

Design Of Medians Detection For Vehicles

Submitted in fulfillment of the requirements for the award of
Bachelor of Engineering degree in Mechatronics

by

Arun K (39090003)

Nagapatla Yaseer Basha (39090029)



**DEPARTMENT OF MECHATRONICS
SCHOOL OF MECHANICAL ENGINEERING**

SATHYABAMA

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

**Accredited with Grade "A" by NAAC | 12B Status by UGC | Approved by AICTE
JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHENNAI - 600 119**

MAY - 2023

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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **K.Arun (39090003)**, **Nagapatla Yaseer Basha (39090029)** who have done the project work entitled “**DESIGN OF MEDIANS DETECTION FOR VEHICLES**” under our supervision from June 2022 to May 2023.



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Submitted for Viva Voce examination held on ____ May 2023



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DECLARATION

We **K.Arun (39090003), Nagapatla Yaseer Basha (39090029)** hereby declare that the Project Report entitled “**DESIGN OF MEDIANS DETECTION FOR VEHICLES**” done by us under the guidance of **Dr.T.Chinnadurai, M.E., Ph.D.**, is submitted in fulfillment of the requirements for the award of Bachelor of Engineering degree in Mechatronics.

1.



2.



DATE: ____ May 2023

PLACE: Chennai, Tamil Nadu

SIGNATURE OF THE CANDIDATE

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ABSTRACT

Center medians and barriers are critical components of road safety infrastructure that are designed to prevent head-on collisions and other accidents. Unfortunately, these features are frequently missed by drivers, which can lead to a number of accidents. For example, drivers may inadvertently cross over the center median due to distracted driving, drowsiness, or other factors. This can result in head-on collisions, which are among the most serious and deadly types of accidents. One of the reasons why drivers may miss center medians and barriers is because there are often no reflector indicator plates present before the median. This can make it difficult for drivers to see the median, especially at night or in low-light conditions. In addition, improper divider placement, explosive lanes, and other factors can make it even more difficult for drivers to navigate safely. To address this issue, there are several solutions that can be implemented. One approach is to install reflector indicator plates before the median to help drivers see it more clearly. Additionally, motor braking and alarm systems can be used to alert drivers when they are approaching the median. This can help minimize the effects of minor incidents and alert drivers to more serious accidents. Another potential solution is to use different ranges for different types of vehicles. For example, commercial vehicles or low-tech cars may have different ranges and alarms than high-tech vehicles. This can help ensure that drivers are aware of the median and other barriers and can navigate safely. Of course, there are many factors that need to be considered when evaluating center medians and barriers. For example, the placement of the median, the design of the road, and the speed limit all play a role in determining the effectiveness of these safety features. It is important to take a holistic approach to road safety and consider all of these factors when designing and implementing safety infrastructure.

TABLE OF CONTENTS

CHAPTER NO.	TITLE	PAGE No.
	ABSTRACT	v
	LIST OF FIGURES	viii
	LIST OF ABBREVIATIONS	ix
1	INTRODUCTION	1
2	LITERATURE SURVEY	4
	2.1 LANE KEEP ASSISTANT SYSTEM	4
	2.2 AUTONOMOUS VEHICLE	5
	2.3 VEHICLE ALERT SYSTEM	8
	2.4 AUTOMATIC VEHICLE ALERT SYSTEM	10
	2.5 VEHICLE TRACKING SYSTEM	13
	2.6 CAR DRIVING INTELLIGENT AND SAFETY ALERT SYSTEM	15
	2.7 SLEEPINESS WARNING SYSTEM	16
	2.8 LOW SPEED FOLLOWING MODE SYSTEM	17
	2.9 LANE DETECTION AND TRACKING ALGORITHMS	18
	2.10 LANE DEPARTURE WARNING	18
	2.11 LANE CENTERING ASSIST	20
	2.12 AUTOMATED LANE KEEPING SYSTEM	21
	2.13 EMERGENCY LANE KEEPING	23
3	AIM AND SCOPE OF THE INVESTIGATION	25
4	MATERIALS AND EXPERIMENTAL METHOD	26
	4.1 SOFTWARE	27
	4.2 MICRO CONTROLLER	27
	4.3 PROXIMITY SENSOR	28
	4.4 ULTRASONIC SENSOR	29
	4.5 LED INTERFACING	31
	4.6 DC MOTOR	33

CHAPTER NO.	TITLE	PAGE No.
4	4.7 MOTOR DRIVE SHIELD	35
	4.8 RELAY	36
	4.9 PROGRAMMING	38
	4.9.1 Arduino Uno	38
	4.9.2 Arduino Mega	42
5	RESULTS AND DISCUSSION	47
6	SUMMARY AND CONCLUSIONS	50
	REFERENCES	51
	ANNEXURE	54

LIST OF FIGURES

FIGURE NUMBER	TITTLE	PAGE NO
5.1	Model working flowchart	47
5.2	Bottom View Of The Prototype	48
5.3	Top View Of The Prototype	48
5.4	when there is no detection	49
5.5	When the s2 front right and s3 rear right sensor is detected	49

LIST OF ABBREVIATIONS

ESP	Electronic stability program
SAE	Society of Automotive Engineers
AVS	Autonomous vehicle system
VAS	Vehicle alert Systems
FCW	Forward Collision Warning
LDW	Lane Departure Warning
BSW	Blind Spot Warning
RCTAS	Rear Cross Traffic Alert system
IOT	Internet of Things

CHAPTER 1

INTRODUCTION

Globally, at least one person each minute passes away in a car accident. A minimum of 10 million people are injured each year in motor vehicle accidents, with 2 to 3 million of those suffering serious injuries. Passing lane safety precautions Most drivers prefer to overtake in passing lanes. The majority of persons felt safe when using a passing lane, whereas the majority felt unsafe when using the opposing lane[1]. Only 50% of respondents mentioned pulling back mid-move when passing on multiple lane, two-way freeways. At the beginning of the passing lane and at the end of the passing lane, unsafe tailgating and unsafe merging were both observed by more than half of the respondents. More than half of those surveyed mentioned risky passing actions outside of the passing lane. [1] According to the survey, respondents are aware of the safety benefits of using the passing lane. They might have a tendency to overtake in passing lanes because they generally feel safer doing so. The value of passing lanes as a place to be for drivers. Passing lanes are valuable to drivers because they provide a place where they can safely overtake. Although this study did not quantify this benefit, it appears to be a significant aspect of passing lanes and might be taken into account when making investment decisions on passing lanes. While passing lanes seemed to offer safety benefits, road users were nonetheless able to report tailgating at the beginning of the passing lane and dangerous merging at the end of the passing lane, but not frequently. If there are any further issues that may be solved to lessen the reported unsafe tailgating and merging into passing lanes, it is advised that these issues be further studied. According to IRC, the Republic of India's roads are this wide. Roadway dimensions for national roads (NH), state highways (SH), major district roads (MDR), other district roads, and village roads (VR) are standardized for routes in the Republic of India. The pavement or highway is the part of the road that is built up over which traffic is expected to maneuver. The width of each lane and the number of lane segments that are to be built determine the pavement dimension. [2] In general, the width of the road is three.75 meters for single-lane traffic and seven meters for two-lane traffic, so each lane must have a minimum width of three.5 meters. On the edge of

the road, shoulders are present and designed to accommodate stopping cars, serve as an emergency lane for moving vehicles, and offer lateral support. The shoulder needs to be strong enough to support a fully loaded truck even in bad weather. For providing an operating space, shoulder measurements should be required. According to the guidelines and principles of the Indian Road Congress (IRC), the ideal and conventional width of a national and throughway should be twelve meters wide. This is employed when crossing and passing. This contains a three.75 m wide roadway and a four m wide shoulder on either side of the single lane of traffic. A center median accident is a type of traffic accident that occurs when a vehicle collides with the raised or lowered strip of land that separates opposing lanes of traffic on a highway or freeway. These accidents can be caused by a variety of factors, including driver error, poor road conditions, or external factors such as weather or wildlife. The severity of the accident can range from minor to catastrophic, depending on the speed and angle of impact, the size and weight of the vehicle, and other factors. One common cause of center median accidents is distracted or reckless driving. Drivers who are distracted by their cell phones, radios, or other devices may not notice when they drift into the center median or fail to adjust their speed to changing road conditions. Similarly, drivers who are reckless or impaired by drugs or alcohol may lose control of their vehicle and collide with the median.

Speeding is another common factor in center median accidents. When drivers exceed the posted speed limit, they may be unable to adjust their speed in time to avoid a collision with the median. This can be particularly dangerous on highways or freeways where traffic is traveling at high speeds. Poor road conditions can also contribute to center median accidents. For example, if the road surface is wet or icy, vehicles may be more likely to skid or slide into the median. Similarly, if the median is poorly maintained or lacks proper barriers or guardrails, it may be more difficult for drivers to avoid a collision. The impact of a center median collision can cause significant damage to the vehicle and its occupants. Depending on the speed and angle of impact, the vehicle may spin or roll over, leading to further damage or injuries. In some cases, the collision may cause the vehicle to cross over into the opposite lane of traffic, leading to a head-on collision with another vehicle. To reduce the risk of center median accidents, highway authorities can

take a variety of measures. These may include installing barriers or guardrails to prevent vehicles from crossing over into opposite lanes of traffic. The use of rumble strips or other tactile warnings can also alert drivers when they are approaching the center median, reducing the risk of accidental collisions. Drivers can also take steps to reduce the likelihood of center median accidents. These may include obeying posted speed limits, remaining alert and focused while driving, and avoiding distractions such as cell phone use or eating while driving. Drivers should also maintain their vehicle in good working order, including checking tire pressure and brake performance, to ensure that they can respond quickly and safely to changing road conditions.

If you are involved in a center median accident, it is important to take immediate action to protect yourself and others. The first step is to seek medical attention for any injuries sustained in the accident. Even if you do not feel injured, it is important to have a medical evaluation, as some injuries may not be immediately apparent.

CHAPTER 2

LITERATURE SURVEY

Due to an follow up in the number vehicles on the road and reckless driving, road accidents are a significant problem around the world and a constant source of worry. Each year, there are many casualties from these accidents, which is a serious problem. In some situations, deaths are brought on by the victim's inability to receive urgent medical attention. This situation can be managed with the aid of an automated system, which will reduce the time required to complete tasks like contacting the closest hospital for medical supplies, dialling 911 in the event of a serious accident, and informing the worried family of who to contact in an emergency. This study analyses several algorithms and technologies that have been created for accident detection and automating the process of notification rather than depending on the local populace. The goal is to analyse and evaluate numerous algorithms examined in the review in terms of efficiency, benefits, and drawbacks in order to improve the most suitable algorithm for constructing a system that synchronises emergency contacts for Accident Detection.

2.1.LANE KEEP ASSISTANT SYSTEM

When it is necessary to correct the direction, Lane Keeping Assist uses the camera to detect the lane line in front of the car. Assistance is activated if the distance between the car and these indicators is less than a predetermined threshold. It steers gently to keep you in your lane in an electric-assist vehicle; without it, it uses ESP (electronic stability program) to apply brake pressure to individual wheels to accomplish the same task. This intervention only occurs if someone activates the turn signals for other reasons; the driver can override the system at any time to maintain control of the car (such as changing lanes or making a turn). The test results show that the LKAS algorithm was created to work as expected [1]. The algorithm needs to be refined before it can be used in a real car to maintain driver or passenger comfort. Improvements include using a camera as a sensor and adding a set for entry and exit. Technology known as the "lean keep assistant" seeks to enhance posture and lower the risk of musculoskeletal problems in employees who conduct manual or repetitive jobs. The system tracks

the worker's posture and motions using sensors and algorithms, delivering real-time feedback and instructions to assist them maintain an ergonomic and safe stance. The device is especially helpful in sectors like manufacturing, construction, and healthcare where employees frequently have to move large things, carry out repeated actions, or spend a lot of time in one position. These activities can put a lot of strain on the body, which can cause pain, exhaustion, and injuries. Little sensors are attached to various parts of the worker's body, including the back, shoulders, and arms, to activate the lean maintain assistance. These sensors track the worker's posture and motions, giving immediate feedback. For instance, the device may generate a warning tone or vibration to notify the worker to change their posture if they are leaning too far forward or bending their back in an unhealthy manner. In order to help supervisors and safety managers spot movement or posture patterns that could be causing injuries or pain, the system can also offer feedback to supervisors.

To increase the safety and comfort of employees, this information may be utilised to create training programmes and ergonomic solutions. The lean keep assistant is a component of a larger movement towards utilising technology to enhance worker ergonomics and safety. Maintaining a safe and healthy workforce is becoming more and more important as more sectors use automation and digital technology. By giving workers real-time feedback and direction to aid in maintaining a secure and ergonomic posture, the lean keep assistant is one example of how technology may be utilised to accomplish this aim.

2.2.AUTONOMOUS VEHICLE

Six degrees of automation are outlined by the Society of Automotive Engineers (SAE) [3]. No automation is indicated by a mechanisation of 0. Using active safety technologies, the driver completes the DDT at the zero position. Level 1 mechanisation allows marketers to control the car longitudinally or laterally but is not a complete OEDR. The driver is the backup DDT, therefore he or she must always be present and capable of taking control of the car. Anti-lock braking system, electronic stability control system, and other systems. The initial degree of mechanisation includes the brake system and adaptive cruise control. AD may manage the vehicle longitudinally and laterally in position two mechanisation,

however similarly to level one. In level three mechanization, AD performs the entire DDT. The DDT rescue is again the motorist, who is warned if the ODD limit is exceeded. The driver is also warned if a performance-tuned system fails. The mechanization of the fourth position does not perform lethal intervention. Location Four Mechanized Vehicle Ads will run the entire DDT at limited ODD locations with proper maps and road structures. Motorists can intervene as needed, but AD will minimize any threat of DDT fallback.

Mechanization level five is the final mechanization slot. Fully mechanized, AD can perform the entire ODD without any restrictions. DDT rescue is also managed by AD, and the only time the driver has control of the vehicle is when requested. The graph is a representation of all the different autonomous situations. Recently, the artificial intelligence driver has introduced less driving in the rainy environment and uses measuring tool sensors. The basic configuration of the measurement instrumentation system is shown in the figure and consists of a transmitter and a receiver. This study examines the impact of AVS on the capacity of a metropolitan road network. AVS is expected to significantly improve the capacity, efficiency, stability and security of current mobile systems [4].

The use of AVS can have negative impacts on the traffic system, but the scientific literature has already studied these effects and shown that AVS can actually increase the capacity of motorways, especially when they have high penetration rates. However, most research projects have focused on improving freeway capacity, and only a few studies have investigated the impact of adopting various AVS on urban traffic. To fill this gap, two urban road networks were created to represent typical urban environments: one with a grid shape (common in the United States for example), and the other presenting a typical European network (given that the sizes of the streets become quite irregular). The traffic demand increases slowly and steadily to run the simulation over the full range of demand conditions [4]. AVS was simulated in the SUMO traffic simulation suite with different driving parameters compared to conventional vehicles according to the standard car tracking model (Krauss model) [4]. The two networks simulate six scenarios with different AVS penetration rates from 0% to 100%.

3. Centerline Lane Keeping Assist This system guides the driver to avoid accidents on the

center line using sensors and on-screen or audible instructions. When the car approaches a lane separation, it senses and guides the driver to move a safe distance away. It helps with the medial minor accident. It works as a safe driving system. Autonomous vehicles, also known as self-driving cars, are vehicles that use sensors, cameras, and other technologies to navigate and operate without human intervention.

They have the potential to transform transportation by improving safety, reducing congestion and increasing accessibility. The development of self-driving cars has been underway for several years, with big companies like Google, Tesla and Uber investing heavily in the technology. Significant progress has been made in this area in recent years, many self-driving cars are already on the roads and others are being developed. One of the main benefits of self-driving cars is improved safety. Human error is a major factor in road accidents, and self-driving cars can eliminate most of these errors. According to a report from the National Highway Traffic Safety Administration, 94 percent of accidents are caused by human error. With self-driving cars, the risk of accidents caused by human error is greatly reduced. Another advantage of self-driving cars is increased efficiency. Autonomous vehicles are designed to work better than conventional vehicles, reduce accidents and improve traffic flow. In addition, driverless cars can communicate with each other, improving traffic flow and reducing the risk of accidents. Despite the potential benefits of self-driving cars, there are challenges that need to be addressed. One of the most important issues is the need for infrastructure. Self-driving cars require specialized infrastructure such as communication lines and communications, which will require significant investments. The requirement for creating standards and rules presents another difficulty. Autonomous cars are governed differently than regular vehicles and require defined criteria to assure their safety and dependability.

Concerns have also been raised concerning the possible effects of autonomous vehicles on employment, as many positions in the transportation industry will be unfilled. Electric cars therefore have the potential to transform transportation and enhance accessibility, efficiency, and safety. However, there are still a lot of problems to be fixed, including management, operations, and infrastructure. As

technology advances, electric cars have the potential to play a significant part in future transportation.

2.3.VECHICLE ALERT SYSTEM

Vehicle Warning Systems (VAS) are safety innovations made to better protect motorists, passengers, and pedestrians. These systems employ a range of sensors and cameras to identify potential dangers, such as other cars, pedestrians, and objects, and to notify the driver in order to avoid accidents. We go into great length on automobile alarm systems in this post, including their kinds, parts, features, and limits. Vehicle Alarm System Types There are several types of automobile alarm systems available, including: Systems that provide forward collision warning (FCW) These devices detect the separation between the driver and the car in front of them using sensors. The device alerts the driver visually or vocally if the distance between the two cars is too close.

The technology will alert the driver either visually or audibly if it detects another car.Rear Cross Traffic Alert (RCTA) Systems: While the driver is reversing, these systems employ sensors to identify other cars that are coming from the sides. The technology will alert the driver either visually or audibly if it detects another car.Vehicle Alert System ComponentsTypically, vehicle alert systems comprise the following elements:Radar, lidar, and cameras are a few examples of sensors that are used to find possible dangers.The central processing unit that collects and examines data from the sensors is known as the control module.When possible risks are identified, the driver is alerted via an auditory or visual warning system.Vehicle Alert Systems: Benefits Vehicle Alert Systems provide a number of advantages, including:Improved Safety: VAS technologies help drivers

By sounding an alarm when they are approaching other cars or barriers too closely, you may prevent possible collisions.Increased Awareness: By delivering information about possible threats that drivers might not be able to detect on their own, VAS technologies assist drivers in being more aware of their surroundings.Insurance savings: Some insurance providers provide savings to motorists who use VAS technology.

This can be frustrating for drivers and can lead to a lack of trust in the system. Limited Effectiveness: VAS technologies are not effective in all driving situations. For example, they may not work well in heavy rain or snow. High Cost: VAS technologies can be expensive to install and maintain, which may make them inaccessible to some drivers. The Vehicle Alert System (VAS) focuses on cooperative alert services supporting timely and reliable communication below the difficult circumstances concerning an extremely mobile conveyance network[4]. Through a cross-layer style, we have a tendency to gain the flexibility required to adapt the system to the individual necessities of 3 chosen application situations that represent completely different things wherever cooperation between vehicles will build a big impact. Wakamatsu, Kitakyushu, Hibikino et al projected a brand new approach on the Accident bar system supported linguistics networks, here they used the net mining technique to analyze the net data by suggesting that of looking, recommending, surfing and visualizing the net. [4].

The target of this paper is to make an associate degree accident bar system by suggesting that of the linguistics International Journal of computing & data Technology (IJCSIT). The system is composed of a number of ranking algorithms that are backed by generality and degreed novelty metrics taken from accident data. Bao Rong Yangtze Kiang, Chung-Ping Young, Hsiu Fen Tsai, and Jian Ping Young, Hsiu Fen Tsai, and Jian-Jr Lin et al created a study to examine the feasibility of high performance collision warning system (CWS), which would provide protection against traffic accidents while in transit[4].

An embedded hybrid accommodative network-based fuzzy logical thinking system (ANFIS) and quantum-tuned back-propagation neural network (QT BONN) designed anthem platform with Davinci+XScale-NAV270 was used to comprehend collision warning system, and they additionally put in motorcar event knowledge recorder (MVEDR). A method to apply vehicle safety has been provided by Padmini Kumari J, S. S. Dorle, A. G. Keskar Megha, B. Chakole, and others. Typical applications embrace forward collision warning, accommodative control, and lane keeping.

2.4.AUTOMATIC VEHICLE ALERT SYSTEM

Automatic Car Accident Alert System, a warning message with the time and location of an accident delivered automatically by the specific device placed in a vehicle to emergency and relief organizations. They might then swiftly make their way to the accident scene and assist the victim. Through a mobile application, DynamoDB receives the necessary parameters and sensor information. [5] The AWS platform houses the data storage. To detect the accidents, an accelerometer sensor is used so when an accident is detected we can retrieve the location from the mobile app and send notifications to nearest hospitals from the mobile app and can intimate family members. Also for double confirmation force sensors come into action.

When the accelerometer fails to send the required details through the mobile application using Bluetooth, this framework utilizes the use of GPS modem and the Internet of Things (IoT) for automobile accident detection, alerting accident experts, and vehicle tracking. We have designed a framework using a GPS modem for this task that uses IoT-based car accident detection. [5] Hence IoT can revolutionize the way the framework connects and responds for the assortment of uses particularly in the event of traffic controls. This framework can be interfaced with vehicle air bag systems that keeps vehicle tenants from striking interior objects, for example, the controlling wheel or window.

This can also be achieved by connecting a camera to the controller module, which takes a picture of the accident site and makes the next step easier. Automatic Vehicle Alert Systems (AVAS) are a specific type of Vehicle Alert System that use advanced technologies to provide automatic warnings to drivers in the event of a potential hazard. AVAS can be used to provide warnings about a wide range of hazards, including other vehicles, pedestrians, obstacles, and weather conditions. In this article, we will discuss Automatic Vehicle Alert Systems in detail, including their components, types, benefits, and limitations.

Components of Automatic Vehicle Alert Systems

The components of an Automatic Vehicle Alert System typically include the following:

- Sensors:** AVAS technologies use advanced sensors, such as radar and lidar, to detect potential hazards on the road.
- Control Module:** This is the central processing unit that receives and analyzes data from the

sensors. Warning System: This includes automatic audible or visual alerts that are provided to the driver when potential hazards are detected. Types of Automatic Vehicle Alert Systems There are several types of Automatic Vehicle Alert Systems available, including: Automatic Emergency Braking (AEB): AEB systems use advanced sensors to detect potential collisions and can apply the brakes automatically to prevent accidents. Adaptive Cruise Control (ACC): ACC systems use advanced sensors to detect the speed and distance of other vehicles on the road and can adjust the speed of the driver's vehicle accordingly. Lane Keeping Assistance (LKA): LKA systems use cameras to detect the driver's lane position and can provide automatic steering assistance to keep the vehicle within the lane. Traffic Sign Recognition (TSR): TSR systems use cameras to detect road signs, such as speed limit signs, and provide automatic alerts to the driver if they are exceeding the speed limit. Benefits of Automatic Vehicle Alert Systems Automatic Vehicle Alert Systems provide several benefits, including: Improved Safety: AVAS technologies can help drivers avoid potential collisions by providing automatic warnings and assistance when hazards are detected. Increased Awareness: AVAS technologies can help drivers become more aware of their surroundings by providing automatic alerts about potential hazards that they may not be able to see on their own.

Reduced Driver Fatigue: AVAS technologies can help reduce driver fatigue by providing automatic assistance with tasks such as steering and braking. Improved Fuel Efficiency: ACC technologies can help improve fuel efficiency by adjusting the speed of the vehicle based on the speed of other vehicles on the road. Limitations of Automatic Vehicle Alert Systems While Automatic Vehicle Alert Systems provide several benefits, they also have limitations, including: High Cost: AVAS technologies can be expensive to install and maintain, which may make them inaccessible to some drivers. Limited Effectiveness: AVAS technologies are not effective in all driving situations. For example, they may not work well in heavy rain or snow. Potential for False Alarms: AVAS technologies may provide false alarms when they detect potential hazards that are not actually present. This is frustrating for drivers and can lead to a lack of confidence in the system. An automated vehicle alert system is a device that detects and alerts other drivers and emergency services in the case of a traffic collision or other emergency scenario

involving a car using sensors and communication networks. The system operates by detecting abrupt changes in vehicle speed or direction, which may be an accident or emergency. When an occurrence is found, the system immediately alerts nearby drivers as well as emergency agencies including the police, fire, and ambulance. The alerts may be visual cues, auditory indications, or text messages, among other formats.

The location and significance of the event, as well as any other pertinent information regarding, may also be included. The automated vehicle alert system can offer a variety of advantages, including quicker reaction times in the case of an accident or emergency, better situational awareness for drivers, and a decreased chance of further collisions or accidents. By promptly notifying other drivers to the location of an accident or emergency, the system can assist to avoid more accidents and lessen the severity of injuries. The technology is still in its infancy, therefore there are certain obstacles to its application, such as guaranteeing the dependability and accuracy of the sensors and communication networks, as well as making sure the system does not cause erroneous warnings or unneeded distractions for drivers. The automatic vehicle alarm system might considerably increase traffic safety overall. Automatic Car Accident Alert System, a warning message with the time and location of an accident delivered automatically by the specific device placed in a vehicle to emergency and relief organizations. They might then swiftly make their way to the accident scene and assist the victim. Through a mobile application, DynamoDb receives the necessary parameters and sensor information. [5]

The AWS platform houses the data storage. To detect the accidents accelerometer sensor is used so when an accident is detected we can retrieve the location from the mobile app and send notifications to nearest hospitals from the mobile app and can intimate family members. Also for double confirmation force sensors come into action when the accelerometer fails to send the required details through the mobile application using Bluetooth. This framework utilizes the use of GPS modem and the Internet of Things (IoT) for automobile accident detection, alerting accident experts, and vehicle tracking.

2.5. VEHICLE TRACKING SYSTEMS

Security for all vehicles is the main objective of a vehicle monitoring system. The purpose of an accident alarm system is to save lives. This will enhance car security systems. [6] The most recent technology, such as GPS, is very helpful today since it allows the owner to watch and monitor his vehicle, as well as learn about its whereabouts and previous activity. The security of the car improved dramatically thanks to this new technology, commonly referred to as vehicle tracking systems. This gear is installed on the car in a way that it cannot be seen by anyone inside or outside the car. As a result, it functions as a covert device that provides location information to the monitoring unit continuously or whenever the system is interrupted. When the car is stolen, the tracking system's location data can be utilised to locate it and give the police the information they need to take further action. Some car tracking systems can even inform the owner when the vehicle is moved without permission.

This offers it a competitive advantage over other technology used for the same purpose. [6] This accident alert system locates the accident and provides GPS coordinates to the designated mobile device, PC, etc. This vehicle tracking feature's features It primarily benefits businesses that rely on transportation networks. Since it can display the location of every vehicle in real time, they can produce the desired data as a result. These tracking systems may retain all of the information on the location of the vehicle, its stops, and the length of time it spends at each one, as well as generate comprehensive data analyses. In order to determine how far away they are and how long it will take them to arrive at a specific stop, it is also used in buses and trains. These systems are employed to gather, store, analyze, and transport data. Features of the accident alert system: this system is based on modern technologies, [7]

Therefore, the control room's assistance will be provided in accordance with its needs. The current board design is more valued and functional because it has both vehicle tracking and accident alert systems. This sign also provides information on how to spot accidents and cautions us against theft. Adding a fire detector to one of the interrupt pins allows this device to detect fire accidents as well.

A vehicle tracking system is an advanced technology for monitoring and tracking the position and movement of vehicles in real time. These systems use various technologies such as GPS, GSM and GPRS to provide real-time information about the vehicle's location. This article details vehicle tracking systems including components, types, advantages and limitations.

Vehicle Tracking System Components

The components of a typical vehicle tracking system are:

- GPS Receiver:** This component receives signals from GPS satellites to determine the position of the vehicle.
- GSM/GPRS Module:** This component is responsible for sending and receiving data between the vehicle and the tracking system.
- Control Unit:** This component processes the data received from the GPS receiver and GSM/GPRS module and provides the user with location and other relevant information.
- Software:** Software used in vehicle tracking systems is responsible for displaying location and other data in an easy-to-use format, such as a map.

Types of Vehicle Tracking Systems

There are several types of vehicle tracking systems available, including:

- Passive Vehicle Tracking Systems:** Passive vehicle tracking systems store location data in storage devices that can later be retrieved and analyzed.
- Hybrid Vehicle Tracking Systems:** Hybrid vehicle tracking systems combine the capabilities of active and passive systems for real-time location and data storage.

Vehicle Tracking System Benefits

Vehicle Tracking Systems offer several benefits, including:

- Improved safety:** Vehicle tracking systems help improve driver and passenger safety by providing real-time information about vehicle location and movement.
- Anti-Theft:** Vehicle tracking systems help prevent vehicle theft by providing law enforcement with real-time location information.
- Cost savings:** Vehicle tracking systems help reduce fuel and maintenance costs by optimizing vehicle usage.
- Improved Customer Service:** Vehicle tracking systems help improve customer service by providing real-time information about vehicle location, enabling more accurate delivery estimates.

Vehicle Tracking System Limitations

Although vehicle tracking systems have some advantages, they also have the following limitations:

- Privacy Concerns:** Vehicle tracking systems collect and store data about vehicle location and movement, which can raise privacy concerns.
- Limited Effectiveness:** The vehicle tracking system is not effective in areas with weak GPS signal strength, such as:

B. May not be effective in areas

with tall buildings or mountains. Data overload: Vehicle tracking systems can generate large amounts of data that can be overwhelming and difficult to manage.

2.6 CAR DRIVING INTELEAGENT SAFETY WARNING AND ALERT SYSTEM

In order to strike a balance between driver safety protection and the growth of vehicle speed limitations, new vehicle performance has been regularly improved, and study results pertaining to driving safety have been continuously published and shown. In the present research and development of many products, whether it be in the enforcement of vision systems, radar detection, or the tracing and control, it is constantly requiring the driver to monitor or fix the possible issues after the occurrence of accidents. This initiative aims to develop a system that will inform the vehicle control unit about an accident before it happens, enabling the automobile to avoid an accident.

If an unfortunate accident leads to a fatality,.As technology advances, intelligent automotive safety alarm and warning systems are becoming more widely used. These systems are designed to improve driving safety by warning drivers of potential hazards and providing assistance in navigating difficult driving conditions. This article discusses the various safety warnings and warning systems available in modern automobiles. Adaptive Cruise Control Adaptive Cruise Control (ACC) is a safety system that automatically adjusts your car's speed based on the distance to the vehicle ahead. The system uses sensors to detect the distance and speed of the vehicle in front of the vehicle and automatically adjusts the vehicle's speed to maintain a safe following distance.

If the vehicle ahead slows down or stops, the ACC system slows down or stops accordingly. Lane Departure Warning Lane Departure Warning (LDW) is a safety system that warns the driver when the vehicle begins to stray from its lane. The system uses sensors to detect the vehicle's position relative to the lane markings on the road. If the car begins to stray from its lane, the LDW system will sound an alarm to warn the driver. Forward Collision Warning Forward Collision Warning (FCW) is a safety system that warns the driver of an imminent collision with another vehicle or object. This system uses sensors to detect the distance and speed of the car in front of it. The FCW system warns the driver with an audible

alarm if the vehicle is too close to the vehicle in front, or if there is a sudden stop or obstacle. **Blind Spot Detector** The Blind Spot Detector (BSW) is a safety system that warns the driver of the vehicle's blind spots. The system uses sensors to detect the presence of vehicles in adjacent lanes. If there is a vehicle in the blind spot, the BSW system will sound an alarm to warn the driver.

Cross Traffic Alert Cross Traffic Alert (CTA) A safety system that warns the driver of the presence of vehicles and pedestrians when reversing. This system uses sensors to detect the presence of objects behind the car. B. Other vehicles or pedestrians. The CTA system sounds an alarm to warn the driver if there is a potential danger. **Pedestrian Detection** Pedestrian Detection is a safety system that uses sensors and cameras to detect pedestrians and other objects in the path of the vehicle. When the system detects a pedestrian, it automatically applies the brakes to avoid a collision. **Driver Awareness Monitor** Driver Awareness Monitor is a safety system that monitors driver attention and fatigue.

The system uses sensors to detect driver drowsiness and inattentiveness. If the system detects that the driver is drowsy, it will alert the driver with an alarm. **Summary** As technology advances, intelligent safety alert and warning systems for vehicles become more and more important. These systems are designed to increase driving safety by warning drivers of potential hazards and helping them navigate difficult driving situations.

2.7 SLEEPINESS WARNING SYSTEM

A sleepiness warning system is a piece of technology that assists in recognizing drowsiness or weariness in persons performing work that need a high degree of attention and alertness, including operating equipment or heavy machinery. In order to promote safety and avoid accidents, the technology informs users when they are about to nod asleep or lose attention.[8] According to statistics, the fatality rate increases by four times for drivers who are fatigued while behind the wheel. The link between driver fatigue and variables including pupil vision, head motion, and the width of their eyelids has therefore been the subject of several research. ITRE has even employed the ultra wide bandwidth (UWB) method to combine low-power devices.

The in-car system, which frequently makes use of sensors to track the driver's eye movements, head position, and driving habits, is one popular sort of sleepiness warning system. These sensors are capable of identifying drivers who are nodding off or whose eyes have been closed for a long time. The technology may sound an audible warning or cause the steering wheel or seat to vibrate when it detects such changes, alerting the driver to stop and take a break. Finally, drowsiness warning systems are an essential piece of technology that may enhance safety and assist avoid mishaps in a number of circumstances.

These systems can advise users to take a break or rest by identifying indicators of weariness or sleepiness, lowering the risk of accidents and injuries. Sleepiness warning systems have the potential to significantly affect public safety and enhance the quality of life for millions of people with continuing research and innovation.

2.8 LOW-SPEED FOLLOWING MODE SYSTEM

The LSM uses mini-meter wave radar to monitor the frontcar's acceleration, deceleration, and halting in order to assess the distance between the two vehicles. He also uses the radar to manage the brake and fuel systems in order to keep his vehicle within a safe range[8]. The driver will be alerted by an alarm sound if the front automobile experiences an abnormal condition. LSFM devices are made to function in stop-and-go traffic and can normally go up to 20 to 25 mph. The car's speed is automatically regulated based on the distance to the vehicle in front of it when the driver selects the LSFM mode. The LSFM system will automatically slow down or, if required, bring the car to a complete stop if the vehicle in front slows down or stops. Radar, lidar, and cameras are among of the sensors used by LSFM systems to measure the separation between the car in front of you and other objects on the road.

The algorithm also considers the vehicle's speed, the state of the roads, and the driver's actions, such as how quickly they use the brakes. LSFM systems can offer a variety of advantages, including as lowering driver stress and tiredness in congested areas, enhancing fuel economy by lowering idling acceleration and

braking, and enhancing safety by lowering the likelihood of rear-end crashes. The possibility of giving drivers a false sense of security and encouraging complacency is one possible disadvantage of LSFM devices. Even while utilising LSFM devices, it is crucial that drivers maintain their focus and engagement. Several automakers now provide LSFM as a standard or elective feature, making LSFM technology more and more prevalent in new cars. Drivers should be aware of how LSFM systems operate and how to utilise them properly as with any new technology. Always read the owner's manual, drivers.

2.9 LANE DETECTION AND TRACKING ALGORITHMS

Feature-based approach (images and sensors are used to monitor and detect lanes) Using camera and sensor technologies, the automobile decides how to identify and track lanes based on the information it has received. A trajectory identification algorithm is used in this technique to detect the trajectory after recording visual data. The sensor data dictate which way the floor markings should move [5,6]. According to Kang et al. [7].

A kinematics-based fault tolerance system can follow lanes even if the camera is broken or encountering external impacts, and the image continues to represent distinct roadways. In the absence of camera data, the kinematic model calculates the trajectory based on characteristics such as vehicle length and speed. The camera input is shown as a constitutional cubic. It was put to the test using a Hyundai Tucson electrical box in a test car. Zhang and Shi [8] devised a method for detecting lanes at night that allows awake and attentive operators to discern the margins of observed lanes. Gradients that cross a given threshold are labelled as edge points.

2.10 LANE DEPARTURE WARNING (LDW)

Is an automotive safety system that helps prevent accidents caused by unintentional lane departures. The system uses cameras or sensors mounted on the vehicle to monitor its position on the road and alerts the driver if it detects that the vehicle is drifting out of its lane.

LDW is designed to work in a variety of driving conditions, including highways, rural roads, and city streets.[9] The system uses a combination of cameras and sensors to detect the position of the vehicle on the road. Typically, these sensors are located on the front and rear bumpers, as well as on the side mirrors. They work together to create a detailed picture of the vehicle's surroundings, which is used to determine whether the vehicle is drifting out of its lane. When the system detects that the vehicle is drifting out of its lane, it sends a signal to the onboard computer, which triggers an alert to the driver. The alert can take several forms, including a visual warning on the dashboard, an audible warning such as a beep or chime, or a haptic warning such as a vibration in the steering wheel.

LDW is a passive safety system, which means that it does not actively intervene to keep the vehicle in its lane. Instead, it simply alerts the driver to take corrective action[10]. The driver is still responsible for steering the vehicle and keeping it within the lane markings. One of the key benefits of LDW is that it helps prevent accidents caused by driver inattention or fatigue. Studies have shown that driver inattention is a major cause of accidents, and LDW can help prevent these accidents by alerting drivers when they are drifting out of their lane. In addition, LDW can help prevent accidents caused by drowsy driving, which is a common problem on long road trips.

LDW is also useful in preventing accidents caused by distracted driving. With the rise of smartphones and other electronic devices, distracted driving has become a major problem on the roads. LDW can help prevent these accidents by alerting drivers when they are not paying attention to the road. In order to be effective, LDW must be properly calibrated and adjusted for the specific vehicle and driving conditions. The system must also be properly maintained to ensure that it is functioning correctly. While LDW is a useful safety feature, it is not a substitute for safe driving practices[11]. Drivers should always pay attention to the road, avoid distractions, and follow all traffic laws and regulations. In addition, LDW should be used in conjunction with other safety features, such as seat belts, airbags, and anti-lock brakes.

2.11 LANE CENTERING ASSIST (LCA)

Is an advanced driver assistance system that builds upon the Lane Departure Warning (LDW) feature by actively steering the vehicle to keep it centered in the lane. The system uses a combination of cameras, sensors, and a control system to analyze the vehicle's position on the road and make steering adjustments as needed to keep it centered within the lane markings.

LCA is designed to operate in a variety of driving conditions, including highways, rural roads, and city streets. The system uses cameras and sensors to detect the position of the vehicle on the road[12]. The cameras can detect the lane markings on the road, and the sensors can measure the distance between the vehicle and the markings. The control system then uses this information to calculate the necessary steering adjustments to keep the vehicle centered in the lane. When LCA detects that the vehicle is drifting out of the center of the lane, it sends a signal to the control system, which then makes the necessary steering adjustments to keep the vehicle centered within the lane markings. Like LDW, LCA also provides the driver with visual, audible, or haptic feedback to let them know that the system is actively steering the vehicle[13].

The effectiveness of LCA largely depends on the accuracy of its cameras and sensors, as well as the quality of the control system. Therefore, it is important for vehicle manufacturers to properly calibrate and test LCA before releasing it to the market. In addition, drivers must be properly trained to use LCA and understand its limitations[14]. One of the key benefits of LCA is that it can reduce driver fatigue and stress, particularly during long highway drives. By taking over some of the steering tasks, LCA can allow the driver to relax their grip on the steering wheel and focus more on other aspects of driving, such as traffic conditions, speed, and navigation. This can make long drives more comfortable and less tiring for drivers, which can help improve their overall driving experience. LCA is also effective in reducing accidents caused by driver inattention or distraction. Studies have shown that driver distraction is a major cause of accidents, and LCA can help prevent these accidents by actively steering the vehicle to keep it centered within the lane. In addition, LCA can also help prevent accidents caused by driver fatigue or drowsiness, which are common problems on long road trips[15].

Another benefit of LCA is that it can improve the overall safety of the vehicle. By keeping the vehicle centered within the lane, LCA can reduce the risk of side-swipe collisions with other vehicles or objects on the side of the road. This can help prevent accidents and reduce the severity of injuries in the event of a collision. However, LCA is not a substitute for safe driving practices. Drivers must always pay attention to the road, avoid distractions, and follow all traffic laws and regulations. In addition, LCA should be used in conjunction with other safety features, such as seat belts, airbags, and anti-lock brakes. LCA is also not foolproof and has some limitations. For example, the system may not work properly in certain weather conditions, such as heavy rain or snow. In addition, LCA may not be able to detect faded or non-existent lane markings, which can lead to incorrect steering inputs. Therefore, drivers must always be aware of the driving conditions and be prepared to take control of the vehicle if necessary.

Overall, Lane Centering Assist (LCA) is an advanced driver assistance system that can improve the safety and comfort of driving. By actively steering the vehicle to keep it centered within the lane markings, LCA can reduce the risk of accidents caused by driver inattention, distraction, fatigue, or drowsiness. However, drivers must always remain vigilant and use LCA in conjunction with other safety features to ensure a safe.

2.12 AN AUTOMATION LANE KEEP SYSTEM (ALKS)

Is an advanced driver assistance system that is designed to take over the steering of a vehicle in certain driving conditions. ALKS is a step beyond Lane Departure Warning (LDW) and Lane Centering Assist (LCA)[16], as it is capable of actively steering the vehicle without requiring any input from the driver. ALKS uses a combination of cameras, sensors, and a control system to analyze the vehicle's position on the road and make steering adjustments as needed to keep it centered within the lane markings.

However, unlike LCA, ALKS is designed to operate without any driver input, meaning that the system can take over the steering tasks completely. ALKS is designed to operate in specific driving conditions, typically on highways and other

controlled-access roads[17]. The system uses cameras and sensors to detect the position of the vehicle on the road and can analyze the road surface to determine if it is suitable for ALKS to take over the steering.

Once ALKS is activated, the system will take over the steering of the vehicle, and the driver can relax and let the system do the work. ALKS will keep the vehicle centered within the lane markings and adjust the steering as needed to maintain a safe distance from other vehicles. The effectiveness of ALKS depends on the accuracy of its cameras and sensors, as well as the quality of the control system. Therefore, it is important for vehicle manufacturers to properly calibrate and test ALKS before releasing it to the market.

In addition, drivers must be properly trained to use ALKS and understand its limitations. One of the key benefits of ALKS is that it can reduce driver fatigue and stress, particularly during long highway drives. By taking over all of the steering tasks, ALKS can allow the driver to relax and focus on other aspects of driving, such as traffic conditions, speed, and navigation. This can make long drives more comfortable and less tiring for drivers, which can help improve their overall driving experience. ALKS is also effective in reducing accidents caused by driver inattention or distraction. Studies have shown that driver distraction is a major cause of accidents, and ALKS can help prevent these accidents by taking over the steering tasks and allowing the driver to focus on other aspects of driving. In addition, ALKS can also help prevent accidents caused by driver fatigue or drowsiness[18], which are common problems on long road trips. Another benefit of ALKS is that it can improve the overall safety of the vehicle. By taking over the steering tasks, ALKS can reduce the risk of side-swipe collisions with other vehicles or objects on the side of the road.

This can help prevent accidents and reduce the severity of injuries in the event of a collision. However, ALKS is not a substitute for safe driving practices. Drivers must always pay attention to the road, avoid distractions, and follow all traffic laws and regulations. In addition, ALKS should be used in conjunction with other safety features, such as seat belts, airbags, and anti-lock brakes. ALKS is also not foolproof and has some limitations. For example, the system may not work

properly in certain weather conditions, such as heavy rain or snow. In addition, ALKS may not be able to detect faded or non-existent lane markings, which can lead to incorrect steering inputs. Therefore, drivers must always be aware of the driving conditions and be prepared to take control of the vehicle if necessary.

2.13 AN EMERGENCY LANE KEEP SYSTEM (ELKS)

IS an advanced driver assistance system designed to prevent accidents by automatically guiding a vehicle back into its lane if it starts to drift out of it. ELKS is designed to help drivers avoid collisions caused by sudden or unexpected lane departures, such as those caused by drowsiness, distraction, or sudden evasive maneuvers. ELKS uses a combination of cameras, sensors, and a control system to monitor the position of the car on the road and detect any deviations from the lane markings. If the system detects that the vehicle is starting to drift out of its lane, it will immediately take corrective action, such as applying the brakes or adjusting the steering, to guide the vehicle back into its lane.

ELKS is designed to operate in emergency situations, such as sudden evasive maneuvers or unexpected lane departures, and is not intended to replace safe driving practices. However, ELKS can help drivers avoid accidents in situations where they may not have enough time or space to react. One of the key benefits of ELKS is that it can prevent accidents caused by driver distraction or drowsiness. Studies have shown that distracted driving and drowsiness are major causes of accidents, and ELKS can help prevent these accidents by taking corrective action if the driver drifts out of the lane[19]. ELKS can also help prevent accidents caused by sudden evasive maneuvers, such as swerving to avoid an obstacle in the road.

ELKS is also effective in reducing accidents caused by impaired drivers. Impaired drivers are more likely to drift out of their lane, and ELKS can help prevent accidents by detecting and correcting these deviations before they lead to a collision. In addition, ELKS can also help prevent accidents caused by drivers who are under the influence of drugs or alcohol. Another benefit of ELKS is that it can improve the overall safety of the vehicle. By automatically guiding the vehicle back into its lane[20], ELKS can reduce the risk of side-swipe collisions with other vehicles or objects on the side of the road. This can help prevent accidents and

reduce the severity of injuries in the event of a collision. However, ELKS is not a substitute for safe driving practices. Drivers must always pay attention to the road, avoid distractions, and follow all traffic laws and regulations[21].

In addition, ELKS should be used in conjunction with other safety features, such as seat belts, airbags, and anti-lock brakes. ELKS also has some limitations. For example, the system may not work properly in certain weather conditions, such as heavy rain or snow. In addition, ELKS may not be able to detect faded or non-existent lane markings, which can lead to incorrect steering inputs. Therefore, drivers must always be aware of the driving conditions and be prepared to take control of the vehicle if necessary. There are also legal and regulatory issues surrounding the use of ELKS. As of 2021, ELKS is not yet widely available in the market and there are no universal standards for its implementation. However, there have been efforts to introduce ELKS in certain regions, such as the European Union, where it is being considered as part of a wider range of safety measures. In conclusion, an Emergency Lane Keep System (ELKS) is an advanced driver assistance system designed to prevent accidents caused by sudden or unexpected lane departures. ELKS can help drivers avoid collisions caused by driver distraction, drowsiness, sudden evasive maneuvers, and impaired driving. While ELKS has its limitations, it has the potential to improve the overall safety of vehicles and reduce the risk of accidents on the road[22].

CHAPTER 3

AIM AND SCOPE

The main aim is to improve driver safety by assisting the driver in maintaining their vehicle within the intended lane. systems are designed to detect when a vehicle is near to median and to alert the driver or take corrective action to prevent the vehicle from leaving the lane. The scope of systems is to prevent accidents caused by lane departure, which can occur due to various reasons such as driver distraction, drowsiness, or inattentiveness. systems can help drivers stay alert and avoid drifting out of their lane by providing visual, auditory, or tactile alerts when the vehicle is about to leave the lane. systems work by using various sensors, such as cameras, radar, and ultrasonic sensors, to detect the position of the vehicle within the lane. The system can then take corrective action, such as steering the vehicle back into the lane or adjusting the speed of the vehicle to prevent it from leaving the lane. The benefits of systems are numerous. They can reduce the risk of accidents caused by lane departure, which is a significant cause of traffic accidents. They can also improve driver comfort and reduce driver fatigue, especially during long trips. Additionally, systems can improve the overall driving experience by reducing the driver's workload and increasing the level of control over the vehicle. The scope of systems is constantly expanding as new technologies and innovations are developed. For example, some systems can now recognize and respond to complex traffic situations, such as merging lanes, while others can be integrated with other advanced driver assistance systems to provide a more comprehensive safety package. In conclusion, is an important driver assistance system designed to improve driver safety by preventing accidents caused by lane departure. systems can reduce driver workload, improve driver comfort, and provide a more comprehensive safety package when integrated with other advanced driver assistance systems. With ongoing advancements in technology,

CHAPTER 4

MATERIAL AND METHODS

4.1 SOFTWARE

The Arduino IDE is open source software for developing and uploading code to the Arduino board. The IDE programme is compatible with a wide range of operating systems, including Windows, Mac OS X, and Linux. It is compatible with the C and C++ programming languages. Integrated Development Environment is referred to by the abbreviation IDE. Writing code or a programme in the Arduino IDE is a process known as sketching. We need to connect the Genuino and Arduino board to the IDE in order to upload a sketch produced with the Arduino IDE software. The file extension of sketches is .ino. An open source software development environment called the Arduino IDE is used to programme Arduino boards. Download the software for nothing from the Arduino website. It's intended to make things simple. upload code to your Arduino board and help beginners get started with electronics and programming. The Arduino IDE is based on the Processing programming language and includes a simple text editor, compiler, and software serial monitor. It also supports various programming languages such as C and C++. This makes it easier for users with different programming backgrounds to create programs for Arduino boards. One of the key features of the Arduino IDE is its ease of use. It comes with a large library of pre-built code, making it easy for beginners to learn how to write code and upload it to their board. It also provides a graphical interface for uploading code to her Arduino board, eliminating the need for users to type commands into a command line interface. Another important feature of the Arduino IDE is its compatibility with various hardware platforms. This means users can write code for a wide variety of Arduino boards and shields, as well as other microcontroller platforms such as the Raspberry Pi. The Arduino IDE also includes a number of code debugging and testing tools that allow users to easily identify and fix errors in their programs. These tools include a serial monitor that allows the user to view data passed between the board and the computer, and a set of debugging tools that allow the user to identify and fix errors in the code. The Arduino IDE is not only easy to use and compatible with various hardware platforms, but also has a large and active community of users and

developers. The community provides users with a wealth of resources and support, including tutorials, code libraries, and forums where users can ask for help and share projects.

In summary, the Arduino IDE is a powerful and easy-to-use development environment for programming Arduino boards. The simple user interface and compatibility with various hardware platforms make it an ideal choice for both novice and experienced programmers. A large community of users and developers also offers extensive resources and support, making it easy for users to learn and create their own projects with her Arduino boards.

4.2 MICRO CONTROLLER

The open source Arduino micro controller is easy to program and always up to date. In 2005, the first Arduino was released. The Arduino micro controller was originally created for experts and students to create devices that can communicate with their environment through sensors. The inputs and outputs of the Arduino micro controller can be used to obtain information and the Arduino can provide an output based on the information received. Arduino micro controllers can also send and receive data over the Internet using HTTP requests.

The Esp board is a simple micro controller that can be connected to the Internet. The ESP micro controller can be used as a Wi-Fi server or connected to one. Hardware and software components of the Arduino platform can be separated. Arduino uses Arduino hardware. development committee. Arduino IDE is the name of the program used to create Arduino (Integrated Development Environment) code. These micro controllers with 8-bit ATMEAL AVR or 32-bit ATMEAL ARM can be easily programmed in Arduino using C or C++ language. In this project we are using an Arduino mega ATmega2560 based micro controller board called Arduino Mega 2560. It contains 16 analog inputs, 4 hardware serial ports (UARTS), a 16 MHz crystal oscillator, 54 digital I/O pins (15 of which can be used as PWM outputs), USB connection, power connector, an ICSP header, and a reset button. It comes with everything you need to support your micro controller; to get started, all you need to do is plug in a USB cable, AC/DC adapter or batteries. Most earlier Mega 2560 shields and card. The Arduino Mega 2500 is a

microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Mega 2500 is compatible with most shields designed for the Arduino Uno and the older Mega boards.

4.3 PROXIMITY SENSOR

A proximity sensor is a device that can detect the presence of nearby objects without physical contact. They work by emitting an electromagnetic field or beam of radiation and measuring the reflection or destruction of that field or beam by nearby objects. Proximity sensors are widely used in various applications. B. Automation, safety systems, robotics, etc. There are several types of proximity sensors: Inductive Proximity Sensors: These sensors work by generating an electromagnetic field and measuring changes in the field caused by nearby conductive objects.

They are often used in automation applications. B. To detect the presence of metal objects on conveyor belts. Capacitive Proximity Sensors: These sensors work by generating an electric field and measuring changes in the electric field caused by nearby objects with different dielectric constants. They are commonly used to detect the presence of liquids or powders in tanks or containers. Ultrasonic Proximity Sensors: These sensors emit high frequency sound waves and measure the reflection of these waves from nearby objects. They are commonly used in automotive applications for parking sensors and collision avoidance systems. Magnetic Proximity Sensors: These sensors work by detecting changes in magnetic fields caused by nearby objects. They are commonly used in security systems to detect openings in doors and windows. Optical Proximity Sensors: These sensors emit a beam of light and measure the reflection of that beam from nearby objects. They are commonly used in robotics and automation applications to detect the presence of objects on production lines. Proximity sensors have several advantages over other types of sensors. Being contactless, it can detect objects without physical contact, reducing the risk of damage and wear. It is also

fast and reliable, providing accurate and instant feedback on the presence or absence of nearby objects.

In summary, proximity sensors are essential components in various industries and applications. They provide a reliable and accurate method for detecting the presence of nearby objects without physical contact. The availability of different types of proximity sensors for different applications makes them versatile and valuable tools for automation, security, robotics, etc. A proximity sensor is a device that can detect the presence of nearby objects without any physical contact. It can be used for various applications, such as obstacle avoidance, gesture recognition, or distance measurement. In this tutorial, we will learn how to use a proximity sensor with an Arduino board. We will use an infrared proximity sensor module that consists of an infrared LED and a photodiode. The module emits infrared light and measures the amount of light reflected by the object. The closer the object is, the more light is reflected. The module outputs a digital signal that indicates whether the object is within a certain range or not. We will connect the module to an Arduino and use a buzzer to make a sound when an object is detected.

4.4 ULTRASONIC SENSORS

Ultrasonic Sensor Similar to sonar detectors, ultrasonic sensors work by sending sound pulses beyond the human audible range. The pulse leaves the rangefinder at the speed of sound (340 m/s) and travels in a cone. Rangefinder up to 400cm picks up sound after bouncing off an object.

The sensor interprets this as an echo and calculates the time elapsed between the transmission of the signal and the reception of the echo. The controller then calculates the element's distance based on this interval. The piezoelectric transducers that make up an ultrasonic sensor can convert an electrical signal into a mechanical vibration, which can be converted back into an electrical signal. So an ultrasonic sensor is a transceiver that works very close to a single frequency speaker and microphone.

Ultrasonic sensors can detect materials of different shapes, transparencies or colors. In this experiment, waterproof ultrasonic sensors are used for each case to be avoided.

Ultrasonic sensors work on the principle of echolocation, which is similar to how bats and dolphins navigate and locate objects. The sensor emits a high-frequency sound wave, which travels through the air and bounces off an object. The reflected sound wave is then picked up by the sensor, which measures the time it takes for the wave to return. The time it takes for the wave to return is proportional to the distance between the sensor and the object. Ultrasonic sensors are devices that can measure the distance to an object by emitting and receiving ultrasonic waves.

They have four pins: VCC, GND, TRIG and ECHO. VCC and GND are used to supply power to the sensor, while TRIG and ECHO are used to send and receive signals. To connect an ultrasonic sensor to Arduino Mega, we need to connect VCC to 5V, GND to GND, TRIG to any digital pin and ECHO to any digital pin. To detect the median of a sound wave, we need to use four ultrasonic sensors arranged in a square formation. The median is the point where the sound wave has equal amplitude on both sides. To find the median, we need to measure the distance from each sensor to the sound source and compare them. The sensor that has the smallest distance is closest to the median, while the sensor that has the largest distance is farthest from the median. The other two sensors are on either side of the median.

To measure the distance from each sensor to the sound source, we need to use the following algorithm:

- Set TRIG pin to LOW for 2 microseconds.
- Set TRIG pin to HIGH for 10 microseconds.
- Set TRIG pin to LOW again.
- Wait for ECHO pin to go HIGH.
- Start a timer and wait for ECHO pin to go LOW.

- Stop the timer and calculate the distance using the formula: $\text{distance} = (\text{time} * \text{speed of sound}) / 2$.

We need to repeat this algorithm for each sensor and store the distances in an array. Then, we need to find the minimum and maximum values in the array and compare them with the other two values. The sensor that corresponds to the minimum value is closest to the median, while the sensor that corresponds to the maximum value is farthest from the median. The other two sensors are on either side of the median.

To display the results, we can use a serial monitor or an LCD screen connected to Arduino Mega. We can print out the distances from each sensor and indicate which one is closest to the median, which one is farthest from the median and which ones are on either side of the median.

4.5 LCD INTERFACING

On the LCD panel, there are two rows with 16 character spaces each. It also has 16 pins (16 channels), which it uses to connect to other devices and display the necessary messages.

- VSS, Ground (0V), Pin 1.
- Pin 2 is the power (+5V) pin.
- Pin 3: V0, which controls the display's contrast via a potentiometer (0 to 5V).
- Pin 4: RS, which switches between the instruction and data registers (0 represents instruction mode and 1 represents data mode).
- Pin 5 is marked RW or R/W (0 is for writing, 1 is for reading).
- Pin 6: E, Enable, must be high in order to operate.
- Pins 7 through 14: D0-D7, indicating data or instruction sequences, respectively.
- Pins 15, 16: A, K, anode and cathode of the backlight LED, respectively.

4-bit and 8-bit modes for LCD displays.

Only 4 bits of data are processed at once in 4-bit mode. If the data is encoded as a byte, the high order nibble and subsequently the low order nibble will be processed to display the necessary character via register shifting. Only when the Arduino required I/O pin count is insufficient to simultaneously handle an 8-bit sequence is this more complex technique desirable. 8-bit mode: The full 8-bit

sequence is processed using 8 lines from the Arduino and the LCD display's 8-bit data lines. If a different Arduino board with numerous additional I/O ports issued, then the 8-bit mode would lead to simpler programming and faster execution. LCD interfacing using Arduino is a process of connecting a liquid crystal display (LCD) module to an Arduino board and displaying text or graphics on the screen. LCD modules are widely used in various applications, such as clocks, calculators, monitors, and electronic devices.

LCD modules can be controlled by Arduino using different methods, such as parallel, serial, or I2C communication. In this article, we will discuss how to interface an LCD module with Arduino using the parallel method, which is the simplest and most common way of connecting an LCD to Arduino. LCDs are based on the principle of liquid crystal manipulation, where the behavior of liquid crystals changes when subjected to an electric field. An LCD typically consists of multiple layers, including two glass plates with transparent conductive coatings, a liquid crystal layer sandwiched between them, and a backlight for illumination. The liquid crystals in the LCD act as a light valve, allowing or blocking the passage of light to create a visible image. When an electric field is applied to the liquid crystal layer, the orientation of the liquid crystals changes, which in turn alters the polarization of the incoming light.

By controlling the electric field across different segments of the liquid crystal layer, it is possible to control the passage of light and create patterns or images on the LCD. There are various types of LCDs available in the market, including character LCDs and graphic LCDs. Character LCDs display text characters arranged in rows and columns, while graphic LCDs can display graphical images or custom characters in addition to text. Character LCDs are more common and widely used in many projects due to their simplicity and ease of use, making them a popular choice for interfacing with Arduino.

Character LCDs typically come in different sizes, such as 16x2, 20x4, etc., where the first number denotes the number of characters per row, and the second number denotes the number of rows. Graphic LCDs come in various sizes, such

as 128x64, 128x32, etc., where the numbers denote the resolution of the LCD in pixels.

4.6 D.C Motor

The DC Motor is a rotating electric motor that converts direct current (DC) electrical energy into mechanical energy. The most common type depends on the force generated by an induced magnetic field caused by an electric current flowing through a coil. For a part of the motor current that occasionally changes direction, almost all types of DC motors contain electromagnetic or electronic internal mechanisms. 200RPM Twin Shaft BO Motor - Direct motors provide good torque and speed at low operating voltage, which is their greatest strength. The combination of small shafts and matching wheels results in an optimized design for your application or robot. Because there are mounting holes on the body, it is lightweight and suitable for in-line placement.

The motor is compatible with 69mm diameter plastic gear motor wheels. This is an alternative to our metal gear DC motors. It has an operating voltage of 3 to 12 V, which makes it ideal for building small to medium robots. A D.C. motor is a type of electric motor that converts direct current (DC) into mechanical power. It is commonly used for Arduino projects that require motion control, such as robots, cars, or drones. To connect a D.C. motor to an Arduino, a motor shield is often needed. A motor shield is a circuit board that plugs into the Arduino and provides terminals for connecting and controlling one or more motors.

It also handles the power supply and protection for the motors, making it easier and safer to use them with the Arduino. Direct current (DC) motors are widely used in many applications due to their simplicity, efficiency, and controllability. When paired with an Arduino microcontroller, DC motors can be easily controlled for various projects such as robotics, automation, and motorized devices.

In this article, we will explore the basics of using DC motors with Arduino, including their working principles, types, control methods, and some practical tips. DC motors work on the principle of electromagnetic induction, where a current-carrying conductor placed in a magnetic field experiences a force that causes it to

rotate. There are two common types of DC motors: brushed and brushless. Brushed DC motors have a rotating armature (or rotor) with brushes and a commutator that provide the necessary current and voltage to generate the magnetic field and drive the motor.

On the other hand, brushless DC motors have a fixed magnet (or stator) and a rotating magnet (or rotor) that are controlled electronically without the need for brushes or commutators. To control a DC motor with an Arduino, a motor driver circuit is typically required. A motor driver is a specialized electronic circuit that provides the necessary voltage, current, and control signals to the motor. It acts as an interface between the Arduino and the motor, allowing the microcontroller to control the motor's direction and speed. There are several common motor driver types that can be used with Arduino, including H-bridge, L293D, and DRV8825, among others. H-bridge motor drivers are commonly used for controlling the direction and speed of brushed DC motors, as they allow for bidirectional control by reversing the polarity of the motor terminals. L293D and similar motor drivers are typically used for small to medium-sized motors, while DRV8825 and other stepper motor drivers are used for controlling stepper motors, which are commonly used in applications that require precise positioning. When working with DC motors and Arduino,

It is essential to consider some practical tips. Firstly, it's crucial to choose a motor driver that is suitable for the specific motor being used, considering the motor's voltage, current, and power requirements. Secondly, it's essential to provide proper power supply to the motor driver and motor, taking into account the voltage and current ratings. Additionally, it's essential to handle the motor with care, as it can generate mechanical and electrical stress that can affect its performance and lifespan.

To control a DC motor with an Arduino, a motor driver circuit is typically required. A motor driver is a specialized electronic circuit that provides the necessary voltage, current, and control signals to the motor. It acts as an interface between the Arduino and the motor, allowing the microcontroller to control the motor's direction and speed.

4.7 MOTOR DRIVE SHIELD

This L293D Motor Driver Shield for Arduino is one of the most versatile shields on the market, with two servo couplers and four motor couplers for DC or stepper motors. As such, it's a great shield for any robotics project. This Arduino-compatible motor driver display is a complete product that can drive four DC motors, two four-wire stepper motors, and two five-volt servo motors. The L293D drives the DC motor and stepper motor, and Arduino pins 9 and 10 drive the servo. The L293D is a 4-channel high-voltage, high-current integrated monolithic driver. This basically means you can run DC motors up to 36 volts, which is more than enough for some large motors, and the chip can supply a maximum current of 600mA per channel; the L293D chip is also a kind of H-bridge. An H-bridge is a circuit that allows voltage to be applied to an output (like a motor) across a load in both directions.

The expansion board contains two L293D engine drivers and a 74HC595 shift register. To control the direction of the motor driver, a shift register extends three Arduino A motor drive shield is a device that can be attached to a microcontroller board, such as an Arduino, to control the speed and direction of one or more DC motors. The motor drive shield uses a driver chip, such as an L293D to amplify the signals from the microcontroller and provide enough current to drive the motors. The motor drive shield also has terminals or connectors for attaching the motors and a power supply. Some motor drive shields have additional features, such as current sensing, PWM control, or protection diodes. Connecting a motor shield to an Arduino Uno is a straightforward process. The pins of the official Arduino motor shield will only align with Arduino Uno Rev. 3.

In order to make it work, you need to place the shield on top of the Arduino board and press down gently until the shield is fully seated. Once the shield is installed, you can start using its features to control motors. The motor shield has 2 channels, which allows for the control of two DC motors or 1 stepper motor¹. You can then write a program to control the speed and direction of the motors using the functions provided by the motor shield library. The Motor Drive Shield is an Arduino Uno compatible expansion board that provides an easy and convenient

way to control various types of motors using an Arduino Uno microcontroller. It is a popular choice among hobbyists, makers, and engineers who want to build projects involving motor control, such as robotics, automation, and electric vehicles. The Motor Drive Shield is designed to stack on top of the Arduino Uno, extending its capabilities for motor control.

It comes with built-in motor driver circuits that can handle different types of motors, including DC motors, stepper motors, and servo motors. This makes it versatile and suitable for a wide range of applications. One of the key features of the Motor Drive Shield is its ability to provide motor control in both direction and speed. It has multiple channels, typically two or more, to control multiple motors simultaneously. Each channel usually consists of a motor driver circuit, which can control the direction of rotation and speed of the motor. The motor driver circuit uses pulse-width modulation (PWM) technique to vary the motor speed by adjusting the duty cycle of the PWM signal. This allows precise control over the motor's speed and direction, enabling smooth and accurate motor movements.

4.8 RELAY

A relay is a type of electrical switch that can be controlled by Arduino or any other micro-controller. It is useful for connecting Arduino to high voltage or high current devices, such as motors, lights, solenoids, and so on. A relay acts as a bridge between Arduino and the device, allowing Arduino to turn the device on or off with a digital signal. However, working with high voltage or high current can be dangerous, so you should always be careful and follow safety precautions when using a relay. To connect a relay of all four DC motors and get the RDX in pin 3 in Mega 2500, you need to follow these Connect the positive terminal of the battery to the common terminal of the relay. Connect the negative terminal of the battery to the ground of the Mega 2500 board. Connect the normally open terminal of the relay to one end of each motor. Connect the other end of each motor to the ground of the Mega 2500 board. Connect the control terminal of the relay to pin 3 of the Mega 2500 board. Write a program that sends a high signal to pin 3 when you want to turn on the motors and a low signal when you want to turn them off. Upload the program to the Mega 2500 board and test your circuit. We learnt how to switch on and off an LED in an earlier session. In this lesson, we will learn how to turn on

and off several devices that utilise a high voltage power source (for example, a light bulb, fan, electromagnetic lock, and linear actuator).

Relays are electrical switches that may be programmed and are managed by micro-controllers like Arduino. The devices that use high voltage and/or high current are turned on and off using programming. The input (low voltage) group and the output (high voltage) group are the two sets of pins on a relay. The input group's pins, including three of them, are linked to Arduino. To be linked to GND (0V) is the DC- pin. VCC (5V) IN pin and DC+ pin must be connected.

It is employed in both ordinarily open and typically closed modes. An open pin is a NO pin. It operates in generally open mode. NC pin: A pin that is usually closed. When in use, it is closed normally. The input mode mode (for the IN pin): There are two input modes that cause relays to function in different instructions: LESS intense trigger mode MODE OF HIGH LEVEL TRIGGER The output mode (for output pins) is as follows: Two output modes exist that cause relays to operate in opposition to one another: the typically open mode frequently in closed mode. These are the opposing modes. If the IN pin is connected to LOW (0V), then "normally" signifies that. HIGH Level Trigger - Open Mode.

A relay is a sort of electrical switch that may be controlled by Arduino or any other microcontroller. It is helpful for connecting Arduino to high voltage or high current gadgets like solenoids, motors, and other such things. A relay functions as a link between Arduino and the device, allowing Arduino to switch it on and off using a digital signal. However, dealing with high voltage or high current can be hazardous, therefore you should always be cautious and observe safety procedures while utilising a relay. The high voltage device must be connected to the COM pin and NO pin in order to operate in this mode. When the IN pin is linked to LOW (0V), the switch is open. The gadget is inactive or off. If the IN pin is connected to HIGH (5V), the switch is closed. The gadget is turned on or in use. HIGH Level Trigger - Usually Closed Mode.

We must attach the high voltage device to both the COM pin and NC pin in order to use this mode. When the IN pin is connected to LOW (0V), the switch is closed. The gadget is turned on or in use. If the IN pin is connected to HIGH (5V), the switch is open. The gadget is inactive or off. Arduino manages a relay to control a

high-voltage device. A relay is easy to manage. All we need is: Connect an Arduino's pin to the relay's IN pin. Set the pin to LOW or HIGH to control the relay.

4.9 PROGRAMMING

4.9.1 *Arduino Uno*

Arduino programming is a way of creating and controlling electronic devices using a microcontroller board and a software environment. One of the applications of Arduino programming is to make a car move using a motor shield. A motor shield is an accessory that allows an Arduino board to control and drive motors using 4 dc motor which is connected with arduino uno which is controlled by hc-5 bluetooth controller. Connecting an HC-05 Bluetooth controller to an Arduino Uno is a simple process. Here are the steps you can follow to connect the two devices:

- Start with the GND pin connection: Connect the GND pin of the Bluetooth module to the GND pin of the Arduino Uno¹.
 - Connect the TXD Pin: Connect the TXD pin of the Bluetooth module to the RXD pin of the Arduino Uno¹.
 - Connect the RXD Pin: Connect the RXD pin of the Bluetooth module to the TXD pin of the Arduino Uno¹. Once you have made these connections, you can power on both devices and start using them together.
 - Connect the VCC Pin: Which give the power of the Bluetooth module
- The motor shield is a device that allows you to control multiple motors with your Arduino Uno board. To connect the motor shield to the Arduino Uno, you need to follow these steps:
- Make sure the Arduino Uno and the motor shield are powered off and disconnected from your computer.
 - Align the pins of the motor shield with the headers of the Arduino Uno and gently press them together until they are firmly attached.

- Connect the motors to the terminals on the motor shield according to the labels. For example, if you want to use motor 1, connect it to M1A and M1B terminals.
- Connect a power supply to the motor shield using the DC jack or the screw terminals. The voltage of the power supply should match the voltage of the motors. Do not use the USB port of the Arduino Uno to power the motor shield, as it may not provide enough current and damage your board.
- Connect the Arduino Uno to your computer using a USB cable and upload your code using the Arduino IDE. You can use the Adafruit Motor Shield library to control the motors easily.

```
#include <AFMotor.h>
#include <SoftwareSerial.h>
SoftwareSerial bluetoothSerial(9, 10); // RX, TX
//initial motors pin
AF_DCMotor motor1(1, MOTOR12_1KHZ);
AF_DCMotor motor2(2, MOTOR12_1KHZ);
AF_DCMotor motor3(3, MOTOR34_1KHZ);
AF_DCMotor motor4(4, MOTOR34_1KHZ);
char command
void setup()
{
  bluetoothSerial.begin(9600); //Set the baud rate to your Bluetooth module.
}
void loop()
{
  if (bluetoothSerial.available() > 0)
  {
    command = bluetoothSerial.read();
    Stop(); //initialize with motors stoped
    switch (command) {
      case 'F':
        forward();
```

```

        break;
    case 'B':
        back();
        break;
    case 'L':
        left();
        break;
    case 'R':
        right();
        break;
    }
}
}
void forward()
{
    motor1.setSpeed(255); //Define maximum velocity
    motor1.run(FORWARD); //rotate the motor clockwise
    motor2.setSpeed(255); //Define maximum velocity
    motor2.run(FORWARD); //rotate the motor clockwise
    motor3.setSpeed(255); //Define maximum velocity
    motor3.run(FORWARD); //rotate the motor clockwise
    motor4.setSpeed(255); //Define maximum velocity
    motor4.run(FORWARD); //rotate the motor clockwise
}
void back()
{
    motor1.setSpeed(255); //Define maximum velocity
    motor1.run(BACKWARD); //rotate the motor anti-clockwise
    motor2.setSpeed(255); //Define maximum velocity
    motor2.run(BACKWARD); //rotate the motor anti-clockwise
    motor3.setSpeed(255); //Define maximum velocity
    motor3.run(BACKWARD); //rotate the motor anti-clockwise
    motor4.setSpeed(255); //Define maximum velocity
    motor4.run(BACKWARD); //rotate the motor anti-clockwise
}

```

```

}
void left()
{
    motor1.setSpeed(255); //Define maximum velocity
    motor1.run(BACKWARD); //rotate the motor anti-clockwise
    motor2.setSpeed(255); //Define maximum velocity
    motor2.run(BACKWARD); //rotate the motor anti-clockwise
    motor3.setSpeed(255); //Define maximum velocity
    motor3.run(FORWARD); //rotate the motor clockwise
    motor4.setSpeed(255); //Define maximum velocity
    motor4.run(FORWARD); //rotate the motor clockwise
}
void right()
{
    motor1.setSpeed(255); //Define maximum velocity
    motor1.run(FORWARD); //rotate the motor clockwise
    motor2.setSpeed(255); //Define maximum velocity
    motor2.run(FORWARD); //rotate the motor clockwise
    motor3.setSpeed(255); //Define maximum velocity
    motor3.run(BACKWARD); //rotate the motor anti-clockwise
    motor4.setSpeed(255); //Define maximum velocity
    motor4.run(BACKWARD); //rotate the motor anti-clockwise
}
void Stop()
{
    motor1.setSpeed(0); //Define minimum velocity
    motor1.run(RELEASE); //stop the motor when release the button
    motor2.setSpeed(0); //Define minimum velocity
    motor2.run(RELEASE); //rotate the motor clockwise
    motor3.setSpeed(0); //Define minimum velocity
    motor3.run(RELEASE); //stop the motor when release the button
    motor4.setSpeed(0); //Define minimum velocity
    motor4.run(RELEASE); //stop the motor when release the button
}

```

4.9.2 Arduino Mega

Arduino Mega is a microcontroller board that can be used for various projects and applications. One of the features of Arduino Mega is that it has 54 digital input/output pins, which can be connected to different sensors and devices. Ultrasonic sensors are devices that can measure the distance to an object by emitting and receiving ultrasonic waves. They have four pins: VCC, GND, TRIG and ECHO. VCC and GND are used to supply power to the sensor, while TRIG and ECHO are used to send and receive signals. To connect an ultrasonic sensor to Arduino Mega, we need to connect VCC to 5V, GND to GND, TRIG to any digital pin and ECHO to any digital pin. To detect the median of a sound wave, we need to use four ultrasonic sensors arranged in a square formation. The median is the point where the sound wave has equal amplitude on both sides. To find the median, we need to measure the distance from each sensor to the sound source and compare them. The sensor that has the smallest distance is closest to the median, while the sensor that has the largest distance is farthest from the median. The other two sensors are on either side of the median. To connect a relay of all four DC motors and get the RDX in pin 3 in Mega 2500, you need to follow these steps:

- Connect the positive terminal of the battery to the common terminal of the relay.
- Connect the negative terminal of the battery to the ground of the Mega 2500 board.
- Connect the normally open terminal of the relay to one end of each motor.
- Connect the other end of each motor to the ground of the Mega 2500 board.
- Connect the control terminal of the relay to pin 3 of the Mega 2500 board.
- Write a program that sends a high signal to pin 3 when you want to turn on the motors and a low signal when you want to turn them off.
- Upload the program to the Mega 2500 board and test your circuit.

```

#include <LiquidCrystal.h>
LiquidCrystal lcd(12,11,10,9,8,7);
#define trigPin1 A0
#define echoPin1 A1
#define trigPin2 A2
#define echoPin2 A3
#define trigPin3 A4
#define echoPin3 A5
#define trigPin4 A6
#define echoPin4 A7
int relay =2;
char command;
int ALARM = 7;
int STOP = 3;
long,duration,distance,
FIRSTSensor,SECONDSensor,THIRDSensor,FOURsensor;
void setup()

{
lcd.begin(16,2);
Serial.begin (9600);
lcd.clear();
pinMode(relay,OUTPUT);
pinMode(trigPin1, OUTPUT);
pinMode(echoPin1, INPUT);
pinMode(trigPin2, OUTPUT);
pinMode(echoPin2, INPUT);
pinMode(trigPin3, OUTPUT);
pinMode(echoPin3, INPUT);
pinMode(trigPin4, OUTPUT);
pinMode(echoPin4, INPUT);
pinMode(ALARM, OUTPUT);
digitalWrite(relay,LOW);
digitalWrite(ALARM, LOW);

```

```

    lcd.setCursor(0,0);lcd.print("Interfacing ");
    lcd.setCursor(0,1);lcd.print("of Multiple ");
    delay(3000);lcd.clear();
    lcd.setCursor(0,0);lcd.print("3 HC - SR04 ");
    lcd.setCursor(0,1);lcd.print("Ultrasonic ");
    delay(3000);lcd.clear();
    lcd.setCursor(0,0);lcd.print("SensorS With ");
    lcd.setCursor(0,1);lcd.print("Arduino ");
    delay(3000);lcd.clear();
    Serial.begin(9600); //Set the baud rate to your Bluetooth module.

}

void loop()

{
    //////////////////////////////////////
    SonarSensor(trigPin1, echoPin1);
    FIRSTSensor = distance;
    SonarSensor(trigPin2, echoPin2);
    SECONDSensor = distance;
    SonarSensor(trigPin3, echoPin3);
    THIRDSensor = distance;
    SonarSensor(trigPin4, echoPin4);
    FOURsensor = distance;
    //////////////////////////////////////
    digitalWrite(ALARM, LOW);
    //////////////////////////////////////
    Serial.print("S1:");Serial.println(FIRSTSensor); delayMicroseconds(10);
    Serial.print("S2:");Serial.println(SECONDSensor);delayMicroseconds(10);
    Serial.print("S3:");Serial.println(THIRDSensor); delayMicroseconds(10);
    Serial.print("S4:");Serial.println(FOURsensor); delayMicroseconds(10);
    //////////////////////////////////////
    if (FIRSTSensor>50){lcd.print("");}else if (FIRSTSensor<50)
    {

```

```

lcd.setCursor(0,0);lcd.print("S1:");lcd.setCursor(4,0);lcd.print(FIRSTSensor);
}
if(SECONDSensor>50){lcd.print("");}else if(SECONDSensor<50)
{
lcd.setCursor(9,0);lcd.print("S2:");lcd.setCursor(12,0);
lcd.print(SECONDSensor);
}
if(THIRDSensor>50){lcd.print("");}else if(THIRDSensor<50)
{
lcd.setCursor(0,1);lcd.print("S3:");lcd.setCursor(4,1);lcd.print(THIRDSensor);
}
if(FOURsensor>50){lcd.print("");}else if(FOURsensor<50)
{
lcd.setCursor(9,1);lcd.print("S4:");lcd.setCursor(12,1);lcd.print(FOURsenso);
}
delay(1000);lcd.clear();
Serial.println(FIRSTSensor);
////////////////////
if((FIRSTSensor <= 10))
{digitalWrite(ALARM, HIGH);
digitalWrite(STOP, LOW);
digitalWrite(relay,HIGH);
}
else
{
digitalWrite(relay,LOW);

}
if((SECONDSensor <= 10))
{
digitalWrite(ALARM, HIGH);
digitalWrite(STOP, LOW);
digitalWrite(relay,HIGH);}
else

```

```

{
    digitalWrite(relay,LOW);
}
if((THIRDSensor <= 10))
{digitalWrite(ALARM, HIGH);
digitalWrite(STOP, LOW);
digitalWrite(relay,HIGH);}
else
{
    digitalWrite(relay,LOW);
}
if(FOURsensor <= 10)
{digitalWrite(ALARM, HIGH);
digitalWrite(STOP, LOW);
digitalWrite(relay,HIGH);}
else
{
    digitalWrite(relay,LOW);}
}
/////////////////////////////////////////////////////////////////
void SonarSensor(int trigPin,int echoPin)
{
    digitalWrite(trigPin, LOW);
    delayMicroseconds(2);
    digitalWrite(trigPin, HIGH);
    delayMicroseconds(10);
    digitalWrite(trigPin, LOW);
    duration = pulseIn(echoPin, HIGH);
    distance = (duration/2) / 29.1;

}

```

CHAPTER 5

RESULTS AND DISCUSSION

It helps drivers stay within their lane while driving. The system uses sensors to detect median markings and provides warnings if the vehicle drifts out of its lane. the goal is to improve safety and reduce the risk of accidents caused by unintentional medians. it's important to note that this is not a fully autonomous driving system and still requires the driver to remain engaged and attentive. some drivers may find the warnings or corrective actions of the system to be distracting or annoying. Overall, the outcome of median keep assist can be positive in terms of improving safety and reducing the risk of accidents, but it should be used as a supplement to responsible driving practices and not relied upon as a substitute for driver attentiveness and control.

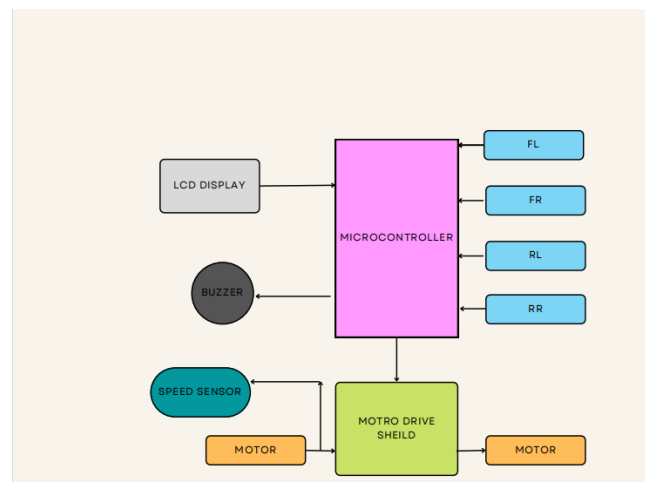


Fig:5.1 : working flow chart

By taking more than one input from a system and working on true or false [9] then this logic is .when distance is detected and waits for speed if speed is above limit then it slow down the speed of motor and on all emergency lights. A micro controller based safe system for car where it helps or guide driver to safe drive. Mainly when it comes to road accidents it most of over speeding or obstacles hit. Finding the distance between obstacles and moving in safe distance from obstacles is done here. Using proximity sensors, buzzers, led display and

controller to find distance between obstacles and car. Then from speed sensor we collecting speed and if above limit it gives indication and more near it brakes the motor by decreasing speed.

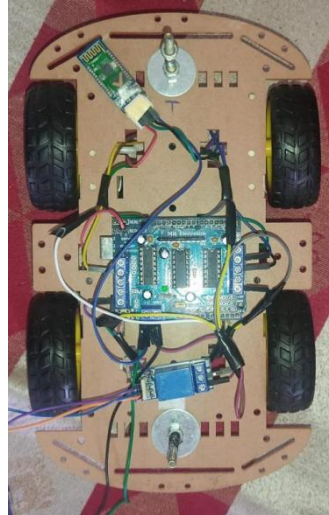


Fig:5.2 : Bottom View Of The Prototype

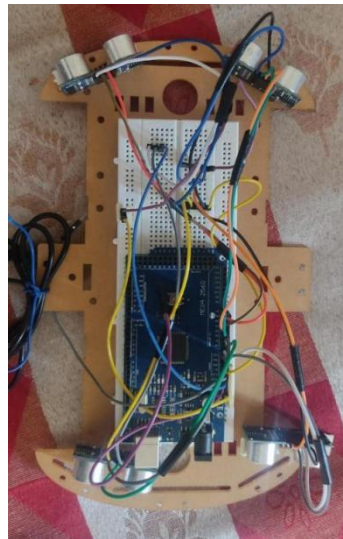


Fig:5.3 : Top View Of The Prototype

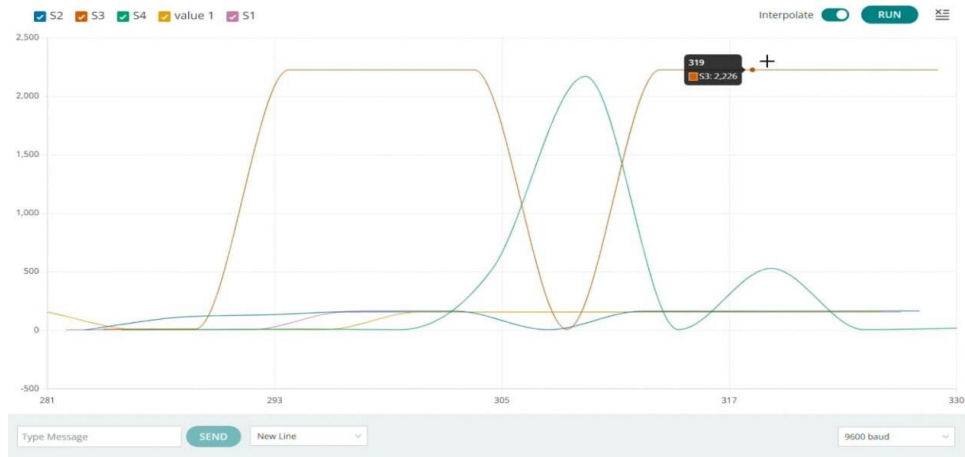


Fig:5.4 : when there is no detection

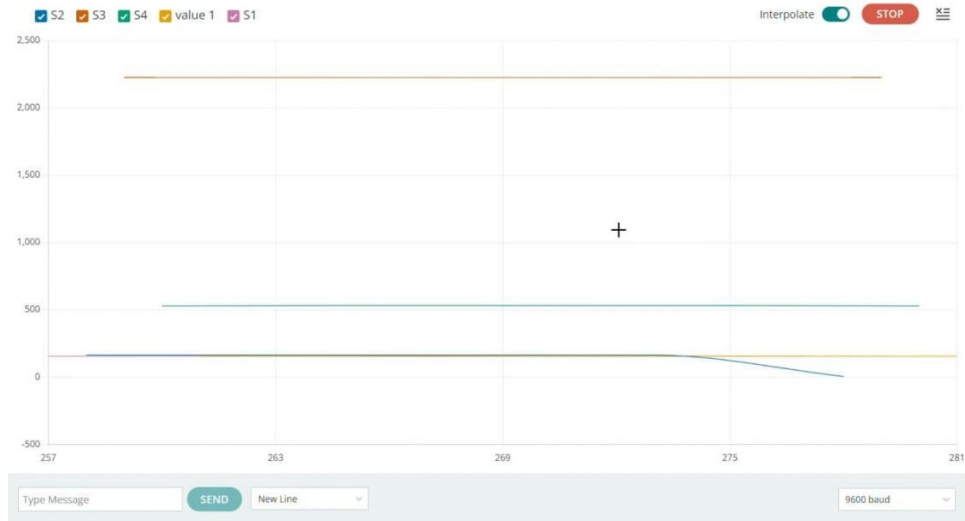


Fig:5.5:When the s2 front right and s3 rear right sensor is detected

CHAPTER 6

CONCLUSION

More deaths are caused by driving on the roads at night and not following the rules of the road. It is the best choice to provide the driver with a guide while driving the vehicle. Focus on the meridians or obstacles that separate the path. By using a proximity sensor, we can detect the distance and keep a safe distance from obstacles. If there are obstacles, the system gives indications. The implementation of such systems has shown promising results in reducing accident rates, especially those caused by driver fatigue, distraction or inattention. However, it is important to note that the lane keeping assistant does not replace careful driving, it should only be used as an aid. With new technological advances and increased adoption, can lead to a safer driving experience for all road users.

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ANNEXURE

- Submitted the review paper title “Review Of Safety And Indication System For Vehicle” for ICMMSSE 2022 ON 24.12.2022
- PRESENTED ON PAPER IN ICMMSSE 2022 ON 30.12.2022
- The paper as accepted for virtual oral and currently on under the review
- Submitted the research paper title “DESIGN OF MEDIANS DETECTION FOR VEHICLES” FOR ICDTM 2023 ON 25.04.2023
- Presented on paper in ICDTM 2023 ON 09.04.2023