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Object Detection and Auto-Destroy System Using IOT

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Abstract - *Sonar (originally an acronym for Sound Navigation and Ranging) is a technology for mobile communication or detection of objects such as tanks and soldiers using radio waves of sound (usually underwater, such as underwater navigation). The term sonar is also used for devices that produce and receive sound. Sonar just uses echo. When an animal or machine makes noise, it sends sound waves to the surrounding environment. These waves are reflected noise from nearby objects and are also reflected by objects.*

This project is interfaced with the esp32 cam micro controller and ESP32 microcontroller which also it consists of ultrasonic sensors, servo motors, LEDs, buzzer, LASER, etc. One programming has to be done through Arduino IDE for the hardware system and another programming has to be done through processing IDE for the software system. This project detects the objects within a short range and gives the information about the object and behavior of the object on the LED screen. And also, it displays the real time video of that tracking system over IOT.

Key Words: *ESP 32 microcontroller, ESP 32 CAM, Ultrasonic Sensor, LASER, Blynk App, Servomotor.*

1.INTRODUCTION

War is an organized armed conflict waged by states, nations, states and social groups. Until now the border security was totally depending on soldiers. Where, many of our soldiers sacrifice their life. Inorder to reduce the damage to human life or to replace humans by sparing a life, this project is proposed.

The purpose of this project is to design and construct automatic object detection and destroy system. The target destroying system moves automatically in the direction of object and fires it upon fixing the target. Object tracking system continuously monitors the target upon detecting the target. This project involves the complete system design and construction of object detection and auto destroy system.

1.1 Objective:

The main aim of our project is to replace human beings by this system, ultimately sparing a life. We aimed to develop a compact and highly mobile defense system that allows operational flexibility. The system can autonomously track and shoot at moving targets.

2. IMPLEMENTATION:

2.1 Block Diagram:

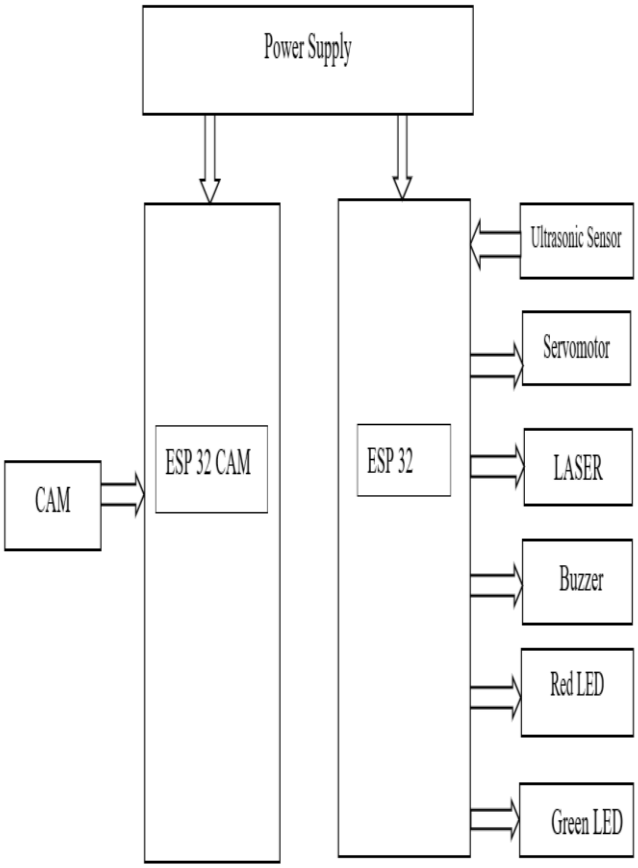

Fig 1: Block Diagram of Object Detection and Auto- Destroy System using IOT.

2.2 Components Used:

ESP 32 Microcontroller:

ESP 32 Microcontroller is a dual core microcontroller.

It can not only connect to a Wi-Fi network and interact with the internet, but it can also setup a network of its own, allowing other devices to connect directly to it.

The Wi-Fi direct is easier to setup and the data transfer speeds are much better than Bluetooth. It has an inbuilt voltage regulator (3.3V), 15 ADC channels, 2 UART interfaces, 25 PWM Outputs, SPI, I2C and I2S interface, 9 touch pads, and a micro-SD card.

ESP32 can perform as a complete standalone system or as a slave device to a host MCU, reducing communication stack overhead on the main application processor. **ESP32** can interface with other systems to provide Wi-Fi and Bluetooth functionality through its SPI / SDIO or I2C / UART interfaces.

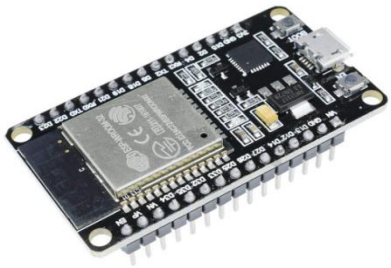

Fig 2: ESP 32 Microcontroller(ESP 32 DEVKIT V1).

Specifications:

Dual Core.
Wi-Fi: 2.4 GHz up to 150 M bits/s.
BLE (Bluetooth Low Energy) and legacy Bluetooth.
Clock Frequency: Up to 240 MHz.
RAM: 512 KB.

ESP 32 CAM:

The ESP32-CAM can be a small size, low power consumption ESP32 compatible camera module. It is equipped with an OV2640 camera and offers a TF card slot. The ESP32-CAM is widely used in intelligent IoT applications such as wireless video surveillance, Wi-Fi image transfer and QR code recognition.

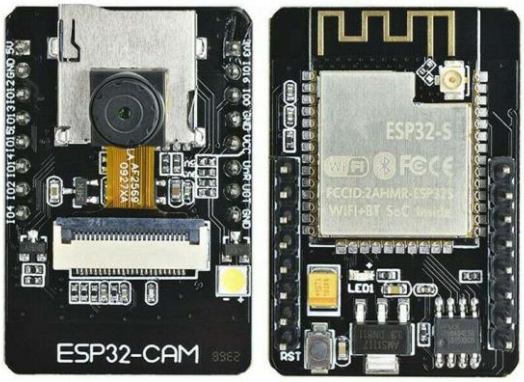

Fig 3: ESP 32 CAM.

Specifications:

WIFI module: ESP-32S
RAM: internal 512 Kb + external 4MPSRAM
Wi-Fi protocol: IEEE 802.11 b / g / n / e / i
Antenna: Onboard antenna PCB
Supported TF card: up to 4G
Bluetooth: Bluetooth 4.2 BR / EDR and BLE
Output image format: JPEG (compatible with OV2640 only), BMP, GRAYSCALE.

Ultrasonic Sensor:

Ultrasonic sensor is an electronic device, used to measure the distance of the object by emitting ultrasonic sound waves (which are higher than human audible range), and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound. Ultrasonic sensors have two main components: the transmitter (which emits the sound using piezoelectric crystals) and the receiver (which encounters the sound after it has travelled to and from the target).

Fig 4: Ultrasonic sensor

$$distance = \frac{speed\ of\ sound\ \times time\ taken}{2}$$

The distance of the object is measured by calculating the time taken by the emitting sound wave to reflect back to the sensor.

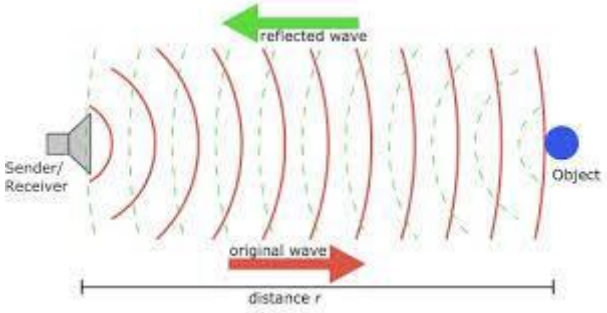

Fig 5: Emitting and reception of ultrasonic waves.

Specifications:

Power Supply – +5V DC.
Ranging Distance – 2cm – 400 cm/1″ – 13ft.
Resolution – 0.3 cm.

Servomotor:

A servomotor is a closed-loop servomechanism that uses position feedback to control its motion and final position. The input to its control is a signal (either analogue or digital) representing the position commanded for the output shaft.

Generally, the servo motor rotates 90 degrees in each direction, so the maximum movement is 180 degrees.

Fig 6: Servomotor (Sg 90).

Specifications:

Operating Voltage is +5V typically
Torque: 2.5kg/cm
Operating speed is 0.1s/60°
Rotation: 0°-180°

LASER:

The term LASER started with the abbreviation for Light Amplification by Stimulated Emission of Radiation. All devices that emit highly amplified and consistent radiation with multiple discrete frequencies. The laser transfers light to a very pure, almost perfectly parallel beam (collimation) that has access to a single wavelength. Basically, it is used to produce a coherent, non-dispersive beam through multiple refractions in a highly polished glass cavity.

Fig 7: LASER.

Blynk App:

Blynk was designed for the Internet of Things. You can control hardware remotely, display sensor data, store data, visualize data, or perform many other great functions.

Here, we can watch the live streaming of the video recorded by ESP 32 CAM.

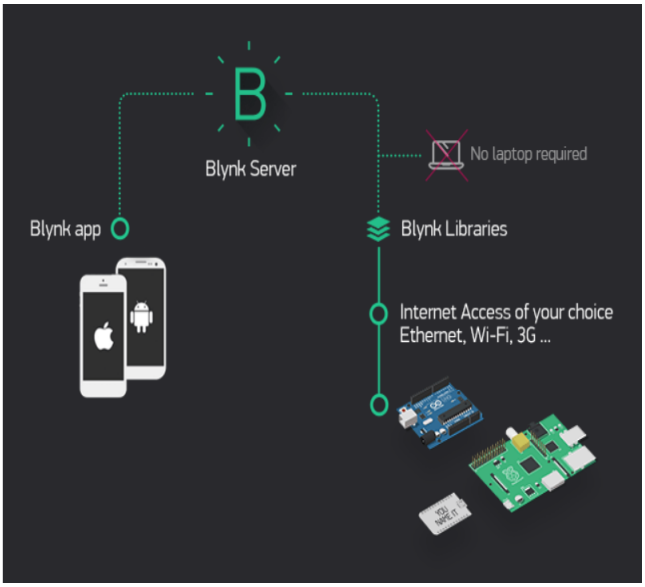

Fig 8: IOT project through Blynk App.

2.3 Working:

Initially the input 230V AC is given to the power supply circuit, to convert it into required DC voltage. The power supply circuit consists of a step-down transformer, rectifier, filter, and a voltage regulator. The output of Voltage regulator is given as the input to the system.

The connections are made according to the circuit diagram. All the Vin and Ground are connected. The power supply to the system can be given either by micro-USB cable or by the power supply circuit. The USB cable is connected to ESP 32 micro-USB connector. The power to all the components is given from ESP 32 microcontroller.

All the other connection are given to GPIO's of ESP 32. ESP 32 and ESP 32 CAM are connected through Bluetooth. The Servomotor rotates from 0 degree to 180 degree. The Ultrasonic sensor, LASER, and ESP 32 CAM are placed on the Servomotor.

The ESP 32 microcontroller generates a pulse signal and is given to the Ultrasonic sensor trigger input. Where the Ultrasonic sensor transmits the sound signal, whenever there is an obstacle or object then the receiver in Ultrasonic sensor receives the signal as an echo and measures the distance and sends it to ESP 32 micro controller. The ESP 32

processes the data given by ultrasonic sensor, and acts according to the instructions written.

The live streaming is seen through the Blynk app. Where we connect the ESP 32 CAM with our mobile hotspot, and we can control the operation of LASER.

Whenever there is an object detected by the Ultrasonic sensor, the ESP 32 process the data and an alert are given, by pop up message in the mobile and by switching ON the red LED, Buzzer and the LASER. When there is no object detected then the Buzzer, LASER is switched OFF and the Green LED is switched ON, indicating the safe condition i.e., there is no object.

2.4 RESULT AND DISCUSSION:

According to the conditions written, whenever there is an object in the range of the Ultrasonic sensor, then, the red LED glows, buzzer buzzes and LASER is ON and the green LED is OFF. Hence, the object is destroyed.

If there is no object detected by the Ultrasonic sensor, then according to the condition written, the switching ON of Green LED. Buzzer, Red LED, LASER are switched OFF indicating safe condition.

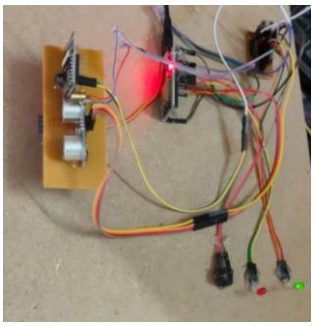

Fig 9: Safe condition.

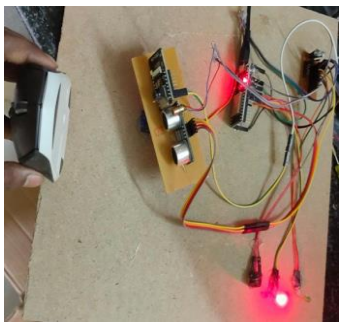

Fig 10: Object detected.

3. CONCLUSION:

The purpose of this project is to design and construct automatic object detection and destroy system. This system is designed to detect the target moving in multiple directions. Until now the border security was totally depending on soldiers. The target destruction system automatically moves in the direction of the object, locks the target and fires it. When an object tracking system finds a target, it continuously monitors it. It senses the target location to a central control system which takes the action of moving and the firing mechanism in the direction of target and fires it.

ADVANTAGES:

This setup is easy to install.
This is fast and efficient.

APPLICATIONS:

Used for object detection.
This system is used in defense.
This system is used in forest areas to kill the wild animals.
This system is used for fisherman to kill the fish.

REFERENCES

[1] Chai, R., Savvaris, A. and Chai, S., 2019. Integrated missile guidance and control using optimization-based predictive control. Nonlinear Dynamics, 96(2), pp.997-1015. Coffey, K.R., Marx, R.G. and Neumaier, J.F., 2019.

[2] M. Anushree Kirthika, "missile detection and automatic destroy system", Advances in Aerospace Science and Applications ISSN 2277- 3223 volume 4, number 1(2014), pp.16.

[3] M. Young, The Technical Writer's Handbook. Mill Valley, CA: University Science, 1989.

[4] Weiss, M. and Shima, T., 2018. Missile guidance law based on linear quadratic optimal control with obstacle avoidance [J]. IEEE Transactions on Aerospace and Electronic Systems, 55 (1), pp. 205-214.

[5] Hong, D., Kim, M. and Park, S., 2020. Study on Reinforcement Learning-Based Missile Guidance Law. Applied Sciences, 10(18), p.6567.