Missile Detection and Auto Destroy System on a Robot Platform

Ms. Palwe Pooja Balasaheb\(^1\) Ms. Shinde Tejashree Anil\(^2\) Ms. Sonawane Chaitali Shivajirao\(^3\)
Prof. S. M. Bhilegaonkar\(^4\)

\(^{1,2,3,4}\)Department of Electronics & Tele Communication Engineering

Bharati Vidyapeeth’s College of Engineering For Women, Pune, India

Abstract—In our project, a robotic platform along with a stepper motor which continuously rotate in 360 degree direction fitted with ultrasonic sensors is used to automatically locate and aim at a stationary target and moving target at a pre-defined range. This project uses radio frequency bands i.e. RF transmitter by sending a specific command to RF Receiver and motor drive IC to control the movement of Robot in various direction. We prefer ultrasonic sensor to IR sensor because the Ultrasonic sensors covers larger sensing distance and it can detect the target in all the lighting conditions (day or night). This project is divided in 3 part RF Transmitter, RF Receiver, and microcontroller. The Radio Frequency based control proves to be more advantageous compared to the Infrared Red based control that limits the operating range to only a few meters of distance.

Key words: Ultrasonic Sensor, RF Transmitter, RF Receiver, DC Motor, Microcontroller, Stepper Motor

I. INTRODUCTION

Today in the twenty first century the missile technology is rapidly developing, these missiles can be tracked with the help of Radar. in order to make its design simple, easy to install the project has been designed in such a manner that the missile is detected using ultrasonic sensor at cheaper cost.

Our project is missile detection and auto destroy system on Robot Platform. As shown in figure 1 we use microcontroller ATmega16 for loading embedded C program .we use stepper motor on that we mount ultrasonic sensor hence sensor rotate continuously rotate in 360 degree direction if any obstacle come in between ultrasonic ray that time stepper motor will stop and Laser gun gets on. sensor also measure the distance and it is displayed by using LCD display. Here we use Laser for destroying purpose as obstacle is destroyed.

Here we also make Robotic Platform as shown in figure 2 for movement of our whole kit in all required direction it means forward, backward, left, right etc. for that RF transmitter for sending wireless data, RF receiver for receiving data and motor drive IC for movement of robot according to our input data.

II. BLOCK DIAGRAM

- **Fig. 1: Block Dig. Of Whole Circuit**
- **Fig. 2: Block Dig. Of Robot**

III. SPECIFICATION

A. Hardware for Detection:

1) AVR At mega 16 Microcontroller
2) Stepper motor
3) Ultrasonic sensor
4) Laser
5) Lcd display

B. Hardware for Robotic Platform:

1) Robot chassis
2) RF Transmitter and Receiver
3) DC Motor driver IC

C. Software:

Code Vision AVR /AVR Studio AVR ISP Programmer
Pony Prog/AVR
Dude software to download the hex file

D. Hardware for Detection:

1) AVR at Mega16 Microcontroller:

The ATmega16 is 40 pin IC which has four port like port A, port B, port C and port D. The pin diagram of microcontroller IC is as shown in below figure 3. ATmega16 is 8 bit microcontroller and it is based on RISC architecture. It works on 16MHz frequency. It has low power consumption and inbuilt analog to digital converter.
microcontroller execute powerful instruction in single clock cycle. it has main pin are

1) VCC – this pin is use for the supply voltage purpose.
2) GND – this pin is use for Ground purpose.
3) Port A – Port A has inbuilt Analog to Digital converter. Which is from pin no.33 to 40.
4) Port B – port B is available for pin no.1 to 8, it is bi-directional input output port.
5) Port C – port C is also bi-direction pin. which is from pin 21 to 29.
6) Port D – port D has timers, interrupts, oscillator input. Which from pin no.13 to 20.
7) AVCC – it is pin no. 30 which is use for supply voltage. For A/D converter and D/A converter.
8) AREF - This is the analog reference pin for the A/D Converter.

Fig. 3: Pin Description of ATMEGA16 Microcontroller

2) Stepper Motor:
A stepper motor works on principle same as electromachanism in which Electromechanical device which converts electrical pulses in to discrete mechanical movements. when electrical command pulses are applied to it in the proper sequence then the shaft of a stepper motor rotates in discrete step movement. stepper motor or a step motor is a brushless, synchronous motor which divides a full rotation into a number of steps. Here we use step angle for stepper motor is 15 degree for one step, which rotate continuously in 360 degree. The type of stepper motor is Permanent magnet stepper motor

Fig. 4: Working of Stepper Motor.

3) Ultrasonic Sensor:
Ultrasonic sensor is also known as Range finder it means it transmit ultrasonic waves from its sensor head and receive the ultrasonic waves reflected from an obstacle or any object. It detects position as well as distance of object. Here ultrasonic sensor measure the distance up to 400cm with accuracy of 1 cm. advantage of using ultrasonic sensor is they required no calibration and no conversion from analog to digital data. And also ultrasonic wave are narrower that infrared or any other sound beam. it has four pins which are named as VCC, GND, ECHO,TRIGGER.

Fig. 5: Operation of Ultrasonic Sensor
4) **Laser:**
It is Light Amplification (by) Stimulated Emission (of) Radiation

1) Any device that emit highly amplified and coherent radiation of one or more discrete frequencies.
2) LASER delivers light in an almost-perfectly parallel beam (collimated) that is very pure, approaching a single wavelength.
3) Well basically it is used to produce a coherent non-dispersing beam of light by multiple refractions inside a highly polished glass cavity.

5) **LCD Display:**
LCD 16x12 it is Liquid crystal Display and it can display 16 character per 2 line. it is very common device use in various circuit and device. this LCD has a two register namely command and data.

**E. Hardware for Robotic Platform:**
1) **Robot Chassis:**
Robot chassis is a platform on which we mount our whole project on it. and by using robot chassis we move our circuit in Various possible direction.
2) **RF Transmitter and Receiver:**
RF Transmitter is use for transmit the wireless data from input side. it operates at 434MHz frequency. for communication purpose we need serial data so we use Encoder HT12E, it converts parallel data into serial form at transmitter side. and at receiver side decoder HT12D converts that serial data in to parallel form.

Fig. 6: RF Transmitter and Receiver

3) **DC Motor Driver IC:**
L293D is motor driver IC which is useful for rotating motor in clockwise and anticlockwise direction.it is a bidirectional IC.

Fig. 7: DC Motor Driver IC

**IV. RESULT AND CONCLUSION**

Conclusion of our project is by using ultrasonic sensor with stepper motor we continuously detect the target in all direction. And if and is come between ultrasonic rays their distance is measure and display on screen and by using laser beam we show that target is destroy but in actual system by using special type of gun or missile we will destroy target completely. and Robotic platform is useful for the movement of whole circuit in possible direction.

**REFERENCES**

[1] Kit Axelrod (305153692), Ben Itzstein (305128329), and Michael West (305159240), “Self-targeting missile system using computer vision”, MTRX 4700 Experimental Robotics Major Project University of Sydney


[7] Programming and Customizing AVR microcontrollers by Aanad V Gadre