IOT MILITARY SECURITY SYSTEM FOR TRACING OF MISSILE USING ULTRASONIC RADAR

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ABSTRACT

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. 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. The ultrasonic sensor movement is maintained by the servo motor fixed within it. The servo motor is made to revolve through fixed angles; if object is detected then the angle position is sent as the input to the launcher fixed servo motor. The launcher will release the missile fixed within it because the Ultrasonic sensors covers larger sensing distance and it can detect the target in all the lighting conditions (day or night). The programming of Microcontroller is done using Embedded ‘C’.

Keywords: Military Security, Tracing of Missile, Ultrasonic Radar, Servo Motor.

1. INTRODUCTION

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. 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 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). The programming of Microcontroller is done using Embedded ‘C’. An embedded system is a combination of software and hardware to perform a dedicated task. Some of the main devices used in embedded products are Microprocessors and Microcontrollers. Microprocessors are commonly referred to as general purpose processors as they simply accept the inputs, process it and give the output. In contrast, a microcontroller not only accepts the data as inputs but also manipulates it, interfaces the data with various devices, controls the data and thus finally gives the result. The Missile tracking and auto collision system using ARDUINO Microcontroller is an exclusive project that can move the target aiming gun according to the instructions given by microcontroller and also alerts through LCD when any missile is being detected by it. The thesis explains the implementation of “Missile tracking and auto collision system” using ARDUINO microcontroller. RADAR is an object detection system which uses Microwaves. Microwaves are nothing but the radio waves. It uses microwaves to determine the Range, Altitude and Direction or Speed of objects. The radar dish or antenna transmits pulses of radio waves or microwaves which bounce off any object in their path. RADAR systems come in a variety of sizes and have different performance specifications. Some RADAR systems are used for air-traffic control at airports and others are used for long range surveillance and early-warning systems. A RADAR system is the heart of a missile guidance system. Technology in 21st century puts an emphasis on making the devices autonomous, be it self-driving car or a defence system all are being made autonomous. In this modern era there is an advancement in radar system also having privileges over the existing systems. The term RADAR itself, not the actual development, was coined in 1940 by United States Navy as an acronym for Radio Detection and Ranging. A radar system is the heart of a missile guidance system. Small portable radar systems that can be maintained and operated by one person are available as well as systems that occupy several large rooms. Radar was secretly developed by several nations before and during the World War II. The term RADAR itself, not the actual development, was coined in 1940 by United States Navy as an acronym for Radio Detection and Ranging. The modern uses of radar are highly diverse, including air traffic control, radar, astronomy, air-defence systems, antimissile systems, marine radars to locate landmarks and other ships; aircraft anticollision systems; ocean surveillance systems, outer space surveillance and rendezvous systems; meteorological precipitation monitoring; altimetry and flight control precipitation monitoring; altimetry and flight control systems; guided missile target locating systems; and ground penetrating radar for geological observations. High tech radar systems are associated with digital signal processing and are capable extracting useful information from very high noise levels.

2. LITERATURE SURVEY

Missile Detection by Ultrasonic and Auto Destroy System. (May 2014). Samir Chopra, Suman Bharti, Tarun Singh Negi, Prof. P.D Kulkarni. In this paper they are attempting to make a robotic platform along with a stepper motor fitted with ultrasonic sensor is used to automatically locate and aim at a moving target and successfully destroys it. The control system is ATmega32 is an 8-bit high performance microcontroller of Atmel’s Mega AVR family with low power consumption [1]. This system takes decision to detect and destroy the moving missile. It sends control signal to firing unit to destroy missile. The Ultrasonic transceiver (Transmitter & Receiver) detects missile object and displays the missile direction on LCD through Microcontroller. If there is any target within the detection range, the application will turn ON the Laser gun to the nearest detected target and fires. A buzzer alarms when any of the ultrasonic sensor identifies the missile to alert the nearest people. They have introduced wireless camera for taking the visuals at war field. A RF
transmitter and receiver are used for controlling robotic platform [2]. Microcontroller Based Missile Detection and Destroying System. (July 2014) S. Nagakishore Bhavanam, Acharya Nagarjuna The proposed paper describes that this project consists of an intelligent sonar based object tracking system and DC geared motor driven firing unit interfaced with microcontroller based control unit is used. ultrasonic sensor is preferred instead of IR sensor, because the Ultrasonic sensors can cover large distances and it can detect target in all the lighting conditions (day or night). Atmel 89c52 microcontroller is used as a control unit. As the target (missile) is detected the control unit sends commands to firing unit to destroys the target. The programming of microcontroller is done using embedded ‘c’ language [3]. Missile Detection and Auto Destroy System on a Robot Platform. (2015) Ms. Palwe Pooja Balasaheb, Ms. Shinde Tejashree Anil, Ms. Sonawane Chaitali Shivajirao, Prof. S. M. Bhilegaonkar. This paper proposes a missile detection and auto destroy system on Robot Platform. A microcontroller ATmega16 for loading embedded C program. The ATmega16 is 40 pin IC which has four port like port A, port B, port C and port D. 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. This microcontroller executes powerful instruction in single clock cycle. Stepper motor and ultrasonic sensor are mounted 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 Laser is used for destroying purpose as obstacle is detected. Robotic Platform movement 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 driver IC for movement of robot according to our input data [4]. Automatic Missile Detector Using Ultrasonic Proximity Detector. (April 2016) Narayan Thakkar, Shubham Sahu, Shrushi Sindhemeshram, Roshan Kumar. This proposed system uses 8051 Microcontroller as a central control system to send control command to targeting system to attack the target (missile) via laser. The Intel MCS-51 (commonly termed 8051) is an internally Harvard architecture, complex instruction set computing (CISC) instruction set, single chip microcontroller series developed by Intel in 1980 for use in embedded systems. 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. In this project 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 and firing a laser. It is Light Amplification by Stimulated Emission of Radiation. 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. This research has an additional advantage that it checks the target is hostile or not and accordingly fire the laser. A RF transmitter and receiver modules are used for controlling robotic platform 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 [6]. Definition: - 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 gunbased systems into the shortest-range roles.
3. PROPOSED SYSTEM

Arduino is an open-source project that created microcontroller-based kits for building digital devices and interactive objects that can sense and control physical devices. The project is based on microcontroller board designs, produced by several vendors, using various microcontrollers. These systems provide sets of digital and analog input/output (I/O) pins that can interface to various expansion boards (termed shields) and other circuits. The boards feature serial communication interfaces, including Universal Serial Bus (USB) on some models, for loading programs from personal computers. For programming the microcontrollers, the Arduino project provides an integrated development environment (IDE) based on a programming language named Processing, which also supports the languages C. The projected system uses an ultrasonic module interface to microcontroller of ARDUINO family. An ultrasonic transducer encompasses a transmitter and the receiver is worn. The transmitted waves had been mediated from the object and acquired by way of the transducer again. the overall time taken for sending the waves to receiving it become calculated by way of taking into apprehension the rate of sound. Then the distance is calculated via the program going for walks at the microcontroller and displayed on an liquid crystal displayed (liquid crystal display) display screen interfaced to the microcontroller.

![Block Diagram](image)

**Figure.1: Block Diagram**

**WORKING**

An IOT based Military Security System for tracking missiles using ultrasonic sensors typically involves integrating sensors on the missile and a central IOT platform. The ultrasonic sensor detects obstacle, and data is transmitted through IOT protocol for real time tracking. The system may include GPS for location accuracy and possible accelerometers for motion tracking. Advanced algorithms analyze data, providing valuable insights for military operations. The core component of this security system is ultrasonic sensor, a device that utilizes sound waves beyond the range of human hearing to detect and locate objects, providing accurate data for trajectory adjustments and ensuring optimal navigation. The IOT framework facilities seamless communication between missile and centralized military control system. Real time data, including distance and measurement and environmental factors, is transmitted through secured channels. Advanced algorithms process this information, enabling dynamic course corrections and enhancing the missiles precision. Additionally, the system can incorporate geospatial technologies to map and analyze the missile path. Integration with satellite data ensures comprehensive monitoring, enabling military operations to respond swiftly to change in scenarios.
This IOT based approach not only improves the accuracy and efficiency but also enhances overall military security. It enables a more adaptive and responsive defense mechanism, strengthening national security by leveraging cutting-edge sensor technology within robust interconnected framework.

4. RESULTS

The project “IOT based Military Security System for tracking of missile using ultrasonic radar” was designed such that the 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.

Additionally, the system can incorporate geospatial technologies to map and analyze the missile path. Integration with satellite data ensures comprehensive monitoring, enabling military operations to respond swiftly to change in scenarios. This IOT based approach not only improves the accuracy and efficiency but also enhances overall military security.

![Image of IOT based Military Security System for tracking of missile using ultrasonic radar](image)

Figure.2: IOT based Military Security System for tracking of missile using ultrasonic radar

5. Conclusion

In this paper we have attempted to use ultrasonic sensor for implementation of RADAR and got results that exceeds our presumed expectations. The basic system is created for preventing collisions of vehicles and self-driving cars. With some enhancements the system can be used for real time purposes. By connecting wireless camera to the system, then we can see the outer world from our personal computer only by using GPRS and GPS. We can use this system at so many fields and we can use to handle so many situations.

REFERENCES


