# ANTI COLLISION CAR SYSTEM USING MICRO CONTROLLER

VISHWAKSENAN.N[1], SELVAMURUGAN.M [2], Dr.T.CHANDRASEKAR, M.E.,Ph.D. [3]

1,2 -Student Department of Electrical and Electronics : 3- Professor Department of Electrical and Electronics

VELAMMAL COLLEGE OF ENGINEERING AND TECHNOLOGY ,MADURAI -09 , TAMILNADU

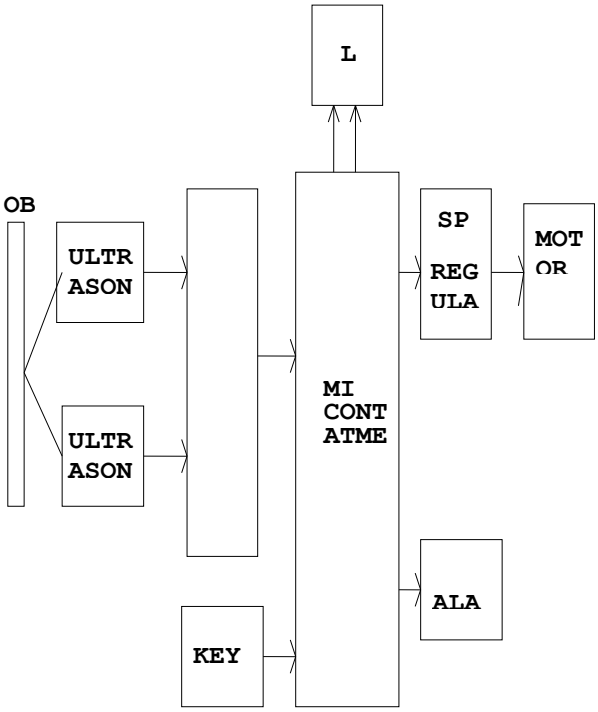
***ABSTRACT*** **-** Automotive vehicles are increasingly being equipped with collision avoidance and warning systems for predicting the potential collision with an external object, such as another vehicle or a pedestrian. Upon detecting a potential collision, such systems typically initiate an action to avoid the collision and/or provide a warning to the vehicle operator.This system consists of a distance-measuring system based on ultrasonic sound utilizing the ATMEGA 328 microcontroller and transmits a burst of ultrasonic sound waves towards the target and then receives the corresponding echo. The speed limit for different class of vehicles is set by authorities at different.

## I. INTRODUCTION

The ever-increasing number of vehicles on our roads translates to a growing risk of collisions. Distractions, sudden stops, and miscalculated distances are just a few factors that can lead to devastating accidents. Advanced Driver-Assistance Systems (ADAS) are emerging as a beacon of hope, offering technological solutions to enhance road safety

This project embarks on the creation of a foundational AntiCollision System powered by the Atmega328 microcontroller, a popular choice for its ease of use and affordability. This system will leverage sensors to act as the car's eyes, constantly scanning for obstacles in its path.By processing sensor data, the microcontroller will trigger real-time warnings, alerting the driver to potential dangers. This project focuses on designing and implementing an anticollision system using a microcontroller. The system will employ sensors to detect obstacles and calculate their distance from the vehicle. Based on this information, the system will activate warning signals or automatic braking mechanisms to prevent collisions. By developing this system, we aim to showcase the practical application of microcontrollers in enhancing vehicle safety. Moreover this project has the potential to contribute significantly to advancement of intelligent transportation systems, making our roads safer for everyone.

## II. PROJECT DESCRIPTION

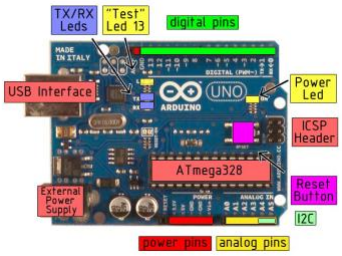



BLOCK DIAGRAM

### A. ARDUINO UNO WITH ATMEGA 328

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 connect it to 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 Atmega8U2 programmed as a USB-to-serial converter.

The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform for a comparison with previous versions.




Arduino Uno with Atmega 328

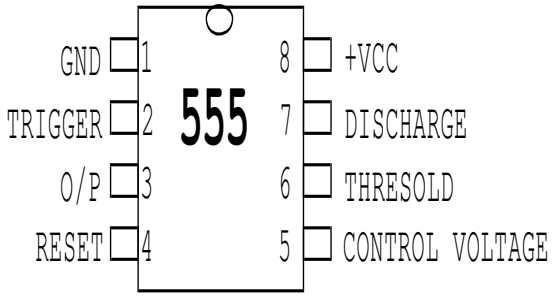
### B. ULTRASONIC SENSOR

Ultrasonic sensors are commonly used to measure oil levels in various applications, especially in industrial settings and automotive systems. These sensors utilize ultrasonic waves to determine the distance between the sensor and the oil surface, enabling accurate oil level measurements without direct contact with the oil.In the context of measuring oil levels, ultrasonic sensors are often installed above the oil reservoir or tank. When the sensor emits ultrasonic pulses, they travel through the air until they reach the surface of the oil. Upon reaching the oil surface, the pulses are reflected back to the sensor.

Ultrasonic Sensor

C. 555 TIMER

The 555 timer is a highly stable device for generating accurate time delay or oscillation. The 555 timer contains two 555 timers and is a 14 pin o/p. A single 555 timer can provide time delay ranging from microseconds to hours. The 555 timer can be used with supply voltage in the range of +5v to +18v and can drive load upto 200mA. Various application include oscillator, pulse generator, ramp and square wave generator, mono-shot multivibrator, burglar alarm, traffic light control and voltage monitor..

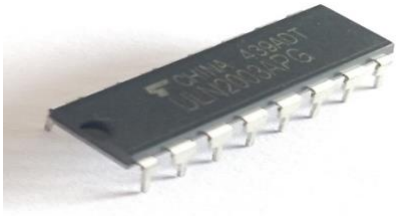



555 Timer

D. ULN DRIVER

The ULN2003 is comprised of seven high voltage, high current NPN Darlington transistor pairs. All units feature common emitter, open collector outputs. To maximize their effectiveness, these units contain suppression diodes for inductive loads and appropriate emitter base resistors for leakage. The ULN2003 has a series base resistor to each Darlington pair, thus allowing operation directly with TTL or CMOS operating at supply voltages of 5.0V.

The ULN2003 offers solutions to a great many interface needs, including solenoids, relays, lamps, small motors, and LEDs. Applications requiring sink currents beyond the capability of a single output may be accommodated by paralleling the outputs.



ULN driver

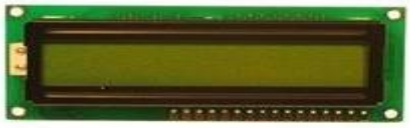
E. BUZZER

The piezoelectric type uses the piezoelectric ceramic's piezoelectric effect and pulse current to make the metal plate vibrate and generate sound. This kind of buzzer is made with a resonance box, multi resonator,piezoelectric plate, housing, impedance matcher, etc. Some of the buzzers are also designed with LEDs. Themulti resonator of this mainly includes ICs and transistors. Once the supply is given to this resonator, it will oscillate and generated an audio signal with 1.5to 2 KHz. The impedance matcher will force thepiezoelectric plate to produce sound.

Buzzer

## F. LCD DISPLAY

LCD is essentially used for expose the information. Here we are using 2x16 LCD. It is used to display numbers, texts and graphics. This is in contrast to LEDs, which are limited to numbers and characters. The LCDs are fragile with only a few millimeter thickness. Since the LCDs utilize less power, the y areefficient with low power electronic circuits, and can be charged for long terms. The LCDs don't provoke light and so light is needed to read the display. The LCDs have long lasting life and a wide operating temperature range.



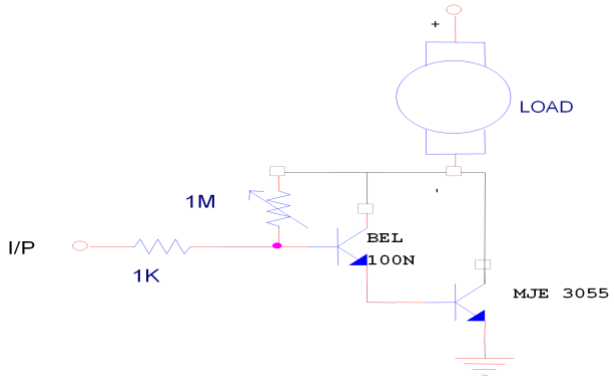
LCD Display

## G. PWM

It consists of High current NPN Darlington transistor pairs. All units feature common emitter, open collector output. Pulse width modulation (PWM) is a power technique for controlling analog circuit with a processor's digital outputs. PWM is employed in a wide variety of application, ranging form measurement and communications to power control and conversion.It is used to drive load and speed control of the motor.

Pulse Width Modulation (PWM) is a technique to generate low frequency output signals from high frequency pulses. Rapidly switching the output voltage of an inverter leg between the upper and lower DC rail voltages, the low frequency output can be thought of as the average of voltage over a switching period

in electrical design and load calculations, as it helps determine the capacity requirements for wiring,

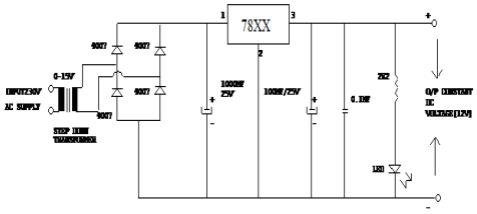



PWM circuit

## H. POWER SUPPLY

Most electronic circuits require DC voltage sources or power supplies. If the electronic device is to be portable, then one or more batteries is usually needed to provide the DC voltage required by electronic circuits. But batteries have a limited life span and cannot be recharged.

The solution is to convert the alternating current lose hold line voltage to a DC voltage source.




Power supply

The Mc 7800 is a 3 terminal, positive, fixed voltage integrated circuit regulator. These regulators employ internal current limiting, thermal shutdown and safe area compensation. The Mc 7900 is a 3 terminal, negative, fixed voltage integrated circuit regulator.

Mc 7800 and Mc 7900 series requires no external components.

The input voltage must be atleast two volts higher than the output voltage capacitor c1 is required if the regulator is located far from the power supply. Capacitor c2 improve the transient response.

## LITERATURE SURVEY

1. Ultrasonic sensors are widely used due to their cost-effectiveness and reliability in detecting objects at short ranges. Studies have shown that these sensors can effectively measure the distance to obstacles by emitting sound waves and measuring the time taken for the echo to return.Infrared (IR) sensors detect obstacles by measuring the reflection of infrared light. These are effective for short-range detection and are often used in conjunction with other sensors.Radar sensors are crucial for long-range detection and are increasingly used in modern anti-collision systems. They provide accurate distance and speed measurements of surrounding objects.LIDAR (Light Detection and Ranging) sensors use laser pulses to create high-resolution 3D maps of the environment, providing precise obstacle detection and distance measurement.

2. Microcontrollers serve as the brain of the anti-collision systems, processing sensor data and making real-time decisions.By using ATMEGA 32 microcontroller.Neural networks can learn from data and improve decision-making processes over time, making them ideal for complex scenarios.Proportional-Integral-Derivative (PID) controllers are used for precise control of braking and steering mechanisms in response to obstacle detection.Fuzzy logic algorithms handle the uncertainty and variability in sensor data, making them suitable for dynamic environments.Integration of the anti-collision system with the vehicle's existing architecture and thorough testing in real-world conditions are critical.Combining data from multiple sensors (sensor fusion) can enhance detection accuracy and reliability.

3. Then system architecture represent such as

1.Sensor Fusion Module:Combines data from ultrasonic, radar, and LIDAR sensors to create a comprehensive view of the surroundings.Utilizes advanced algorithms to filter noise and improve detection accuracy.
2.Microcontroller Unit:Processes the fused sensor data in real-time.Runs collision detection and avoidance algorithms.
3.Actuation Module:Controls the braking and steering mechanisms based on microcontroller commands.
Ensures smooth and timely responses to avoid collisions.
4.User Interface:Provides visual and auditory alerts to the driver.Displays real-time data on a dashboard screen.

4. Algorithms

Collision Detection Algorithm:
Fuzzy Logic: Handles uncertainties in sensor data and makes decisions based on the proximity and speed of detected objects.
Neural Networks: Continuously learns from driving data to improve the accuracy of collision predictions.
Control Algorithm:
PID Controllers: Precisely control braking and steering actions to avoid collisions without causing abrupt maneuvers.
Sensor Fusion Algorithm:
Integrates data from different sensors to create a reliable environmental model.Uses Kalman filters to estimate the position and velocity of obstacles accurately.

## III. PROPOSED SYSTEM

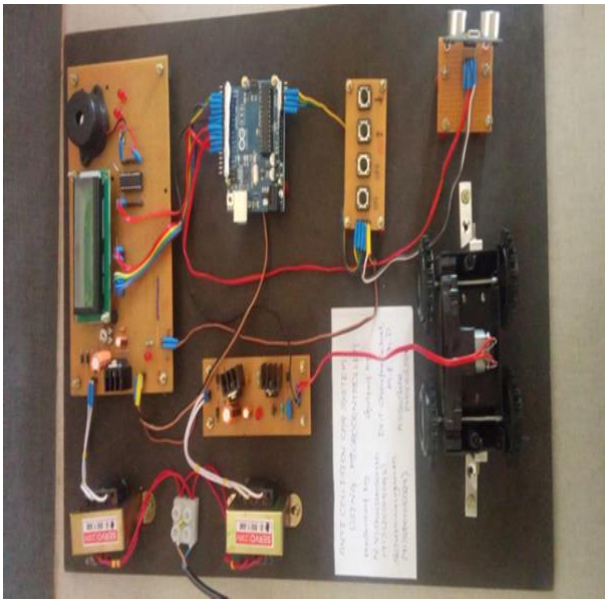
The proposed anti-collision car system aims to enhance vehicle safety by integrating multiple sensors, a microcontroller, and intelligent algorithms to detect and avoid obstacles.
The system consists of the following key components:

1. Microcontroller: ATMEGA 32` microcontroller for its high processing power and real-time capabilities.
2. Sensors:Ultrasonic sensors for short-range obstacle detection.Radar sensors for long-range detection and speed measurement.LIDAR sensors for high-resolution 3D mapping of the environment.
3. Actuators: For automatic braking and steering control.Power Supply: A robust power supply unit to ensure stable operation of all components.

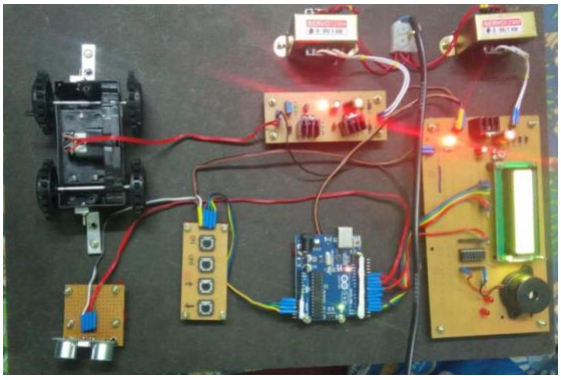
The proposed anti-collision car system leverages advanced sensor technologies, powerful microcontrollers, and intelligent algorithms to enhance vehicle safety. By integrating multiple sensors and using sophisticated data processing techniques, the system aims to provide reliable collision avoidance in real-time, ensuring safer driving experiences

## IV. RESULTS

Thus the Vehicle distance detection using Ultrasonic sensors and Micro Controller is successfully explained and implemented. This model helps to avoid road accidents and increases the stability of the vehicle.



Implemented prototype



Working condition


Output of speed and distanc measurement against opposite vehicle

## V. CONCLUSION

This project on "ULTRASONIC SENSOR BASED DISTANCE MEASUREMENT WITH COLLISION & ACCIDENT AVOIDANCE SYSTEM INCLUDING DYNAMIC SPEED GOVERNOR" is working fire, getting the parameter envisaged during the conceptual stage. During the design, as well as during the construction, greater care has been put in to avoid hiccups at the final stage.

## VI. REFERENCES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