TRAFFIC WARNING AND MID AIR COLLISION SYSTEM FOR AIRCRAFT USING ULTRASONIC SENSOR

Abstract

Resolution advisories (RAs), which suggest actions (including manoeuvres), and traffic advisories (TAs), which are meant to encourage visual acquisition and serve as a precursor to RAs, are used to achieve this.

ACAS was created to supplement the current conventional air traffic control system's collision avoidance capabilities while eliminating unnecessary alarms in encounters where the risk of a collision does not call for escape maneuvers. ACAS doesn't rely on any ground-based systems to function.

Keywords: Traffic Advisories, Collision, ATC

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I. INTRODUCTION

A mid-air collision is an accident in aviation when two or more aircraft make an unanticipated encounter while in flight. Due to the very high velocity involved and the potential of a subsequent crash with the earth or the sea, at least one aircraft typically sustains very severe damage or is completely destroyed.

Miscommunication, mistrust, navigational errors, departures from flight plans, a lack of situational awareness, and the absence of collision-avoidance devices all enhance the risk of an in-flight accident. Collisions are uncommon in general because of the great amount of open space, but they frequently occur near or at airports when many more planes are packed together than during normal flight.

Terrain Avoidance and Warning System (TAWS)

II. PROBLEM IDENTIFICATION

The mechanical and electronic components that make up a control system enable an airplane to be flown with outstanding accuracy and dependability. Cockpit control, sensors, actuators, and computers make up the control system.

Air traffic controller (ATC) instructions are the main means of airbus control. The pilots are inclined to follow the ATC controller's instructions in an emergency. The pilot is restricted in his or her ability to operate and is unaware of any environmental constraints.
But in cases where ATC operators fail to report about an impending crash, a novel idea known as Traffic crash Avoidance System (TCAS) has been employed.
Pilots are no longer directed by the ATC system once TCAS is in place.

III. PROPOSED DESIGN

Since the pilot is informed of a crash only 25 seconds before it occurs, the TCAS concept used in the current system may fail.

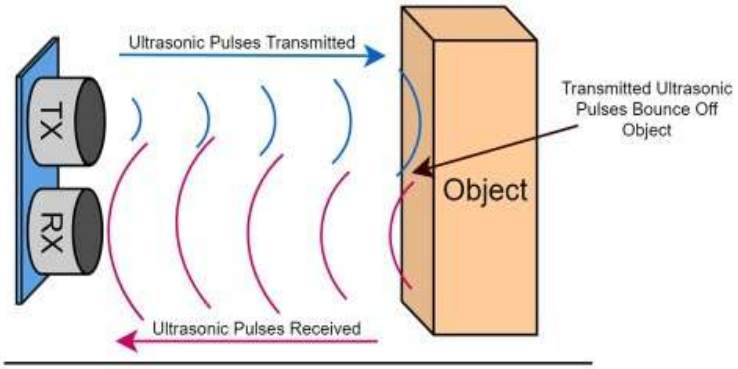
Installing ultrasonic sensors that can locate objects around the aircraft is suggested. These sensors are used by the cockpit's control system to send an alarm message to the pilot. The pilot is made aware of any impediments by this.

It might alert the pilot to hazards within five nautical miles. In order to prevent collision, the control system also displays a different route away from the obstruction. The pilot chooses the new route, avoiding any difficulties that might arise while flying.
Ultrasonic sensors are utilized to identify any obstructions in their path by sending out sound waves.

IV. ULTRASONIC SENSOR

- For robotics and test equipment applications, the HC-SR04 Ultrasonic Distance Sensor is a cheap tool that is highly helpful.
- This tiny sensor is able to gauge the separation between itself and the closest substantial item.
- The HC-SR04 runs on 5 volts and can be connected straight to an Arduino or other microcontroller.
- This ultrasonic distance sensor can measure gaps between objects between 2 and 400 cm away.
- Since it draws a low current, battery-powered devices can use it..

PRINCIPLE



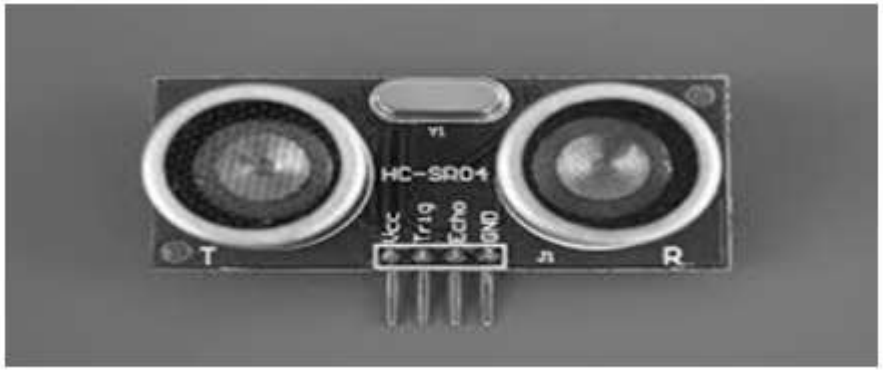
V. COMPONENTS USED

- Arduino
- Ultrasonic Sensor (HC-SR04)
- RF module (rf transmitter and receiver 434Mhz)
- L293D IC
- HC12E-Encoder IC
- HC12D-Decoder IC

VI. ARDUINO

- The Arduino UNO is a microcontroller board based on the ATmega328P. It contains 6 analog inputs, a 16 MHz ceramic resonator, 14 digital input/output pins (of which 6 can be used as PWM outputs), a USB port, a power socket, an ICSP header, and a reset button.
- It comes equipped with everything needed to support the microcontroller; to get started, just plug in a USB cable, an AC-to-DC adapter, or a battery.

Ultrasonic Sensor (HC-SR04)



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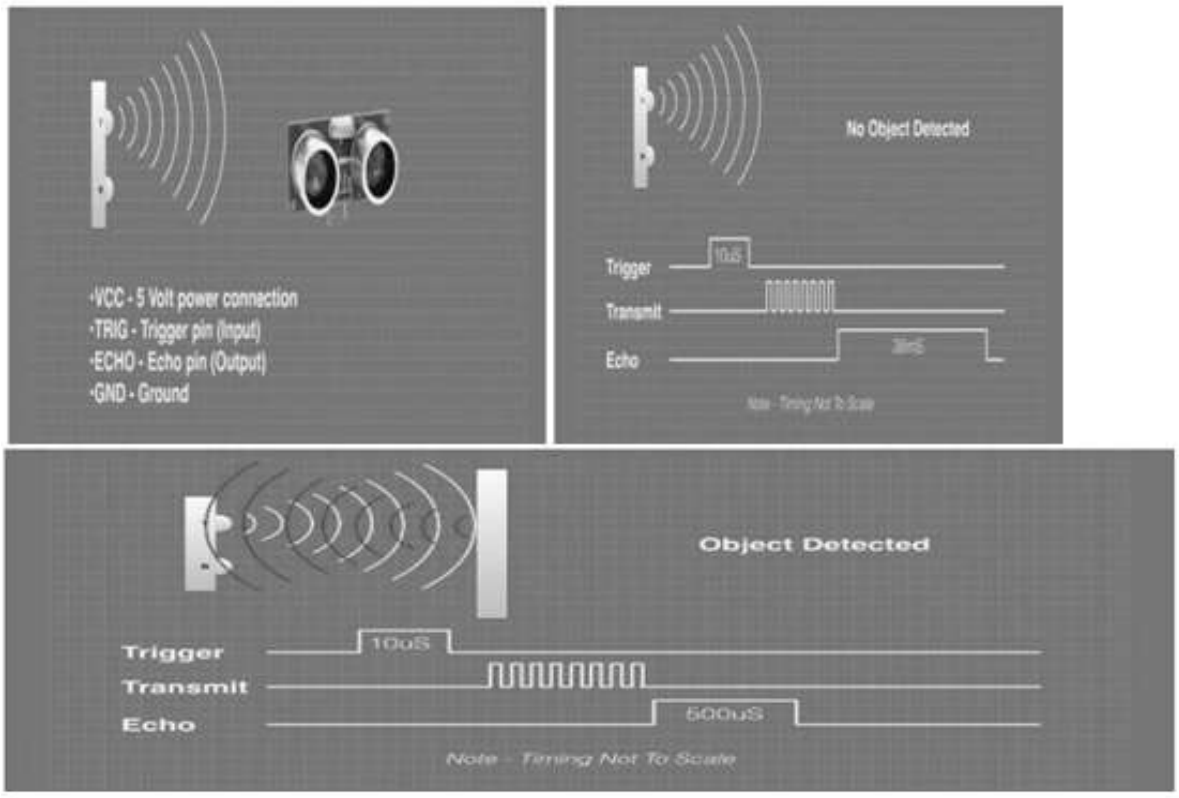
- This tiny sensor is able to gauge the separation between itself and the closest substantial item. The HC-SR04 runs on 5 volts and can be connected straight to an Arduino or other microcontroller.
- This ultrasonic distance sensor is suitable for battery-powered devices because it uses low current and can measure distances of up to 400 cm.
- Ultrasonic sensor object detection



VII. RESULTS AND DISCUSSION

- The proposed distance measurement system using an ultrasonic sensor was successfully constructed and put into operation as a working model.
- The circuit could measure a distance of up to 100 meters.
- The circuit also succeeded in locating the object. Various distances were measured using the circuit. It responds quickly.
- The ultrasonic module functions properly.
- By using ultrasonic sensor, we were able to reduce cost and increase efficiency.
- This implementation has been the readily used in the fast growing avionics on aircraft systems.

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