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Implementation of Automatic Missile Detection by Ultrasonic and System Tracking

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ABSTRACT: This project involves the complete system design of a Missile detector and tracking system. It is designed to detect the target moving in multiple directions. ARDUINO Microcontroller is an exclusive compact project module that can manage the whole tracking & detection process. The Ultrasonic sensor is used to detect the target. Here the controller is interfaced with sensors and it will be detected. It can autonomously track and detect moving targets. This process is been processed to reduce the man power and to automate the entire missile system. This leads to less human error and more accurate processing of the system.

KEYWORDS: Arduino Micro controller, Ultrasonic Sensor, Servo motor,LCD module Buzzer.

I. INTRODUCTION

War is an organized armed conflict that is carried out by states, nations, national and social groups. Basically, army systems can do many taThe circuit is used to receive the reflected signals of 40 KHz from the missile object, to feed that to a program of the microcontroller and to switch on appropriate load while the program is executed at the microcontroller. When the microcontroller receives the signal from ultrasonic receiver it activates the servo motor to rotated in 180 degrees and activates the buzzer. Hence the target will be detected and tracked using this reliable compact embedded module.

Such as camouflage, face detection; metal detection, unauthorized person detection and automatic destroy. The security of the nation is in the hands of the soldiers. This system can be used in the risk prone areas and protect the soldiers from foe.The purpose of this project is to design and construct automatic missile detection and tracking system. It is designed to detect the target (missile) moving in multiple directions.

Here the ARDUINO microcontroller is used as a main control system to control the main project module.All the devices are connected to microcontroller. The mechanism of any ultrasonic sensor is based upon the ultrasonic sensors. The sensors work on the principle which estimates the path of the object by receiving the echoes back to the transmitter. Ultrasonic radar module produces high frequency sound waves and the echo is estimated when received back by the sensor. Using Ultrasonic sensor to detect the object which is in the range of the sensor as it programmed in the embedded programming in structure of C.

The object detection message will be displayed in the LCD (Liquid Crystal Display) module and the distance to be calculated where it to be given in the program of the sensor which is interfaced with LCD and the Arduino microcontroller.Hence it give the alarm by the buzzer module by using the servo motor mounted on it.By using the soft wares ARDUINO IDE 2.0 and Proteus 8.0 for the circuit making and uploading the respective programs. And it can used in the detection and tracking purpose.

II. RELATED WORK

In this paper [1], the authors 'M. Varun'et.al,The main technique was camouflage the robot. Colour Sensing camera was used to capture the image which can turned in 360 degrees. A buzzer alarmed when any of the ultrasonic sensor identified the missile to alert the nearest people.

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In this paper [2], the authors 'Manjula B K' et.al. The ultrasonic transducer was rotated at 360 degrees and consisted of a transmitter and a receiver. An ultrasonic transducer consisting of a receiver and a transmitter is used. The task "Rocket Discovery and Decimating Framework" has been effectively structured and tired.

In this paper [3], "Missile detected, locating and destructing robot platform using radar" employs an ultrasonic radar module which included an ultrasonic transmitter and receiver along with the microcontroller. It is operated by transmitting 40HZ frequency 'echo pulse' which is not audible to human ear. The detected of missile with good accuracy.

In this paper [4], themain reason for this paper was automate the vehicle and reduced the manpower with then to increase the efficiency of the system. It provided the user friendly environment to access the system.

In this paper[5], the system consist of a SONAR based object tracked system that continuously monitored the target. Upon detected the target send the target location to a central target missile.

III. EXISTING SYSTEM

In the existing method the target can be detected and after detection the controller will send the information to the controller. This system was developed by using the various types of sensors and radars. Maintenance of DC motor is high cost due to the presence of commutator and brush gear and it cannot operate in explosive and hazard conditions due to sparking occur at brush.

DISADVANTAGES:

- Due to low accuracy, maximizing the range and speed of the sensor.
- High cost of motors and drivers to be used.
- Low power and efficiency.

IV. PROPOSED SYSTEM

This proposed system uses an Ultrasonic sensor module for distance measurement and object detection purpose. It will be displayed in the LCD module accurately where the target to be situated. The Missile tracking system using ARDUINOMicrocontroller is an exclusive compact project module that can manage the whole tracking & detection process of moving the targets and also alerts through LCD display. It kept with the servo motor with the clamp and the sensor to be mounted on it toview the target which is rotated 180 degrees. It can display the target's distance and the appearance of the target within the range or not to be displayed clearly.This system determines the target's distance is calculated by taken in to consideration ofthe velocity of sound. Hence the distance and speed to be calculated by a program running on the microcontroller through communication devices.Inthis proposed system it requires both hardware and software requirements are as follows.

Hardware Requirements:

- Arduino Microcontroller
- Ultrasonic sensor
- Servo motor
- Liquid Crystal Display(LCD)
- Buzzer

Hardware Requirements:

- ARDUINO IDE 2.0
- PROTEUS 8.0

Hardware Requirements:

A. Ardiuno UNO:

Arduino UNO is a **microcontroller board based on the ATmega328P**. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header and a reset button.

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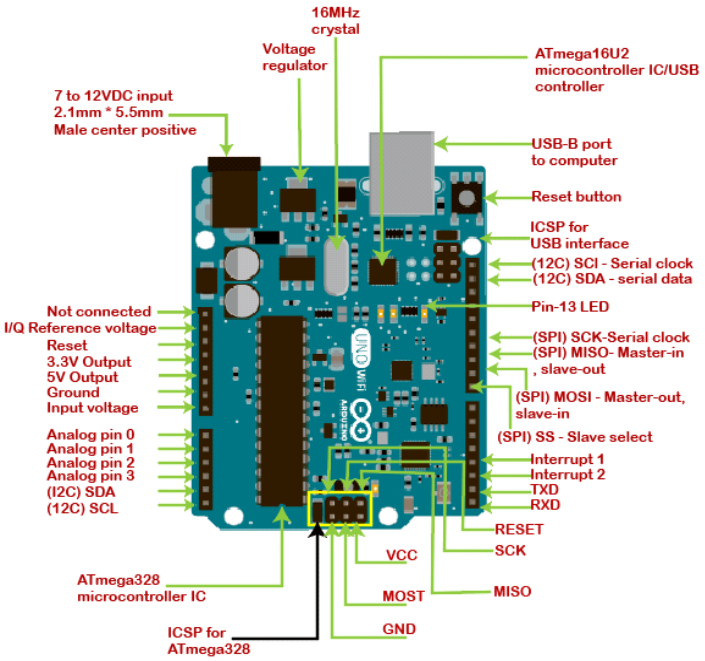

Fig.1 Arduino UNO

It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with AC-to-DC adapter or battery to get started. It contains very thing needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with 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 Atmega16U2programmedas a USB-to serial converter. Revision 2 of the Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode.

B. Ultrasonic Sensor(HC-SR04):

Ultrasonic sensors are electronic devices that calculate the target's distance by emission of ultrasonic sound waves and convert those waves into electrical signals. The speed of emitted ultrasonic waves traveling speed is faster than the audible sound. Ultrasonic sensor is also known as Range finder it means it transmits ultrasonic waves from its sensor head and receive the ultrasonic waves reflected from an obstacle or any object.It is compact and measures an amazingly wide range from 2cm to 4cm.

There are mainly two essential elements which are the transmitter and receiver. Using the piezoelectric crystals, the transmitter generates sound, and from there it travels to the target and gets back to the receiver component.

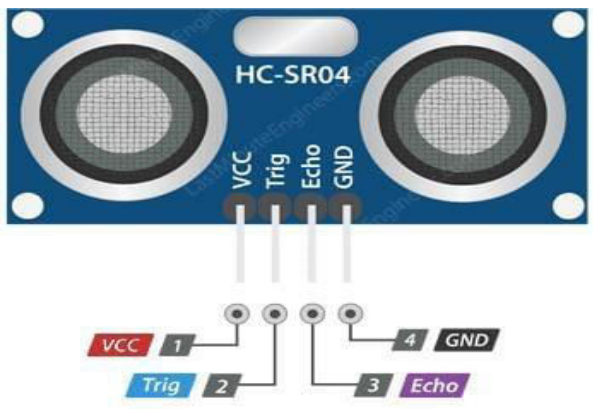

Fig. 2: Ultrasonic Sensor

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Ultrasonic sensor working principle is either similar to sonar or radar which evaluates the target/object attributes by understanding the received echoes from sound/radio waves correspondingly. These sensors produce high-frequency sound waves and analyse the echo which is received from the sensor. The sensors measure the time interval between transmitted and received echoes so that the distance to the target is known.

C. Servo Motor

A servomotor (or servo motor) is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity, and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors.

Servomotors are not a specific class of motor, although the term *servomotor* is often used to refer to a motor suitable for use in a closed-loop control system. Servomotors are used in applications such as robotics, CNC machinery, and automated manufacturing.The servo motor has a rotation detector (encoder) mounted on the back shaft side of the motor to detect the position and speed of the rotor. This enables high resolution, high response positioning operation.

Fig 3: Servo Motor

Servo motors have three wires: power, ground, and signal. The power wire is typically red, and should be connected to the 5V pin on the Arduino board.

- The power wire is typically red, and should be connected to the 5V pin on the Arduino board.
- The ground wire is typically black or brown and should be connected to a ground pin on the board.
- The signal wire is typically orange which is to connected to the PWM of Arduino.

D. Liquid Crystal Display(LCD):

Liquid Crystal Display also called as LCD is very helpful in providing user interface as well as for debugging purpose. A (LCD) is a flat panel display that uses the light modulating properties of liquid crystals(LCs). The 2*16 characterLCD interfacecard with support both modes 4 bit and 8-bit interface, and also facility to adjust contrast through trim pot.The term LCD stands for liquid crystal display. It is one kind of electronic display module used in an extensive range of applications like various circuits & devices like mobile phones, calculators, computers, TV sets, etc. These displays are mainly preferred for multi-segment light-emitting diodes and seven segments. The main benefits of using this module are inexpensive; simply programmable, animations, and there are no limitations for displaying custom characters, special and even animations, etc.

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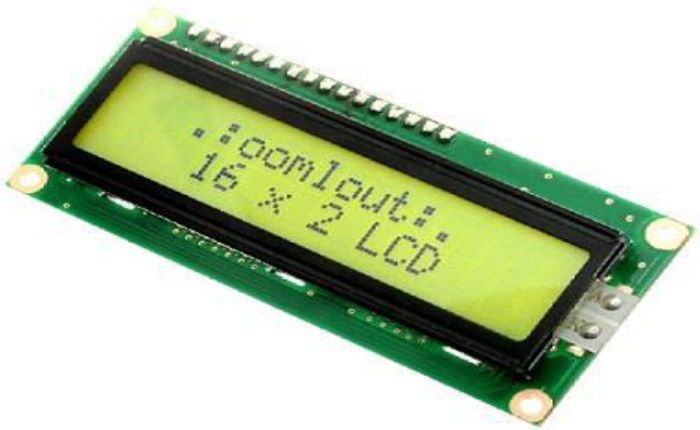

Fig 4: Liquid Crystal Display

Liquid Crystal Display (LCD), electronic display device that operates by applying a varying electric voltage to a layer of liquid crystal, thereby inducing changes in its optical properties. LCDs are commonly used for portable electronic games, as viewfinders for digital cameras and camcorders, in video projection systems, for electronic billboards, as monitors for computers, and in flat-panel televisions.

E. BUZZER

A buzzer is a small device that can be used to generate some sound at a specific frequency. Generally, buzzers/beepers used to give an audio indication in many applications. Moreover, it is used to produce the sound of a click, beep as well as ringing. The piezo, also known as the buzzer, is a component that is used for generating sound. It is a digital component that can be connected to digital outputs, and emits a tone when the output is HIGH. Alternatively, it can be connected to an analog pulse-width modulation output to generate various tones and effects.

A buzzer or beeper is a signalling and alerting device, usually electronic, typically used in automobiles, household appliances such as a microwave oven, or game shows. Alarms when any of the ultrasonic sensor identifies the missile to alert the nearest people.

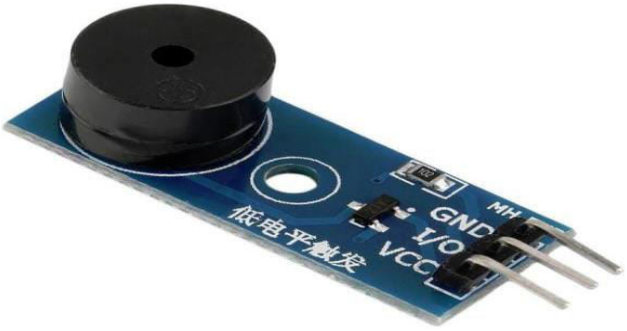

Fig 5: Buzzer

The buzzer had two pins.

- First, one pin is positive and has the positive sign (+). A 6V DC voltage powers pin 1.
- The second pin is the negative pin identified by the (-) symbol. In addition, this pin has a short terminal lead. It is usually connected to the ground terminal of the electronic circuit.

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SOFTWARE REQUIREMENTS:

Arduino IDE:

- The Arduino IDE is an open-source software, which is used to write and upload code to the Arduino boards.
- The IDE application is suitable for different operating systems such as Windows, Mac OS X, and Linux.
- It supports the programming languages C and C++.

Proteus 8.0:

Proteus Design Suite includes the ultimate in support for the Arduino ecosystem, including STM32 Arduino with the Blue Pill board as well as traditional AVR based Arduino boards.

v. RESULTS AND DISCUSSION

This proposed system uses an ultrasonic module interfaced to a microcontroller of Arduino UNO. An Ultrasonic transducer comprising of a transmitter and receiver are used. The transmitted waves are reflected back from the object and received by the transducer again. The total time taken from sending the waves to receiving it is calculated by taking into consideration the velocity of sound. Then the distance is calculated by a program running on the microcontroller and displayed on a liquid crystal display screen interfaced to the microcontroller. This can be applied in various defense fields to protect the Nation from foreign attacks.

The circuit is used to receive the reflected signals of 40 KHz from the missile object, to feed that to a program of the microcontroller and to switch on appropriate load while the program is executed at the microcontroller. When the microcontroller receives the signal from ultrasonic receiver it activates the servo motor to rotated in 180 degrees and activates the buzzer. Hence the target will be detected and tracked using this reliable compact embedded module.

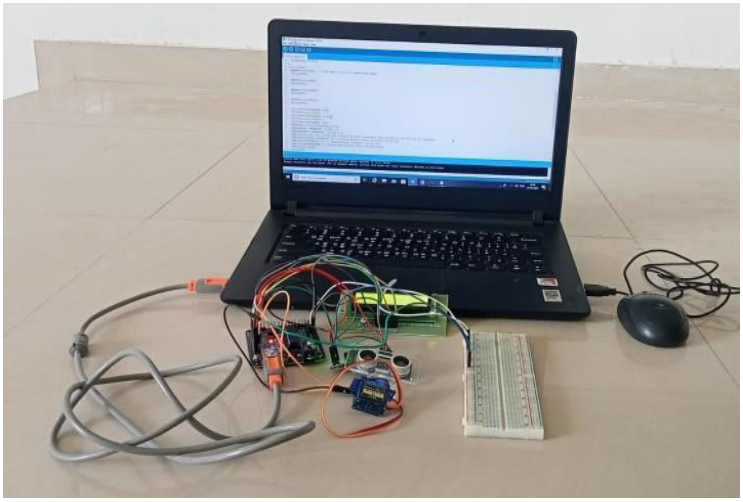

Fig:6Hardware Setup

The Ultrasonic transceiver (Transmitter and Receiver) detects missile object and displays the missile direction on LCD through Microcontroller. If there is any target within the detection range, the application will turn ON the servo motor to detect the target and track on it. A buzzer alarms when any of the ultrasonic sensor identifies the missile to make the user with an early detection alert. In case of global military conflict, the role of anti-missile defense becomes very important. This project module can be applied in various defense fields to protect the Nation from foreign attacks.

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VI. ADVANTAGES

- Detection and tracking of the missile are done automatically using the compact module.
- It can detect the small objects over long operating distances and it can measure distance of the target accurately and display in the LCD module.
- Discrete distance of the object can be detected and measured using the compact sensor module.

VII. APPLICATIONS

- The proposed system of Missile detecting and tracking using ultrasonic has a wide range of applications because of its design, accuracy and the precision of the servo motors used in the system.
- It can bring advancement in the anti-missile technology used in the Defense Services because of its automatic nature and accuracy in finding the target which is in the range of the ultrasonic sensor module of the system.
- With its accuracy in finding and tracking the target, it can also be used in the air and the naval services for predicting the missile earlier or cancelling the missiles from the enemy. Hence, it can be used for border security services and so it becomes an important technology for the Army.

VIII. FUTURE SCOPE

In Future it can be used as an advanced tracking system along with high intensity camera to track a real target.In Future with the more advanced devices we are able to design more reliable and accurate protection system for the cruise missile.Further developments could relax these restrictions by allowing range detection from the video image and implementing tracking and prediction of a moving target, but these features proved impossible to include within our timeframe. Target acquisition occurs via processing of an image stream from a single webcam, making use of foreground segmentation and SURF feature detection, together with a calibrated pinhole model to convert from pixel distances into real-world Cartesian coordinates. Because the missile launcher has no sensors to provide feedback on its pose, described in terms of the altitude and azimuth angles of its barrel, we also present results for a visual servicing system. This uses a camera mounted on the barrel to read a calibrated fan pattern printed behind the launcher base, providing pose feedback by detecting and recording movement from a denned origin. We also show results for ballistic light tests conducted on the foam missiles, which allow the calculation of the desired launcher pose given a target location.

REFERENCES

[1] "Camouflage based Multipurpose Army Robot UsingRaspberry Pi", *International Journal of Research in Engineering,Science and Management(IJESR),* Vol. 3, Issue-6,pp. 20-23, June 2020.

[2] Manjula B K, Venkata Sumana CH and Dr.Latha B M, "Experimental Study on Biohazard Missile Detection and automatic destroy system", *Bioscience Biotechnology Research Communication(BBRC),* vol. 13, No 13, pp. 338- 343 2020 systems," Pearson Education.

[3] Abuturab Kazmi, Anish Chatterjee, Shashank Rana, "IMPLEMENTATION OF MISSILE DETECTING, LOCATING AND DESTRUCTING ROBOT PLATFORM USING RADAR", *International Journal of Engineering & Science Research(IJESR),* Vol. 8, Issue 4, pp. 54-57, April 2018.

[4] Dr. M. Sureshkumar, R. Vignesh , S.Vinotha, S. Priyadarshini, "Missile Directed by Maneuverable Actuators", *IJSRST,* Vol. 3, Issue-1, pp. 266-270, March 2017.

[5] Samir Chopra, Suman Bharti, Tarun Singh Negi, Prof. Ms. P.D Kulkarni, "Missile Detection by Ultrasonic AndAuto Destroy System", *INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH TECHNOLOGY(IJESRT),* pp. 106-110, May 2014.

[6] Wang Shaokun, Xiao Xiao, Zhao Hongwei, "The Wireless Remote Control Car System Based On ARM9, College of Software, 2011 International Conference on Instrumentation, Computer, Communication and Control, China.

[7] B. Suchitha Samuel, B. Bharathi, J. Mrudula, "Design of PC Controlled Automatic Solar Tracker Robot," in International Journal of Innovative Research in Science, Engineering and Technology, vol. 2, no. 10, October.

[8] Muhammad Ali Mazidi and Janice GillispieMazidi "The 8051 microcontroller''

[9] The AVR micro controller and embedded systems by Anand V Gadre.

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[10] Rajan J,, Hareesh, Habeeb-ur-rahman, Abraham J, Shrivastava BAK, Verma A, Singh SP. Distance Measurement ofan Object or Obstacle by Ultrasound Sensors using P89C51RD2. International Journal of Computer Theory and Engineering 2010.

[11] Md. Shamsul Arefin, Mollick T. Design of an Ultrasonic Distance Meter. International Journal of Scientific &Engineering Research 2013;

[12] Singh C, Agnihotri A, Patel P. Development of Radar Using Ultrasonic Sensor" in International Journal of Advance Research in Science and Engineering.

[13] Suchitha Samuel B, Bharathi B, Mrudula J. Technology, Keesara, Andhra Pradesh, India, Design of PC Department of Electronics &Communication Engineering, Geethanjali College of Engineering and Controlled Automatic Solar Tracker Robot. International Journal of Innovative Research in Science,Engineering and Technology2013;

[14] He H, Liu J. The design of ultrasonic distance measurement system based on S3C2410, Proceedings of the IEEE International Conferenceon Intelligent Computation Technology and Automation, Oct. 2008.

[15] Chai, R., Savvaris, A. and Chai, S., 2019. Integrated missile guidance and control using optimization-based predictive control. Nonlinear Dynamics, 96(2), pp.997 1015.

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