

# Surveillance Patrolling ROBOT Using Arduino Nano

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**Abstract:** Safety comes as first priority in people's mind. In the on-going world safety is at stake. Nowadays the main problem, is the fall back of time to search for locations where crimes and accidents are happening. Due to this we cannot catch the accused and save the victims at the right time. In this project, we suggest a safety patrolling robot which uses specific components for the protection of the surroundings. The robot travels at a pre-defined path at particular intervals. During patrolling it stops at different areas and observes the entire surroundings. If any sound is recognized by the robot, it then starts scanning the location in that direction. The robot uses IR – based path following system for patrolling the allocated area. With the use of ESP32 cam, it monitors the entire area for any trespassing. Through the voice module, it cognizes sound at the surroundings. If any intrusion occurs to the robot, by using ultra sonic waves it stops for span of time in its path and starts patrolling again. It records the photographs and sends them to the Local Area Network (LAN). This LAN receives the images and location that are transmitted from the situation by the robot, displaying them with warning sounds on the screen to the user in the centre. Which helps the nearby rescue teams to go to that premises as soon as possible. Thus, we suggest a continuous safety patrolling robot which patrols in the areas alone to monitor them with the help of automatic tools.

**Key Words**—Surveillance, Patrolling, Intruder, Arduino Nano.

## I.INTRODUCTION

Surveillance in the security is the close observation among the people and their activities to prevent crimes or criminal activities and also it is used to provide the evidence of the cases that are happened in the dark to the public service officers. Surveillance using CCTV footage for a wide range area would become a expansible process where the camera could not capture the images and the scene in all directions and stationary cameras are complicated for the security patrolling purposes.

To avoid this disadvantage, introducing the security robot on a patrol that which patrols the

whole instructed area and collects the pictures of entire area. These patrolling robots are of programmed automated supervision. Robot moves along the black path using the help of IR line follower and also changing its route using the Ultrasonic sensor. These robots are equipped with the 360 degrees rotating camera with the high resolution which scans the whole location and provide the recordings or direct video to the control station where the whole monitoring is done. These supervised robots also consist of the siren to indicate an alerting sign to the near people for the rescue purpose.

Robots like security patrolling which are replaced by the security guards for the establishment of the mobile CCTV surveillance. In these long-distance CCTV cameras are provided in addition to the six panoramic TV defined cams, where these cameras captures the images the motion bodies, whereas the IR camera is used to detect the human face even if they are at 100 yards of distance.

What makes it perfect for patrolling the perimeter in the territories of industrial enterprises. Video transmission from the robot, information about its location and operation of the systems is carried out via 4G or Wi-Fi wireless communication channels. Video from CCTV cameras and alarm information is available for display in any stationary VMS supporting ONVIF protocol. The status and location of robots on patrol routes displayed in the web-based service for group monitoring of the operation of robots.

## II.LITERATURE SURVEY

- Intelligent Robots by Kok-meng lee About the functioning of the intelligent robots and their usage of them or scope them in all fields. And also analysed that how does these robots work for the patrolling purpose.
- Security Patrolling Robot by Rohini Debase. About what is patrolling robot and the importance of the patrolling robot to provide security and the safety of the people, also

about the usage and brief working of the patrolling robot.

- Home Security Mobile Surveillance Bot by D. Chandrakala, K. Adhithiya. What is surveillance? Need of the surveillance, and the advantages of having mobile surveillance over the stationary surveillance. How the bots are used for the mobile surveillance?
- Night Patrolling Robot For Women Safety by Shinde Kiran, Nimse Vaibhav, Got inspired from providing the safety to the women in night and remote places areas. And modified this usage of safety robot, to provide full security and safety to all the people in the society by doing surveillance all the day and night.

### III. BLOCK DIAGRAM

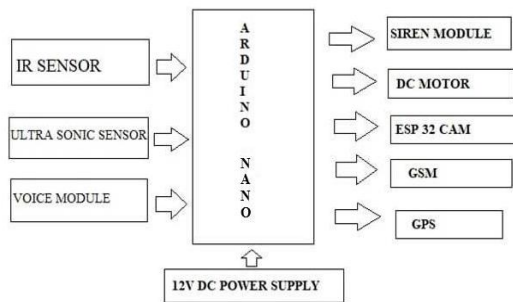


Fig.1. Block Diagram



Fig.2. Arduino Nano

Arduino Nano is portable & bread-board friendly that works on ATmega328P. ATmega328P microcontroller is a 8-bit MC of 36 pins out of these 8 are analog,14 digital I/O pins among which 6 are used for PWM outputs. It also has 3 reset pins & button, also having a special feature called Audio Video Recorder (AVR). It is similar to Arduino Uno but in a small scale. It is equipped using 30 male I/O headers in a DIP30like configurations, that is programmed using Arduino Software Integrated Development Environment (IDE). We use type B small-USB cable or 9V battery to power up the Arduino. Arduino introduced nano in recent years with a pin evaluation ATmega4089P with twice RAM than previous.



Fig.3. Ultrasonic Sensor

Devices that generate or sense the ultrasound energy are ultrasonic sensors or transducers. Transmission of electrical signals into ultrasounds is done by transmitter. Receiver receives the ultrasound and convert them into electrical signals, whereas trans-receivers can do both the transmission and retrieving of signals. The transmitting range of ultrasonic waves in the system is up to 18KHz which turns the electrical energy into the sound signal, as the echo received by the receivers turns the electrical energy into sound energy which is to be measured.



Fig.4: IR Sensor

IR sensor is an electronic device which measures and detects IR radiation of the surroundings by emitting light. It is a radiation sensitive optoelectronic device. It measures the intensity of the reflected radiation. An infrared sensor is an electrical gadget that distinguishes specific properties in its current circumstance. Either communicating or detecting infrared radiation is utilized. Infrared sensors can identify movement just as measure the warmth emanated by an item. Gas cautioning frameworks, gas analysers, clinical gas estimation innovation, fire locators, and contactless accuracy temperature estimation all utilization Infrared sensors from Infra Tec. The producer is basically an IR LED (Light Emitting Diode) and the locator is just an IR photodiode. Photodiode is touchy to IR light of a similar frequency which is discharged by the IR LED. At the point when IR light falls on the photodiode, the protections and the yield voltages will change in relation to the greatness of the IR light got.

There are five fundamental components utilized in a common infrared discovery framework: an infrared source, a transmission medium, optical part, infrared finders or beneficiaries and sign preparing. Infrared lasers and Infrared LEDs of explicit frequency utilized as infrared sources.



Fig.5: DC Motor

It is a rotatory electrical motor, that helps to convert DC electrical energy into mechanical energy. The most common types of DC motors will depend on the force which is produced by the magnetic field. In order to change the direction of current in the motor, nearly all types of DC motors have some internal mechanism, either electronics or electro chemicals.

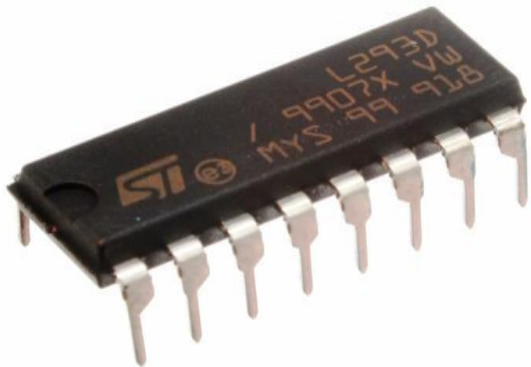


Fig.6: L293D Motor Driver

It is an IC device. It is used to drive motors in required direction. It consists of 16 pins and it can control a set of two DC motors at a time in any direction



Fig.7: GSM Module

GSM is a modem with stands for Global System for Mobile communication. At different frequency bands, it is used as open & digital cellular

technology. GSM technology was evolved by using TDMA technique for the purpose of communication. Reduction of data can be done by GSM & the client information is sent through two different channels with respect to time. By using SIM, it is differentiated from ordinary mobile to GSM Module to find out the network. Through GSM international roaming became popular. It differs from its forerunner, which made the signals to transmit digitally which results in the development of second generation in telecommunication. Comparing with the previous technologies, it is inbuilt with advanced features, and it reached rapidly throughout the world.



Fig.8: GPS Module

This is used to track the movement and location of a particular object. This tracking is done by the process called Trilateration. In this trilateration three or more satellite positions are used.



Fig.9: Voice Module

It is a voice recognition module which responds on the speech of the speaker and takes it as a command. This voice module recognizes specific number of voice speech of the speaker as its command. All these commands are in the library of the voice module, where 7 commands are recognised at a time by a recogniser.

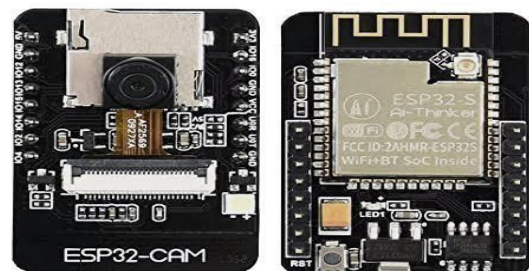




Fig.10: ESP32 cam

This framework utilizes a 5MP Raspberry Pi Camera Module Rev 1.3. With the Raspberry Pi 3B+, you may need to use any USB webcam. This camera module is ideal for Raspberry Pi projects which require a little measure of room. The top-quality camera module takes superb photos and can likewise record video, making it ideal for drones or a reconnaissance activity. For extra computations, the Raspberry Pi 3B+ constantly gets signal from the 5MP camera module. It's normally used in picture handling, AI, and security projects.



Fig.11: LM317

The LM317 is an adaptive 3-terminal positive transformer capable of supplying in excess of 1.5 A over an output voltage scale of 1.2 V to 37 V. This voltage regulator is exceptionally simple to use and need only two external resistors to adjust the output voltage. Further, it employs internal current limiting, thermal collapse and safe zone compensation, making it basically leak proof. The LM317 serves a broad range of applications containing local, on card regulation. This device may be used to create a programmable output regulator, or by connecting a permanent resistor between the adjustment.

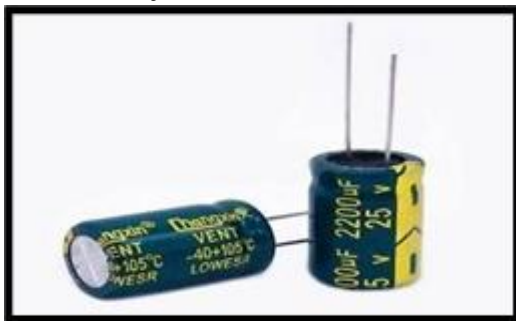


Fig.12: Capacitor

Capacitor is an electronic component that stores electric energy in an electric field. Capacitor is known as condensator. Effect of capacitor is known as capacitance. Capacitor is a passive component with two terminals i.e., anode and cathode. The positive terminal which is anode that is connected to power supply and negative terminal which is cathode that is connected to the

ground. It consists of more than two metal plates placed in parallel which does not touch each other.

**1N4007 DIODE**

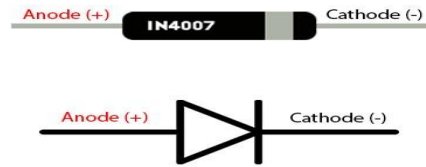


Fig.13: 1N4007 Diode

The arrow in the diode symbol indicates that the direction of flow of current. Diodes serve as a protection for sensitive electronic components. When we use a diode as a voltage protection device, it becomes nonconducting under normal operating conditions. There are other special diodes called transient voltage suppressors, which are specifically designed to protect excessive electrical power.



Fig.14: Power Supply

An anode (-), a cathode (+), and hence the electrolyte, are the three elements of a battery as shown in fig 3.18. An electrical circuit connects the cathode and anode (the positive and negative sides of a conventional battery). The battery's chemical processes create an accumulation of electrons at the anode. As a result, there is an electrical differential between the anode and the cathode. This difference will be interpreted as an unstable electron build-up. The electrons are compelled to reorganise themselves in order to eliminate the discrepancy

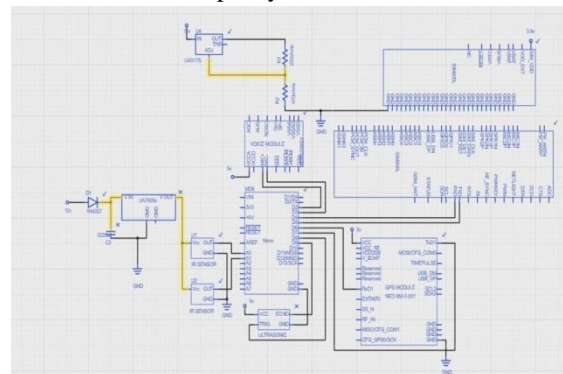


Fig.15: Circuit Connections

Working of the surveillance patrolling robot starts when the DC motor of the robot get their respective triggering voltage. These rotatory motors run at the speed of 30rpm on the predefined black path. In the movement of the black path sensor which is fixed at the starting of the robot comes in to existence. These sensors sense the black color path and gives conditions to the robot based on the route turnings of the path.

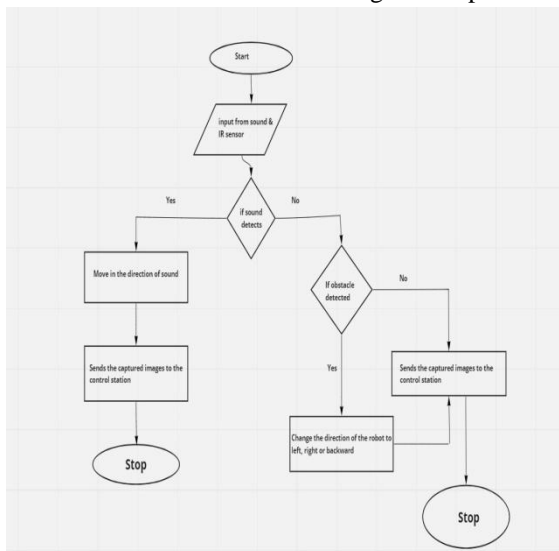
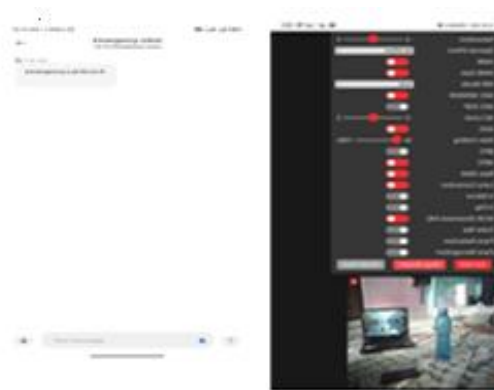
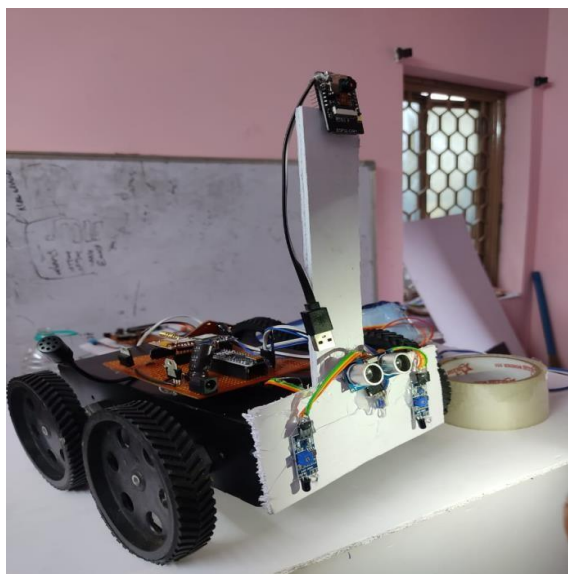


Fig.16: Flow chart

#### IV.RESULT & OUTPUT

By using IOT, the location and photographs are shared from the situation successfully through this project. Hence with the help of this robot, we can save the victim in time and catch the accused. Thus, surveillance and the security of the society is provided in an efficient manner.



#### V.CONCLUSION

Women can never feel afraid or helpless in any situation, and they can defend themselves even late at night. These methods will also aid authorities in apprehending and tracking down the criminals. Because women's safety is an issue in many parts of the world, this robot can prove to be a valuable resource. In the case of accidents, these robots could work in efficient manner that we could claim the accused person based on the necessary evidences. In some parts, children safety is the main concern because of the abduction of the children. These robots help to find the abductors with ease. Thus, we put forward a well – defined security providing robots for the safety of the people. As a CCTV surveillance and the provided security could not work in an efficient way for a vast area of the place with lot of population. This mobile surveillance robot has a big scope in the future. Many modifications could also be emphasised in the current working project, that we can use servo motor for the movement of the robot to the location where the voice could be detected.

#### REFERENCE

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