"Automatic Missile Detection And Destroying System"

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ABSTRACT—

This system consists of an intelligent sonar 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 for attacking the target. In this project we are making use of ultrasonic radar system and a DC geared motor driven firing unit interfaced with a Microcontroller based control unit. 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 uses radio frequency bands to control the movement of Robot. The movement is controlled by the transmission of signals through air. This project is divided in 3 part RF Transmitter, RF Receiver, and microcontroller. The movement of Robot is controlled by RF transmitter by sending a specific command to RF Receiver. This project makes use of the transmitter and receiver at 433MHz that is available at low cost hence making it very complicated. 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. The programming of Microcontroller is done using Embedded 'C'.

***Keywords*—** Embedded, Microcontroller, Stepper Motor, IR sensor

INTRODUCTION :

Target acquisition and tracking are frequently the do-main of active sensing methods such as radar, ultra-sound, or laser scanning. The ability to track targets at manipulation range without resorting to these active methods 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. 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.In this project, a robotic platform along with a stepper motor fitted with ultrasonic sensors is used to automatically locate and aim at a stationary target, and moving target at a pre-defined range. Finally, we summarize the project's main advances and indicate possible directions for future work

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The main objectives of this project are:

1. Monitoring the moving target.
2. Real time monitoring of target.

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3. Works in any lighting conditions.
4. Automatic target attacking.
5. Controlling the robot using RF TX and RX

SYSYTEM BLOCK DIAGRAM

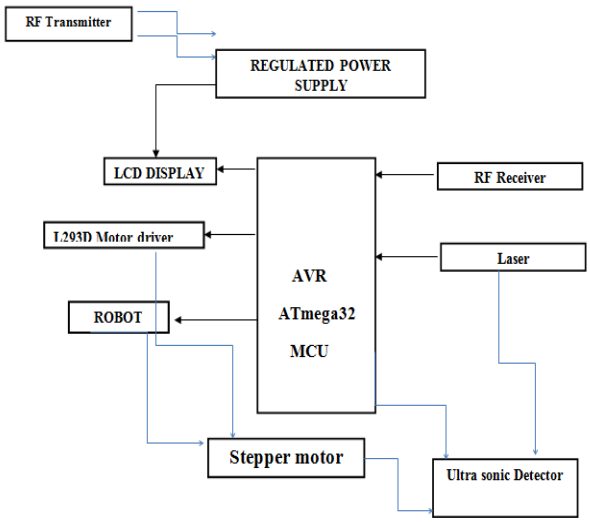

Fig-1:system block diagram

MISSILE DETECTION BY ULTRASONIC MEANS AND ACTIVATE THE DESTROYER. This ultrasonic proximity detector comprising independent, battery or AC powered transmitter and receiver sections make use of a pair of matched ultrasonic piezo ceramic transducers operating at around 40 kHz each. This circuit is used in getting reflected signals of 40 KHz from the object (like a missile) to feed that to a program to the microcontroller to switch on appropriate load while the program is executed at the microcontroller end. When the microcontroller receives the signal from ultrasonic receiver it activates the door gun by triggering the gate of MOSFET through a transistor. The power supply consists of a step down transformer 230/12V, which steps down the voltage to 12V AC. This is converted to DC using a Bridge rectifier. The ripples are removed using a capacitive filter and it is then regulated to +5V using a voltage regulator 7805 which is required for the operation of the microcontroller and other components.
This ultrasonic proximity detector comprising independent, battery or AC powered transmitter and receiver sections make use of a pair of matched ultrasonic piezo ceramic transducers operating at around 40 kHz each. This circuit is used in getting reflected signals of 40 KHz from the object (like a missile) to feed that to a program to the microcontroller. Opamps are used to amplify the weak signals received upon reflection from the obstacle, by the receiving ultrasonic transducer sent by the transmitting one, to switch on appropriate load while the program is executed at the microcontroller endIn this application of project consist of the ultrasonic transmitter and receiver which works for the frequency of 40 kHzAt 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. The power supply consists of a step down transformer 230/12V, which steps down the voltage to 12V AC. This is converted to DC using a Bridge rectifier. The ripples are removed using a capacitive filter and it is then regulated to +5V using a voltage regulator 7805 which is required for the operation of the microcontroller and other components.

I. HARDWARE DESIGN

A. MICROCONTROLLER

ATmega32 is an 8-bit high performance microcontroller of Atmel's Mega AVR family with low power consumption. Atmega16 is based on enhanced RISC (Reduced Instruction Set Computing, Know more about RISC and CISC Architecture with 131 powerful instructions. Most of the instructions execute in one machine cycle. Atmega16 can work on a maximum frequency of 16MHz.

ATmega32 has 16 KB programmable flash memory, static RAM of 1 KB and EEPROM of 512 Bytes. The endurance cycle of flash memory and EEPROM is 10,000 and 100,000, respectively.

ATmega32 is a 40 pin microcontroller. There are 32 I/O (input/output) lines which are divided into four 8-bit ports designated as PORTA, PORTB, PORTC and PORTD.

ATmega32 has various in-built peripherals like USART, ADC, Analog Comparator, SPI, JTAG etc. Each I/O pin has an alternative task related to in-built peripherals.

B. RF MODULE :

The RF module, as the name suggests, operates at Radio Frequency. The corresponding frequency range varies between 30 kHz & 300 GHz. In this RF system, the digital data is represented as variations in the amplitude of carrier wave. This kind of modulation is known as Amplitude Shift Keying (ASK). Transmission through RF is better than IR (infrared) because of many reasons. Firstly, signals through RF can travel through larger distances making it suitable for long range applications.
Also, while IR mostly operates in line-of-sight mode, RF signals can travel even when there is an obstruction between transmitter & receiver. Next, RF transmission is more strong and reliable than IR transmission. RF communication uses a specific frequency unlike IR signals which are affected by other IR emitting sources. This RF module comprises of an RF Transmitter and an RF Receiver. The transmitter/receiver (Tx/Rx) pair operates at a frequency of 434 MHz. An RF transmitter receives serial data and transmits it wirelessly through RF through its antenna connected at pin4. The transmission occurs at the rate of 1Kbps - 10Kbps.The transmitted data is received by an RF receiver operating at the same frequency as that of the transmitter. The RF module is often used alongwith a pair of encoder/decoder. The encoder is used for encoding parallel data for transmission feed while reception is decoded by a decoder. HT12E-HT12D, HT640-HT648, etc. are some commonly used encoder/decoder pair ICs.

C. DC MOTOR

DC Motor has two leads. It has bidirectional motion
If we apply +ve to one lead and ground to another motor will rotate in one direction, if we reverse the connection the motor will rotate in opposite direction.
If we keep both leads open and both leads ground it will not rotate (but some inertia will be there).
If we apply +ve voltage to both leads then braking will occur.
Direction control of a DC motor is very simple, just reverse the polarity, means every DC motor has two terminals out. When we apply DC voltage with proper current to a motor, it rotates in a particular direction but when we reverse the connection of voltage between two terminal, motor rotates in another direction.

D. ULTRASONIC SENSOR

In this project, we are going to interface ultrasonic rangefinder with ATMEGA16. Ultrasonic rangefinder is used to find range of an obstacle or a wall from the sensor. However, when there are cheap methods available to find range like the IR sensor or even a combination of LED's and LDR would do but the question is why we use a more costly sensor. The reason is:-

- IR sensors are not accurate
- Result varies from object to object
- Calibration is required
- Works good only for shot range

Normally the IR sensors have a range from 30-80 cm or even less depending upon the manufacturer and also the LED's used.

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However for an ultrasonic rangefinder, the distance can be measured accurately up to 400cm with an accuracy of 1cm.

Ultrasonic rangefinders find application to measure level of a liquid, object sensing. Also, the great thing with this sensor is they required no calibration; no conversion from analog to digital data and the code are is not limited to any particular manufacturer sensor. The code will work pretty much with almost all sensors available in the market.
Another advantage of using ultrasonic sensor is that ultrasonic waves are narrower than infrared or any other sound beam. This is useful to detect objects that are exactly in line with the sensor.
In this project, we will find the distance of any object.
The sensors we are using is a 4 pin sensor, one for Vcc, one for ground and the other two pins are echo and trigger However there are sensors, that have three pins, mainly Vcc, ground, and the third pin to connect to microcontroller.

E. STEPPER MOTOR

Stepper motors work on the principle of electromagnetism. There is a soft iron or magnetic rotor shaft surrounded by the electromagnetic stators. The rotor and stator have poles which may be teethed or not depending upon the type of stepper. When the stators are energized the rotor moves to align itself along with the stator (in case of a permanent magnet type stepper) or moves to have a minimum gap with the stator (in case of a variable reluctance stepper). This way the stators are energized in a sequence to rotate the stepper motor.

F. LASER

A **laser** is a device that emits light through a process of optical amplification based on the stimulated emission of electromagnetic radiation. The term "laser" originated as an acronym for *Light Amplification by Stimulated Emission of Radiation*. Lasers differ from other sources of light because they emit light coherently. Spatial coherence allows a laser to be focused to a tight spot, enabling applications like laser cutting and lithography. Spatial coherence also allows a laser beam to stay narrow over long distances (collimation), enabling applications such as laser pointers. Lasers can also have high temporal coherence which allows them to have a very narrow spectrum, i.e., they only emit a single color of light. Temporal coherence can be used to produce pulses of light—as short as a femtosecond.

Lasers have many important applications. They are used in common consumer devices such as DVD players, laser printers, and barcode scanners. They are used in medicine for laser surgery and various skin treatments, and in industry for cutting and welding materials. They are used in military and law enforcement devices for marking targets and measuring range and speed. Laser lighting displays use laser light as an entertainment medium. Lasers also have many important applications in scientific research.

II. CONCLUSION :

By using ultrasonic waves we can detect the missile then micro controller activate the destroyer. This system consists of an intelligent sonar 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 for attacking the target.

III. FUTURE SCOPE

1. By using controller microcontroller we can implement the intelligent system in future.
2. In Future we can use advanced tracking system along with high intensity camera to track a real target.
3.The advantage of this unit is that to run the system we can use camera and other sensors to see the live moving target from anywhere in the world.

IV. ACKNOWLEDGEMENT

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