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Military Surveillance System Using IOT

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ABSTRACT: This project provides better surveillance for our country by using Internet of things. It is a Rover type device which is useful in high risky boundary regions and the lands where human cannot enter. In this project, the motion of the rover and the rotation of the camera can be controlled using internet. Therefore, we can control this device from anywhere in the world. It provides live streaming and more information about that area. It also has MQ2 smoke sensor which senses the inflammable gas and the gas presence in the environment. Ultrasonic sensor is used to detect the motion of the objects present in the surroundings. In this project camera can be controlled by using pan and tilt servo motors. Land Mines can also be detected by using Land mine detection circuit. IOT is easily supported using Raspberry pi 3 model B. SD card is used for storing the sensed information. This device is used to prevent the human casualty and abnormal hazardous events. It prevents forest fire with help of smoke sensor. This device can also be useful for detecting and surveillance purposes.

KEYWORDS: Raspberry-Pi, IOT, Smoke sensor, Ultrasonic sensor, Active IR sensor, Land Mine detection, pan-tilt camera.

I.INTRODUCTION

In this modern world drones, CCTV, RADAR and man power is used for surveillance purposes. India has 15,106 kilometres of land borders which is being shared among 7 countries such as China, Pakistan, Bhutan, Myanmar, Afghanistan, Nepal and Bangladesh. India's coastal border is protected by the Border Security Force. Multiple soldiers and guards protect our country but still lot of issues is faced due to various factors such as weather, environment and health of human. So, it is mandatory to use a device that senses the environment and send information to make sure that the country is protected. Also, a land mine buried under the ground does not differentiate between soldier and a civilian which results in killing and injuring people and remains active for about 50 years. Thus, the people living near the International border and Line of control are in a state of high vulnerability. Detecting mines in dense forest and human risky regions are difficult. So, it could be a good initiative to provide better surveillance to reduce human mobility. In addition, it is necessary to detect the mines before stepping on it.

II.EXISTING SYSTEM

For the purpose of surveillance, various methods have been deployed. These include CCTV cameras, drones, etc. Drones are manned or unmanned vehicles capable of flying over a particular region either manually or automatically piloted by computers. This provides information only up to a certain distance from ground. This method fails on certain conditions such as downpour, derecho, etc. Considering the security of the nation, laser fencing is built across borders to prevent the entry of strangers. This method fails as it cannot be built everywhere around the border. CCTV's also cannot be fixed everywhere for monitoring purpose. For different application, separate modules are used. This increases the number of modules to be used. The existing system has its own disadvantages which are eliminated in the proposed system.

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III.PROPOSED SYSTEM

Rover type device is used for surveillance purpose where humans cannot enter and high risky boundary regions. It has various modules such as camera, sensors, land mine detector circuit to obtain the information about the region under surveillance. Camera can be controlled by the user by giving directions through web browser with the help of pan and tilt servo motors. This provides 24*7 live surveillance and it can be stored in storage device. Rover has the following sensors namely active infrared sensor, MQ2 gas sensor and ultrasonic sensor. Active IR sensor is used to identify the obstacles nearer to the device. Grove - Gas Sensor (MQ2) is used for detection of gas leakage such as alcohol, smoke, hydrogen, methane, propane, LPG as well as carbon monoxide. This device will provide information about the forest fire, leakage of gases, smoke and determines the quality of air in the region. Ultrasonic sensor is used to identify the motion of the human or the target object in that environment by measuring the distance using ultrasonic waves. Land mine detection circuit is used to detect the mines buried underground preferably metals. This device is used for spying the regions by controlling the motion directions from anywhere in the world through web server. The main objective of this project to avert human mobility and provide better surveillance.

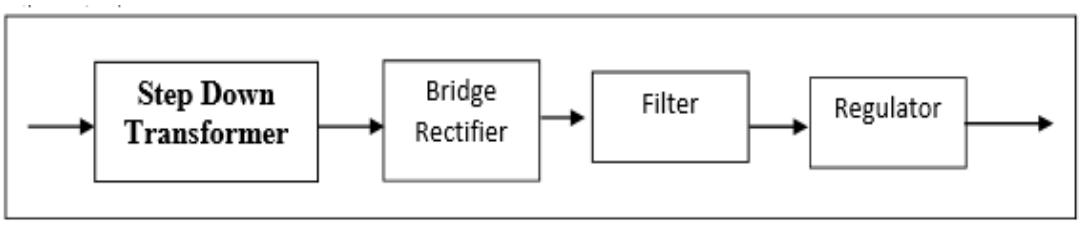

Figure 1: Block Diagram of Linear Power Supply

IV. HARDWARE AND SOFTWARE DESCRIPTION

In the proposed system, 20000mAh lithium Polymer battery is used to store maximum electrical energy and provide that stored electrical power to charge up the pi board. This can last for10 hour per day.

Figure 2: L293D Motor Driver

Motor Driver L293D is used to control DC motors. It requires separate power supply because it operates at high current and low voltagehence the circuit operation is protected from it by using separate battery supply.

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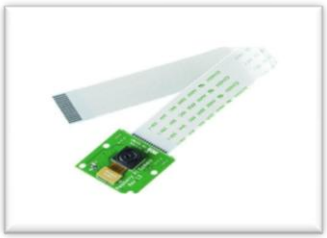

Figure 3: Raspberry pi camera

Pi Camera usually placed on the external body of a vehicle and provide real-time video for the driver of anything which is happening outside. This provides 3 main application: raspi still, raspi vid and rapistillyuv. Both raspi still and raspistillyuv are too smaller which are used for capturing images, while raspi vid is mainly used for capturing video.

Figure 4: Ultrasonic sensor

Ultrasonic sensor is used for Robot navigation, Obstacle avoidance, Engineering measurement tools in this system. This sensor emits ultrasonic waves and measures the time till it returns back after reflection from the object that got hit. The sensor has two pins namely trig and echo which is connected to the controller to provide digital input and digital output. The distance between the rover and the target object is calculated which is then sent to the user, who has the full control of the rover.

Figure 5: MQ2 Smoke sensor

Grove - Gas Sensor (MQ2) is used for detection of gas leakage such as alcohol, smoke, hydrogen, methane, propane, LPG as well as carbon monoxide. This sensor is highly sensitivity to methane, smoke and oxygen. Thus, provides information about the forest fire, leakage of gases, smoke and determines the quality of air in the region. This alerts the user when there is a presence of smoke or other gases.

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Figure 6: Metal detection sensor

Metal detectors are useful for finding metal inclusions hidden within objects or metal objects buried upto 10 to 15 cm from the ground surface.It uses electric current to create electromagnetic waves which is used to detect a metal on the ground. This circuit is simply a Colpitts's oscillator working in the medium band frequency and a radio tuned to the same frequency.

Figure 7: Pan Tilt Module

Pan tilt module is ideal for a mini CCTV system, which pans and tilts through 180 degree in each axis. This set of horizontal and vertical motion servos will give Pi camera movement with a minimum of fuss. This independently drives the two servos (Pan and tilt), which resembles as the eyes of the rover.

Figure 8: GPS Module

The **NEO-6MV2** is a **GPS** (Global Positioning System) module, which is used for navigation and checks its location by providing the longitude and latitude of its position on the earth.

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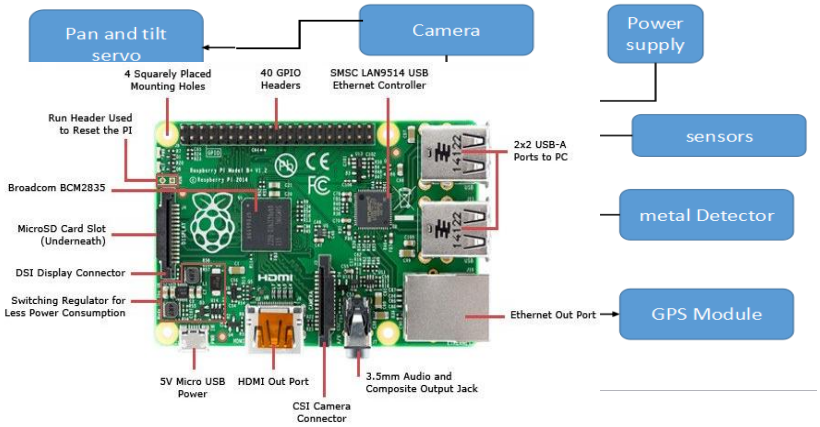

Figure 9: Raspberry pi model 3B

Raspberry Pi model 3B is the core of this system. It has a Quad-Core 64-bit CPU, WIFI& Bluetooth. It is a 3rd generation Raspberry pi. The powerful credit card sized single board computer can be used for IOT based applications.

Figure10: MobaXterm software

MobaXterm X server and SSH client is the ultimate toolbox for remote computing. This provides various important remote network tools (SSH, X11, RDP, VNC, FTP, MOSH, ...) and Unix commands (bash, ls, cat, sed, grep, awk, rsync, ...) to Windows desktop, in a single portable exe file which is capable of working out of the box.

V.WORKING OF THE PROPOSED SYSTEM

In the transmitter section, the rover sends the data to the user who controls the motion and camera rotation of the system. Also, when ultrasonic sensor detects a distance less than a specific length, then the rover alerts the user as well as the mine detector detects metallic or any other unknown objects immediately it will send the information through IOT.

In the receiving section, the user can monitor a particular area by live streaming and receives the sensed information from sensors through IOT. It gives information to determine forest fire, land mines, stranger intrusion and abnormal activities in that area. It is also very useful for spying purpose by controlling the motion of the rover using web server.

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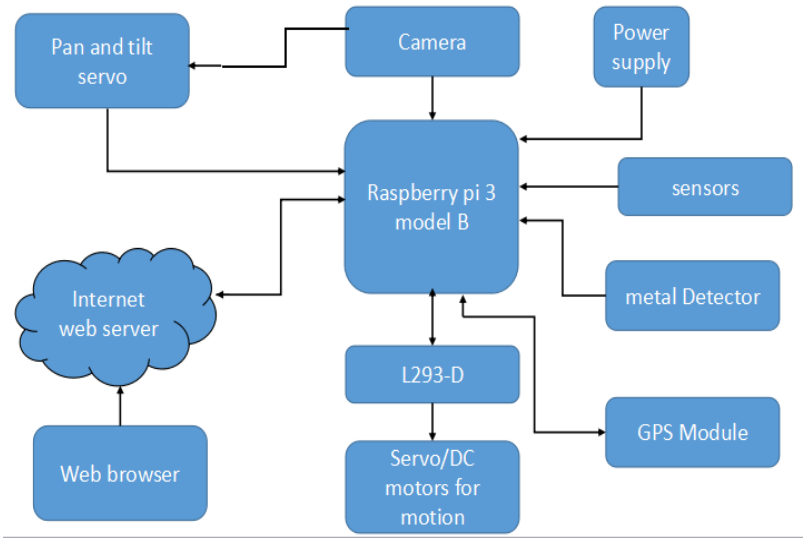

Figure 11: Block diagram of surveillance system

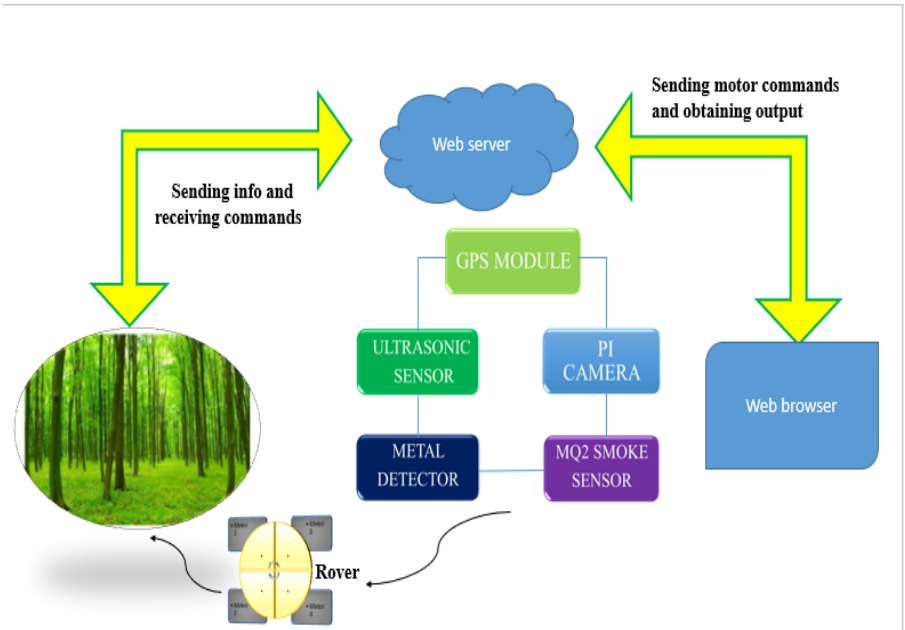

Figure 12: Working function

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VI.REPERCUSSIONS

The rover moves in all the major possible directions. These directions include: Forward, reverse, left and right. Various results have been found while testing and the results can be seen in the corresponding physical pins of 7 11 13 15(left motor) and 29 31 33 35(right motor) in the table below.

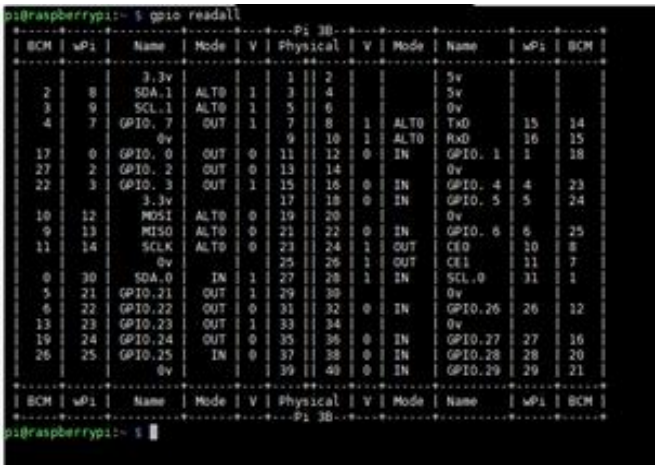

Figure 13: Motor forward condition

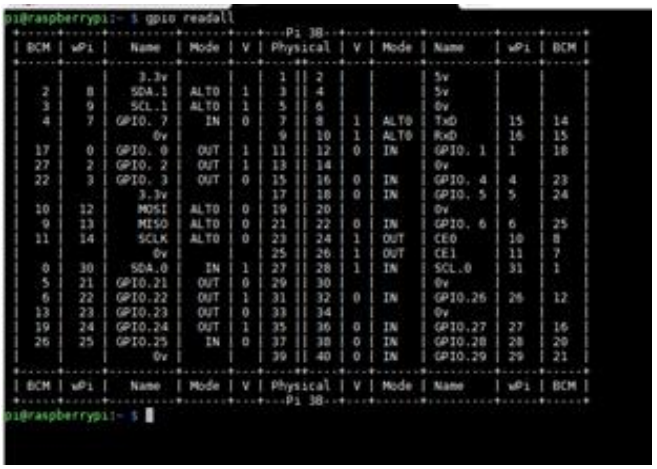

Figure 14: Motor reverse condition

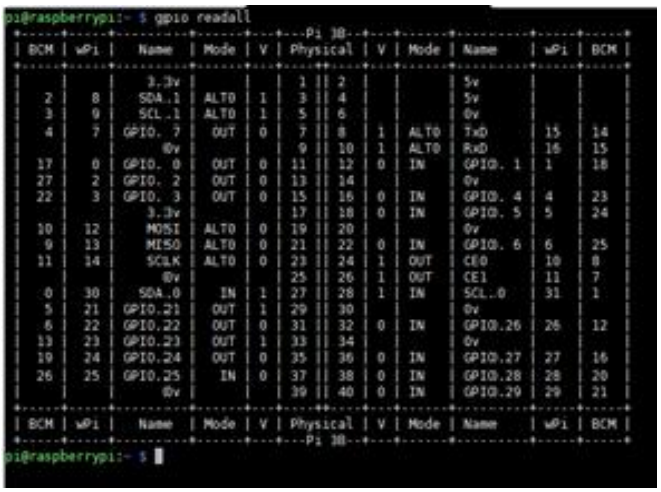

Figure 15: Motor left condition

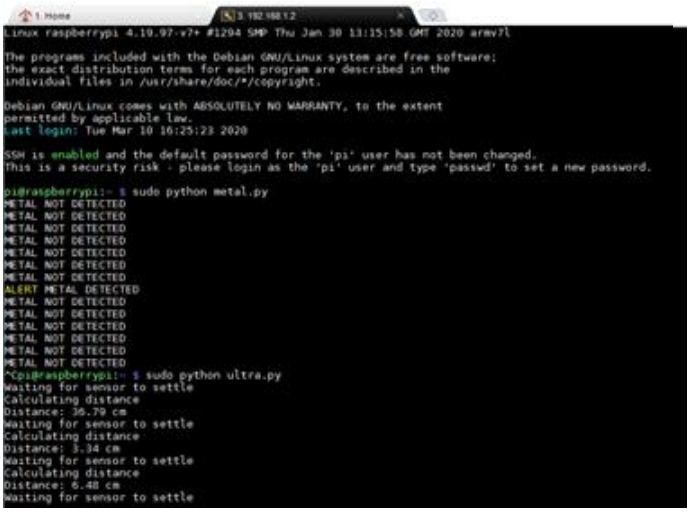

Figure 16: Motor right condition

Metal detector detects the presence of mine buried under the ground and provides the information about the presence or absence of mines. For better detection and testing purpose, buzzer has been enabled to easily detect its existence. Ultra-sonic sensor determines the distance between the target object and the rover. It determines the distance in terms of centimetres and displays the exact distance to the user. The GPS module simply checks the rover's location on earth and provides output data in terms of longitude and latitude. The results are obtained as:

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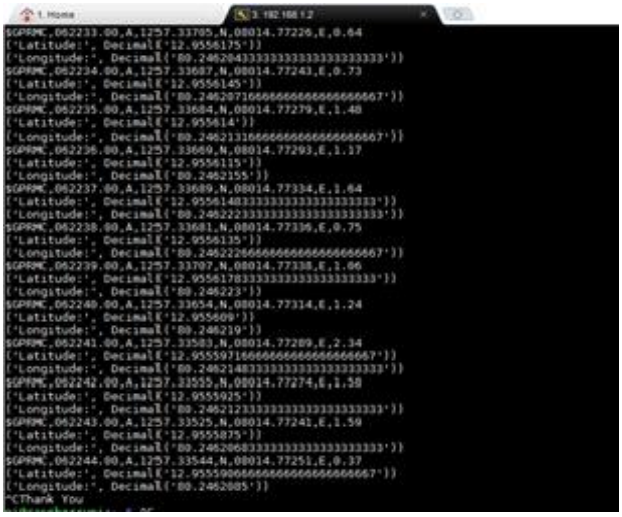

Figure 17: GPS output

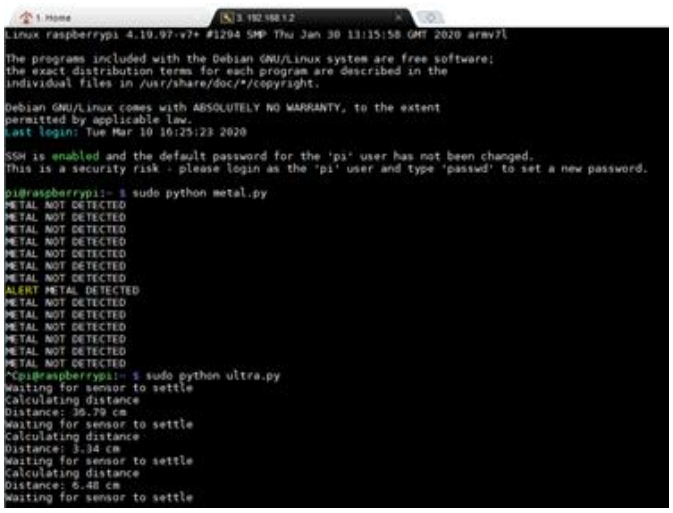

Figure 18: Metal detection and Ultrasonic

VII. HARDWARE OUTPUT

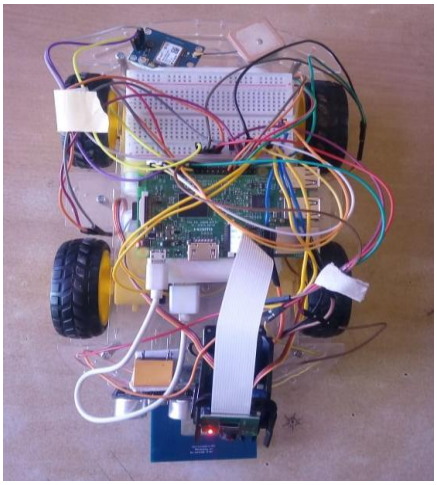

Figure 19: Surveillance rover

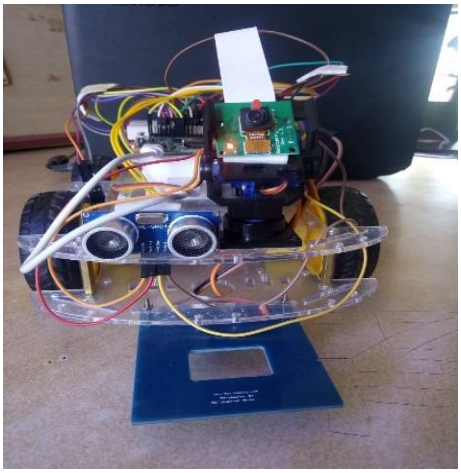

Figure20: Front view

VIII. ADVANTAGES OF THE PROPOSED TECHNIQUE

1. Sending exact information.
2. Low maintenance cost.
3. High performance.

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IX. CONCLUSION

Rover based system for surveillance can be a good initiative for monitoring and protecting our country from enemy troops. This will be useful for better surveillance to reduce causalities. There are many soldiers and guards are protecting our country but still we are facing lot of issues due to weather, environment and health of human. So, it is mandatory to use a device that senses the environment and send information to make sure the country is protected.This project can also be useful to better surveillance in home, industries, schools and work places. It will give a peaceful and healthy environment for our future generations.

X. ACKNOWLEDGEMENT

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Finally, we express our sincere benevolence to our beloved parents for their perpetual encouragement and support in all Endeavours.

XI. FUTURE SCOPE

This project can be improved by integrating face recognition to understand the known person of the environment and renewable energy can be used as a power supply by some changes in the internal circuit of the power bank. Rover path can be traced using database to set destination using internet.

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