

Trigger Based Anti-Violence Robot “The Vision”

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Abstract

The major goal in creating this robot was to reduce the number of people killed or injured as a result of terrorist attacks. An arduino is used to drive this robot wirelessly, and a Bluetooth module is used to communicate with it. It is a robot that is operated by hand. For video transmission, a camera is used connected to a PC which continuously feeds data and monitors terrorist movement in all four directions (left and right, up and down). Three servo motors (panning, tilting, and recoiling) and two DC motors make up the robot's triggering system. Human life is valuable and must be preserved; these robots are intended to replace fighters or soldiers in the fight against terrorists. In the future, these robots will be utilized in military forces by numerous countries. These robots can be used in malls, stores, and deployed in open fields or susceptible regions where terrorist attacks are likely to occur.

Keywords

Anti-Terrorist Robot, Camera, Bluetooth Module, DC Motors.

1. Introduction

The main objective of “THE VISON” is an anti-terrorism robot. The terrorist attack at Sukma-Bijapur border in Chhattisgarh on 3rd April 2021[1]. In this incident deaths and losses were heavy, 22 killed and 32 were seriously wounded. These terrorist attacks can never be stopped but they can be minimized by taking some sensible measures. The main goal to build this robot is to be used effectively and minimize casualties. Rover's walking style is based on four wheels and an Arduino-controlled robot[2]. The camera is mounted here, and its initial position is stable, with a 180-degree pan movement and a 90-degree tilt angle.

When the camera receives power, it looks for and senses a face; the camera will move per the movement of the face[3]. If the robot cannot identify the face, it will move to the right, left, up, and down before it does; this is where the triggering part comes into play; in the triggering part, three servo motors are used (panning, tilting, recoiling) two DC motors for shooting and Buck-boosters are used to generate more power.

Since this robot can be operated manually, you can put it to good use. This means that no innocent people are killed, and our primary goal is not to destroy the terrorist. Darts are used in this robot for shooting. There is also a manual alternative, which allows us to drag our camera and shoot the target.

2. Literature Review

Sentry wizard is a robot used in battle. The robot primarily possesses three characteristics. Obstacle avoidance and motion detection are the first two functions. Thirdly, patrolling and searching for objectives is a standard. A wireless Bluetooth module controls all of the behaviors. It is an Arduino-powered robot equipped with a vision tracking device. It is capable of simultaneously firing and tracking moving objects. It is intended to patrol an area and detect suspicious activity. Bluetooth

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modules communicate wirelessly and a series of instructions for basic robot control is inserted. Sentry wizard is controlled by an Arduino microcontroller, and the robot senses obstacles and its path using sonar signals; if the path is open, it spins in the opposite direction; if the path is blocked, it detects the moving object from a distance of 1.5 feet or approximately 46 cm.

Then comes motion detection, which is used for monitoring. A Prioria Merlin 2 with Cyclone III C120 is used for monitoring, while 4GB RAM is used for storage. Due to the Omnicision 5MP sensor, the camera can catch "two images" in a very brief interval of time, i.e. milliseconds. Then, it sends this information directly to the FPGA (Field Programmable Gate Array). Now, the NIOS II Processor inspects both images and determines the object's next movement based on the magnitude of the object in the first image and the magnitude of the object in the second image. This process is repeated several times before it reaches a conclusion, at which point the FPGA[4] determines its next movement. Following that, the FPGA sends the output to the Arduino via RS232, which is responsible for targeting and firing and then fires three rounds. The turret has a 0-180 degree panning servo and is capable of firing four rounds per second. In the future, robots will be more powerful and use less energy, and by adding multiple servos, we will be able to shoot more shots. Instead of sending soldiers into battle, we should send our robots, ensuring that no lives are lost. Finally, the robot accomplishes the mission of transporting the Merlin 2 device and performing video analysis.

3. Research Methodology

The HC05[5] Bluetooth module is used for wireless communication. Arduino is used to power the robot. The rover drives on four wheels, and the camera transmits video and senses faces from all directions (right, left, up, and down). After that, the trigger takes over with three servo motors: one for pan movement (180 degrees), the second for tilt movement (90 degrees), and the third for recoiling. One 7805 voltage regulator that outputs +5V for a servo motor for constant supply for powering up an Arduino with two DC motors, and it acts as a string in that you can easily aim at the target and it starts shooting in the forward direction. The initial position of the darts, on the other hand, is 125 degrees. The VISION will be made up of an Arduino-controlled rover, a Bluetooth HC05 for wireless communication, a webcam for video transmission for face recognition, an Ultrasonic sensor for motion, and a buck-booster for high power generation [6].

4. Block Diagram

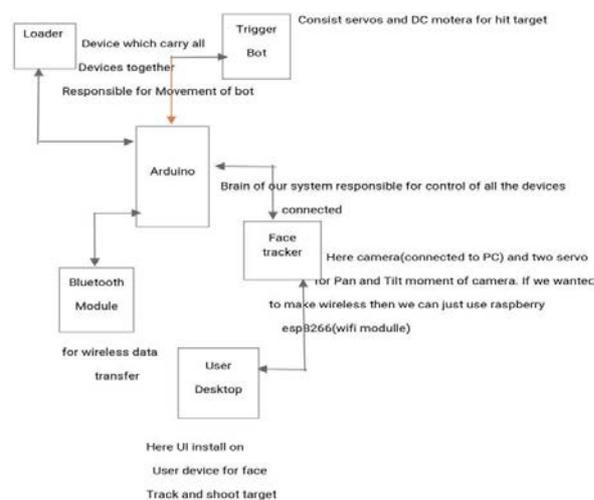


Figure 1: Block Diagram

5. Block Description

5.1. Bluetooth module HC05

Bluetooth module is used here for wireless communication. HC-05 Bluetooth module is Bluetooth SPP (Serial Port Protocol) module, designed for a wireless serial connection setup. Its communication is via serial communication which makes an easy way to interface with a controller or PC [7].

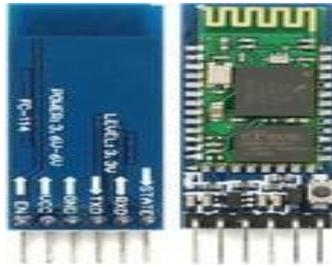


Figure 2: Bluetooth Module

5.2. DC Motors

DC motors are used here for high RPM (Revolution Per Minute). This will help the darts to cover a larger distance with more rpm. The DC motor is the device which converts the direct current into mechanical energy. Lorentz Law is the basic principle of DC motors, which states that the current-carrying conductor placed in a magnetic and electric field experiences a force [8].



Figure 3: DC Motors

5.3. Arduino Uno

Arduino UNO is a microcontroller of 8 bit based on ATmega328P which acts as the brain of the system which controls all the devices. It has 14 digital I/O (input-output) pins, 6 analog inputs, a quartz crystal of 16MHz, a power jack, a USB connection, an ICSP header, and a reset button [9].



Figure 4: Arduino Uno

5.4. Servo Motors

Here three servo motors are used in triggering, one servo for panning movement, the second servo for tilting, third servo for recoiling. A servo motor is a linear actuator or rotary actuator that allows for precise control of linear or angular position, velocity, and acceleration [10].



Figure 5: Servo Motors

5.5. Ultrasonic sensor

Like bats, the ultrasonic sensor uses SONAR to determine particle separation. Here, ultrasonic sensors are used to detect objects and move them as required. Sunshine and dull content have little impact on the action, whereas sensitive constituents such as texture can be difficult to detect acoustically. Via an ultrasonic transmitter and a beneficiary device, it comes from a variety of sources [11].



Figure 6: Ultrasonic sensor

Based on input provided, as per set of instructions given:-

- Moves right
- Moves left
- Moves upward
- Moves downward

6. Applications

- It's possible to use it in the armed forces.
- It can be used in shopping malls and stores.
- It's a weapon that can be used in a battle.

7. Extra Benefits

- Robots are excellent data collectors.
- Robots could be superior warriors.
- Robots do not need protection.

8. Limitations

The robot is unable to distinguish many faces in the same frame, which confuses the robot. Due to the robot's 180-degree panning movement, it cannot capture from rest 180 degrees, i.e. 360 degrees. The robot's face must be stable to identify its target movement, as instability results in mistakes.

9. Future Scope

In the future, robots can incorporate a superior video processing camera with faster data transmission in the suggested system that we have designed. We can improve the efficiency and effectiveness of our robot by incorporating more advanced technology. Raspberry Pi ,ESP8266 (wifi module) can also be used to transmit music and video. The pan range can be expanded from 180 to 360 degrees. We'll be able to shrink it as well. This robot was created to reduce the length of terrorist strikes. We'll be able to deploy them wherever, including malls, businesses, and battleground. These robots will not only protect ordinary residents from terrorists, but they will also save our soldiers' lives by sending them to battle.

10. Conclusion

Terrorist attacks are, as we all know, the front page of most newspapers daily in most nations. In this project, we created a robot that will aid in the reduction of casualties and losses. Human life is priceless, and we must safeguard it at all costs. To combat this fear, we created this robot that would use a camera to capture movement and then fire at the target. Most significantly, we can manually operate this robot and move or fire it as we desire. Instead of killing the target, we hope to capture them. Every country requires a well-planned defense system in every manner; this robot will assist them in achieving that goal..

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