

# Smart Surveillance Robot

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## Abstract:

This paper deals with a smart surveillance robot which is being created as a military application. It can be used on places where human movement is not a possibility. It can also be used in rescue missions where the person controlling the robot gets to see the feed live from the field on the device being used and even trigger the gun on detecting any assailants. The various sensors send back the feed regarding the situations on the field, the detection's from the sensors attached to the robot. It can also be used as a surveillance robot sent to places where human activity is an impossibility like mine fields and the metal detector detects any mines that lay beneath. The IR(Infrared) sensors are able to cease the movement of the robot on spot if any human motion is detected ahead and the PIR(Passive Infrared) sensor is able to detect the human motion around using the heat waves radiated from the human body. .

## Keyword:

Smart Surveillance, Raspberry Pi, Efficient, Usability, Entity

## 1. INTRODUCTION

This paper talks about the construction and working of the smart surveillance robot, which is being made as a military application. It can be used in and around places where human movement is not a possibility at times of war. It has various sensors attached to it which is helpful for detecting the movement of humans to land mines which lay hidden beneath. The attached camera is helpful for viewing the live feed directly from the grounds and a gun mechanism which can be triggered directly by the person controlling the robot.

The relay drivers attached to the robot helps in distributing equal power through out the various parts of the robot for its proper functionality as shown in fig1. The batteries used for the robot is 9v, but due to the weight a 9v battery isn't able to power up the motors enough so we use a 12v battery just for the motor for a proper movement.

The robot is also controlled via a application which is connected via bluetooth to the robot and can be controlled easily as bluetooth has a wider range.

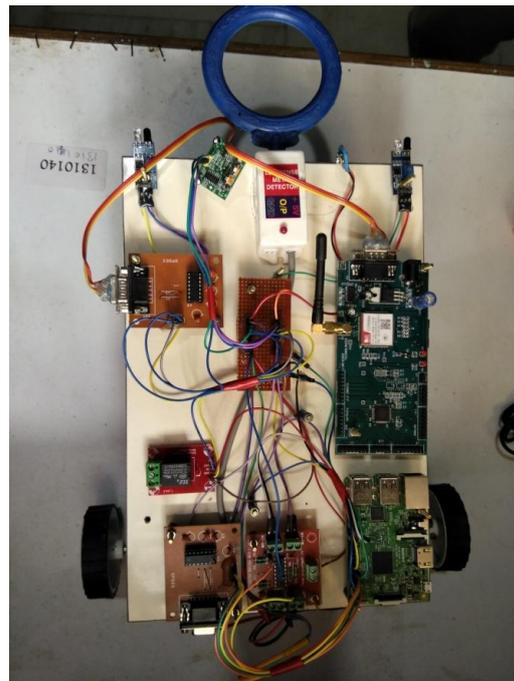


Fig 1. top view of the robot

## 2. EXISTING SYSTEM

In the previous systems bluetooth was used to control the robot and there was no possibility of the robot being able to interact back to the user with outputs from the sensors regarding what happens on the field. The lack of camera made it hard to monitor the happenings on the field and it also required an application be installed in every device used to control the robot.

### 3. PROPOSED SYSTEM

This paper talks about the advancements compared to the existing systems, being a military application certain advancements had to be made keeping in mind the safety of humans in dangerous situations. For further monitoring and easy controls few sensors like IR sensor, PIR sensor, metal detector have been added to the robot. A USB camera and a gun mechanism has also been added where the user can view live what happens on the field, from any device used to control and the gun can be triggered by the user on sighting any foreign bodies. The robot can be controlled from any device and no applications are required on each device to handle the movement of the robot.

The SIM800A board with a sim card having data enabled is attached to the robot which uploads the output from the sensors to the cloud which enables us to view the output from any device.

#### COMPONENTS USED

- ✓ USB camera
- ✓ Raspberry pi
- ✓ IR sensor (Infrared)
- ✓ PIR sensor (Passive Infrared)
- ✓ Gun mechanism
- ✓ Metal detector
- ✓ SIM800A board
- ✓ Zigbee board

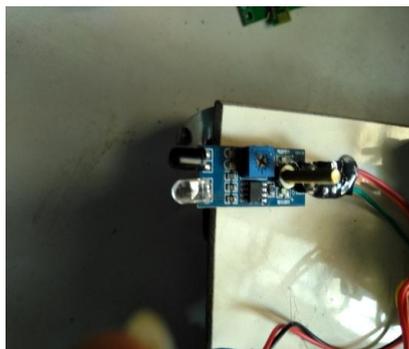


Fig2. IR(Infrared) sensor

- **USB camera**

Used to view the live feed from the grounds, it is attached to the Raspberry pi. Using the IP address from the USB camera feed can be monitored from any device.



Fig3 Raspberry pi board

- **Raspberry pi board**

Raspberry pi is a credit card sized micro computer which is the main source used here, the commands input by the person is transmitted to other parts of the robot from this board as shown in fig.3.

- **IR sensor (Infrared sensor)**

IR sensor is used to detect any motion or any obstacles that lay ahead of the robot. Here as the robot starts moving, on sensing any object ahead it transmits a signal back to the raspberry pi which stops the robot movement as shown in fig.2.

- **PIR sensor (Passive Infrared sensor)**

PIR sensor here is used to detect the motion happening around the robot, being connected to the cloud it gives the output on the screen stating motion detected.

- **GUN mechanism**

The gun mechanism is attached to the robot and can be triggered anytime when required from the device used to control the robot.

#### COMPONENT DESCRIPTION



Fig 4. SIM800A board

● **SIM800A board**

This board is connected to the raspberry pi and is helpful for displaying out the outputs from various sensors with the time and date on the screen used to control the robot. A sim card with data enabled is required as it helps to upload the data on cloud where we are able to view as shown in fig.4.

● **ZIGBEE board**

The zigbee board here is used to control the robot, two zigbee boards are used. One attached to the robot and the other attached to the device used to control the robot. As the SIM800A board delays the signal, for faster response we use the zigbee board.

**Putty configuration and VNC viewer**

To install the Raspberry pi OS, putty configuration and VNC viewer is required. It is the open source software that can be easily downloaded from internet with which we can configure as per our needs. Without putty configuration and the VNC viewer it is not possible to perform any operations on the system.

The OS cannot be handled using the Windows it needs the Linux kernel, so it is preferred we use Linux for further usage. The SSH and Telnet Client which are the open source software, helps in connecting to the internet. The Graphical desktop sharing system, used to connect the system from one place to another place.

**System Architecture**

In this system we can see that the Raspberry Pi is connected by the power supply, ADC, PIR, IR, relay driver as shown in fig.3. The web camera is used to monitor the obstacles, human movement and also environment for obstacles. The camera is placed on the robot and outputs of the web camera is received by the PC and sent via IOT to

the concerned user. Control of the robot is done by using the relay that activates the motors used in the robot according to the given instruction by Raspberry pi via the concerned user. The information is received by the concerned user and actions can be taken respectively .

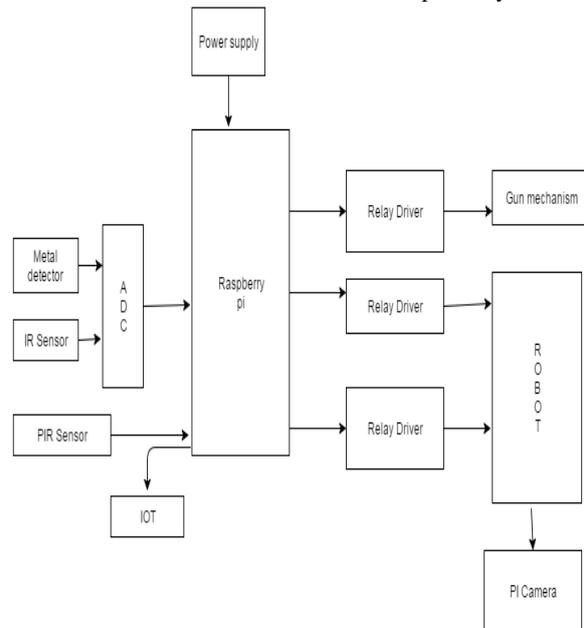


Fig 3. Smart Surveillance Robot Architecture

**DRIVER CIRCUIT**

The uln2003 collection enters in the resistors determined on for operation right away with 5 v TTL or CMOS. The ones devices will contend with numerous interface needs mainly those past the capabilities of general right judgment buffers.

The uln2003 is a monolithic excessive voltage and immoderate cutting-edge Darlington transistor arrays. It consists of seven NPN Darlington pairs the ones competencies excessive-voltage outputs with commonplace-cathode clamp diode for switching inductive loads. The collector-present day rating of a single Darlington pair is 500ma. The Darlington pairs can be paralleled for better modern functionality. Applications embody relay drivers, hammer drivers, lamp drivers, show drivers (led gasoline discharge), line drivers, and well judgment buffers.

**CONSTRAINTS**

The main constraint in using raspberry pi is that so much garbage collection accumulates on the output field,

which makes it hard to control the robot later. The other issue faced is the power surge, equal amount of power is required for all the components to function properly. The lack of proper power supply gives way to the delay in the movement of the robot.

## WORKING FUNCTIONALITY

The working principle of this smart surveillance robot is to be able to be in places where human movement is not a possibility. There are various sensors attached to the robot including a camera and a gun mechanism. The IR sensor is able to detect the human motion or any obstacle ahead of the robot and it ceases the movement of the robot on spot while it simultaneously sends back a message to the user stating that an obstacle is detected. The PIR sensor is used to detect any human motion happening around the robot using the heat radiation emitted by the human body and it too sends back a response to the user stating motion detected.

The metal detector attached ahead of the robot is helpful in detecting any metal objects or any mine that lay hidden beneath. Once the metal detector detects any metal it sends back a response to the user stating metal detected. The user is able to view a live feed directly from the field using the camera attached to the robot, and on detecting any unwanted entry on the field the user is able to trigger the gun mechanism attached to the robot.

All these responses from the sensors are uploaded in cloud using the SIM800A board which has a sim installed in it with data enabled and the user is able to login into required web page and is able to view the output with the time and dates.

A bluetooth device is also attached to the robot and an application installed on the device which is connected to the bluetooth device attached on the robot which helps us in controlling of the robot. As the range of the bluetooth device is quite high, its easy to control it.

## CONCLUSION

This paper has been designed with the help of an efficient smart surveillance camera used to send and receive data through the android device or PC. It is able to tread anywhere and track the movement of the person moving in the particular area. The concerned person receives the necessary information to his desired device. Only the concerned person can view the image or recording which is captured on the web camera. The one controlling the robot is able to view the live feed, thus keeping him updated on

the next further activities. Others cannot view the image or video recording. The web camera has the ability to capture the number of persons that they have detected, surrounding that place. The only necessity is that there must be an internet connection to retrieve the recording or live streaming from the 3G dongle. So internet is necessarily important to capture all the data. With this system we can detect and get rid of the unwanted obstacles or threats.

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