MERCILESS BORDER SECURITY SYSTEM

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Abstract : Our present day army does not include complete 360 degree surveillance thereby monitoring the entire border by soldiers alone is difficult due to various factors such as fog, snow, rain and other climatic conditions which would make visibility poor. Detection of bombs present underground is another major problem. Many harmful gases are being ejected that would make the soldiers drowsy which is making the enemies attack easily. The government is spending a huge amount of money in keeping the intruders in jail without merciless killing which is creating a loss. Thus our aim is to provide solutions for problems like 360 degree surveillance, Mine detection, Drug detection, Economical growth (GDP), Merciless killing, Surgical gas detection.

I. INTRODUCTION

This Project is an IR & camera based security system for protected areas & borders, which senses the intruders, trespassers and transfer video to other end (control room). In this Project, we have an IR Sensor which senses any intruders / trespassers and will activate the alarm as well as switch on the laser guns in that particular place. The laser gun equipped will shoot in the direction of the intruder. The robot is equipped with a GSM module that would provide the coordinates of the location where the robot shoots at the intruder. It will also activate the Camera, which will start capturing the live video and transmit the same to the control room. At the same time it will start giving a voice alert to the control room and the data will be transferred through the RF Transmitter & Receiver to the control room.

The type of communication technique that is being used to enhance operations would let the user control the robot and get live video feedback, compared to earlier robots that had limited access to Wi-Fi. Also, the IoT and video camera makes it cost effective combat robot. The network provides a mechanism for notifications, or administrations reports, monitoring information such as alerts or details of performance obtained from the system. The gateway capabilities support devices connected through different kinds of wired or wireless technologies, such as Bluetooth and also have a reliable communication by decreasing the high maintenance cost of wired communication networks using a Zigbee transmitter.

II. LITERATURE SURVEY

In [1], the author focuses on the different tanks, missile, guns etc are used by enemy at the border. This causes problems and harms our force or soldiers. To overcome this problem, a robot is design and developed for military purpose application to protect our army. This uses PLM which includes different functions like capturing real world data using digital image processing used to detect its obstacle which is found in its path.

In [2], the system provides continuous visual monitoring through the wireless camera attached to the robots and sends continuous data to the control unit. The robotic arm is fitted with the laser gun that is used to hit the target. Fully controlled touch screen and commands from the touch screen via ZigBee transmitter. It has camera attached that can help the robot driven to remote places.

In [3], the paper focus on increasing the quality of surveillance networks which is not up to the level of expectation. Wireless surveillance cameras can be useful in situations where it is difficult to lay cables. Wireless surveillance is cost effective and can be deployed quickly.

In [4], paper focuses on containing mine explosions in war fields and ensuring security of the soldiers by detecting land mines. It also uses various sensors to detect gas, temperature and humidity. This system helps in reducing human casualties, especially in war prone regions,MQ-3-SEN0880 sensor can detect gases, while metal detecting sensors can detect mines,IR and PIR sensors help detect obstacles and trapped humans using Infrared rays.

In [5], they have conceived an alternate solution to increase the safety of underground mines and form reliable communication by decreasing the high maintenance cost of wired communication networks using a Zigbee transmitter. Various sensors like temperature, humidity, fire, gas and vibration detection features can be implemented in helping the Army. Installation cost and power consumption is lower as compared to wired connections. Humidity detection can help in preventing condensation, corrosion, mould, warping etc on military equipment which can help save millions of rupees. Fire and gas detection sensors can be used to detect potential harmful gases which might be deadly and cannot be detected otherwise. Vibration detection sensors can detect landslides and earthquakes (Eastern Ghats).
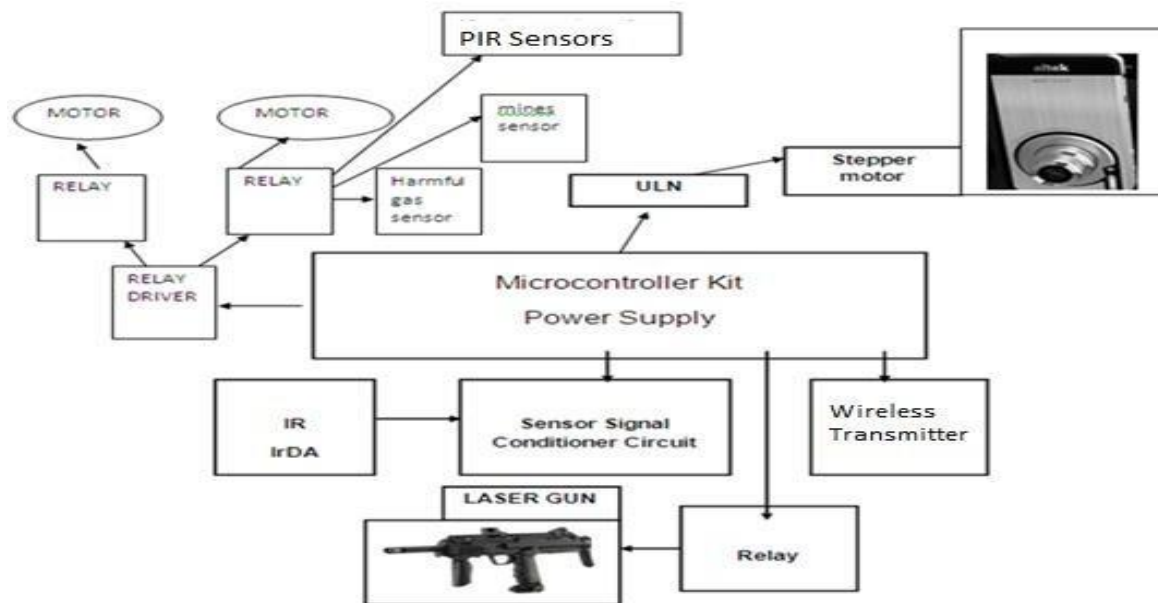
III. PROPOSED SYSTEM

Figure 1: System Architecture

The methodology is explained briefly as follows:

The proposed work is an IR & camera based security system for protected areas & borders, which senses the intruders, trespassers and transfer video to other end (control room).

The Designed system consists of Arduino UNO Board, LCD (2x16), RTC (Real Time Clock), Sensors, GPS Modem, GPS receiver as its main components.

- In this project, solutions are obtained using software and hardware components to achieving the results of the Intruder detection, Poisonous smell, Metal detection and also to shoot in the direction of the intruder when an intruder is detected along with an alert message sent through SMS as well as voice alarm.

- The Robot is connected to the mobile device through Bluetooth. Bluetooth operates in the range of 2400–2483.5 MHz (including guard bands). Bluetooth is used to control the movement of the Robot with the help of an app.

- A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through Radio waves. Like a GSM mobile phone, a GSM modem requires a SIM card from a wireless carrier in order to operate, controlling machines using GSM mobile SMS services.

- Text message may be sent through the modem by interfacing only three signals of the serial interface of modem with micro controller i.e, TxD, RxD and GND.

- The IR sensors are used to detect the intruder. There are 4 IR sensors used that detect the intruder in all 4 directions.

- Upon detection of an intruder, the 360 degree camera rotates to that direction where the intruder is and the laser gun equipped shoots twice in the direction of the intruder. The robot also sends a message and alerts the person controlling the robot by giving alarm through audio.

- The 360 degree camera will be capturing the live footage and sending it to the mobile device connected to it.

- Upon receiving this, the person controlling the robot can request for the location of the device. The location is sent to the mobile device and is directly opened on Google Maps. This requires our mobile data to be turned on.

- The Metal Detector senses any metal that might come in contact with the robot it turns the buzzer on and send a alert message with the location of the bomb.

- The system would also consist of a Metal Detection sensor, with which it can detect any metal bomb can be detected and with the help of GPS facility it would send the exact location of the robot.

- The gas sensors sense the poisonous smell and this sends an SMS as well as an audio note of the same.

- The Laser gun attached to the robot is an excellent substitute for the weapons carried by the soldiers. The laser gun can be triggered with the help of IR Sensors. It is used to shoot in the direction of the intruder.

IV. RESULTS AND DISCUSSION

As a solution to the problem statement, our results are more realistic and affordable compared to other research papers.

Within our project, the controls to move the robot front, back, right and left can be done through the app. The wheels of the robot move according to the signals received with the help of the stepper motor.(figure1 and 2)
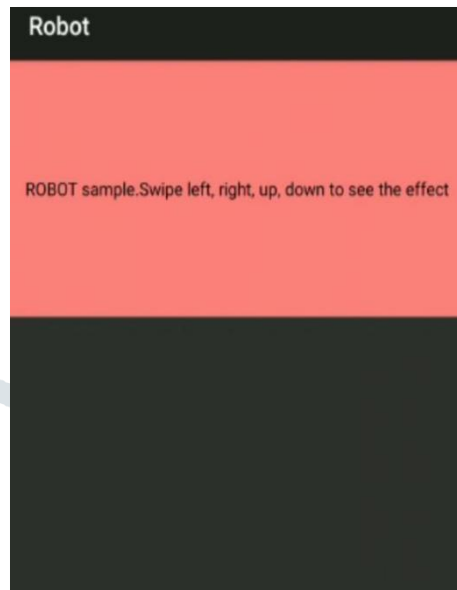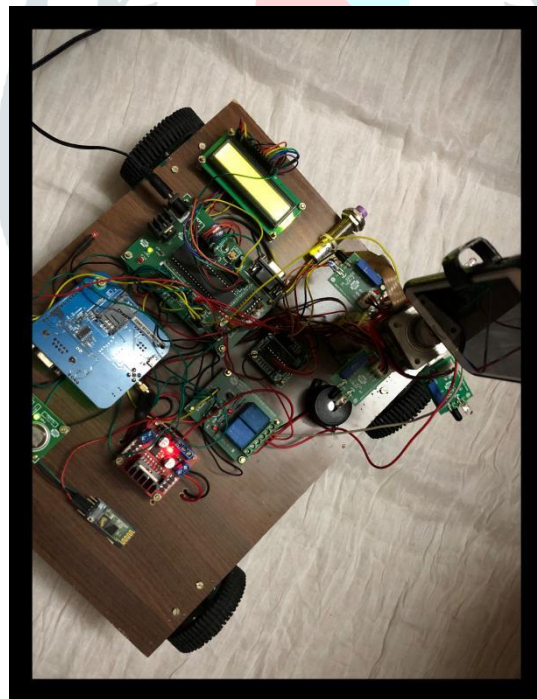

Figure 1: Robot Movement Controls

Figure 2: Designed System

Human Detection is done using PIR (Passive Infrared) sensor which detects human temperature and displays as "human detected" and displays on the LCD screen as follows in figure3:
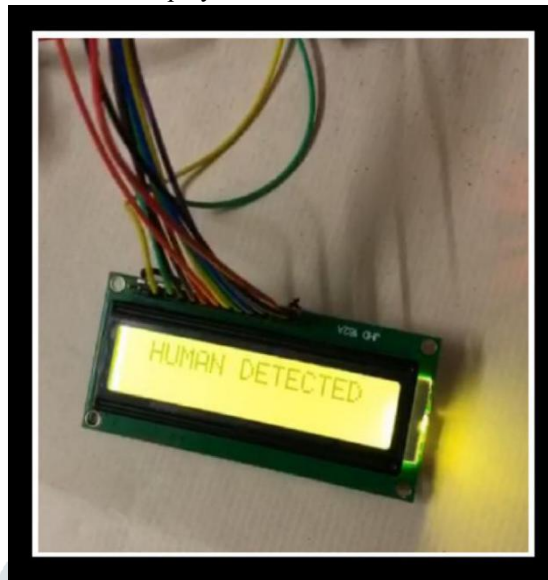

Figure 3: Human Detection

There are 4 sensors mounted on the sides of the 360 degree surveillance camera which can detect any kind of movement and its direction. The figure 4 shows the enemy detected in 4 different directions:
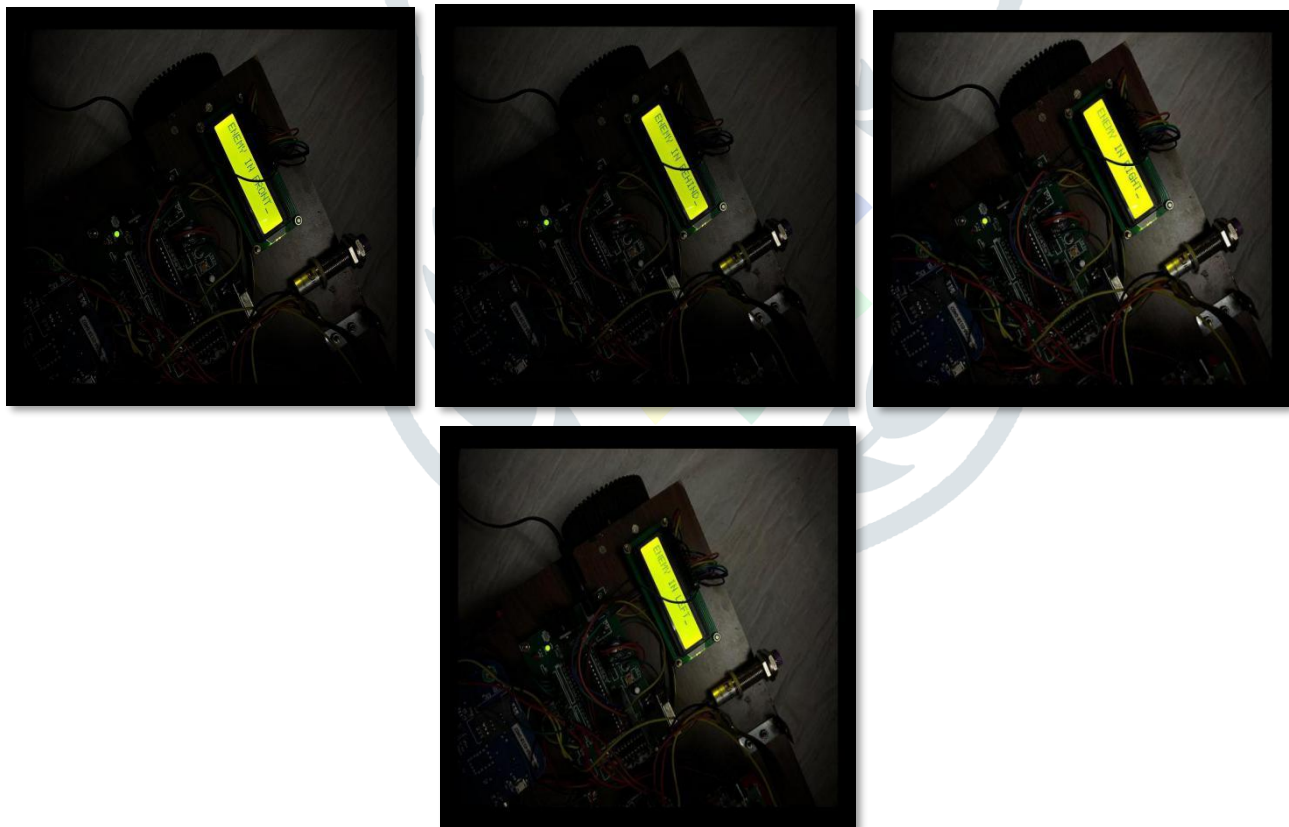

Figure 4: Enemy Detected in different directions

Gas detection is done using a sensor and the message is displayed on the LCD and also sent to the mobile device, as follows in figure 5:
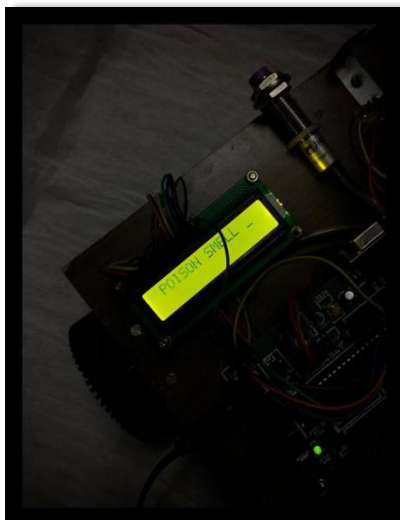

Figure 5: Gas Detection

Metal detection is done using a metal detection sensor and the LED lights up(red), as follows in figure 6:

Figure 6: Metal Detection

Laser gun is mounted on the robot to shoot intruders. Once the IR sensor senses movement the camera rotates in that direction of the enemy detected and the laser is shot.(red dot), as follows in figure 7:
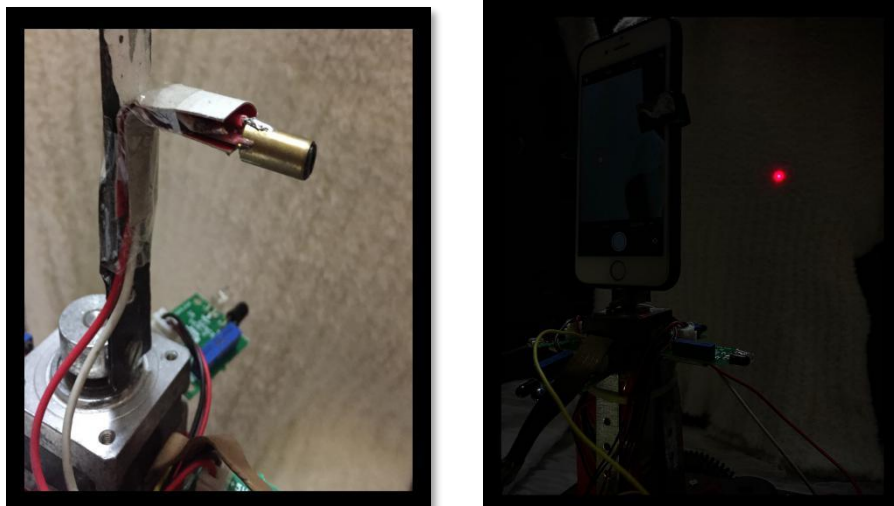

Figure 7: Laser gun

SMS is sent to mobile phone after human detection, gas detection and human movement. GSM module is used to send the message upon detection and opens the maps and displays the location, as in figure 8:
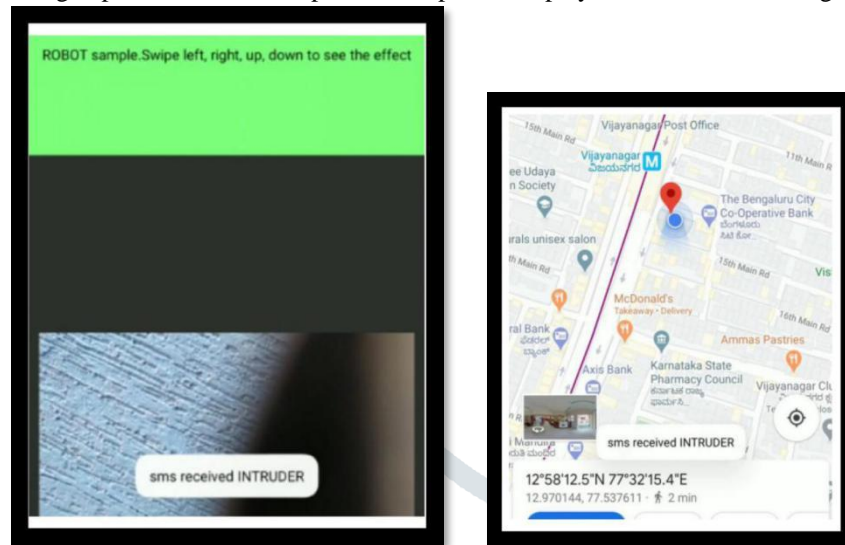

Figure 8: SMS alert and GPS location

V. CONCLUSION

Merciless BSF is the current area of research where lots of scope exists. Currently this particular security technique is required by several countries, one such enhancement we are trying to do. The type of communication technique enhance operation, where the user can control the machine from any part of the world by getting the live video feedback, compared to the earlier robots work like wifi with constraints have limited, IOT and video camera makes it cost efficient combat robot. This robotic vehicle can be used as surveillance robot for emergency rescue operations where human and user will be able to alert prior to the intruder.

The proposed system gives an exposure to design a multifunctional defence robot. The robot has a wide spread industrial, defence applications. The laser gun attached to the robot is an excellent substitute for the weapons carried by the soldiers. The laser gun can be triggered with the help of wireless camera. It can be used in a hostage situation to pinpoint at the direction of terrorists with the help of wireless camera, saving many lives during rescue mission. The current range of operations is up to 10m and can be made more sophisticated.

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