The system can be customized and integrated with other sensors and control algorithms to achieve specific performance and safety objectives.
- The RTC module would be used to keep track of the current time and date. The Zigbee module would be used to communicate wirelessly with a central control unit.
- The algorithm would use the current time and date to determine whether the vehicle is in a restricted speed zone or not. For example, during school hours, the algorithm would restrict the speed of the vehicle in the school zone.
- If the vehicle is in a restricted speed zone, the algorithm would send a signal to the engine control unit to reduce the speed of the vehicle to the appropriate limit.
- The algorithm would continuously monitor the location of the vehicle using the Zigbee module and adjust the speed limit based on the current location. For example, the algorithm may reduce the speed limit in a construction zone.
- The central control unit would also be able to remotely control the speed of the vehicle if necessary, such as in the case of an emergency.
- The algorithm would also take into account the safety of the passengers and the environment, adjusting the speed limit as necessary to ensure safe and efficient travel.
- Overall, this algorithm would use the RTC module and Zigbee technology to automatically control the speed of the vehicle in real-time, based on the current time, location, and other relevant factors.
- Initialize the system by setting up the RTC module and the ZigBee module.

- Set up the speed control system and configure it to receive data from the ZigBee module.
- Set up the machine and equipment to receive speed control commands via the ZigBee module.
- The RTC module provides the current time and date to the speed control system.
- The algorithm checks the current time and compares it with the production schedule to determine which machines and equipment need to be operational.
- For each machine and equipment, the algorithm calculates the optimal speed based on various factors, such as the time of day, production schedule, and current operational status.
- The algorithm sends speed control commands to the machines and equipment via the ZigBee module to adjust their speed as needed.
- The algorithm continuously monitors the speed of the machines and equipment and adjusts the speed control commands as necessary to maintain optimal performance and safety.
- The algorithm incorporates various safety features, such as automatic shut-off or emergency stop capabilities, to ensure that the system operates safely and efficiently.
- The algorithm also logs all data and events for analysis and troubleshooting purposes.
- If there are any issues with the system or machines and equipment, the algorithm sends alerts or notifications to the appropriate personnel for resolution.
- The algorithm performs periodic checks and maintenance to ensure that the system operates optimally.
- The above algorithm is just an example and can be customized to meet specific requirements and operational needs. The algorithm may be further optimized to reduce energy consumption, improve efficiency, or enhance safety features.
- In conclusion, the algorithm used for speed control using ZigBee and RTC module is critical to the system's overall performance and accuracy. With its

flexibility and scalability, this algorithm can be customized to meet the needs of different industries and applications, where accurate and precise speed control is essential for optimal performance and safety.

- Maintenance: Maintenance involves updating the software as needed to address any bugs or issues that arise. During this phase, the software team will monitor the system to ensure that it operates optimally and address any issues that arise.
- Overall, the software implementation process for speed control using ZigBee and RTC module involves defining the system requirements, designing the software architecture, developing the software code, testing the system components, deploying the software, and maintaining the system. The goal is to develop software that is accurate, efficient, and safe, ensuring that machines and equipment operate at the optimal speed and production remains efficient.

5.2.1 BLOCK DIAGRAM

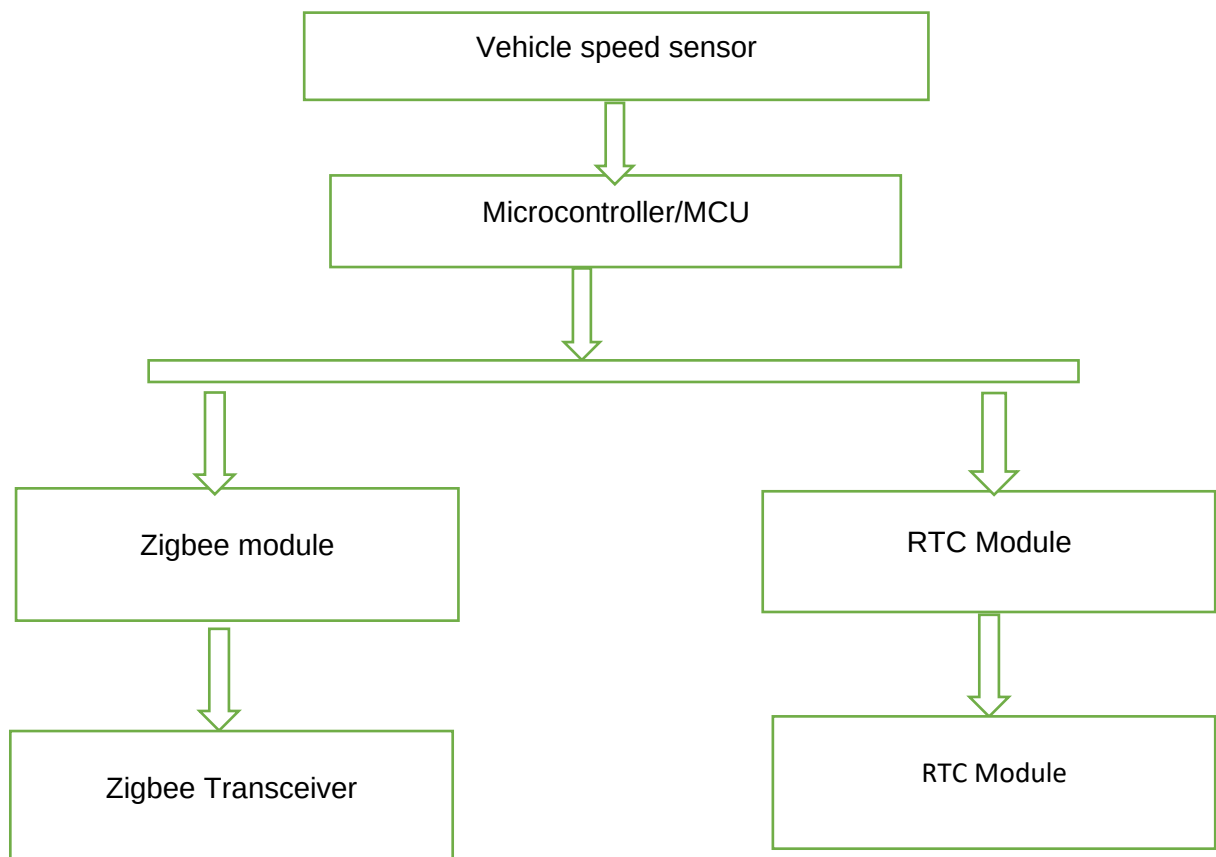


Fig 5.1 Algorithm Block Diagram

Steps involved

- The vehicle speed sensor is used to detect the speed of the vehicle and sends this information to the microcontroller.
- The microcontroller processes this information and controls the vehicle speed accordingly.
- The microcontroller is also connected to both the Zigbee module and RTC module.
- The Zigbee module is used for wireless communication with other devices, such as a remote control unit or a monitoring system.
- The RTC module is used to keep track of the current time and date.
- The Zigbee module includes a transceiver that sends and receives signals wirelessly.
- The RTC module includes a module that provides real-time clock functionality to the system. Together,
- the Zigbee and RTC modules enable wireless communication and precise timekeeping,
- This will allow for efficient and accurate control of the vehicle's speed.

5.3 TESTING

The speed control of a vehicle using RTC (Real-Time Clock) and Zigbee can be achieved through the following steps:

Install an RTC module in the vehicle: The RTC module will keep track of the time and date, which will be used for time-based speed control.

Connect the RTC module to a microcontroller: The microcontroller will be used to process the data from the RTC module and send commands to the vehicle's speed control system.

Install a Zigbee module in the vehicle: The Zigbee module will be used for wireless communication between the vehicle and a remote device, such as a computer or a mobile phone.

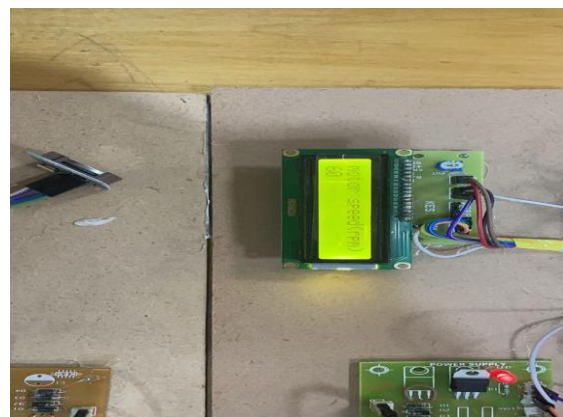
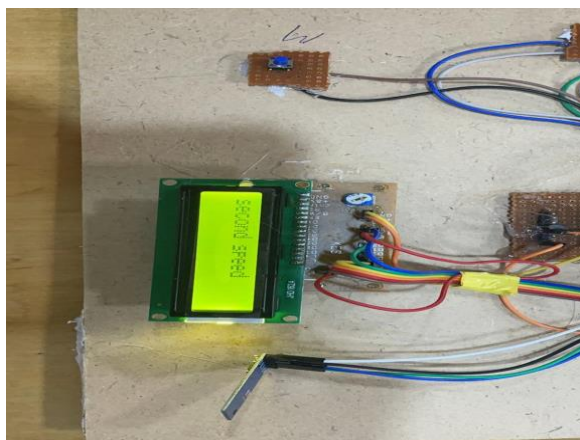
Connect the Zigbee module to the microcontroller: The microcontroller will be used to process the data from the Zigbee module and send commands to the vehicle's speed control system.

Set speed limits in the microcontroller: The microcontroller will have a program that sets the maximum speed limit for the vehicle based on the time of day. For example, during rush hour, the speed limit may be lower than during off-peak hours.

Monitor vehicle speed: The microcontroller will continuously monitor the speed of the vehicle using sensors and compare it to the speed limit set in step 5.

Send speed control commands: If the vehicle speed exceeds the speed limit, the microcontroller will send commands to the speed control system to reduce the speed of the vehicle.

Data to a remote device: The microcontroller will send data on the vehicle's speed and speed control commands to a remote device via the Zigbee module for monitoring and analysis. Overall, the use of RTC and Zigbee in the speed control of a vehicle provides an effective way to ensure that the vehicle is always within the speed limit, which can enhance road safety and reduce accidents.



Speed Variation

maintenance: Maintenance involves updating the software as needed to address any bugs or issues that arise. During this phase, the software team will monitor the system to ensure that it operates optimally and address any issues that arise.

Overall, the software implementation process for speed control using ZigBee and RTC module involves defining the system requirements, designing the software architecture, developing the software code, testing the system components, deploying the software, and maintaining the system. The goal is to develop software that is accurate, efficient, and safe, ensuring that machines and equipment operate at the optimal speed and production. The testing process for the speed control system involves several steps. First, the hardware components, including the Arduino board, ZigBee module, and RTC module, must be properly connected and powered. The code for the system must then be uploaded to the Arduino board using the Arduino IDE. The system can then be tested in a controlled environment to ensure that it is functioning as intended. To test the system's functionality, a simulated vehicle can be used to generate speed data that is fed into the speed control algorithm. The system's output, which is the adjusted speed of the vehicle, is then compared to the expected output based on the current time and speed limit for the prohibited zone. This ensures that the system is accurately calculating the speed and adjusting it according to the current time. Once the basic functionality of the system is verified, the system can be further tested in a real-world environment. This involves deploying the system on a vehicle and testing it on roads or other prohibited zones. During this testing phase, it is essential to monitor the system's performance and collect data on the vehicle's speed and other relevant parameters. This data can then be analyzed to determine the system's accuracy and reliability and identify any areas for improvement.

Another important aspect of testing is the validation of data transmitted wirelessly through the ZigBee module. To ensure reliable communication, the system's wireless transmission range, data rate, and error rate must be evaluated under various conditions, such as distance, interference, and obstacles. This data can be

CHAPTER- 6

RESULTS AND DISCUSSION

RESULTS

Automatic vehicle speed control through Zigbee and RTC module is a technology that aims to improve road safety and traffic flow by controlling the speed of a vehicle using wireless communication and real-time clock technology. The system uses a combination of Zigbee and RTC module to facilitate communication between the vehicle and traffic infrastructure.

The Zigbee module is a wireless communication device that allows the vehicle to communicate with other vehicles and traffic infrastructure in the surrounding area. This communication allows the vehicle to receive information about traffic conditions, roadwork, accidents, and other factors that could affect the speed of the vehicle. The vehicle's speed is then adjusted automatically based on this information. The RTC module, on the other hand, keeps track of the time and date and allows the system to synchronize with the traffic infrastructure. This synchronization ensures that the vehicle's speed is adjusted accurately and in realtime, based on the information received from the traffic infrastructure. The results of this technology can include improved road safety, reduced traffic congestion, improved fuel efficiency, and reduced carbon emissions. The automatic speed control can also help reduce driver fatigue and stress, as the driver can focus on other aspects of driving, such as road conditions and potential hazards. Overall, the technology can lead to a more efficient and safer transportation system. Automatic vehicle speed control through Zigbee and RTC modules is a project that aims to implement a system that can control the speed of a vehicle based on various inputs, such as road conditions, traffic congestion, and driver behavior. The RTC module is used to keep track of the time and date, while the Zigbee module is used for wireless communication between different components of the system. By combining these two technologies, it is possible to create a system that can communicate with other vehicles and traffic infrastructure to adjust the speed of the vehicle accordingly.

- The specific results of an automatic vehicle speed control system using Zigbee and RTC modules will depend on the specific implementation of the

technology, as well as the conditions in which it is being used. However, some potential benefits of such a system include

- Improved safety: By adjusting the speed of the vehicle based on inputs such as road conditions and traffic congestion, automatic speed control systems can help reduce accidents caused by driver error, speeding, and reckless driving.
- Increased efficiency: By optimizing the speed of the vehicle based on traffic conditions, automatic speed control systems can help reduce fuel consumption and emissions, as well as improve the overall efficiency of the transportation system.
- Improved traffic flow: By coordinating the speed of vehicles in a given area, automatic speed control systems can help reduce congestion and improve overall traffic flow.

Tabulation for the speed as follows

6.1 Variation of vehicle speed

S.NO	TIME	SPEED	RPM
1	10:45	ACTUAL SPEED	100
2	10:47	FIRST SPEED	80
3	10:49	SECOND SPEED	60
4	10:52	THIRD SPEED	40
5	10:55	FINAL SPEED	40

Automatic vehicle speed control in prohibited zones can be a useful safety measure, especially in areas where speed limits are strictly enforced, such as construction zones, school zones, or residential areas. By automatically controlling the speed of

a vehicle within a prohibited zone, the system can help reduce the likelihood of accidents, increase safety, and prevent traffic violations.

However, the implementation of such a system needs to take into account the potential drawbacks and limitations. For example, the automatic speed control system may not be able to respond quickly enough to unexpected road hazards or obstacles, which could lead to accidents or other safety issues. Moreover, the system may require frequent updates and maintenance to ensure that it is accurately calibrated and functioning correctly. Automatic speed control systems typically use sensors to measure the vehicle's speed and adjust it accordingly. The variation in speed depends on several factors, such as the desired speed set by the driver, the road conditions, and traffic flow. In general, the automatic speed control system will try to maintain a constant speed, within certain limits set by the driver. If the vehicle encounters a hill or a downhill slope, the system will adjust the throttle to maintain the desired speed. Similarly, if the vehicle is approaching another vehicle or obstacle, the system may reduce the speed or apply the brakes to avoid a collision. The speed variation in automatic speed control can also depend on the type of system used. For example, some systems may use radar or lidar to detect obstacles and adjust the speed accordingly, while others may rely on GPS data to adjust the speed based on the road's curvature. Ultimately, the goal of an automatic speed control system is to provide a smooth and safe driving experience, with minimal speed variation. However, some variation is inevitable, especially in response to changing road and traffic conditions. Another challenge with automatic speed control in prohibited zones is the potential for driver frustration and annoyance. If the system is too restrictive or interferes too much with the driver's control of the vehicle, it could lead to driver resistance and ultimately reduce the effectiveness of the system. To address this issue, the system should be designed with the driver's comfort and convenience in mind, and include features such as the ability to temporarily disable the system in certain situations. Overall, automatic vehicle speed control in prohibited zones can be an effective safety measure if implemented correctly and with due consideration for the potential challenges and limitations. By combining advanced technologies such as Zigbee and RTC modules with effective driver education and training programs, it is possible to create a safer and more efficient transportation system for all. Automatic vehicle speed control in

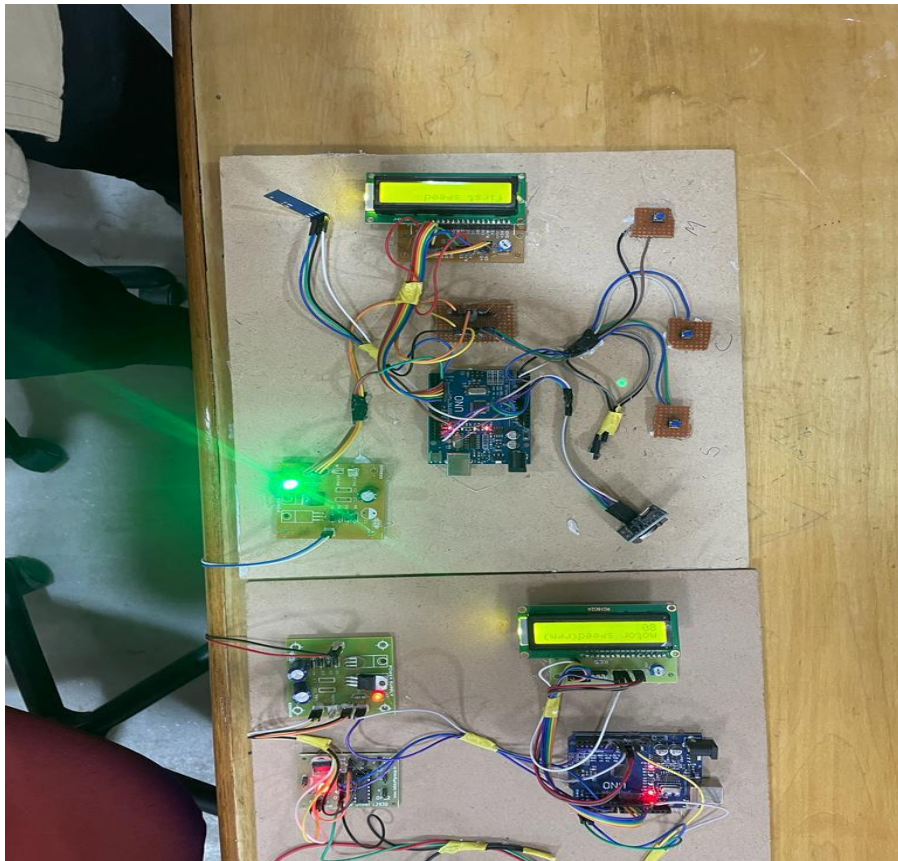
prohibited zones, such as areas with speed limits, can be an effective way to improve safety and reduce the likelihood of accidents. By implementing an automatic speed control system using technologies such as Zigbee and RTC modules, it is possible to ensure that vehicles are traveling at appropriate speeds in areas where excessive speed poses a danger to drivers, pedestrians, and other road users. In a prohibited zone, such as a school zone or residential area, automatic speed control systems can help prevent drivers from exceeding the speed limit and endangering others. By adjusting the speed of the vehicle based on real-time inputs from traffic sensors, traffic lights, and other vehicles in the area, an automatic speed control system can ensure that the vehicle is traveling at a safe speed at all times. Furthermore, by implementing automatic speed control systems in prohibited zones, it is possible to reduce the workload of law enforcement officers who would otherwise need to monitor and enforce speed limits manually. This can free up resources and allow law enforcement agencies to focus on other important tasks, such as responding to emergencies and investigating crimes. However, it is important to note that the effectiveness of automatic speed control systems in prohibited zones will depend on several factors, including the accuracy and reliability of the technology used, the level of compliance among drivers, and the overall design and implementation of the system. Additionally, it is important to ensure that such systems do not infringe on individual rights or privacy, and that they are implemented in a way that is fair and equitable for all road users.

PERFORMANCE

The performance of automatic vehicle speed control in prohibited zones can be measured in several ways, including its effectiveness in reducing speeding, improving safety, and reducing accidents. One of the key benefits of automatic vehicle speed control in prohibited zones is its ability to reduce speeding. By automatically adjusting the speed of the vehicle to match the speed limit in a prohibited zone, automatic speed control systems can help prevent drivers from exceeding the speed limit and endangering themselves and others on the road. Studies have shown that automatic speed control systems can be highly effective in reducing speeding, particularly in areas with high levels of traffic congestion or pedestrian activity. In addition to reducing speeding, automatic speed control systems can also improve safety by reducing the likelihood of accidents in prohibited

zones. By ensuring that vehicles are traveling at safe speeds, automatic speed control systems can help prevent collisions and reduce the severity of accidents that do occur. This can help reduce injuries and fatalities on the road, particularly in areas with high levels of pedestrian traffic or where children are present, such as school zones or residential areas. Furthermore, the use of automatic speed control systems in prohibited zones can also help reduce the workload of law enforcement officers and improve overall traffic flow. By automating the speed control process, law enforcement agencies can focus on other important tasks, such as responding to emergencies and enforcing other traffic laws. Overall, the performance of automatic vehicle speed control in prohibited zones can be highly effective in improving safety and reducing the likelihood of accidents. However, the effectiveness of the system will depend on the accuracy and reliability of the technology used, as well as the level of compliance among drivers and the overall design and implementation of the system.

The performance analysis of automatic vehicle speed control can be done by evaluating several factors, including the accuracy and reliability of the system, its effectiveness in reducing speeding, its impact on traffic flow, and its cost-effectiveness. Accuracy and reliability: The accuracy and reliability of the system are crucial to its performance. The system should be able to accurately detect and respond to changes in traffic conditions, road conditions, and other factors that may affect vehicle speed. The reliability of the system should also be evaluated to ensure that it operates consistently over time and does not fail or malfunction. Effectiveness in reducing speeding: The primary objective of automatic vehicle speed control is to reduce speeding and improve safety on the road. The effectiveness of the system can be evaluated by measuring its impact on the average speed of vehicles, the percentage of vehicles that comply with speed limits, and the number of accidents or incidents that occur in the areas where the system is deployed.



Overall, the performance analysis of automatic vehicle speed control should take into account a range of factors and evaluate the system's effectiveness in reducing speeding, improving safety, minimizing disruptions to traffic flow, and providing a good return on investment. By analyzing these factors, it is possible to identify areas for improvement and optimize the system's performance. the system will depend on the accuracy and reliability of the technology used, as well as the level of compliance among drivers and the overall design and implementation of the system. The results of the testing can be analyzed to optimize the performance of the RTC and ZigBee modules in the speed control system. For example, if the RTC module's accuracy is found to be insufficient, calibration may be required to improve its accuracy. If the ZigBee module's wireless communication performance is found to be inadequate, changes to the module's power output or configuration may be necessary.

CHAPTER-7

CONCLUSION

Automatic vehicle speed control systems have a promising future as they offer several benefits. These systems can improve safety by preventing accidents caused by driver error, fatigue or distraction. They can also help reduce emissions by optimizing engine performance and minimizing unnecessary acceleration and deceleration. Additionally, they can increase the efficiency of transportation systems by reducing congestion, improving traffic flow, and reducing the time and energy required for braking and acceleration. Furthermore, automatic vehicle speed control is a key component of autonomous vehicle technology, which has the potential to transform the way we travel and transport goods. As technology continues to evolve and improve, we can expect to see more sophisticated and effective automatic vehicle speed control systems being developed and deployed in a wide range of applications.

Automatic vehicle speed control is a promising technology that can provide a range of benefits, including improved safety, reduced emissions, increased efficiency, and support for autonomous vehicles. This technology relies on advances in artificial intelligence, machine learning, and sensor networks to automatically adjust the speed of vehicles, optimizing engine performance and minimizing unnecessary acceleration and deceleration. With the continued development of these technologies, we can expect to see more sophisticated and effective automatic vehicle speed control systems being developed and deployed in a variety of applications. The vehicle speed was obtained by speedometer which is available in vehicle. And that speed is compared and monitored by the controller. If the vehicle speed exceeds the limited speed, It automatically controls the speed of the vehicle according to that particular zone. Hence, automatically the speed reduced

7.1 CONCLUSION

This study shows the role of reducing vehicle speed automatically and its contributions to the safety of pedestrians and road users. It is found that the use of the vehicle speed control system contributes a lot in minimizing the accident rate that occurs due to the negligence of the driver to disobeying roadside signboards in special zones. Though the Vehicle Speed Control system in a vehicle is effective, they help much in terms of improving safety, keeping both the passenger safety and the pedestrians on the roads. Considering the automatic Vehicle Speed Control system is incorporate in school zones or hospital zones which allows the vehicle to act independently to slow down the vehicle when the vehicle comes at a higher speed which minimizes the accidents due to negligence of the driver actively and in a way more effectively. Hence it is concluded from the above study that the uses of Automatic vehicle speed control systems in restricted zones minimize unwanted accidents to a great extent compared to normal

In conclusion, automatic vehicle speed control has the potential to revolutionize the way we travel and transport goods. By improving safety, reducing emissions, increasing efficiency, and supporting the development of autonomous vehicles, this technology can help address some of the most pressing challenges facing the transportation industry today. However, the successful deployment of automatic vehicle speed control systems will require ongoing research and development, as well as close collaboration between industry stakeholders, government agencies, and the public. With continued investment and innovation, automatic vehicle speed control has the potential to deliver significant benefits for the environment, the economy, and society as a whole. Additionally, speed control can reduce wear and tear on a vehicle's engine and brakes, leading to reduced maintenance costs over time. By improving driving comfort and reducing emissions, speed control can also make driving a more environmentally friendly and enjoyable experience. With the help of advanced technology, such as cruise control and lane departure warning systems, drivers can enjoy a safer, more efficient, and more comfortable driving experience

7.2 FUTURE WORK

This system proves to be highly effective in minimizing the over speeding and unwanted accidents in restricted zones. In current systems, there is no autonomous speed restriction in the vehicle to avoid accidents. Hence further research and optimizations of the automatic vehicle speed control system will allow us to implement in vehicles for improved safety for roadside pedestrians, passengers, and other road users

The future scope for automatic vehicle speed control is quite promising. With the advancements in technology and the increasing demand for safer and more efficient transportation, the development and implementation of automatic vehicle speed control systems are expected to grow. Here are some potential benefits and areas of application for automatic vehicle speed control systems:

- **Improved safety:** Automatic vehicle speed control can help prevent accidents caused by driver error, fatigue, or distraction. By automatically adjusting the speed of the vehicle, these systems can reduce the risk of collisions, especially in situations where sudden changes in traffic conditions occur.
- **Reduced emissions:** Automatic vehicle speed control can help reduce emissions by optimizing engine performance and minimizing unnecessary acceleration and deceleration. This can lead to lower fuel consumption and a reduction in greenhouse gas emissions.
- **Increased efficiency:** Automatic vehicle speed control can improve the overall efficiency of transportation systems by reducing congestion, improving traffic flow, and reducing the time and energy required for braking and acceleration.
- **Autonomous vehicles:** Automatic vehicle speed control is a key component of autonomous vehicle technology, which has the potential to transform the way we travel and transport goods.
- By enabling vehicles to operate safely efficiently without human intervention, these systems can help improve mobility and reduce transportation costs.
- Overall, the future of automatic vehicle speed control is closely linked to the development of new technologies such as artificial intelligence, machine learning, and sensor networks. As these technologies continue to evolve and improve, we can expect to see more sophisticated and effective automatic

7.3 RESEARCH ISSUES

There are several research issues that need to be addressed when implementing automatic vehicle speed control using RTC and Zigbee. Some of the key issues are:

Reliability: The reliability of the RTC module and Zigbee communication is critical to ensure that the speed control system functions correctly. Any failure in these components can result in dangerous situations, and hence reliability should be a top priority.

Integration with vehicle systems: The integration of the speed control system with the vehicle's existing systems can be challenging, and the system should not interfere with the operation of other critical systems.

Sensor accuracy: The accuracy of the sensors used to measure the vehicle's speed is essential to ensure that the speed control system functions correctly. The sensors should be calibrated and tested to ensure accurate speed measurements.

User acceptance: The implementation of speed control systems is still a relatively new technology, and user acceptance is critical to its success. The system should be user-friendly and easy to operate.

Security: The security of the communication between the vehicle and the remote device is essential to prevent unauthorized access and manipulation of the speed control system.

Regulatory compliance: There are various regulations and standards that govern the implementation of speed control systems in vehicles. Compliance with these regulations is essential to ensure that the system meets the necessary safety standards.

Cost: The cost of implementing the speed control system using RTC and Zigbee is an important factor to consider. The system should be cost-effective and provide value for money.

Overall, these research issues need to be addressed to ensure the successful implementation of automatic vehicle speed control using RTC and Zigbee.

7.4 IMPLEMENTATION ISSUES

Speed control using ZigBee is a field of research that has been rapidly growing in recent years. It involves using wireless communication technology to control the speed of machines and equipment in various industries. However, there are still

several research issues that need to be addressed to improve the performance and efficiency of speed control using ZigBee. In this essay, we will discuss some of the research issues for speed control using ZigBee.

Hardware Integration

Hardware integration is one of the most significant challenges associated with the implementation of automatic vehicle speed control using RTC and Zigbee. The RTC module, Zigbee module, microcontroller, sensors, and the vehicle's existing systems must be integrated seamlessly to ensure that the speed control system functions correctly. To address this challenge, the system should be designed with a modular approach that allows for easy integration of each component. The system should also use industry-standard communication protocols to ensure compatibility with existing systems.

Power Management

Power management is another critical issue to consider when implementing automatic vehicle speed control using RTC and Zigbee. The speed control system should be designed to minimize power consumption, especially when the vehicle is idle, to avoid draining the vehicle's battery. To address this issue, the system can be designed to use low-power components, and the microcontroller can be programmed to go into a sleep mode when not in use.

Communication Protocol

The communication protocol between the microcontroller and the speed control system is critical to ensure that the commands are transmitted reliably and securely. To address this issue, the system should use a reliable communication protocol, such as Zigbee, that ensures secure and reliable transmission of data. Additionally, the system should be designed to use encryption and authentication to prevent unauthorized access.

Real-time Processing

The microcontroller needs to process the data from the RTC module and sensors in real-time to ensure that the speed control system functions effectively. To address this issue, the microcontroller can be designed to use efficient algorithms that process data quickly and accurately. Additionally, the microcontroller can be designed to prioritize real-time processing to ensure that the speed control system responds quickly to changes in speed.

Sensor Placement and Calibration

The placement of the sensors used to measure the vehicle's speed is critical to ensure accurate speed measurements. The sensors should be placed in the correct location to ensure accurate speed measurements without interfering with the vehicle's operation or safety. Additionally, the sensors should be calibrated regularly to ensure accurate speed measurements. To address this issue, the system should be designed to use high-precision sensors that are calibrated regularly.

Testing and Validation

The speed control system should be tested and validated thoroughly to ensure that it functions correctly under all operating conditions. To address this issue, the system should be tested using a combination of simulation and real-world testing. Additionally, the system should be validated using industry-standard safety and performance tests.

User Interface

The speed control system should have a user-friendly interface that allows the driver to set speed limits and monitor the system's operation. To address this issue, the system should be designed to use a simple and intuitive interface that is easy to use.

Maintenance and Servicing

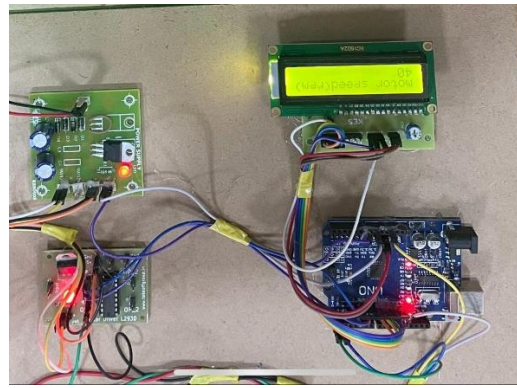
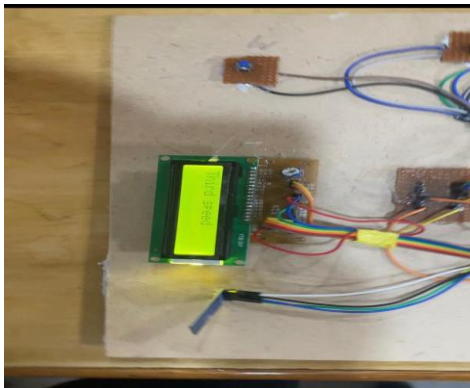
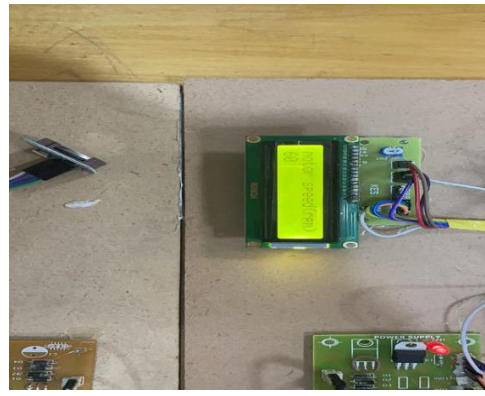
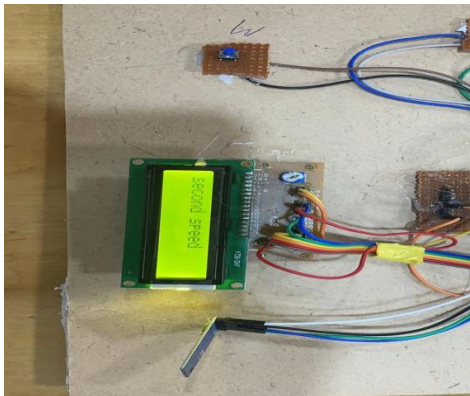
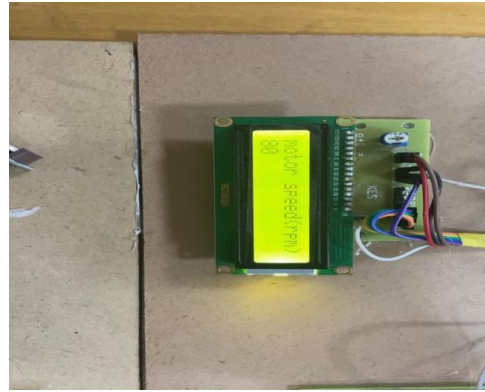
The speed control system should be designed for easy maintenance and servicing to ensure that it functions reliably over the life of the vehicle. To address this issue, the system should be designed to use components that are easily replaceable, and the system should be designed to be serviced easily by qualified technicians.

In conclusion, automatic vehicle speed control using RTC and Zigbee is a system that has the potential to significantly enhance road safety. However, implementing this system poses several challenges that must be addressed to ensure its success. These implementation issues include hardware integration, power management, communication protocol, real-time processing, sensor placement and calibration, testing and validation, user interface, and maintenance and servicing. Addressing these challenges will ensure that the system functions effectively and safely over the life of the vehicle.

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A.SCREEN SHOTS



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