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Drone Detection and Auto Destroy System

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Abstract — ***The purpose of this project is to design and construct automatic drone detection and destroying system using embedded systems. This system is designed to detect the target (drone) moving in multiple directions. The target destroying system moves automatically in the direction of drone and fires it upon fixing the target. In this project we are making use of infrared sensor based radar system and a dc motor driven laser firing unit interfaced with a microcontroller based control unit. Embedded C programming is used for Microcontroller.***
Keywords— microcontroller, infrared waves, IR sensor, laser.

I. INTRODUCTION

Growing technology and advancement in the field of science has raised huge concern to security of resources and commercial infrastructure especially through air. In past years, there needs to be simply a focus on missiles and aircraft, but now with improvements in drone technology in recent years has led to the point of concentrating on them. The drones are having more advantages such as they are used for Ariel filming, surveying etc... But they are also having threat to be hacked easily and with the help of this it is easier for anyone to easily attack through air. In order to overcome all this and defend a specific area with very low price we are using Infrared sensors here. Infrared sensor is interfaced with dc motor and rotated 360 degrees to detect target in multiple directions. Infrared sensor will transmit IR waves continuously and receives reflected waves if a drone is detected. After detection, target destroying system will move automatically in the direction of target and fires to destroy the target. Microcontroller is programmed to control each hardware unit and perform the required task successfully.

II. LITERATURE SURVEY

This paper describes the detecting a mystery objects and automatically destroy them. In this paper they proposed PIC microcontroller based system. Microcontroller is interfaced with object detecting sensor and a LCD display. They have used ultrasonic sensor for object detection. To detect the target coming from multiple direction object detection sensor is rotated 360 degrees. It is also interfaced with wireless camera which can be used for recording purpose. Zigbee wireless communication is also used for communication between detecting and destroying systems. Here ultrasonic waves radiate sound waves in all direction and receives them when object is detected once the object is detected auto destroy system move towards the target and destroys it using a laser gun. [1]

This paper describes design of infrared based radar system. It is designed to detect any target which is close to the system by scanning with angle of 180 degrees. They designed a system based on microcontroller .Once the target is detected user will hear an alarm and target distance from the system is displaced on LCD screen. This system may be able to detect the target in closer proximity but it is inefficient in long range detection [2]

This paper describes how Infrared sensors and focal plane array are used in ballistic missile defense for target detection, target tracking and determination .It discusses IR sensor advantages and disadvantages in defense and space based applications. [3]

This research paper proposes the fusion of both RADAR and IR sensor for detecting and estimating the target in order to overcome the limitations of sinle sensor based target detection systems. A new technique of using multiple sensors has been developed to improve the performance of data association algorithm.[4]

This paper gives detailed explanation about the drones which are also known as UAV (Unmanned Ariel Vehicle). The drones can either be controlled manually or it can be operated from ground or it can also been controlled by another vehicle. After the improvement of drones the aerial surveillance, filming etc... But there is major threat that it can be hacked easily and be used for terror attacks.[5]

III. PROPOSED METHOD

Proposed method uses a fully automated system and due to this valuable time can be saved. The Infrared sensor is used to detect the drones .Here the controller is interfaced with the IR sensor and it will be rotated in 360 degrees and keeps on sending the infrared waves and receiving. When the object is detected the laser gun will turn towards the degree of detected target and shoots.

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Block diagram

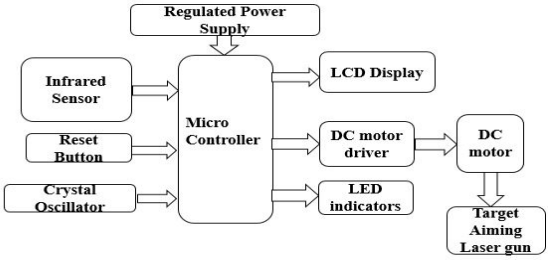


Fig 1: Block diagram of microcontroller based drone detection and auto destroy system

A. PIC Controller

PIC refers as Peripheral Interface Controller. Mostly used because of its low cost and high availability. It has 35 single word instructions and is single cycle instructions and uses two cycles. The operating speed is 200ns instruction code and clock input is 200ns instruction code cycle.

B. Infrared Sensor

An infrared sensor is an electronic device that emits light in order to detect an object in its surroundings. An IR sensor can detect motion as well as measure the heat of an item. All items usually radiate some kind of heat radiation in the infrared spectrum. These kinds of radiation are invisible to the eyes, but these radiation may be detected by an infrared sensor

C. LCD

A liquid crystal display is thin electronic visual display. LCD does not emit light but they use ambient light in the surrounding. So they consume only very little power. They are applied on computer monitors, television, aircraft cockpit display, etc.

D. Motor

The DC motors can be powered from the battery. Here it is used for rotating infrared sensor on 360 degrees.

E. Motor Driver

The DC motor drive is a type of amplifier or power modulator that integrate between the controller and a DC motor. It takes the low current and then converts it into a high current which is appropriate for the motor. The DC motor drive also provides the high current torque, 400 % more than the rated continuous torque.

F. Laser Gun

A laser is a device that emits light through a process of optical amplification based on the stimulated emission of electromagnetic radiation. It is rotated in the direction of target detected and fired to destroy the target.

IV. WORKING

The schematic diagram and interfacing of the PIC16F73 microcontroller with each module is given below.

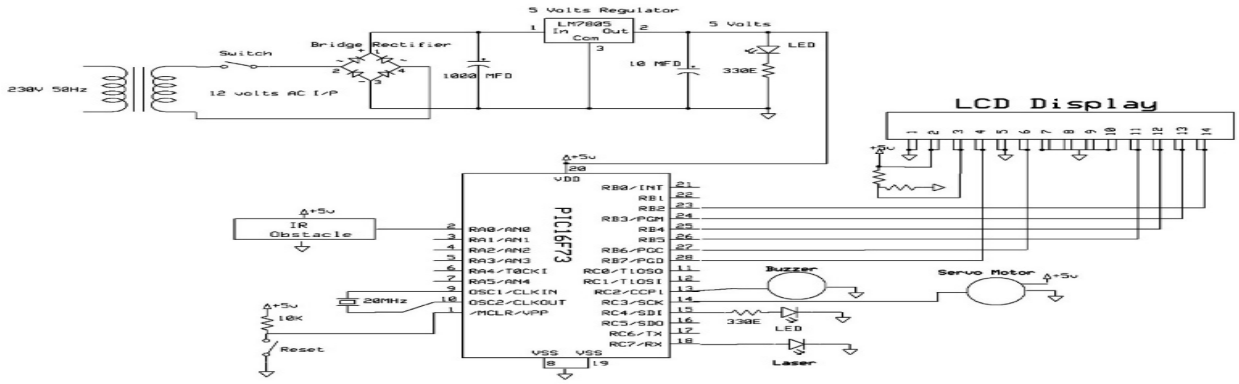


Fig 2:Schematic diagram of drone detection and auto destroy system

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As shown in above schematic diagram regulated power supply is connected to the microcontrolled for working of the system. As microcontroller requires 5 volts D.C to work, instead of using d.c battery which requires replacement after battery is discharged we have used regulated power supply so that system can run continuosly without any interruption. PIC16F73 microcontroller is connected with Infrared sensor module, LCD display and a DC motor interfaced with target destroying system. Infrared sensor is rotated in 360 degrees using dc motor to detect the target in all directions.As system is looking for target "Tracking" message will be displayed on LCD screen. Infrared sensor will transmit IR waves continuously for object detection and it will receive the reflected waves if an object is detected. When object is detected user will hear an alarm and target distance from the system is displaced on LCD screen. Once object is detected laser firing unit is automatically rotated in the direction of target and fired. Firing message will be displaced on LCD when the laser unit is firing. Microcontroller is programmed using Embedded C programming to perform its functions efficiently.

V. RESULT AND CONCLUSION

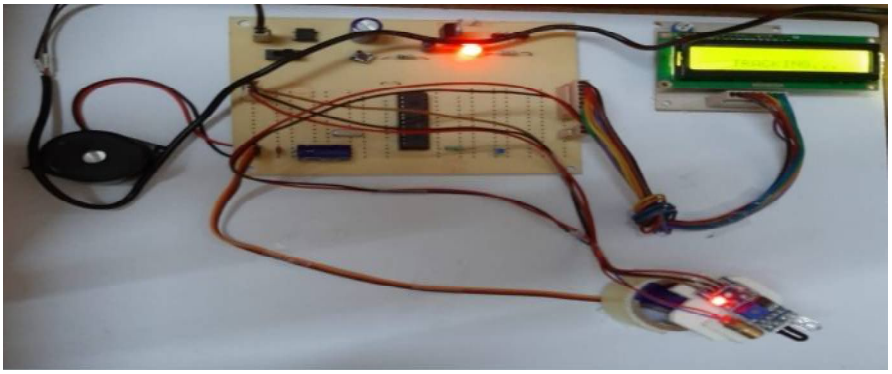


Fig 3: Experimental setup

It has been developed with the integration of all the hardware components. The project was effectively accomplished with the aid of modern ICs with the assistance of increasing technology. The project was designed and tested successfully.

VI. FUTURE SCOPE

In future, range of the Infrared based detection system can be increased using proper electro-optics. Infrared sensors and focal plane array can be used for long range target detection. Infrared Sensor used in this project can be replaced with IR image sensor for detection of drones more efficiently using object detection algorithm.

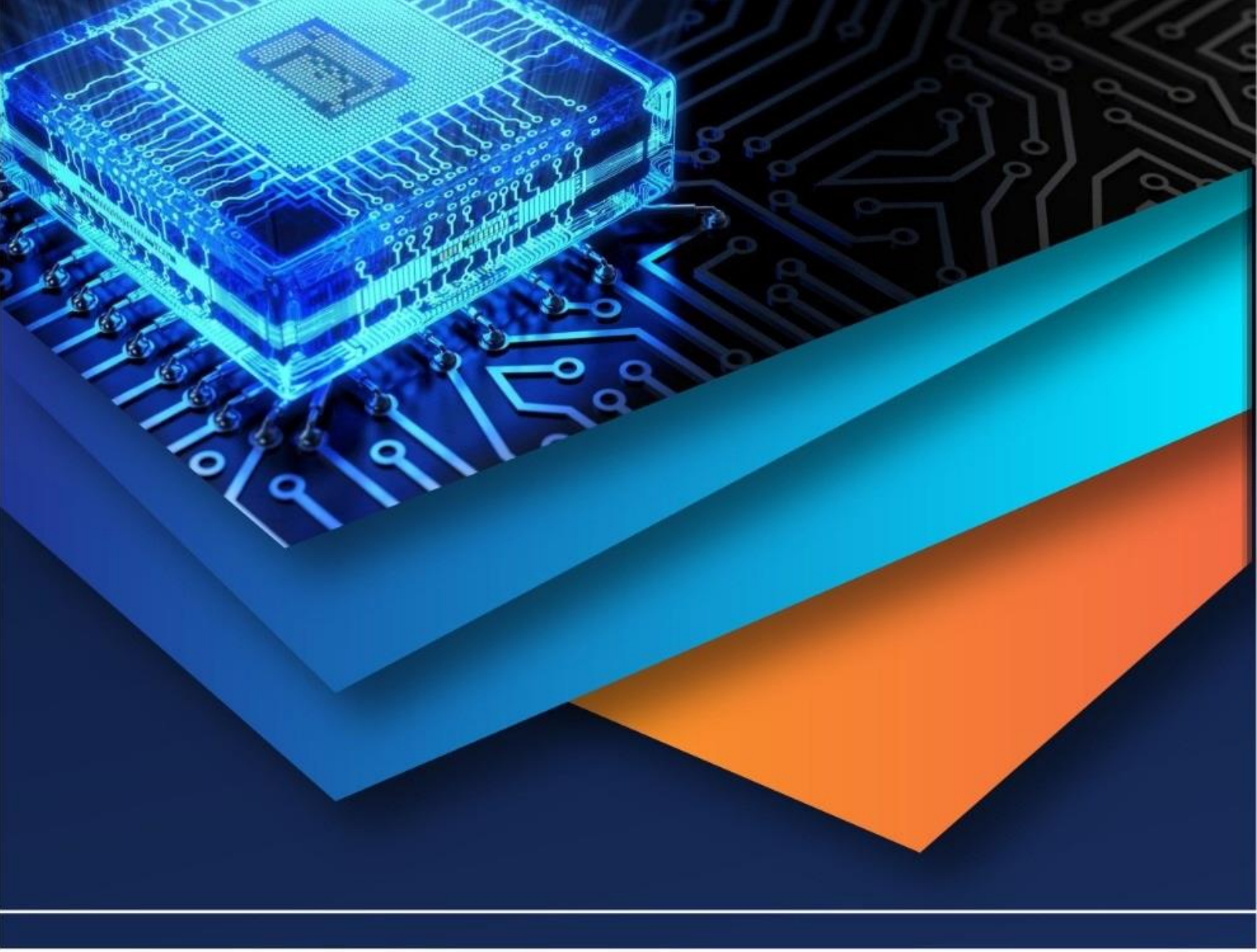
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