

Implementation and Study of the Drone Detection System (Radar)

Ultrasonic radar

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Abstract: Ultrasonic system is not new in market; this technology exists before also in market and is considered as the trusted technology in the area of research as well as on industrial background. Ultrasonic and radar system is used in various instruments and devices such as homes, shops, military etc. purpose. The main objective of this system is to get the exact distance and the angle for the drones and objects placed around the device based on the common theory of ultrasonic waves speed. The aim of the Arduino micro controller is transmitting and receive the ultrasonic waves in order to give flexibility of usage requirements.

Index Terms: Arduino microcontroller UNO, Ultrasonic sensor, Basic structure to mount, Jumper wires, Processing 3.

I. INTRODUCTION

Radar is the device that is used for detection as well as determining the range angle, velocity of object, it is also capable of detecting the movable objects such as drones and aircraft, motor propelled vehicle's, guided missiles, weather information by using ultrasonic sensor which uses ultrasonic waves to detect objects.

Radar system is generally developed for military activities as well as for air traffic control, it is in general use by different nation after the world war 2. Where as in 1940 popular scientist showed an example of a radar unit using the Watson-watt patent in an article of air defense Cambridge, Massachusetts which developed microwave radar technology in year 1941-1945.

II. LITERATURE REVIEW

The ultrasonic radar system is use for the detection of drones in application of army, navy and air force. Radar stands for the detection and ranging the experiment on radar is in 19th century. This starting experiment based on radio waves are reflected on metallic object this is said in James clerk Maxwell's seminal work as electro magnetism. in early 20th century German investor Christian Hulsmeyer is the first used the radar for simple chip detection. On this principle all the radar system in world works.

III. SYSTEM DEVELOPMENT COMPONENTS

ARDUINO

Arduino is an open source electronic platform based on the easy to use hardware and software. Arduino board are able to read input and turn it into the output, over years Arduino is the brain of the most of the IOT projects which includes some of the basic instruments to the scientific instruments. Arduino board started changing to adopt new need and challenge to product for IOT platforms and applications. Arduino provides the set of input and output pins for interface of several circuits or input or output devices. These board feature serial communication and does not need separate piece or hardware for new code onto the board you can simply use USB cables.



Fig No. 1.0 Arduino

Components of Arduino

1. Power USB: USB cable is used to power the Arduino by using computer
2. Barrel Jack: Arduino also power by using directly AC supply by connecting to barrel
3. Voltage Regulator: The main Work of regulator is to control the voltage which is given to Arduino board and also the voltage used by processor and element will stabilize
4. Crystal Oscillator: This component is used in Arduino for sort out time issue. The time is calculated by using this oscillator.
5. Analog Pin: The board has six analog pins. The pin series from A0 to A5. This pin read analog value and convert into digital form.
6. Micro-Controller: Microcontroller is the brain of Arduino. Integrated Circuit of each micro controller different from each other.
7. Digital I/O port: this component has 14 pins out of that 6 pins provide pwm and this is achieved by using pwm (Pulse Width modulation) the width of sending signal to the motor is varied and send for fixed time. Angular position of motor determines by pwm.

SERVO MOTOR



Fig No. 2.0 Servo Motor

Servo motor is electrical device which has a capability to push or rotate an object with great precision .If you want to rotate the object at some specific angle then you use servo motor .It is made of a simple motor which runs through servo mechanism .If motor uses DC power supply it is called DC servo motor, when we use AC power supply then that type of motor is called a AC servo motor. The position of is decided by the electrical pulse and its circuit is placed beside the motor. In generally servo motor consist

of gears system, position sensor control circuit. The motor which is used are dc motor which is power by battery and low torque. The assembly consist of gear and shaft which is connected to dc motor for lowering the speed and increasing the torque.

The position sensor which is used to detect the position of motor shaft from its definite position and this information is given to control circuit and compare the position of motor with desired position accordingly that control the direction of motor to set the desired position.

ULTRASONIC SENSOR



Fig. No. 3.0 Ultrasonic Sensor

By using the sensor, we can produce the sound wave of frequency to wish which is not hear by human. Then after that waiting for signal reflected to the back by using this, we can calculate the distance on the basis of time. This same principle used in radar. Same sensor is use separate receivers and emitter but in these two combines in one device. But combine type sensor manufactured in very smaller packages than separate which is very convenient. Sensor and radar both are used for same purpose application but sound based sensor detect object more efficiently than radar.

IV. WORKING OF COMPONENTS

Radar is device which detect the long-range object in this system that uses radio waves to detect certain parameters of object like speed of object, location of objects, position of objects. This technology is incorporated in Aircraft, missiles, marine, weather prediction and automobiles. This project is circuit implementation project. Firstly, code will be uploaded on Arduino after connection is done. There is servo motor which is sweeping from 0 to 180 and back to 0 position the ultrasonic sensor which is mounted on the motor which also sweep with motor. After that according to our programming the ultrasonic sensor emitted the ultrasonic wave that wave will be reflected when there is an any objects is their path and reflected back according to the time the same display on the screen graphically by using the receiver of ultrasonic sensor and this process is continuous.

V. FUTURE SCOPE

The implemented Radar's primarily objective is to detect the drones and other objects which is flying on low level altitude. In this radar system can further improvised into better efficiency and with very least latency as the components goes evolve. This system can also attach to the missile system to counter the drones attack or any UAV attacks. Thus, it will change into anti drone defense system. The more the powerful equipment, the more the range and better the system will. This Radar system can also further deploy in Police Department or any vigilance department to provide the security to the deployed area.

VI. APPLICATIONS

The objective to create this system is to detect the small objects like drone which is not accurately detect by the bigger radar. This system can be deploy in various way as detection system. Mainly can be implemented in defense force's camp and various other important institutes like financial institutes, all government offices, and Research & Development offices, Nuclear Plants and all were drones are used to spy or attack.

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