AUTOMATIC MISSILE DETECTOR USING ULTRASONIC PROXIMITY DETECTOR

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Abstract— **This paper is to design and construct automatic missile detection and targeting laser 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 a ultrasonic detector based object tracking system that continuously monitors the target. Upon detecting the target it sends the target's location to a Central Control System that is nothing but a microcontroller. The microcontroller takes the action of moving the targeting mechanism in the direction of target missile. Upon fixing the direction, it sends the control command to targeting system to attack the target via laser. This research has a additional advantage that it checks the target is hostile or not and accordingly fire the laser.**

Keywords— **Bot, missile detection, RF module, targeting laser, microcontroller as a controlling unit**

I. INTRODUCTION

A ground Missile is a missile designed to be launched from the ground to destroy aircraft or other missiles. It is one type of antiaircraft system; in modern armed forces missiles have replaced most other forms of dedicated antiaircraft weapons, with antiaircraft guns pushed into specialized roles. The first serious attempts at SAM development took place during World War II, although no operational systems were introduced. Further development through the 1940s and 50s led to the first operational systems being introduced by most major forces during the second half of the 1950s. Smaller systems, suitable for close-range work, evolved though the 1960s and 70s, to modern systems that are man-portable Technology advancements are providing smaller and more cost effective devices for integrating computational processing, wireless communication, and a host of other functionalities. These embedded communications devices will be integrated into applications ranging from homeland security to industry automation and monitoring. They will also enable custom tailored engineering solutions, creating a revolutionary way of disseminating and processing information. The work consists of the ultrasonic transmitter and receiver each of which works for the frequency of 40 kHz.

At the receiver side the received signal is amplified and given to the microcontroller which is used as to operate the relay driver (ULN2003) for operating the relay to drive the loads.

Since power supply is very important for any circuit, so the ripples present are removed using a capacitive filter and it is then regulated to +5V using a voltage regulator 7805 which is required for the proper operation of the microcontroller and other components.

Target acquisition and tracking are frequent domains of active sensing such as Ultra-sound, and then LASER firing. The ability to track targets at manipulation range can significantly reduce the cost and complexity of manipulator control. Ultrasonic sensors, in particular, provide an ideal platform for experimental development in range detection. They are cheap, readily available, and increasingly possessed of high-resolution sensors. Its various Applications range from robotic security systems to environments such as production lines where distance measurement and obstacle measurement and manipulation of objects are routine tasks with potential for wide-scale automation and defense.

Here, a robotic platform along with a stepper motor fitted with ultrasonic sensor is used to automatically locate and aim at a stationary target, moving target at a pre-defined range and firing a laser it successfully. Let's us, we summarize the research's main advances and indicate possible directions for future work, thus

The main objectives of this research are:

1. Monitoring the moving target.
2. Checking that the target is hostile or not.
3. If hostile automatic targeting it by laser.
4. If not hostile moves further.
5. This all features in moving bot.

Components used:

A. **Hardware for Detection***:*
    1. Microcontroller 8051

2. Stepper motor
3. Ultrasonic sensor
4. Laser
5. Servomotor
6. ULN2003
7. RF transmitter and receiver
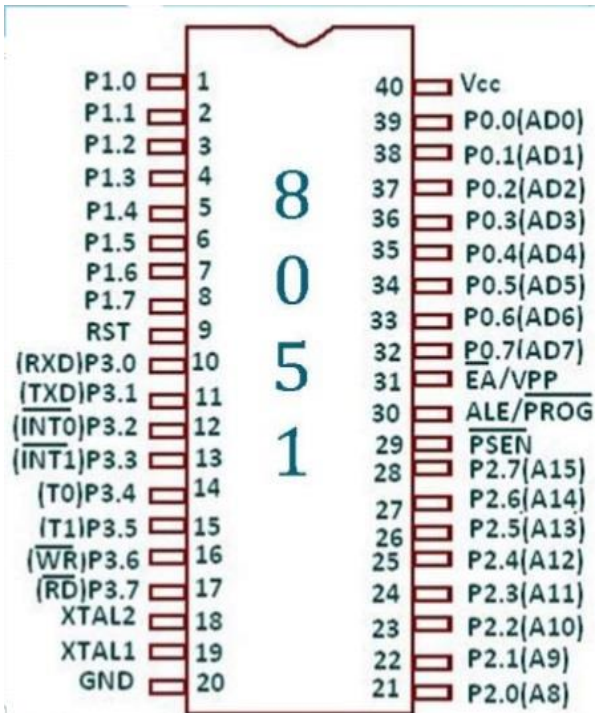8. HT12(E & D)

B. Hardware for Robotic Platform:
1. Robot chassis
2. IR Transmitter and Receiver
3. DC Motor driver IC

C. Software:
Code Vision Keil Ride, Eagle, PCB designer software, flash magic to convert into hex file.

Hardware description:
Microcontroller 8051:

Description of each pin is discussed here:
• VCC → 5V supply
• VSS → GND
• XTAL2/XTALI are for oscillator input
• Port 0 – 32 to 39 – AD0/AD7 and P0.0 to P0.7
• Port 1 – 1 to 8 – P1.0 to P1.7
• Port 2 – 21 to 28 – P2.0 to P2.7 and A 8 to A15
• Port 3 – 10 to 17 – P3.0 to P3.7
• P 3.0 – RXD – Serial data input – SBUF
• P 3.1 – TXD – Serial data output – SBUF

• P 3.2 – INT0 – External interrupt 0 – TCON 0.1
• P 3.3 – INT1 – External interrupt 1 – TCON 0.3
• P 3.4 – T0 – External timer 0 input – TMOD
• P 3.5 – T1 – External timer 1 input – TMOD
• P 3.6 –WR – External memory write cycle – Active LOW
• P 3.7 – RD – External memory read cycle – Active LOW
• RST – for Restarting 8051
• ALE – Address latch enable
1 – Address on AD 0 to AD 7
0 – Data on AD 0 to AD 7
• PSEN – Program store enable

The Intel MCS-51 (commonly termed 8051) is an internally Harvard architecture, complex instruction set computing (CISC) instruction set, single chip microcontroller (μC) series developed by Intel in 1980 for use in embedded systems.[1] Intel's original versions were popular in the 1980s and early 1990s and enhanced binary compatible derivatives remain popular today.
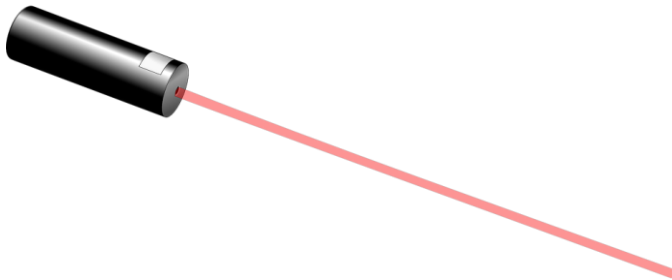
II. STEPPER MOTOR:

A stepper motor works on principle same as electro mechanism 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 in to 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

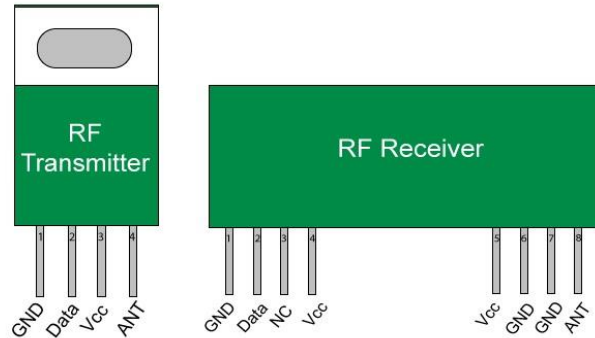### III. ULTRASONIC PROXIMITY SENSOR:

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 detects position as well as distance of object. Here ultrasonic sensor measure the distance up to 5m with accuracy of 10 cm. advantage of using ultrasonic sensor is they required no calibration and no conversion from analogue to digital data. And also ultrasonic wave are narrower than infrared or any other sound beam. It has three pins which are named as VCC, GND, and TRIGGER.

IV. LASER:

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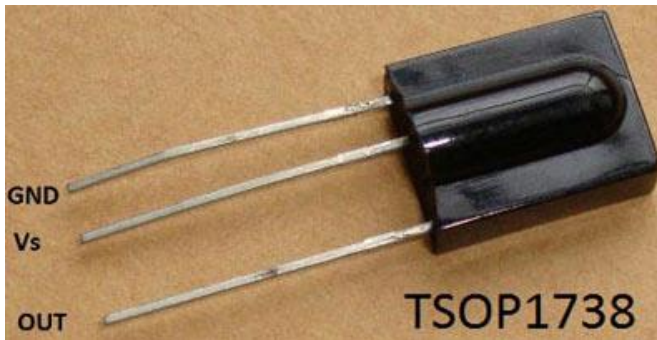
V. RF MODULES:

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.

VI. IR LED:

IR LED emits infrared light, means it emits light in the range of Infrared frequency. We cannot see Infrared light through our eyes, they are invisible to human eyes. The wavelength of Infrared (700nm – 1mm) is just beyond the normal visible light. Everything which produce heat, emits infrared like our human body. Infrared have the same properties as visible light, like it can be focused, reflected and polarised like visible light.
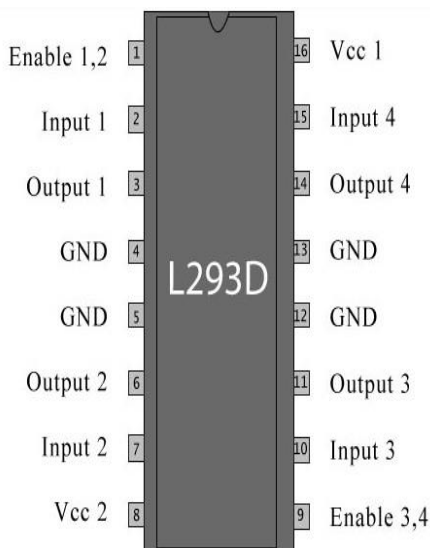
VII.   IR RECEIVER (TSOP17XX)

TSOP17XX receives the modulated Infrared waves and changes its output. TSOP is available in many frequency ranges like TSOP1730, TSOP1738, TSOP1740 etc. Last two digits represent the frequency (in KHz) of modulated IR rays, on which TSOP responds. Like for example TSOP1738 reacts when it receives the IR radiation modulated at 38Khz. Means it detects the IR which is switching On and Off at the rate of 38Khz. TSOP's output is active low, means its output is remains HIGH when there is no IR, and becomes low when it detects IR radiation. TSOP operates on particular frequency so that other IRs in the environment can't interfere, except the modulated IR of particular frequency. It has three pins, Ground, Vs (power), and OUTPUT PIN.
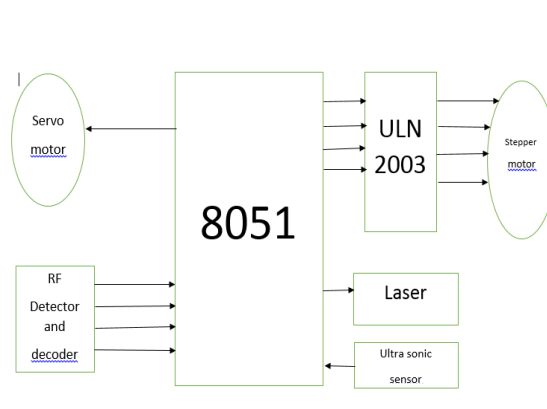
Robot chassis:
Robot chassis is a platform on which we mount our whole research on it and by using robot chassis we move our circuit in various possible directions.
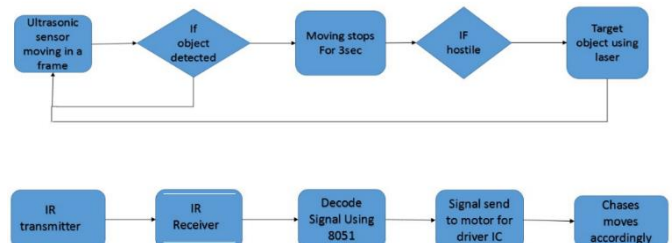
VIII.   DRIVER IC:

L293D is motor driver IC which is useful for rotating motor in clockwise and anticlockwise direction.it is a bidirectional IC. Also provide 12v supply to the motor.

Block diagram of detector circuit:

By using ultrasonic waves we can detect the missile then micro controller activate the laser. This mechanism is kept such that the servomotor is attached with the ultrasonic sensor while it is kept above the stepper motor. Additionally we have kept the provision of friendly plane safety by using RF module so that it identifies that the object is hostile or not.

Flow charts:

IX.   CONCLUSION:

Conclusion of our research is by using ultrasonic sensor with stepper motor we continuously detect the target in all direction. And if and is come between ultrasonic rays 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.

X.   FUTURE SCOPE:

By using microcontroller we can implement the intelligent system in future. In Future it can be used as an advanced tracking system along with high intensity camera to track a real target (say a Missile or Tank).The advantage of this unit

is that to cover the 360 degree air defence from enemy aircrafts. The system can be made by using missile like SA11 missile launcher.

XI. REFERENCES:

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