A NOVEL EMBEDDED BASED PROJECT ON MISSILE DETECTION AND AUTOMATIC DESTROY

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Abstract: A novel approach to performing of automatic missile detection and destroying system. The system is designed to detect the target (missile) moving in multiple directions. The destroying system moves automatically in the direction of missile and fires it upon fixing the target. This system consists of an ultra-sonic based object tracking system that continuously monitors the target. Upon detecting the target it sends the target's location to a Central Control System. The Central Control System takes the action of moving the firing mechanism in the direction of target missile. Upon fixing the direction, it sends the control command to firing system to attack the target. This project is divided in three-part RF Transmitter, RF Receiver, and microcontroller.

Keywords: **Ultra-Sonic, Microcontroller, Stepper Motor, Laser Module, Buzzer, Led.**

I INTRODUCTION

War is an organized armed conflict that is carried out by states, nations, national and social groups. The purpose of this project is to design and construct automatic missile detection and destroying system. This system is designed to detect the target (missile) moving in multiple directions. The target destroying system moves automatically in the direction of missile and fires it upon fixing the target. In this project the system is made up by use of an ultrasonic sensor and a DC geared motor driven firing unit interfaced with a Microcontroller based control unit. The programming of Microcontroller is done using Embedded "C".

The proposed system uses an ultrasonic module interfaced to atmel family microcontroller to detect missile object. An ultrasonic transducer comprising of a transmitter and receiver are used on same module. The ultrasonic transducer produces sound waves. The transmitted sound 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 measured and displayed on a liquid crystal display interfaced to the microcontroller. When the microcontroller receives the signal from ultrasonic receiver, it activates the door gun by triggering the gate of MOSFET through a transistor or relay. The sensor is fitted on antenna and is rotated and controlled by stepper motor through 360 degrees. If there is any target within the detection range, the application will turn the launcher to the nearest detected target and fires. The antenna is rotated and controlled by stepper motor by one axis and also with another axis it rotates up and down directions towards missile object. The programs for 8051 family microcontroller are written by the embedded C programming.

II EXISTING METHOD

In Existing method the was made to the following

It detects the missiles and after detecting it informs the control room that some missile is present some location and we need to take certain action after detecting the missile. The other method to detect the missile through IR sensors since upcoming missiles will undergo chemical reaction which emit IR radiation. Time is wasted when the microcontroller sends the information to control room and because of that the defending areas become less.

III PROPOSED METHOD

In the proposed the missile is detected by using ultrasonic sensor after detecting the missile it automatically destroys the missile by emitting the laser beam on the missile. In this, the sensors are connected to the microcontroller which used to monitor the different directions by rotating the stepper motors.

The sensors are connected to the stepper motor so by rotating the stepper motor all different directions are the monitor. If any unwanted object is entered into its range it will destroy it.

IV BLOCK DIAGRAM

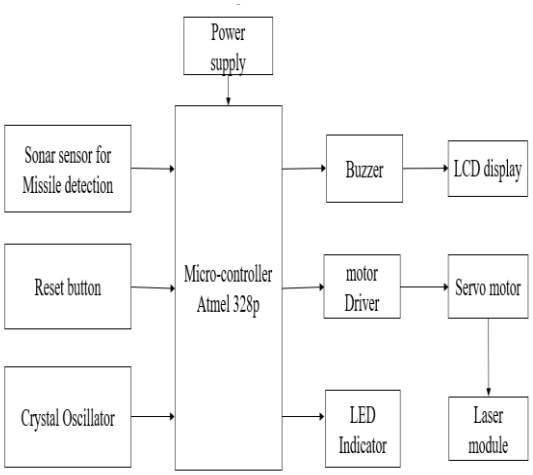

Fig: 3.1 Block diagram

a) MICROCONTROLLER (ATMEGA328p)

The high-performance Microchip Pico Power 8-bit AVR® RISC-based microcontroller combines 32 KB ISP Flash memory with read-while-write capabilities, 1024B EEPROM, 2 KB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented Two-Wire serial interface, SPI serial port, a 6-channel 10-bit A/D converter (8-channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts.

By executing powerful instructions in a single clock cycle, the device achieves throughputs approaching one MIPS per MHz, balancing power consumption and processing speed.

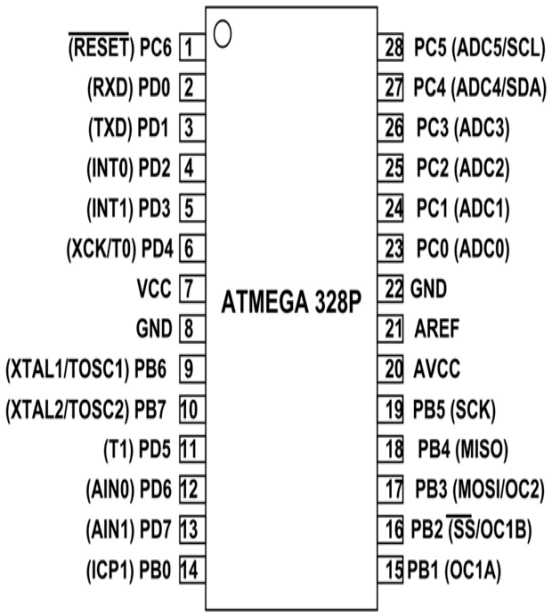

Fig: 3.2 Pinout of atmega 328p

b) ULTRASONIC SENSORS

Ultrasonic sensors (also known as transceivers when they both send and receive) work on a principle similar to radar or sonar which evaluate attributes of a target by interpreting the echoes from radio or sound waves respectively. Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor. Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an object.

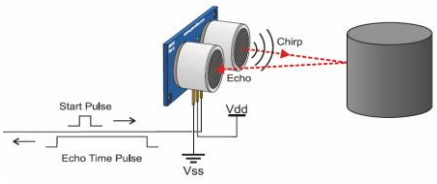

Fig: 3.3 Ultrasonic sensor

This technology can be used for measuring: wind speed and direction (anemometer), fullness of a tank and speed through air or water. For measuring speed or direction a device uses multiple detectors and calculates the speed from the relative distances to particulates in the air or water. To measure the amount of liquid in a tank, the sensor measures the distance to the surface of the fluid.

Further applications include humidifiers, sonar, medical ultrasonography, burglar alarms and non-destructive testing.

Systems typically use a transducer which generates sound waves in the ultrasonic range, above 20,000 hertz, by turning electrical energy into sound, then upon receiving the echo turn the sound waves into electrical energy which can be measured and displayed.

c) LCD

Fig 3.4 LCD display

A liquid crystal display (commonly abbreviated LCD) is a thin, flat display device made up of any number of color or monochrome pixels arrayed in front of a light source or reflector. It is often utilized in battery-powered electronic devices because it uses very small amounts of electric power. When a large number of pixels is required in a display, it is not feasible to drive each directly since then each pixel would require independent electrodes. Instead, the display is multiplexed. In a multiplexed display, electrodes on one side of the display are grouped and wired together (typically in columns), and each group gets its own voltage source. On the other side, the electrodes are also grouped (typically in rows), with each group getting a voltage sink. The groups are designed so each pixel has a unique, unshared combination of source and sink. The electronics or the software driving the electronics then turns on sinks in sequence, and drives sources for the pixels of each sink.

d) BUZZER

Fig 3.5 Buzzer

A buzzer is a small yet efficient component to add sound features to our project/system. It is very small and compact 2-pin structure hence can be easily use on breadboard, Perf Board and even on PCBs which makes this a widely used component in most electronic applications.

A simple buzzer which when powered will make a Continuous sound, the other type is called a readymade buzzer which will look bulkier than this and will produce Sound due to the internal oscillating circuit present inside it. But the one shown here is most widely used because it can be customized with help of other circuits to fit easily in our application.

e) SERVO MOTOR

A servo motor is a type of motor that can rotate with great precision. Normally this type of motor consists of a control circuit that provides feedback on the current position of the motor shaft, this feedback allows the servo motors to rotate with great precision. If you want to rotate an object at some specific angles or distance, then you use a servo motor. It is just made up of a simple motor which runs through a servo mechanism. If motor is powered by a DC power supply then it is called DC servo motor, and if it is AC-powered motor then it is called AC servo motor. For this tutorial, we will be discussing only about the DC servo motor working. Apart from these major classifications, there are many other types of servo motors based on the type of gear arrangement and operating characteristics. A servo motor usually comes with a gear arrangement that allows us to get a very high torque servo motor in small and lightweight packages.

Due to these features, they are being used in this project, it rotates 360 degree so it's monitors all the different directions.

Fig 3.6 Servo motor

f) LASER MODULES

These laser modules consist of a laser diode, lens and driver circuit housed in a metal case. The module body is electrically isolated. Electrical connections are made via flying leads. The lens is a single element of high refractive index glass which produces a high-quality collimated beam over a long distance. Its position can be adjusted to bring the beam to a focused spot using the special key provided.

Laser modules which operate from a negative voltage can be run from an unregulated supply within the range of –8 to –12V. By operating at the lower (–8V) end of the power supply range, less heat will be dissipated within the device and hence the expected life will increase. Laser modules which operate from a positive voltage may only be run from a supply which has been regulated to at least 5%, within the limits specified. For all laser modules the case is isolated from the supply voltages.

Fig: 3.7 laser module

V WORKING PRINCIPLE

The Ultrasonic transceiver (Transmitter & Receiver) detects missile object displays distance on LCD through Microcontroller. The sensor is fitted on antenna and is rotated and controlled by servo motor through 360 degrees and monitors all the directions. If there is any target within the detection range, the application will turn the launcher to the nearest detected target and fires. The tank vehicle is fitted with another microcontroller with movements of the vehicle's control actions send and receive by the communication key panel. The launching system can be modified to aim at missile object in three axis rotation by following the Ultrasonic transceiver data.

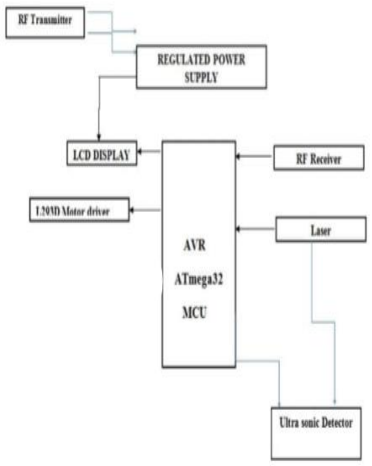

Fig: 6.1 Circuit diagram of missile detection and destroy system

VI EXPERIMENTAL RESULT

A recommended approach for further work is to get more into the specifics of detection the missiles quickly in far ranges. By using ultrasonic waves it can detect the missile then micro controller activate the destroyer. This can be applied in various defense fields to protect the Nation from foreign attacks. In case of global military conflict, the role of antimissile defense becomes very important. This system will be applied by mankind for peaceful purposes.

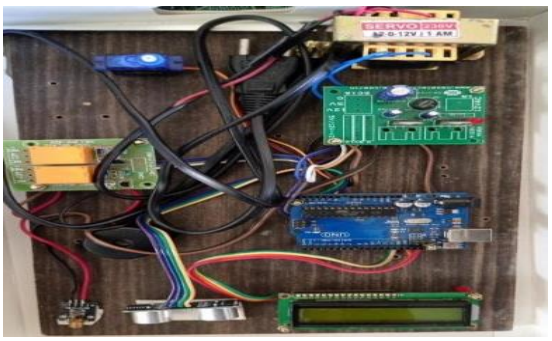

Fig: 6.1 Experimental Setup

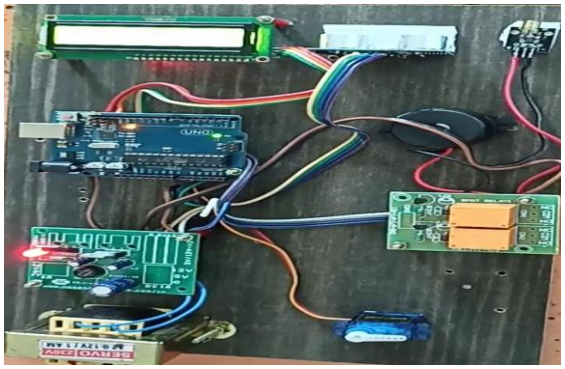

Figure 7.2 Experimental output

VII CONCLUSION

A novel system for implementing an economic and reliable automatic missile detection and destroying system is discussed. The features of prototype system and the benefits are discussed. The novel approach overcomes disadvantages in certain missile destroy system such as using proximity sensors and manual destroying method. This project of missile detection and autonomous launching system is modified to aim at a missile object in three-axis rotation by following the Ultrasonic transceiver data.

SCOPE FOR FUTURE WORK:

- By using controller microcontroller, further can implement the intelligent system
- It can be used as an advanced tracking system along with high intensity camera to track a real target
- In this system we can use video camera and other sensor to see the live moving target from anywhere in the world
- We can also use different software and imagery for detection purposes.
- More technologies can be used for developing an anti-missile technique with the same working principle.

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