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# MISSILE SURVEILLANCE SYSTEM USING ARM

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**ABSTRACT -** Today in the twenty first century the Missile technology is rapidly developing with the advancement of the science. In today's world all types of missiles uses the principle of combustion for its movement. So, until the new technology initiates the tracking of the missile is possible. These missiles can be tracked with the help of Radar, microwave sensing, etc. These equipment are highly advanced and too costly for every developing country to purchase and implement it for their safety.In order to make its design simple, easy to install and to achieve its efficiency, keeping this in background the project has been designed in such a manner that the Missile is detected using an Ultra-sonic sensor at cheaper cost. This will make the proposed system to be an economical, portable and low maintenance solution for tracking a missile. A plane or a unrecognized object by is sensed by the radar up to a certain limit. The thought achieves the same results by the robotic action automatically for possible application in military and industrial usage.

**KEYWORDS** – Missile technology, Radar, Ultra-sonic sensor.

## 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. Ship borne systems followed the evolution of land-based models, starting with long-range weapons and steadily evolving toward smaller designs to provide a layered defense that have pushed gun-based systems into the shortest-range roles.

The proposed system uses an ultrasonic module interfaced to detect missile object. An ultrasonic sensor comprising of a transmitter and receiver are used on same module. The ultrasonic sensor 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.

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 simultaneously. The tank vehicle is fitted with another microcontroller for movements of the vehicle's control actions send and receive by the key panel through wireless GSM communication. The programs for 8051 family microcontroller are written by the embedded C programming using kiel software.


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## II.METHODOLOGY

The transceiver detects missile objects and displays distance on liquid crystal display. A short-range ground surveillance FMCW (Frequency Modulated Continuous Wave) RADAR for separation of ranges and velocities of multiple targets .Robotic platform along with a stepper motor which continuously rotate in 180 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. The main aim is to differentiate between missile and object. Usage of temperature and metal detector sensors, which are have not used in previous works .Providing 360 degree coverage. Sending SMS to base station. To destroy the missile.

### A. Live streaming with wireless camera:

This is a WiFi-camera which is used to monitor surrounding environment conditions. The live streaming of the surrounding environment is done all the time and it keeps sending the live footage regardless of whether the target is detected or not.

Fig 1.wireless WiFi camera

### B. Ultrasonic Sensors

HC SR04 ultrasonic sensors use sonar to determine distance to an object like bats or dolphins do. It offers excellent range accuracy and stable readings in an easy to use package.Its operation is not affected by sunlight or black material like sharp rangefinders. It provides both short and long range detection .HC SR04 ultrasonic sensor uses sonar to determine distance to an object like bats or dolphins do. It offers excellent range accuracy and stable readings in an easy to use package. Its operation is not affected by sunlight or black material like Sharp rangefinders is although acoustically soft materials like cloth can be difficult to detect).

Fig 2 Ultrasonic Sensor

### C. Temperature Sensor

The LM35 series are precision integrated-circuit temperature sensors, with an output voltage linearly proportional to the Centigrade temperature. Here, if the threshold temperature i.e. 50 degree is crossed then it indicates "Missile temperature".

Fig 3 Temperature Sensor


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### D. PIR sensor

PIR sensors allow us to sense motion, almost always used to detect whether an object has moved in or out of the sensors range. Here, if any object is detected, lcd displays "Object detected".

Fig 4 PIR Sensor

### E. Metal detector sensor

Used to detect if the object is made of metal. Metal detectors work on the principle of transmitting a magnetic field and analysing a return signal from the target.

Fig 5 Metal detector Sensor

### F. LPC Board

The LPC2141/42/44/46/48 microcontrollers are based on a 16-bit/32-bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combine microcontroller with embedded high speed flash memory ranging from 32 kB to 512 kB. A 128-bit wide memory interface and a unique accelerator architecture enable 32-bit code execution at the maximum clock rate. For critical code size applications, the alternative 16-bit Thumb mode reduces code by more than 30 % with minimal performance penalty.


Fig 6LPC Board.

## B. SYSTEM ARCHITECTURE

In this section we describe how the connections take place between the various components.

I. First we are going to implement obstacle detection, i.e missile by using metal detector sensors.
II. Temperature and ultrasonic sensors are placed on top of the unit to know the various temperatures and distances of the reference missile.
III. When the missile is detected it is destroyed by the laser, indicated by the glowing led.
IV. The information about the missile distance and other environmental parameters is sent as an SMS via GSM technology.

The figure 7represents the system architecture of missile surveillance system, where it represents the various interactions that occur among various controlling components.


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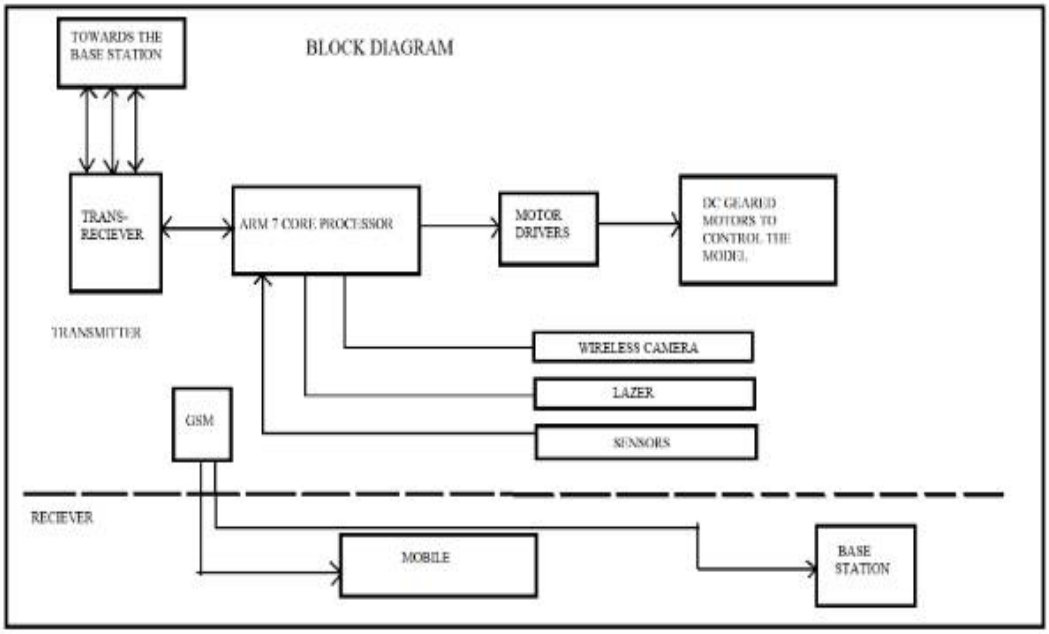


Fig 7 System architecture of admin and student module

**B.IMPLEMENTATION**

The primary problem of missile defence system representative of early warning Radar is how to fast detect the incoming missile. Based on the characteristics of high mobility and rapid surprise attack, detection probability for missile is solved in different conditions.No target indication. Super-distance detection network such as, azimuth Indication. Medium-long range warning Radar-Motion state indication such as missile azimuth, height and velocity.

Aircrafts travel at different speeds based on weather conditions therefore the aircrafts have speed variations. The speed of an aircraft also depends on the air traffic at the airports because an airport having only one runway allows the aircrafts to touch down one at a time hence other aircraft must wait for the confirmation. The missile will never vary its speed while travelling as the missiles must have a constant speed in order to reach the destination because it needs to manage its fuel and other parameters. Hence the missile fails to satisfy the speed parameter.

Airborne Laser weapon is a device that transfers energy by speed of light which acts as an anti-missile weapon. It basically consists of 4 lasers that is, advanced adaptive optics, sensors and computers to locate, track and destroy missiles. Infrared sensors detect the heat signature of the boosting missile and report the respective information to an active tracking missile Now the active tracking laser tracks the missile and reports the relevant tracking information like, distance, speed, altitude The tracker laser scans the target and figures out where it is best to high-energy laser. The coil Laser fires a beam at several Mega-watts at the target.The high-energy laser beam penetrates the skin of the target missile and disables or explodes it, depending upon where the beam strikes.In general evaluation standard single kill probability is the basis of the analysis of airborne Laser weapon effectiveness.

The single kill probability of airborne Laser weapon can be divided into shot error rule and target co-ordinate kill rule according to time sequence. In shot error rule mainly embodies the angle α in the target angle. The α is the angle between plane and line of target projection. Target co-ordinate system kill probability depends mainly on three aspects. The Laser beam quality, effective irradiation time, target damage threshold. Based on these factors of combat effectiveness for Airborne Laser weapon system, mathematical models of Airborne Laser weapon shot error rule and target co-ordinate kill rule are established. The kill probability model is established and the evaluation method of target damaged degree is significant for improving the combat effectiveness of Airborne Laser weapon.

The pseudo code for the working is as follows:

1. START (turn on power supply)
2. Reset the LCD
3. Initial message i.e. "AUTO RADAR DETECTION & DESTROY" will be displayed.
4. IF (object distance<20) Obstacle at short range will be displayed


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5. ELSE Obstacle at long range will be displayed
6. .IF (temp >50) "Missile temperature" will be displayed
7. ELSE room temperature will be displayed
8. . IF(PIR) Object detected will be displayed
9. IF(METAL) "Missile detected will be displayed"
   Then
   LED blinks and a message "Missile destroyed" will be displayed.
10. All messages will be sent via GSM modules..

## B. RESULTS

The project "Missile Surveillance System" has been successfully designed and tested. Integrating features of all the hardware components used have developed it. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly, using highly advanced IC‟s and with the help of growing technology the project has been successfully implemented to their direct destination, but will be applied by mankind for peaceful purposes.

By using Camera, we can detect the object then micro controller activates 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. Although antimissile defense with a hundred percent reliability was not reached by any country, huge efforts are put into this area. For this purpose, early attack detection systems, controllable rockets, high power gun are used. We would like to believe that such technologies will never be used according

Some of the snapshots for the working of the overall working module are shown in the following figures

Fig 8 Overall Picture

Figure 8 represents the overall working module of the surveillance system, including all working components. .

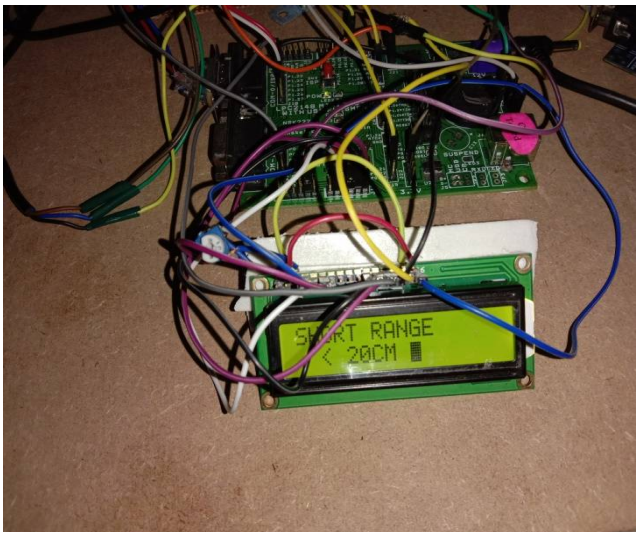


Fig 9 Short range detection screen


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Figure 8 shows the message displayed when an object is detected in short range. From figure 9, figure 10, figure 11, figure 12 displays the various messages on the LED screen for Long Range, High Temperature and Missile detected.

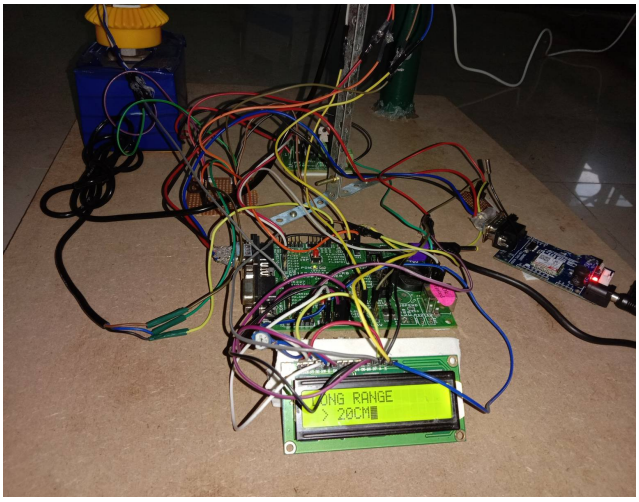


Fig 10 Long range detection screen

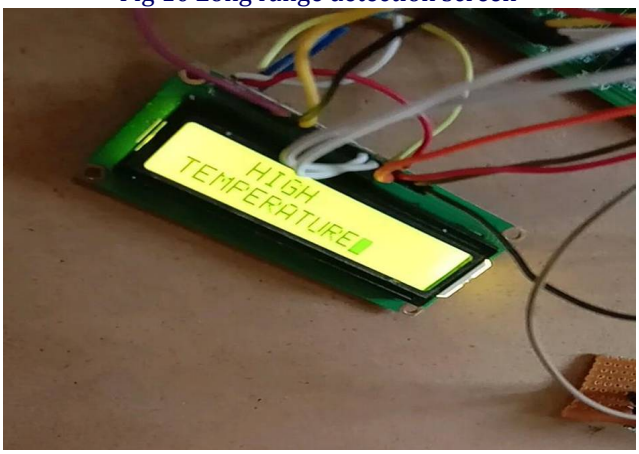


Fig 11High temperature detected .

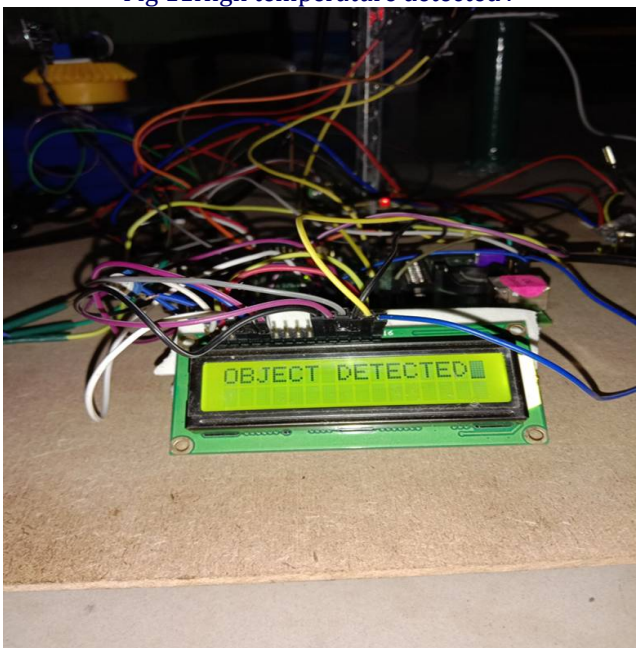


Fig 12 PIR detects the object.


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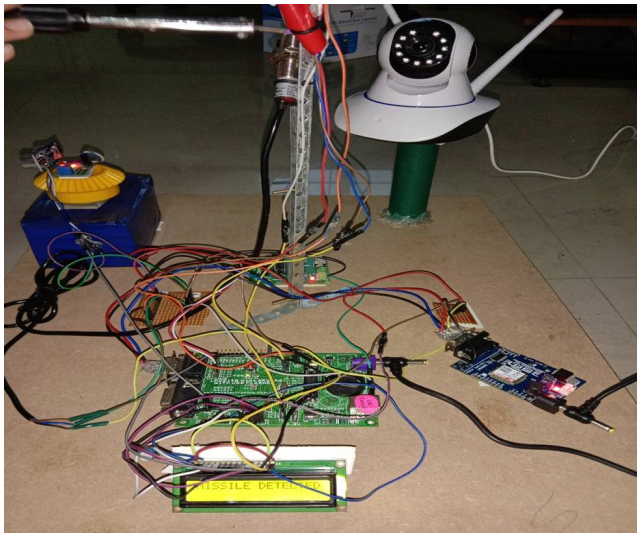

Fig 13 Missile detected by metal detector

The main application of this project is in defense (army, navy or air force) where it can make easy detestability of potential threats in combat environments there by reducing impact and loss caused due to potentially dangerous threats.

## B. CONCLUSION

This project makes missile detection and destroy system design simple, easy to install and to achieve high efficiency without direct involvement of human. Usage of different sensors like metal detector, ultrasonic, PIR and temperature sensors increases the accuracy of the detection with 360-degree coverage including high speed laser.

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