Multi-Dimensional Border Security Robot

Prof.Y.U.Kakad[1], Mr. Vaibhav Bhaldand[2] Ms. Arpita Avhad[3] Ms.Nikita Shinde[4], Mr. Vaibhav Abhale[5]
[1]Professor, Amrutvahini College of Engineering, Sangamner
[2,3,4,5] Students, Amrutvahini College of Engineering, Sangamner

Abstract: The goal of the project is to improve border security with a reliable and simple solution. The proposed design has a high range and covers a large area, preventing illegal entry and smuggling without requiring heavy policing. After analyzing past attacks and annual accidents, it's clear that security forces are unaware of terrorist entry. To protect our nation, a smart security system is needed to detect and report activity near the border. The project shares responsibility and reduces human efforts on the border while identifying border threats. The convergence point is the PIR and ultrasonic sensors on's unmanned wanderer. PIR sensors detect unauthorized individuals in the area, located on boundary walls at the base. After identifying human/object activity, locate the individual's proximity with an ultrasonic sensor radar system. An unmanned drone will follow and provide live video feedback and can be equipped with a missile launcher for extreme defense.

Index Terms: PIC 18F4520, PIR Sensor, Laser gun, MQ 6 Smoke Sensor, Mobile App.

I.INTRODUCTION

Center on human interaction & information for our venture. There's a rise in fear-based oppressor & border exercises. Expanded watching leads to warrior casualties. Our framework is a robotized arrangement for recognizing and disposing of interruptions, requiring negligible support. This venture identifies border interruptions with ultrasonic sensors and alarms officers to require activity. Sensors are mounted on the columns and ceaselessly turn inside a extent of 180 degrees, identifying interruptions and showing the areas on the radar. Sensors identify interruptions and enact alerts and LCD show. Vibration and gas sensors send a flag to the collector. Interruption identified by mounted sensor. The pivoting weapon comes with a camera for live reconnaissance. When the command to fire is gotten, the Diode Laser will dispense with the gatecrasher.

An unmanned ground vehicle (UGV) operates without an on-site human presence, making it useful for challenging, hazardous, or remote situations. The vehicle will have numerous sensors to monitor the terrain and make decisions on its own or relay information to a human manager. The UGV is joined forces with ethereal and submerged rambles through Teleoperation. Unmanned mechanical self-governance is valuable for civilians and military utilization. It performs different unsafe assignments. Unmanned ground vehicles have a stage, sensors, control frameworks, headings interface, communication associations, and framework integration. A remote-controlled UGV is guided by a human director through an interface. All activities are directed by the director utilizing either coordinate locate or sensors like cameras. A fundamental reason for inaccessible development could be a remote-controlled toy vehicle

II LITERATURE SURVEY

The main motto of the armed forces is to ensure the safety of the nation and civilians. While doing border security lots of time soldier lives is in dangers. So designing a robust system become our need.

Proposed is a PIR security system that saves power and memory by detecting warm-blooded moving objects within its range. When infrared radiation changes, the voltage modifies and activates the webcam and lighting through a computer program. The system turns on lights and a webcam, recording if there's an intruder. Webcam and light turn off when an intruder is out of range, and the process repeats. Webcam recording is activated by PIR sensors, conserving memory [1].

A camera that can see when things are moving and recognize what they are. The laser weapons that use PIC18F4520 as technology are used to direct energy and harm targets. It can cause a lot of destruction over a big area. A really strong and powerful laser light can be used. To hit things that are far away with perfect aim. Big People are putting money and studying about high-powered laser weapons [2].

Human-like robots have been refined over time for optimal performance. Useful things for daily use.

Gathering them. A humanoid robot requires processes such as defining objectives, control mechanisms, and calculations. Robot obstacle avoidance methods. Suggestions include ultrasonic sensors or voice for action, while affirmation sensors detect positivity. Laser sensors track running movement and CCD sensors convert light to electric signals. Equipment such as CCD cameras have improved. Test the robot's performance. Suggest a different way to do what? Please provide more context. Camera is vital for perception, next to robots. During testing, we employed a Wii camera that can capture four groups. The robot has a infrared light connected to a person. Clear sky. Using a PI controller application leads to output. Main points in plan.[3].

A PIR sensor can detect humans up to 20 feet away using Black Body Radiation. If anyone crosses the border, the sensor triggers the camera to capture and transmit the image to the security station. The receiver circuit displays the image on a monitor, and officials can activate the relay driver to control features like automatic guns and a voice alarm [4].

III.NEED OF PROJECT

To improve national security, an automated observation system could prevent loss of life in border regions and extreme weather conditions. India faces unique risks due to its life-threatening boundaries. Expansive troop reconnaissance done daily lacks safety confirmation. An automated system should replace manual security at the borders to reduce loss of life.

IV.PROPOSED SYSTEM

In proposed system we are developing one Battle robot which not only do on border but also detect and hit the target.

V.OBJECTIVE OF PROJECT

- The project aims to create a durable and portable security system for national borders.
- The venture points to increase electronic border security and help the 24/7 workload of troopers.
- Diminish human endeavors on the border

VI.METHODOLOGY

PIR sensors equipment is set on the limits of the armed force establishment base. At the point when unapproved person comes towards this restrain, they will be recognized by the PIR sensor circuit and the sign is sent to the control room where the take note will of that a few development is recognized at the constrain. As the PIR distinguishes a few development the consequent arrange is to start the ultrasonic sensor-based radar system which can donate us the separate and point of the person proceeding toward the base. When the person is recognized the drifter will be sent towards the zone to stand up to the person. The camera set on the vagabond will allow the live video to the control room and proceed taking after the person normally. The control room will make encourage move at whatever point required by sending the rocket launcher to the taken after person. After the undertaking is wrapped up the vehicle will came back to its base station.
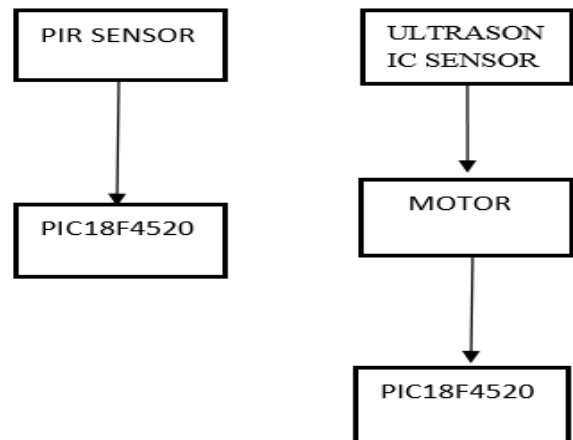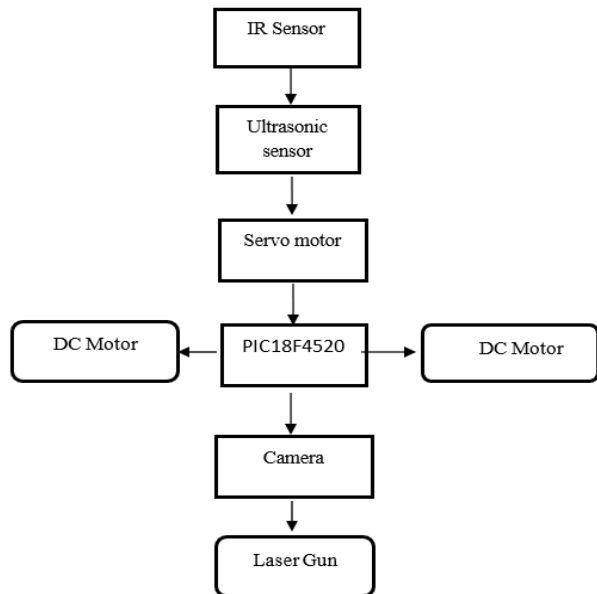

Fig 1: PIR And Ultrasonic Block Diagram

Fig 2: Threat Detection Block Diagram

VII. IMPLEMENTATION

1. **Disclosure of unauthorized person**:
- PIR sensor will distinguish the human activity.
- Take note will be sent to control room.
2. **Tracking wonderer activity:**
- Ultrasonic sensor will track the person.
- Radar system will show up the point and target it.
3. **Defense through Wanderer:**
- Camera will send live film.
- Drifter will take after & track the aggressor. Laser gun further take action.

Flowchart:
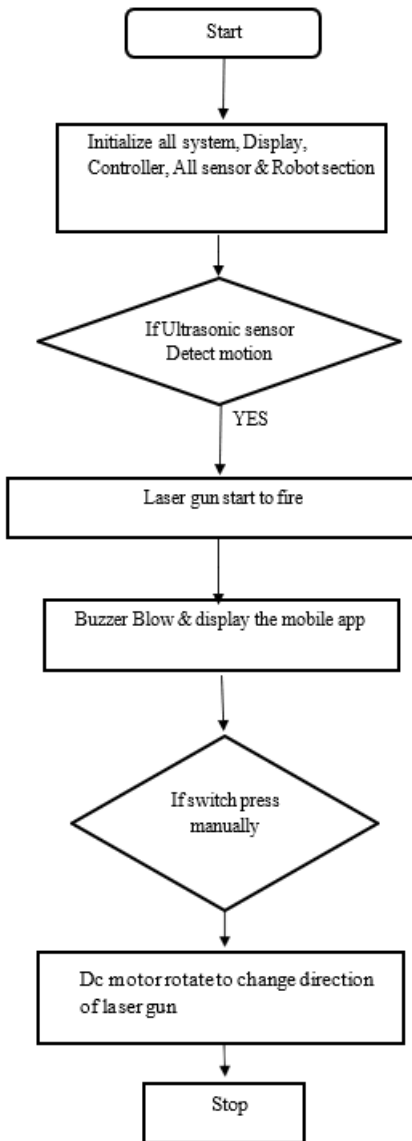
VIII. REVIEW OF THE COMPONENT

1.PIC18F4520: This is an 8-bit PIC microcontroller with Nano Watt technology and RISC architecture. It's widely used in electronic applications like home appliances, industrial automation, security systems, and end-user products. This microcontroller is popular in the market and a go-to for university projects, eliminating the need for many components with its built-in peripherals and multi-functional capabilities.

Data Memory up to 4k bytes Data register map - with 12-bit address bus 000-FFF
- Divided into 256-byte banks.
- There are total of F banks
- Half of bank 0 and half of bank 15 form a virtual (or access) bank that is accessible no matter which bank is selected – this selection is done via 8-bit
- Program memory is 16-bits wide accessed through a separate program data bus and address bus inside the PIC18F4520.
- Program memory stores the program and also static data in the system.

On-chip External
- On-chip program memory is either PROM or EEPROM.
- The PROM version is called OTP (one- time programmable) (PIC18C) The EEPROM version is called Flash memory (PIC18F4520).
- Maximum size for program memory is 2M n Program memory addresses are 21-bit address starting at location 0x000000

Fig 3:PIC18F4520

1. **Ultrasonic Sensor**: The ultrasonic sensor radiates waves which bounce back from objects and show deterrents on the radar screen. This triggers an alert to caution the control room. The sensor includes a transmitter and receiver antenna

that radiate and get ultrasonic waves. Able to calculate remove of impediment by timing wave's return.

Features:
Minimum range 10 centimeters
- Maximum range 400 centimeters (4 Meters)
- Accuracy of +-1 cm
- Resolution 0.1 cm
- 5V DC Supply voltage
- Compact sized SMD design
- Modulated at 40 kHz Serial data of 9600 bps TTL level output for easy interface with any microcontroller

Fig 4: Ultrasonic Sensor

2.16*2 LCD Display: The 16x2 LCD screen is widely used in multiple devices and circuits. People prefer these modules over scattered lights. LCDs are great - low power, simple programming, and customizable displays. LCDs are superior to seven-segment displays as they have no limits. A 16x2 LCD can show 16 characters on both of its lines. This LCD shows letters with 5x7 dots and has Command and Information parts. Enlist command controls LCD functions: preparing, erasing, moving and displaying. The data register holds code for screen letters/symbols. Tap the screen to discover LCD's inner workings. Our power meter info appears on a 16x2 LCD. Connects to ARM MCU.
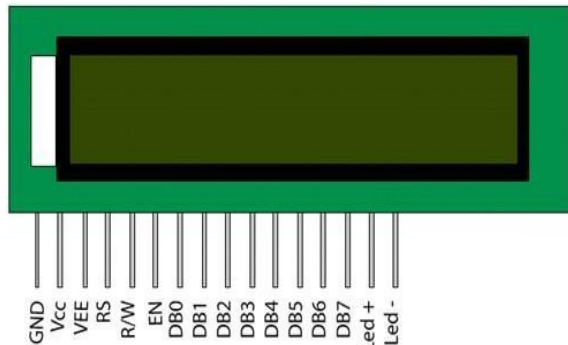

Fig 5: LCD Display

3.**PIR Sensor:** PIR sensors pick up movement to keep an eye on people coming and going. These things are little, don't need much power, are long-lasting, and simple to operate. You might know them as PIR, Pyroelectric, or IR motion sensors. You can find them in homes or workplaces.

PIRs have a special sensor called pyroelectric. This sensor is inside a metal can that is round and has a rectangular crystal. The sensor finds heat given off by things and the heat gets stronger as things get hotter. To sense movement properly, a motion detector's sensor has two components. The pieces are joined to balance each other out, making them not work. If one side gets more or less heat than the other, it will affect what happens.

PIR sensors are great at noticing when something is moving in a room. They don't use up too much energy, aren't too expensive, last a long time, and can be used in many different ways. It's simple to connect to other things, but PIRs don't tell you how many or how close people are. The lens can move a little bit, but it can be changed, and animals might cause it to move.
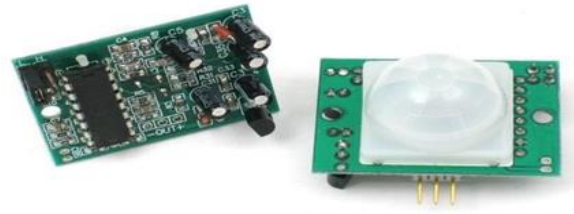

Fig 6: PIR Sensor

4.**DC Motor:** Geared DC motors are similar to regular DC motors, but have additional components. Geared DC Motor: machine connected to motor to measure RPMs. Gears make motor stronger and slower, with the right gears for desired speed. Gear reduction slows down vehicles but increases their strength. This article covers the components of gear heads and their role in powering geared DC motors.

Fig 7: DC Motor

5.MQ6 SMOKE SENSOR:

MQ-6 gas sensor has a SnO2 fabric that is less conductive when clean. Its conductivity increases with rising gas concentration in the presence of combustible gas. Use electro circuit to compare gas concentrations. MQ-6 is sensitive to Propane, Butane, LPG, and Normal gas. This sensor detects combustible gas such as methane, and is versatile for various applications. It has great sensitivity for a wide range of gases and has a long life with a low cost. It can be used for residential or industrial gas leak detection and is also suitable for mobile gas detection. The MQ-6 gas sensor has a special material called SnO2 that doesn't conduct electricity very well when it is clean. When combustible gas is around, its ability to conduct increases as more gas comes along. Use machines to measure how much gas there is. MQ-6 can detect Propane, Butane, LPG, and Normal gas easily. This device finds gas that can catch on fire and can be used in different situations. This thing can detect lots of different gases really well, and it lasts a long time without costing too much. This can find gas leaks in houses or factories and can also be used while moving around.

Fig 8:MQ 6 Smoke Sensor

VII ACTUAL MODEL

Fig 9: Actual Model

IX RESULT

We have finished doing everything we talked about. A way to detect things using PIR and ultrasonic technology. We're going to start with the first two steps of the project, which involve detecting unauthorized individuals using a PIR sensor. Ultrasonic sensor detect object and send Information to control room here control room is mobile app where we get information like object distance and poisonous gas. Which is shown in fallowing picture.
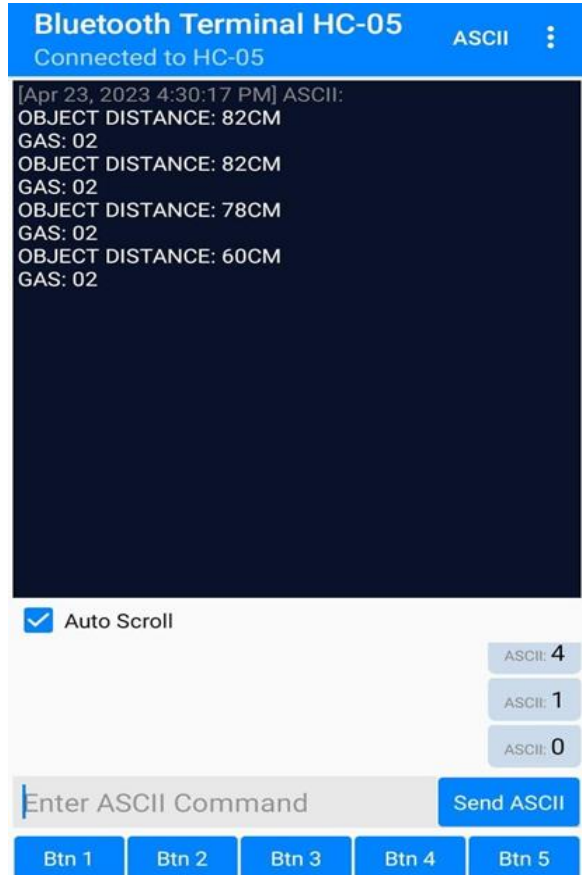

Fig 10: Result and Control App

X.CONCLUSION

We developed a durable and mobile border security system with customizable features. Multiple sensors improve accuracy and precision. Laser tech in military applications was reviewed. The article addressed recent laser projects and suggested a classification system for laser-based systems, as well as military efforts to fill research gaps. Laser technology could revolutionize modern warfare, with offensive, defensive, and supportive uses. Lasers are used in war

as range finders, target designators, communication systems, and defensive countermeasures. They have also revolutionized weaponry, with precise and controlled damage to electronic systems, combat troops, missiles, and physical installations.

ACKNOWLEDGMENT

REFERENCE

[1] Passive Infrared (PIR) Sensor Based Security System -Pema Chodon, Devi Maya Adhikari, Gopal Chandra Nepal, Rajen Biswa, Sangay Gyeltshen, Chencho - (IJEECS) International Journal of Electrical, Electronics and Computer Systems. Vol: 14 Issue: 2, June 2013.

[2] Motion sensor and face recognition-based surveillance system using raspberry pi, B Madhuravani, Dr. P. Bhaskara Reddy, M. Rashmika.

[3] An ultrasonic/RF GP-based sensor model robotic solution For indoors/outdoors person tracking, March 20

[4] Karthikeyan.a Sarath Kumar.v, border security system, International Journal of Engineering Research & Technology (IJERT) Vol. 1 Issue 5, July – 2012ISSN: 2278-0181.

[5] Item Media U.S. Military examines the possibility of replacing RF data transmission with laser communication Interference Technology, USA (2013).

[6] Basil Hamed, "Design and Implementation of Stair- Climbing Robot for Rescue Applications", International Journal of Computer and Electrical Engineering, Vol.3, No. 3, June 2011, PP. 461-468.