Low Level Flying Object Detection Using IoT

Karthika Devi .P[1], Katherin Janet.T[2], Janani.P[3], Krishnashree S M M[4]
[1, 2, 3, 4]SNS College of Engineering

Abstract- *Our project is based on "INTERNET OF THINGS (IOT)" which helps in the "DEFENCE SECTOR". The application of detection and ranging in different places such as military installation, commercial use is done with the help of radar system which uses electro magnetic waves for detection of different physical components such as distance, speed, position, range, direction, size ,etc., which can be either fixed or be in motion. This system consists of basic ultrasonic sensor placed upon a servo motor which rotates at a certain angle and speed.*

Keywords- Arduino, Ultrasonic sensor, Servo motor, Military installation

I. INTRODUCTION

Use of radar system has been developed greatly specially in the field of navigation. In this research we study about existing navigation technologies and proposed an Arduino based radar system. The system consist of a basic ultrasonic sensor placed upon a servo motor which rotates at a certain angle and speed. We know everything produces sound wave just by existence effect flow of air around them with their natural frequency. These frequencies are beyond hearing range of humans. Wave of frequency range of 20000hz and thereabout are called ultra – sonic wave and these waves can be detected by an ultrasonic sensor which helps us to get various knowledge. An Ultrasonic detector usually has a transducer which convert sound energy into electrical energy and electrical energy into sound energy. They are used for measuring object position and orientation, collision avoidance system , surveillance system , etc., Speed of travel of sound wave depends upon square root of ratio between medium density and stiffness. Also, property of speed of sound can also be changed by natural environment condition like temperature. Ultrasonic technology provide relief from problem, as it allows user to get non – contact measurements in this way distance between object and speed can be easily measured. So, basically an ultrasonic sensor sends ultrasonic waves which travels in air and gets reflected after striking any object. By studying the property of reflected wave, we can get knowledge about objects distance, position, speed, etc., A processing software and an Arduino software is used with hardware system for detection of objects in various parameters. One of the most commonapplication of ultrasonic sensor is range finding.

II. LITERATURE SURVEY

[1] This system upcomes with an idea of monitoring the air toxicity level while traveling on roads and find out the best to travel. For this to perform an IoT kit with Arduino IDE and a Wi-Fi module is placed all over the city to measure the air . Toxicity level where it provides the best route through android app where the air toxicity is less. This method is used to harvest energy from rainfall which actually follows the method with the help of piezoelectric transducer with an Arduino measuring system. The energy is obtained from a single drop of rain and the Arduino is used to measure the actual energy produced in it .When rain drop falls on the structure creates an impulsive force which generates an impulsive voltage on electrodes. This method consist of a datalogger built with hardware and software components to experience in multiple sites. The datalogger contains the climatic and electric parameters with accuracy .A 3G technology is included to monitor the environmental conditions with the help of photovoltic cells to obtain energy from the climatic factors and consume it as electrical energy with help of internet and data cloud where the datalogger is used. This paper is about improving the urbanization in countries to avoid over filling of garbage wastes in streets. This proposed system will alert by sending SMS or alarm to inform that the garbage is full. When the waste components estimates over the garbage bin it senses it with the help of Arduino controller and send an SMS to the user via the Android application developed for it. In this modern era automation is one of an important aspect takes place in moving to smart technologies. As of smart technologies there are smart cars which provide better convenience for driving. This technology consist of an Arduino ,ultrasonic sensor and a Li-Fi circuit .First a transmitter and a receiver is placed on the front and the back of the cars .The ultrasonic sensor measures the distance of between the cars and the data is transmitted and send via transmitter which is placed in the backend of the car. The information is received through the receiver of the front end of the second car which shows the speed of the first car to avoid collision. This method is worked by applying this technology on every cars to prevent accidents.

[2] RautSanket Sanjay et al. Radar's evolution and research efforts have been immensely successful, and they have had a significant impact on computing. Finally, researchers working on radar will be able to design, develop, and upgrade security

and user interfaces that are capable of meeting the specified performance criteria in various environments. Radar is an object detection system that uses electromagnetic waves to determine the range, altitude, direction, or speed of both moving and fixed objects such as aircraft, ships, motor vehicles, weather formations, a nd terrain. Ultrasonic radar is an object detection system that uses ultrasonic waves instead of electromagnetic waves to determine the range, altitude, direction, or speed of both moving and fixed objects such as aircraft, ships, motor vehicles, weather formations, and terrain. The Ultrasonic Sensors are the most important parts of any Ultrasonic radar. Ultrasonic sensors work on the same concept as radar or sonar, evaluating a target's properties by reading radio or sound wave reflections. This project intends to use an Ultrasonic Sensor attached to a Raspberry Pi board, with the data from the sensor being sent to a laptop screen to measure the presence of any obstacle in front of the sensor, as well as determine the range and angle at which the obstacle is detected. The apparent shift in frequency or pitch when a sound source moves toward or away from the listener, or when the listener moves toward or away from the sound source, was discovered in 1842 by Christian Doppler.

[3] Milenko S. Andri c, Boban, P. Bondzuli c, and Bojan M. Zrnic described a database of radar echoes from numerous targets in a work published in 2010. The database can be downloaded by anyone. In this study, spectral analysis is utilised to extract extremely basic information that can be used for categorization.In a paper published in 2012, Alexander Angelov, Andrew Robertson, Roderick Murray-Smith, and Francesco Fio showed solutions for classification issues in the context of automobile radar utilising several neural network architectures.

EMPATHY:

Planning for the security and defence of a vast country like India.To demonstrate the need for the military humanperformance a researchcommunity to anticipate and evolve with the emergence of new and disruptive battlefield technologies that are changing the fundamental role of the human combatant. In Indian Military, detection of an object in low level which is not identified by the Earth's satellite leads to attacks and wars.In spite of the modern technological drone which are made for surveillance of our country leads the enemy to find our attack strategies. Even we have modern technology to detect the unknownobjects. These drone cannot be detect by these detectors. Our detector can be a remedy for these modernizedproblem.Our detector helps in preventing such tragedies happening in the military.As technology is rapidly growing we don't know how clever enemy nations can use to attack .

DEFINE:

The various problems faced by the defence sector is noted. Low level flying object detection device is mainly developed to solve the problems that are faced by the military people in their day to day lives. As Enemy nations are advancing in defencetechnologies, we need to keep up with it . The problems which are stated above is faced by military people to solve their day to day problems which are noted in the empathy phase.

IDEATE :

As wars are frequently happening between nations, It is important to keep up with defence technologies. From high level weapons to low level ones. So, Our project is focused on finding the low level weapons (Drones , Mini robots, etc.,) from entering the battlefields and military camps.

Here we propose some ideas to solve these problems:

- The first one is using distance detection device.
- The alternate is to use ultrasonic sensors in the battlefield combined with iot technology and radar system.

Out of these 2 ideas , we came with a project with our second idea .We propose a device to detect a low level flying objects using IOT mechanism.

Figure-1

The aim of this project is to detect the low level objects entering the battlefield. By using ultrasonic sensor upon a servo motor which rotates at a certain angle and speed. This ultrasonic sensor is connected to Arduino digital pins and servo motor also connected to digital input and output pins.
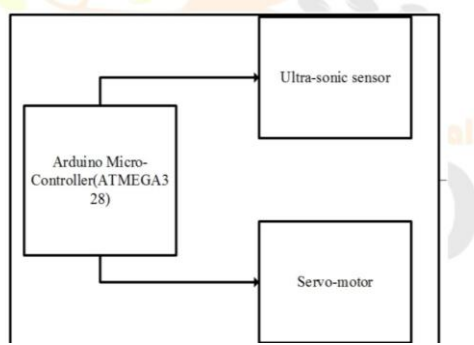
Figure-2

PROTOTYPE:

The prototype model of a design thinking approach for the defence sector using low level detection device with IOT technology are shown in image.
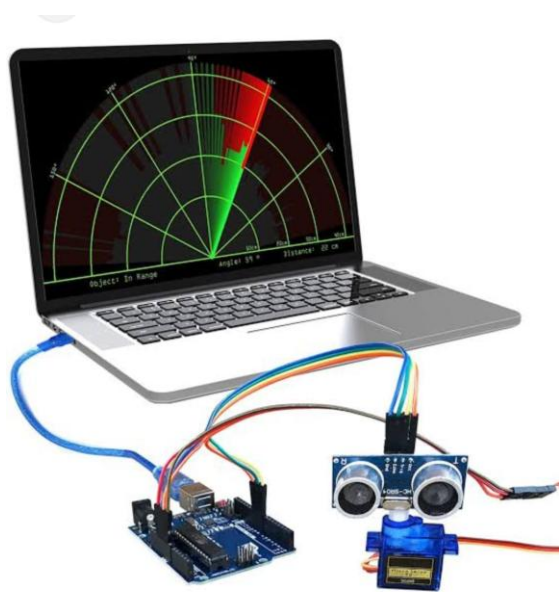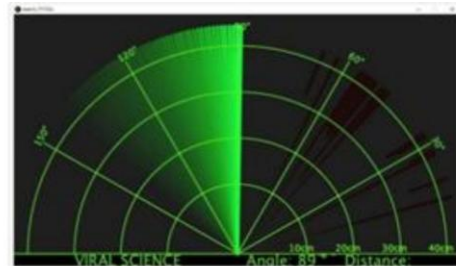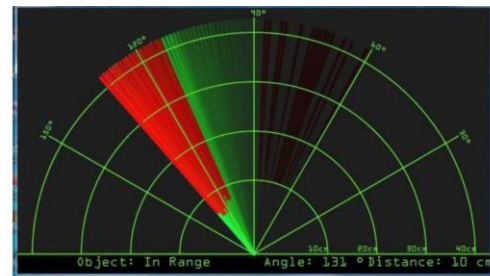

Figure-3

SYSTEM WORKING :

The proposed system design shows how the model work with help of required functions. The ultrasonic sensor is mounted on a servomotor to cover the angle range for the radar. When the sensor that produce frequent radio waves is interrupted by any objects the ultrasonic sensor return back as if finds any object which measures the entry of the object. These information is then carried via the arduino controller. The arduino controller is nothing but a board which is equipped with a set of digital input output pins to carry connection between hardware and software components. when the signals carried from the ultrasonic sensor to the arduino board it generate the signals and display it in monitor screen. The Arduino is uploaded with codes that contains the angle

range of the servomotor and the distance of each degree of angle and also contains the codes for the format of radar.

Radar with no obstacle
Figure-4

Radar with object detected
Figure-5

COMPONENTS USED:

- Ultra sonic sensor
- Servomotor
- Arduino
- Bread board
- Connecting wires

ULTRASONIC SENSOR
Figure-6

ARDUINO
Figure-7

SERVOMOTOR
Figure-8

III. CONCLUSION

In This Paper A radar system was designed with the help of Arduino, servomotor and ultra sonic sensor which can detect the distance, position of the object which comes in its way and converts it into visually representable form. The range of the system depends upon type of ultrasonic sensor used.

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