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Obstacle Avoiding Robotic Vehicle with Eye Blink Sensor

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Abstract: *In today's world ROBOTICS is a fast growing and interesting field. ROBOT has sufficient intelligence to cover the maximum area of provided space. Introduces the design and implementation of an autonomous obstacle -avoiding robot car using ultrasonic wave sensor in this thesis. By sending pulses, the obstacle avoidance distance can be measured. At the same time, we can control steering gear to realize the obstacle avoidance function. The robot car uses front axle steering, rear wheel drive arrangement. Two drive tires are driven by two DC motors with gear reduction mechanisms. Using Arduino MCU chip as the control core of the Robot car. Through the design of the hardware and software system, we build the robot car platform and obtain good experimental effect.*

This project describes about an obstacle avoidance robot vehicle which is controlled by sensor. The robot is made using ultrasonic sensor and it is controlled by Arduino microcontroller. Ultrasonic sensor fixed in front portion of the robot vehicle. The sensor gets the data from surrounding area through mounted sensors on the robot. The sensor is sensing the obstacle and deviate its path to choose an obstacle free path. The sensor will be sending the data to the controller is compared with controller to decide the movement of the robot Wheel. The robot wheel movement and direction will be based on the sensing of the ultrasonic sensor and also using a wheel encoder. This vehicle is used for detecting obstacle and avoiding the collision. We have programmed the controller to be used with ANDROID app.

An ultrasonic sensor is used to detect any obstacle ahead of it and sends a command to the micro-Alternates direction by actuating the motors which are interfaced to it through a motor driver. Obstacle avoidance is one of the most important aspects of mobile robotics. Without it, robot Movement would be very restrictive and fragile. This project proposes robotic vehicle that has an intelligence built in it such that it directs itself whenever an obstacle comes in its path.

Accidents due to driver drowsiness can be prevented using eye blink sensors. The driver is supposed to wear the eye blink sensor frame throughout the course of driving and blink has to be for a couple of seconds to detect drowsiness. Any random changes in steering movement leads to reduction in wheel speed. The threshold of the vibration sensor can be varied and accordingly action can be taken

Keywords: ROBOTICS

I. INTRODUCTION

Robotics is part of Todays communication. In today's world ROBOTICS is fast growing and interesting field. It is simplest way for latest technology modification. Now a day's communication is part of advancement of technology, so I decided to work on ROBOTICS field, and design something which will make human life simpler in today aspect. An autonomous robot is a robot that is capable of moving on its own in an unknown and unstructured environment. An autonomous robot is equipped with software intelligence to sense its environment, detect obstacles in its path and move around an unknown environment overcoming the obstacles. There are many robotic designs that are employed in designing of autonomous robots. These designs are usually developed considering the physical environment in which the robot has to be deployed. There are autonomous robots like snake robots, walking robots, autonomous drones and autonomous robotic cars or rovers. This ROBOT has sufficient intelligence to cover the maximum area of provided space. It has an infrared sensor which are used to sense the obstacles coming in between the path of ROBOT. It will move in a particular direction and avoid the obstacle which is coming in its path. The main motto of designing such type of Robot or the technology is that this technology can be used in today's very fast transportation to avoid the

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accident generally happen in congested by applying emergency break. If we use this technology in the car or any vehicle, it will automatically sense the obstacles then it will take a side to the available free space. An obstacle may be a livingthings or any object. Autonomous Intelligent Robots are robots that can perform desired tasks in unstructured environments without continuous human guidance. Thus, by using this technology in vehicles we make the drive safe.
For any vehicle accidents driver's faults are the most accountable aspect to cause dangerous problem to the society. Many drivers cannot control the vehicles due to different reasons it may cause severe accidents and sometime death. For vehicle accidents various factors involved such as drunk driving, over speeding, many distractions like texting while driving, t alking with others,playing with children etc. one of the important factor is sleeping on the wheel. People know the dangerous of alcohol consumption and run the vehicles but they not understand the seriousness of fatigue driving. In India, Ministry of Road Transport and Highway released a report in 2015, every day around 1,374 accidents may happen and almost 400 people deaths occur. Every hour because of vehicle accidents approximately 57 road accidents and 17 people dies. In that 54.1 percent of people are in the age group of 15 to 34 years are killed in vehicle accident. The Government of India, Ministry of Road Transport and Highway Government of India prepare a strategy to diminish the amount of motorway accidents and losses by 50 % by 2020. Globally vehicle accidents have seemed one of the major community health problems. In India almost 5 lakh road accidents happened in the year 2015. A fatigue Driver those who falls asleep at the move fails to control the vehicle, not possible to take immediate action and results in a crash so it is necessary to monitor the drowsiness of the driver to prevent accidents .

II. LITERATURE SURVEY

Obstacle Avoidance Robotic Vehicle Using Ultrasonic Sensor, Android and Bluetooth for Obstacle Detection" has been designed and developed by Vaghela et.al has mentioned that enormous amount of work has been done on wireless gesture controlling of robots. Various methodologies have been analyzed and reviewed with their merits and demerits under various operational and functional strategies. Thus, it can be concluded that features like user friendly interface, International Journal of Engineering Research & Technology (IJERT) ISSN: 2278 -0181 Published by, www.ijert.org NCESC - 2018 Conference Proceedings Volume 6, Issue 13 Special Issue - 2018 1 light weight and portability of android OS based smart phone has overtaken the sophistication of technologies like programmable glove, static cameras etc., making them obsolete. Although recent researches in this field have made wireless gesture controlling a ubiquitous phenomenon, it needs to acquire more focus in relevant areas of applications like home appliances, wheelchairs, artificial nurses, table top screens etc. in a collaborative manner.
"Obstacle avoidance car" has been designed and developed by FaizaTabassum, et.al has mentioned that Obstacle Avoidance Car successfully detects and avoids obstacles. Simple algorithms used to steer and reducing the turning radius, successfully navigated the vehicle. In conclusion, the group successfully interface every component that was originally planned. Timer interrupts for IR pulse generation. Obstacle detection using IR transceiver. So mechanism using PWM. Steering system using Lego and Servo.

- Automatic driver drowsiness can be detected using artificial intelligence and visual information. System is to detect, track and examine face and eyes of drivers for this different real vehicle image of drivers are taken to validate the algorithms. It is a real time system work in different light conditions [1].
- The numbers of accidents are increased due to several factor, one of the main factor is that driver fatigue. Driver's sleepiness is also implemented using video based approach.This system is noninvasive and human related elements are used. Band power and Empirical Mode Decomposition methods are used to investigate and extract the signal, SVM (Support Vector Machine) used to confirm the analysis and to categorize the state of vigilance of the driver [2].
- The system designs to find the drivers drowsiness using the hypothesis of Bayesian networks. The interaction between driver and vehicle features are extracted to get reliable symptoms of driver drowsiness. It presents more suitable and accurate strategies to design drowsy driver detection system [3].
- Brain and visual activity is used in drowsiness detection system. Electroencephalographic (EEG) channel used to monitor the brain activity. Diagnostic techniques and fuzzy logic are used in EEG- based drowsiness detector. Using blinking detection and characterization for visual activity monitored. Electrooculographic(EOG) channel are used to extract the Blinking features [4]

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III. PROBLEM STATEMENT

The study is an attempt towards developing a robotic vehicle that would be able to detect and avoid obstacle(bumps) in the robot's path using a sensor to achieve the target point in an optimized manner. This problem of effective trajectory planning is what has led to the need for a robot that can detect and avoid objects in a pre-computed path ,objects that appear suddenly. The solution to this trajectory problem involves the use of sensors by the robot to detect objects and avoid them thereby making the robot to be more independent since if would not require external influences The study is an attempt towards developing a robotic vehicle that would be able to detect and avoid obstacle(bumps) in the robot's path using a sensor to achieve the target point in an optimized manner. This problem of effective trajectory planning is what has led to the need for a robot that can detect and avoid objects in a pre-computed path, objects that appear suddenly. The solution to this trajectory problem involves the use of sensors by the robot to detect objects and avoid them thereby making the robot to be more independent since if would not require external influences.

3.1 Objectives

The main objectives of the project are Compreheneded as follows:

- The robot would have the capacity to detect obstacles in its path based on a predetermined threshold distance.
- After obstacle detection, the robot would change its course to a relatively open path by making autonomous decision.
- It can measure the distance between itself and the surrounding objects in real –time.
- It would be able to operate effectively in unknown environment.
- Obstacle avoding robots used in mobile robot navigation system

IV. METHODOLOGY

4.1 Block Diagram

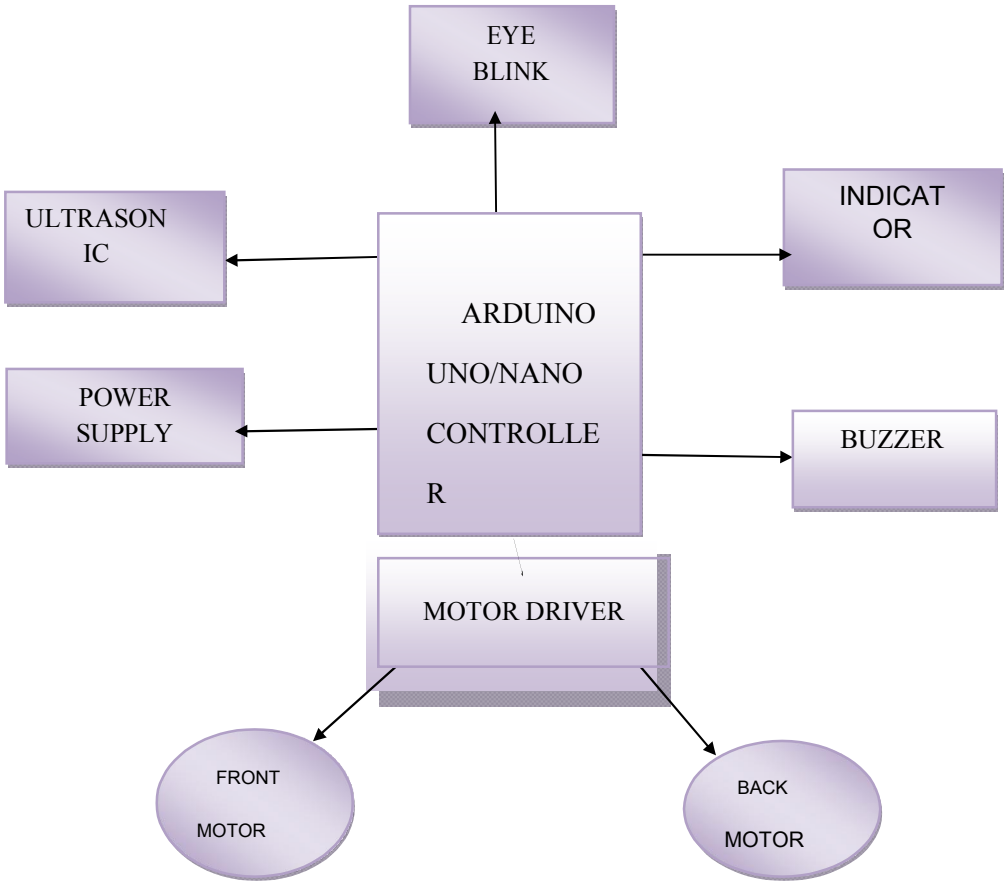

Fig 1 block diagram of Obstacle Avoiding Robotic Vehicle using Arduino with Eye blink sensor

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The sonar system is used in HC-SR04 ultrasonic sensor to determine distance to an object like bats do. Itoffers excellent non-contact range detection from about 2 cm to 400 cm or 1feet to 13 feet. Its operation is not affected by sunlight or black material. The ultrasonic sensor emits the short and high frequency signal. If they detect any object, then they reflect back echo signal which is taken as input to the sensor through Echo pin .Firstly user initialize Trigger and Echo pin as low and push the robot in forward direction. When obstacle is detected Echo pin will give input as high to microcontroller. Pulse In function is used for calculating the time of distance from the obstacle. Every time the function waits for pin to go high and starts timing, then timing will be stopped when pin go to low. It returns the pulse length in microseconds or when complete pulse was not received within the timeout it returns. The timing has been determined means it gives length of the pulse and will show errors in shorter pulses. Pulses from10microseconds to 3 minutes in length are taken into consideration.

Working–Ultrasonic Sensor Module:

It emits an ultrasound wave at 40000 Hz which travels through the air and if there is an object orobstacle on its path, it will bounce back to the module. Considering the travel time and the speed of the sound you can calculate the distance. In order to generate the ultrasound we need to set the Trig on a HIGH state for 10 s. That will send out an 8 cycle sonic burst which will travel at the speed sound. If Forexample, if the object is 10 cm away from the sensor,and the speed of the sound is340m/sor0.034 cm/s the sound wave will need to travel about seconds. But what you will get from the Echo pin will be double that number because the sound wave needs to travel forward and bounce backward. So in orderto get the distance in cm we need to multiply the received travel time value from the echo pin by 0.034 and divide it by 2.

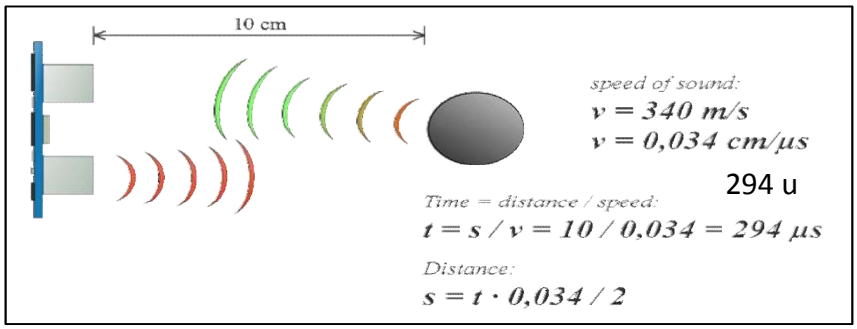

Fig 2 Ultra sonic sensor

Sensors for Obstacle Avoidance

Varieties of sensors are available which can be used for the detection of obstacles some of the very popular sensors are: Infrared sensors (IR), Ultrasonic sensors, Cameras, which can be used as a part of Computer Vision, Sonar. It can measure the distance in its field of view of about thousands to hundreds points In the design of robot, we are using ultrasonic sensors for obstacle detection and avoidance The ultrasonic sensors continuously emits the frequency signals, when obstacle is detected this signals are reflected back which then considered as input to the sensor.

The time taken by beam to return back is saved in variable and converted to distance using appropriate calculations like below Distance= (Time x Speed of Sound in Air (343 m/s))/2

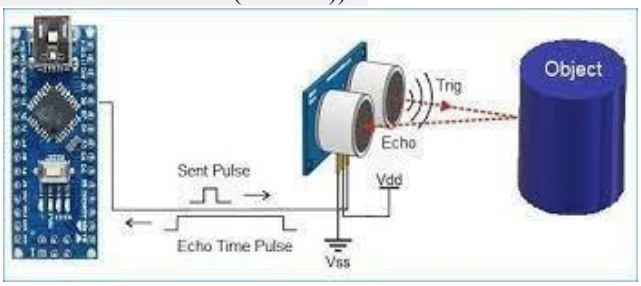

Fig 3 Ultra sonic sensors works

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The ultrasonic sensor consists of a multi vibrator, which fixed at its base. The multi combination of a resonator and vibrator the ultrasonic waves generated by the vibration are delivers to the resonator. Ultrasonic sensor actually consists of two parts: the emitter which produces a 40 kHz sound wave and detector which detects 40 kHz sound wave and sends electrical signal back to the microcontroller. HC- SR04 ultrasonic sensors are used which consist of 4 pins VCC, Trigger, Echo and GND.

4.2.1 Features of Ultrasonic Sensor:

- High sensitivity and high pressure
- High reliability
- Power consumption of 20Ma
- Pulse in/out communication
- Narrow acceptance angle
- Provides exact, non-contact separation estimations within 2cm to 3m The explosion point LED shows estimations in advancement 3-pin header makes it simple to connect utilizing

Working Principle of IR senor

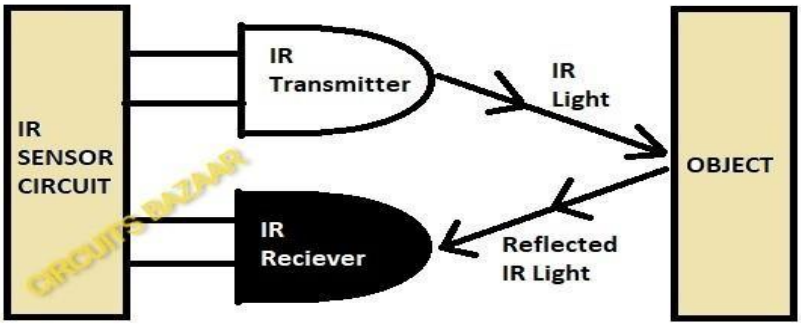

Fig 4 IR sensor

IR Sensor working based on the Rays Reflection principle :

An infrared sensor includes two parts, the emitter (transmitter) & the receiver (receiver), so this is jointly called an optocoupler or a photo-coupler. Here, IR LED is used as a transmitter whereas the IR photodiode is used as a receiver for reflected IR radiations.The photodiode we are using here in the eye blink sensor is very sensitive to the infrared light generated through an infrared LED adjacent to the photodiode. The resistance of photodiode & output voltage can be changed in proportion to the infrared light obtained. This is the fundamental IR sensor working principle for the eye blink sensor. The comparator IC we are using here on the eye blink sensor board is LM358. This IC will compare the signal coming from the photodiode or IR receiver and the potentiometer on the board. The range of the eye blink sensor you can set by rotating the blue colour potentiometer on the board.

There are two types of IR sensors, active and passive. Passive IR sensors have only the IR receiver, not the Transmitter. But active have both transmitter and receiver. Here we are using an active IR sensor.

V. HARDWARE REQUIREMENTS AND SOFTWARE REQUIREMENTS

5.1 Hardware Requirements:

Arduino UNO:

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, 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 connection a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter

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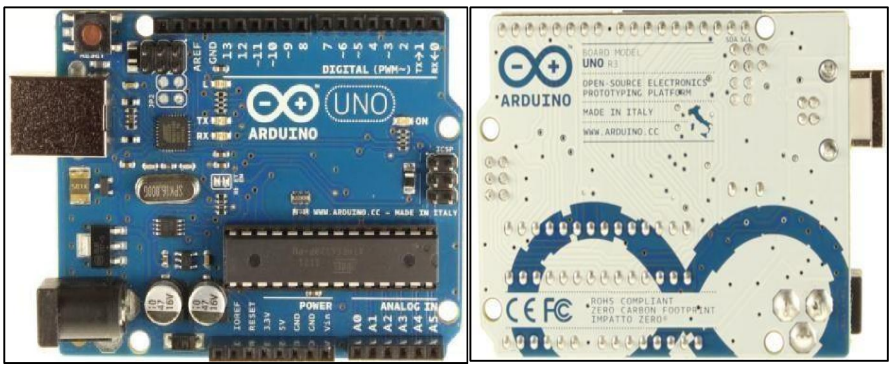

Fig 5 Arduino UNO

ULTRASONIC SENSOR:

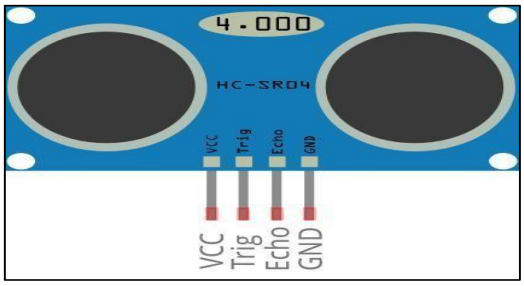

Fig 6 Ultrasonic sensor

An Ultrasonic sensor is a device that can measure the distance to an object by using sound waves. It measures distance by sending out a sound wave at a specific frequency and listening for that sound waveto bounce back. By recording the elapsed time between the sound wave being generated and the sound wave bouncing back, it is possible to calculate the distance between the sonar sensor and the object.

The pin configuration of ultrasonic sensor is shown in above figure. Sensor is having 4 pins such as, VCC,GND and the Echo and Trigger pins.

LM298N Motor driver module

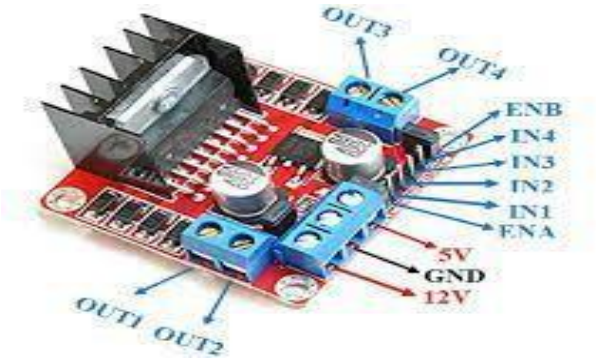

Fig 7 Motor driver module

The LM298N is a popular motor driver module commonly used to control DC motors or stepper motors in various electronic projects. It is a dual H-bridge driver that allows bi-directional control of two motors independently. Here's some information about the LM298N motor driver module and how it works:

Pin Configuration: The LM298N typically comes in a 15-pin package. The important pins and their functions are as follows:

Enable 1,2 (ENA, ENB): These pins are used to enable or disable the motor outputs.

Input 1,2 (IN1, IN2): These pins determine the direction of rotation for Motor 1.

Input 3,4 (IN3, IN4): These pins determine the direction of rotation for Motor 2.

Output 1,2 (OUT1, OUT2): These pins are connected to the motor terminals of Motor 1.

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Output 3,4 (OUT3, OUT4): These pins are connected to the motor terminals of Motor 2.
VCC1, VCC2: These pins are used to provide power supply to the motors (usually 5V to 35V).
GND: Common ground reference for the module.
Motor Control: The LM298N motor driver module allows you to control the direction and speed of the connected motors. By providing appropriate logic signals to the input pins (IN1, IN2, IN3, IN4), you can control the rotation direction of each motor. Generally, a logic high signal (e.g., 5V) is applied to one input pin while the other is kept low (e.g., 0V) to achieve a specific direction. Reversing the logic levels will reverse the direction of rotation.
Speed Control: The LM298N does not have built-in speed control, but you can achieve it by using Pulse Width Modulation (PWM) techniques. By applying PWM to the Enable pins (ENA, ENB), you can varythe average voltage applied to the motors, thereby controlling their speed. Higher PWM duty cycles result in faster motor speeds, while lower duty cycles slow them down.
Power Supply: The LM298N motor driver module requires an external power supply to operate. The VCC1 and VCC2 pins are used to provide power to the motors, and the module itself is typically powered by a separate logic-level power supply (e.g., 5V). It's important to ensure that the motor power supply voltage is within the specified range (5V to 35V) and can handle the current requirements of yourmotors.

DC Motor:

Fig 8 DC Motor

A DC (direct current) motor is an electrical device that converts electrical energy into mechanical energy. It operates using the principles of electromagnetism. DC motors are commonly used in various applications, including robotics, automation, electric vehicles, appliances, and more. Here's some information about DC motors:
The motor acts as the wheel of the vehicle and it rotates when the power is supplied to it through L298 chip. The speed of rotation is slowed down when the driver falls asleep as detected by the eye blink sensor, in the other case the wheel is stopped when the accident occurs.

Power Supply

The Arduino Uno can be powered via the USB connection or with an external power supply.The power source is selected automatically. The power pins are as follows:
VIN. The input voltage to the Arduino board when it's using an external power source (as opposedto 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the powerjack, accessit through this pin.5V.
The regulated power supply used to power the microcontroller and other components on the board. This can come either from VIN via an on-board regulator, or be supplied by USB or another regulated 5Vsupply. 3V3.A3.3 volt supply generated by the on-board regulator. Maximum current draw is 50mA.GND

Eye blink sensor

This sensor module consists of the eye blink sensor frame, the IR sensor and a relay. The vibrator deviceis connected to the eye blink sensor frame which is to be worn by the driver. This vibrator vibrates whenever an accident occurs or the driver falls asleep. The frame consists of the IR transmitter which transmits the IR rays towards the driver's eyes and an IR receiver which receives the reflected rays whenthe eyes are closed. The relay provides the extra current required by this module and hence is also connected to the SST microcontroller board.

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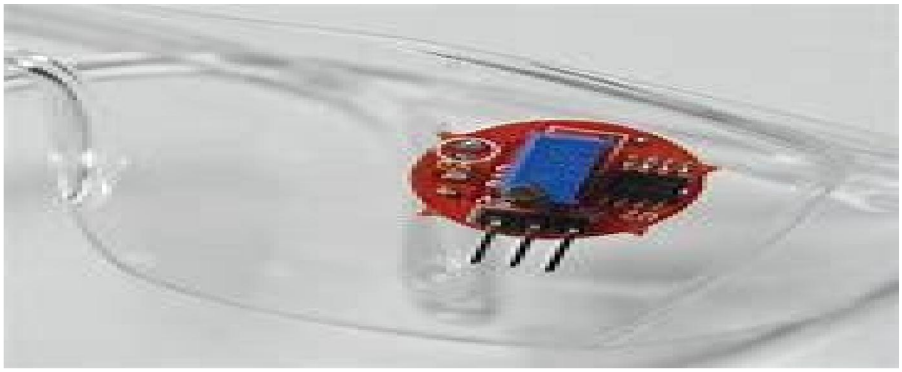

Fig 8 Eyeblink sensor

Buzzer

Fig 9 Buzzer

The image shows a very commonly used piezo buzzer also called piezo transducer operating at DC voltage. A buzzer consists of an outside case with two pins to attach it to power and GND. Inside is apiezo element which consists of a central ceramic disc surrounded by a metal, often bronze, vibration disc. In most cases, a buzzer is designed to produce a single constant tone or sound when activated. It can be triggered by different methods, such as pressing a button, receiving an electrical signal, orthrough an automated control system. The buzzing sound is created by the rapid vibration or oscillation of a diaphragm or other sound-producing element within the buzzer.

Buzzer devices can vary in size, design, and sound output. Some buzzers may be small and integrated into electronic devices, while others can be larger and more powerful for industrial or outdoor applications. They can produce a range of sounds, from high-pitched beeps to low-frequency buzzing tones, depending on their construction and intended purpose.

Overall, buzzers are widely used in everyday life and various industries as attention-grabbing or signaling devices due to their simplicity, reliability, and effectiveness in producing audible alerts or notifications.

Relay

Fig 10 Relay

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate as witch,but other operating principles are also used such as solid-state relays. Relays are used where it is necessary to control a circuit by separate low-power signal, or where sever al circuits must be controlled by one signal. -

The Pin configuration of relay is as below:

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Input /Output

Input and output (I/O) are fundamental concepts in computer systems that refer to the process of transferring data between a computer or digital device and its external environment. Here's an overview of input and output in computing:

Input: Input refers to the data or signals that are received by a computer system from external sources. It allows users or other devices to provide information to the computer for processing. Some common examples of input devices include:

Keyboard: Used for entering text, numbers, and commands.

Mouse: Enables the user to provide cursor control and select objects on the screen.

Touch screen: Allows users to interact with the computer system by directly touching the display. Microphones: Capture audio input for tasks such as voice recognition or recording.

Scanners: Convert physical documents or images into digital format.

Sensors: Detect and convert physical phenomena (e.g., temperature, light, motion) into electronic signals for the computer.

Input data can take various forms, such as text, numbers, images, audio, or video. The computer processes this input data according to its programming or user interaction to produce meaningful output.

Output:

Output refers to the results or information produced by a computer system and sent to external devices or users. It represents the processed or transformed form of the input data. Common examples of output devices include:

Display: Used to present visual information, such as text, images, videos, and graphical user interfaces (GUIs).

Printers: Produce hard copies of digital documents or images on paper. Speakers or headphones: Output audio or sound signals.

Projectors: Display visual content on large screens or surfaces.

Actuators: Convert digital signals into physical actions, such as motors or relays.

Output data can take various forms, such as text, images, sounds, or physical movements, depending on the nature of the information being conveyed.

I/O Operations:

Input and output operations involve the transfer of data between a computer and its external devices. The computer's operating system and software applications provide mechanisms and interfaces to facilitate these operations. I/O operations can be synchronous or asynchronous, depending on whether they occur in a sequential or concurrent manner with respect to the execution of other tasks.

Input and output are crucial for human-computer interaction, as well as for communication between computers and other devices or systems. They enable users to provide input to the computer, receive output information, and interact with digital content and services.

Overall, input and output form the bridge between a computer system and its external environment, allowing for communication, interaction, and the exchange of data.

5.2 Program

```
int ir=11; int buz=3; int led=4; int ml1=5; int ml2=6; int mr1=9; int mr2=10;
int relay=12;
const int TRIG_PIN = 8; // A rduino pin connected to Ultrasonic Sensor's TRIG pin
const int ECHO_PIN = 7; // Arduino pin connected to Ultrasonic Sensor's ECHO pin const int DISTANCE_THRESHOLD = 30; // centimeters
float duration_us, distance_cm; void setup() { Serial.begin(9600);
pinMode(TRIG_PIN, OUTPUT); // set arduino pin to output mode pinMode(ECHO_PIN, INPUT); // set arduino pin to input mode pinMode(11,INPUT);
pinMode(3,OUTPUT); pinMode(4,OUTPUT);
pinMode(5,OUTPUT); pinMode(6,OUTPUT); pinMode(9,OUTPUT); pinMode(10,OUTPUT); pinMode(12,OUTPUT);
```

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```
// put your setup code here, to run once:
}
void loop() { // put your main code here, to run repeatedly: analogWrite(5,400);
analogWrite(6,0);
analogWrite(9,400); analogWrite(10,0);
digitalWrite(TRIG_PIN, HIGH); delayMicroseconds(10); digitalWrite(TRIG_PIN, LOW); duration_us = pulseIn(ECHO_PIN, HIGH); distance_cm = 0.017 * duration_us; Serial.print("distance: "); Serial.print(distance_cm); Serial.println(" cm");
delay(500);
if(distance_cm < DISTANCE_THRESHOLD)
{analogWrite(5,400);
analogWrite(6,0); analogWrite(9,00); analogWrite(10,0); delay(1000); analogWrite(5,400); analogWrite(6,0); analogWrite(9,400); analogWrite(10,00); digitalWrite(4, HIGH); digitalWrite(3, HIGH); delay(500); digitalWrite(4, LOW); digitalWrite(3, LOW); }
int irdata=digitalRead(ir); Serial.print(irdata); if(irdata==LOW)
{ digitalWrite(12,HIGH); digitalWrite(3, HIGH);
}else
{ digitalWrite(12,LOW); digitalWrite(3, LOW);}
}
```

Development Methods:

The development methods decide a large section of how the final system functions, and thus care is taken to ensure that the best practices, tools and equipments are used. The system will be developed using Keil IDE. The programming language embedded C will also be used. Certain sections of the system will be ported android application development for performance enhancement. The main modules would be microcontroller, IR sensor, LM358 comparator, accelerometer, LCD and android phone [12].

Here's a general outline of the steps you can follow to build and program the robot:

Set up the hardware:

- Connect the eye blink sensor module to the Arduino board using jumper wires.
- Connect the motor driver module to the Arduino to control the DC motors.
- Connect the ultrasonic sensor to the Arduino to detect obstacles.
- Connect the DC motors to the motor driver module.

Write the Arduino code:

- Initialize the necessary pins for the eye blink sensor, ultrasonic sensor, and motor driver module.
- Create functions to read the eye blink sensor and detect obstacles using the ultrasonic sensor.
- Implement a logic to move the robot forward if no obstacles are detected and stop if an obstacle is detected.

Use the eye blink sensor to control the movement of the robot. For example, when the sensor detects a blink, the robot can change direction.

Upload the code to the Arduino board:

- Connect the Arduino board to your computer using a USB cable.
- Open the Arduino IDE (Integrated Development Environment).
- Copy and paste the code into the Arduino IDE.
- Select the appropriate board and port in the Arduino IDE.
- Click on the "Upload" button to upload the code to the Arduino board.

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Assemble the robot:

- Attach the Arduino board, eye blink sensor, motor driver module, and ultrasonic sensor to the chassis.
- Connect the wheels to the DC motors.
- Make sure all connections are secure and properly insulated.

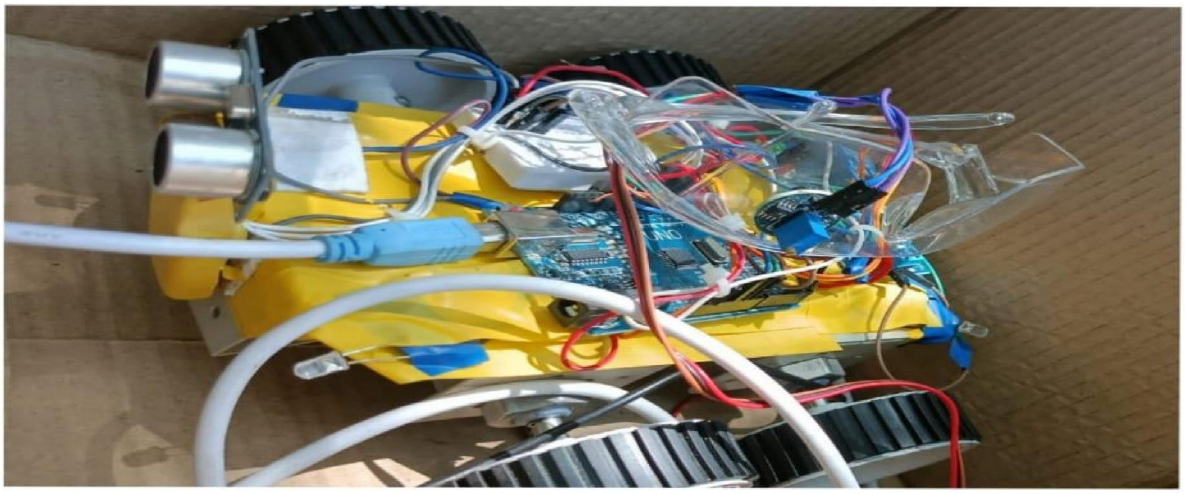
Power up the robot:

- Connect the power supply (batteries) to the Arduino board and the motor driver module.

Test the robot:

- Place obstacles in front of the robot and check if it correctly detects and avoids them.
- Blink your eyes to control the direction of the robot and ensure it responds accordingly.

VI. RESULTS



The result of an obstacle-avoiding robot vehicle using Arduino and an eye blink sensor can vary depending on the specific implementation and application. However, here are some general outcomes and benefits you can expect:

- Obstacle Detection and Avoidance: The robot will be able to detect obstacles in its path using the eye blink sensor and take appropriate actions to avoid them. This can include stopping, changing direction, or navigating around the obstacles, ensuring safe and efficient movement.

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- Autonomous Navigation: The robot will possess the ability to navigate autonomously without constant human intervention. It can move around an environment, detect obstacles, and make decisions on its own, reducing the need for manual control and supervision.
- Enhanced Safety: By effectively detecting and avoiding obstacles, the robot improves safety in its operating environment. It minimizes the risk of collisions, accidents, or damage to both the robot and its surroundings.
- User Interaction: The eye blink sensor enables users to interact with the robot through eye blinks. Users can control the robot's movement or trigger specific actions, adding a level of user engagement and interaction with the robot.
- Learning and Skill Development: Implementing an obstacle-avoiding robot using Arduino and an eye blink sensor can provide valuable learning opportunities in robotics, programming, and electronics. It allows users to gain hands-on experience in designing, building, and programming autonomous systems.
- Adaptability and Scalability: The Arduino platform offers flexibility and scalability, allowing for easy integration of additional sensors, modules, or functionalities. This enables customization and expansion of the robot's capabilities based on specific needs and future requirements.
- Cost-Effective Solution: Using Arduino and open-source components can result in a cost-effective solution compared to more specialized or proprietary systems. It provides a relatively affordable option for implementing obstacle avoidance capabilities in robotic applications.
- Versatile Applications: The obstacle-avoiding robot vehicle can be applied in various domains, such as home security, assistive technology, industrial automation, education, and entertainment. Its versatility allows for potential deployment in different scenarios that require autonomous navigation and obstacle detection.

Ultimately, the result of an obstacle-avoiding robot vehicle using Arduino and an eye blink sensor is a capable and autonomous robot that can navigate its environment, detect obstacles, and safely avoid them. The specific outcomes and benefits will depend on the implementation, customization, and application of the robot in question.

VII. APPLICATION , ADAVANTAGES & DISADVANTAGES

7.1 APPLICATION

The obstacle-avoiding robot vehicle using Arduino and an eye blink sensor can be utilized in various applications where autonomous navigation and obstacle detection are required. Here are some potential applications:

- Home Security: The robot can be deployed as a security system to patrol the premises and detect any intrusions or obstacles. It can move autonomously, avoid obstacles, and send alerts or capture images/video of suspicious activities.
- Assistive Technology: The robot can aid individuals with visual impairments or mobility limitations by navigating through the environment and alerting them about obstacles. It can help them move around safely and independently.
- Warehouse or Industrial Automation: The robot can be used in warehouses or industrial settings to transport goods or perform tasks in environments with obstacles. It can navigate through aisles, avoid collisions, and assist in inventory management.
- Environmental Monitoring: The robot can navigate outdoor environments to collect data on environmental conditions or monitor specific areas. It can avoid obstacles and obstacles such as trees, rocks, or uneven terrain, making it suitable for applications like wildlife monitoring or pollution detection.
- Education and Research: The robot can be used as an educational tool to teach students about robotics, programming, and autonomous systems. It can also serve as a platform for researchers to develop and test new algorithms and techniques in obstacle avoidance and human-robot interaction.
- Entertainment and Gaming: The robot can be integrated into interactive games or entertainment setups. For example, it can navigate a maze, avoid obstacles, and respond to eye blinks or gestures from players.

Retail and Hospitality: The robot can be employed in retail stores or hospitality settings to guide customers or deliver items. It can navigate through crowded spaces, avoid obstacles, and provide assistance or information to users.

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7.2 ADAVANTAGES

The obstacle-avoiding robot vehicle using Arduino and an eye blink sensor offers several advantages

- Autonomous Navigation: The robot can navigate and move autonomously without human intervention. It can detect obstacles using the eye blink sensor and make decisions to avoid them, enhancing its autonomy and reducing the need for constant manual control.
- Real-Time Obstacle Detection: The eye blink sensor provides real-time obstacle detection capability. It can quickly detect obstacles in the robot's path and trigger the necessary actions to avoid them, ensuring a timely response and enhancing safety.
- Versatility: The Arduino platform provides flexibility and versatility in terms of hardware and software customization. It allows for easy integration of additional sensors and modules, enabling the robot to perform a variety of tasks beyond obstacle avoidance.
- Cost-Effective: Arduino is an affordable and widely available open-source platform, making the obstacle-avoiding robot vehicle a cost-effective solution compared to more specialized systems. It provides a low-cost option for implementing obstacle avoidance capabilities in robotic applications.
- User Interaction: The eye blink sensor enables user interaction through simple eye blinks. This intuitive interface allows users to control the robot's movement or trigger specific actions, enhancing human-robot interaction and usability.
- Learning and Educational Tool: The obstacle-avoiding robot vehicle using Arduino and an eye blink sensor can serve as an educational tool for learning robotics, programming, and electronics. It provides a hands-on experience for students and enthusiasts to understand and experiment with autonomous navigation and obstacle avoidance concepts.
- Scalability: The modular nature of Arduino allows for scalability and expansion. Additional features or functionalities can be added easily by integrating more sensors or modules, making it adaptable to evolving requirements and applications.
- Rapid Prototyping: Arduino's simplicity and ease of use facilitate rapid prototyping. It enables quick development and testing of robot prototypes with obstacle avoidance capabilities, reducing time and effort in the design and implementation stages.

Overall, the obstacle-avoiding robot vehicle using Arduino and an eye blink sensor offers advantages such as autonomy, real-time obstacle detection, versatility, cost-effectiveness, user interaction, educational value, scalability, and rapid prototyping capabilities. These advantages make it a practical and accessible solution for various robotic applications.

7.3 Disadvantages

There are a few potential disadvantages to consider:

- Limited Sensing Range: The range of the eye blink sensor and other sensors used for obstacle detection may be limited. This can result in a restricted sensing range for the robot, potentially leading to missed obstacles or delayed reactions in certain situations.
- Sensitivity to Environmental Factors: The eye blink sensor's performance may be influenced by environmental factors such as lighting conditions, reflections, or obstructions. In certain situations, these factors can affect the accuracy and reliability of obstacle detection, leading to false positives or false negatives.
- Complexity of Integration: Integrating multiple sensors, modules, and components can introduce complexity, especially for beginners or individuals with limited technical expertise. Proper wiring, calibration, and synchronization of different components may require additional effort and troubleshooting.
- Power Consumption: The use of multiple sensors, motors, and the Arduino board itself can consume significant power. This can impact the operating time of the robot before requiring recharging or replacing batteries. Energy-efficient design considerations may be necessary to optimize power consumption.
- Limited Processing Power: Arduino boards, depending on the model used, may have limited processing power and memory compared to more advanced microcontrollers or embedded systems. This limitation can affect the

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robot's ability to handle complex algorithms or process large amounts of data, potentially constraining its capabilities.

- Reduced Adaptability to Complex Environments: While the obstacle-avoiding robot vehicle can handle basic obstacle avoidance tasks, it may face challenges in more complex or dynamic environments. Navigating intricate terrains, dealing with unpredictable obstacles, or operating in crowded spaces could pose difficulties for the robot's obstacle avoidance capabilities.
- Lack of Advanced Features: Arduino-based systems may lack certain advanced features or functionalities that specialized robotic platforms offer. For highly specialized or demanding applications, such as advanced mapping or advanced machine learning algorithms, a more powerful and specialized hardware platform may be required.
- Dependency on Programming Skills: To modify or enhance the functionality of the robot, programming skills are necessary. The need for programming knowledge can be a disadvantage for users who are not familiar with coding or who have limited experience in programming.

It's important to consider these disadvantages alongside the advantages when assessing the suitability of an obstacle-avoiding robot vehicle using Arduino and an eye blink sensor for a specific application. Depending on the requirements and constraints of the project, alternative approaches or more sophisticated systems may be more appropriate.

VIII. CONCLUSION

In conclusion, the obstacle-avoiding robot vehicle using Arduino and an eye blink sensor is a versatile and cost-effective solution for implementing autonomous navigation and obstacle avoidance capabilities. By combining the Arduino platform with an eye blink sensor, the robot can detect obstacles in real-time and autonomously navigate its environment, ensuring safe and efficient movement

However, it is important to consider the potential limitations of limited sensing range, sensitivity to environmental factors, complexity of integration, power consumption, limited processing power, reduced adaptability to complex environments, lack of advanced features, and the dependency on programming skills.

The proposed system helpful to avoid vehicle accidents because of driver's sleepiness using eye blink sensor, in this paper we study and design the system for driver fatigue detection. If the driver becomes drowsy the eye blink sensor's frame vibrates attached to the vehicle and also the LCD displays the warning messages and it alerts the driver's through alarm sound to avoid the road accidents. The wheel is slowed or stopped depending on the condition. This is accompanied by the owner being notified through the GSM module, so the owner can retrieve the driver's location, photograph and a list of nearby police stations

Overall, the obstacle-avoiding robot vehicle using Arduino and an eye blink sensor provides a practical and accessible solution for various robotic applications, ranging from home security and assistive technology to industrial automation and education. It offers the potential for autonomous and safe navigation while fostering learning and innovation in the field of robotics

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