

# Merciless Multifunctional Robot for Military Operations

Prof. Sandhya B.R.<sup>1</sup>, Abhishek Kumar Singh<sup>2</sup>, Deepa N C<sup>3</sup>

Assistant professor, Dept. of ISE, Sri Krishna institute of technology, Bengaluru, India<sup>1</sup>

Student, Dept. of ISE, Sri Krishna institute of technology, Bengaluru, India<sup>2</sup>

Student, Dept. of ISE, Sri Krishna institute of technology, Bengaluru, India<sup>3</sup>

**ABSTRACT:** The present defence system of every country is investing huge amount and manpower for providing safety against the increasing illegal activities such as illegal supply of weapons and drugs in order to provide protection to the borders. Hence surveillance at these is essential. But, the quality of surveillance is not up to the level of expectations. This is resulting in the increasing ratio of loss of the lives of soldiers. To increase the quality of surveillance, a system is being proposed for defence and military applications to provide surveillance at LOC (Line of Control) using the robot. The robot uses the IoT (Internet of Things) technology. It performs multiple functions in order to overcome the above mentioned issues by automatically detecting intruders trying to trespass the LOC, detecting harmful gases, mines which explodes when disturbed.

**KEYWORDS:** IoT, SST microcontroller, IR sensor, PIR sensor, Mine detection sensor, Gas detection sensor, Bluetooth module, GPS and GSM module.

## I. INTRODUCTION

For the last few decades, robots are becoming very popular and common in military organizations. There are many advantages of these robots as compare to human soldier. The robots have great impacts towards resistance as they can resist more damage as compared to human. Therefore they give greater chances of success in dangerous environment. We have also seen a great development in military robots when compare to military robots in earlier time. At present, different military robots are utilized by many military organizations. Nowadays, many countries take the helps of these robots to perform dangerous jobs. These military robots appointed with the integrated systems like sensors, gripper, weapons, cameras and actuators. Based on the purpose of robot it comes in different shapes and features.

These robotic technologies in our country are used in almost every sectors of defence, which varies in types based on their purposes. But still now in our country we don't have such kind of technologies to protect the LOC's in the case of attacks. So as to overcome this problem a system is proposed in such a way that it will mercilessly shoot any intruder trying to trespass the borders or trying to promote any illegal activities on the border areas. Beside of automatically detecting and shooting the intruders it also provides multiple functionalities and hence named as multifunctional robot. Some of the functions of the robot are – bomb detection, detection of harmful gases in the environment and providing 24/7 live video surveillance at the border areas. The proposed system uses the concept of IoT, which makes the robot more advanced and efficient.

The Internet of Things (IoT) has given a wide set of predefined services and applications which has made day to day works easy. IoT concepts striving to enable things to get connected anytime, anyplace with anything and anyone ideally by using the internet or any network connecting any service. Objects make them recognizable and they obtain intelligence, they can communicate information about themselves and they can access information that has been aggregated by other things to them. According to infrastructure, IOT is the combination of embedded electronics, sensors, software and connectivity and sometimes it is called internet of everything.

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Fig1: Internet of Things (Iot)

## II. RELATED WORK

Bhawana D. Parate, et al. worked on biped robot which is designed and developed for military purpose application to protect the Indian army. The method involves a biped walking robot using parallel leg mechanism (PLM). The robot uses frame per cycle technique for motion and obstacle detection. For synchronizing all functions propeller IC is used in which all programs are embedded. These biped robot are used for advancement in lower body prosthesis has helped in war veterans and effected soldiers to win their back normal life with certain limitations. [1]

Ramesh Nayak, et al. worked on a multifunctional robot which has been designed for surveillance purposes which uses ZigBee Technology. The information is transmitted through the ZigBee module from the control unit that is ARM 9. In the robot unit another ZigBee module is attached which acts as the receiver, it receives these signals and corresponding operations are carried out. The body of the robot consists of two wheels attached to geared motors. The robot is controlled through a Touch screen that is mounted on ARM9 via ZIGBEE device. [2]

SweetaDeshmukh, et al. worked on security solution that hinges on the novel integration of camera on Raspberry Pi. Raspberry Pi operates and controls video camera for surveillance and records video for future playback. Raspberry pi along with the PCB contains motor driven IC and voltage regulator circuitry. Also in the development of a mobile robot capable of capturing real-time images and videos for surveillance monitoring, the raspberry pi has proved its importance for application in the various field. [3]

Premkumar .M, et al. worked on a system which presents a modern approach for surveillance at remote and border areas using multifunctional robot based which uses PIC18F452 controller. ZigBee is used mainly in the concentrators, data collectors, repeaters, and meters installed in the urban distribution AMR systems and prepayment systems. Thus the proposed system, an Intelligent Unmanned Robot (IUR) using Zigbee saves human live and reduces manual error in defense side. [4]

## III. PROPOSED SYSTEM ARCHITECTURE

The paper presents an IoT robot which is based on SST microcontroller and the mobile application using Bluetooth communication. The main objective of the robot is to provide an effective and efficient surveillance at the border areas. The architecture of the robot is mainly consists of the SST microcontroller, IR sensor, PIR sensor, Gas detection sensor, Metal detection sensor and an android application to control the robot.

### 3.1 SST89E516RD Microcontroller

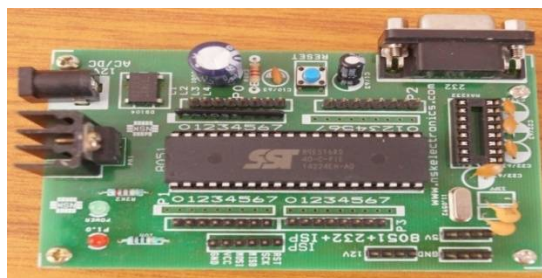


Fig2: SST89E516RD Microcontroller

The SST89E516RD is a member of the FlashFlex family of 8-bit microcontroller products designed and manufactured with SST patented and proprietary SuperFlash CMOS semiconductor process technology. The split-gate cell design and

thick-oxide tunnelling injector offer significant cost and reliability benefits for SST customers. It uses the 8051 instruction set and is pin-for-pin compatible with standard 8051 microcontroller devices. The technical specifications of the SST89E516RD microcontroller are:

- 8-bit 8051-Compatible Microcontroller (MCU)with Embedded SuperFlash Memory
- 72Kb Program Memory
- 10MIPS CPU Speed
- 1024Bytes RAM
- 64Bytes Data EEPROM
- -40C to 85C Temperature Range
- 4.4V to 5.5V Operating Voltage Range

### 3.2 SENSORS

A sensor is a device that detects and responds to some type of input from the physical environment. The proposed system is integrated with the following sensors to strengthen the operation of the robot.



Fig3: PIR Sensor

A passive infrared **sensor (PIR sensor)** is an electronic **sensor** that measures infrared (IR) radiation being emitted from objects in its field of view. A PIR-based motion detector is used to sense movement of people, animals, or other objects.



Fig4: IR Sensor

An Infrared sensor is an electronic instrument which is used to sense certain characteristics of its surroundings by either emitting and/or detecting infrared radiation. Infrared sensors are also capable of measuring the heat being emitted by an object and detecting motion.



Fig5: Gas Sensor

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The Gas sensor module is useful for gas leakage detection (home and industry). It is suitable for detecting H<sub>2</sub>, LPG, CH<sub>4</sub>, CO, Alcohol, Smoke, or Propane. Due to its high sensitivity and fast response time, measurement can be taken as soon as possible. In proposed approach the Gas sensor detects the presence of abnormal gases (LPG gas and smoke) in the home, which is used as a part of safety system.



Fig6: Metal Detection Sensor

A metal detector is an electronic instrument which detects the presence of **metal** nearby. Metal detectors are useful for finding metal inclusions hidden within objects, or metal objects buried underground.

### 3.3 Mobile Application

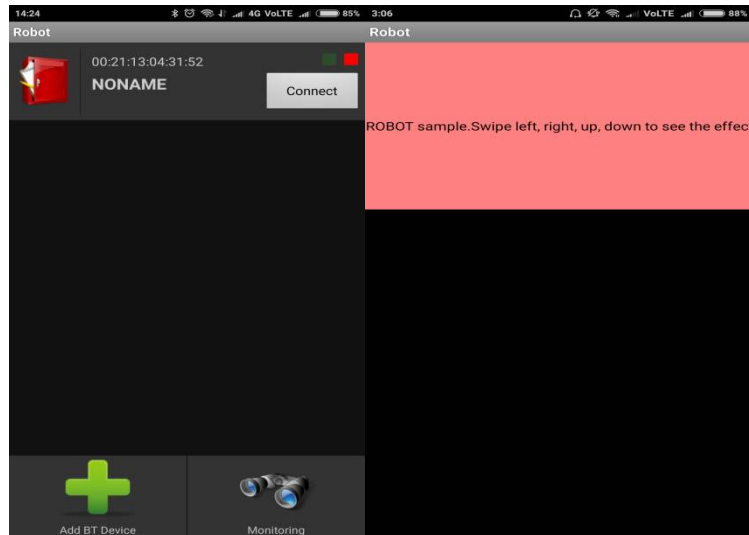


Fig7: Mobile Application

The android application is the mobile operating system installed in the user smart phone. A remote user can monitor and control the movement of the robot using this application. If the user swipes in any of the four directions that is left, right, front and back the robot also moves respectively. The application uses the Bluetooth technology to connect with the robot. Live video streaming facility is also available on the mobile application. . An android platform is used as it has a huge market and cost effective due to the open source. Besides that, android development application tools are free to download and provide flexibility to developers to easily edit and extend the source code.

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#### IV. SYSTEM METHODOLOGY

The proposed system mainly consists of two units i.e., a robotic unit and a remotely control unit. This robot is been remotely controlled through Bluetooth. The robot performs detecting operations through sensors. These sensors sense either the intruders, harmful gases or mines through IR, PIR, gas detection sensors and Mine detection sensor respectively. This sensed information will be sent to SST microcontroller, which processes this information accordingly.

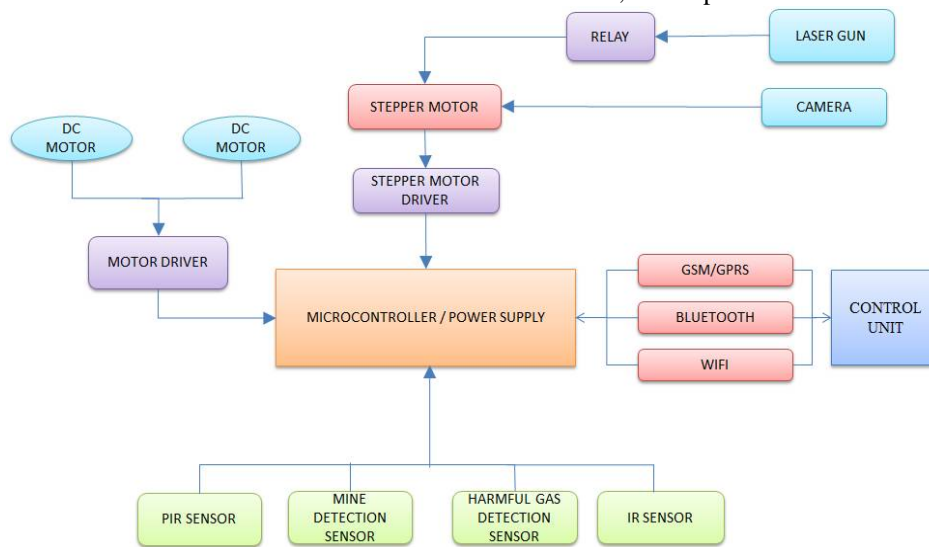


Fig8: Block Diagram

When the IR or PIR sensor senses any intruder or trespasser, the co-ordinate of the sensed intruder would be sent to the SST controller, which in turn turns the Laser Gun mounted on the stepper motor and shoots the intruder. A voice and the text message will be sent to the Control unit indicating the same through GSM module. A message will be displayed on LCD Display mounted on the robot. When Gas detection sensor senses any Harmful gas, it would send the same information to the microcontroller which makes the same information to be displayed on LCD display and a voice and text message will be sent to the Control Unit through the GSM module intimating on the surgical attack in the field. Whenever the Robot's Mine detection sensor senses any Mine, it would send the exact location of the Mine to the control Unit through GPS. The buzzer starts beeping which is mounted on the Robot.

#### V. CONCLUSION

The proposed system is a multifunctional robot for military application, which can be deployed on the LOC in order to provide an efficient and effective means of surveillance. By using this technology the number of lives lost by our soldiers can be reduced. It works efficiently in any climatic conditions and also provides 24/7 video surveillance. It also effectively detects the mines, harmful gases as well as intruders and reduces the risk to life of soldiers at the borders.

#### VI. FUTURE ENHANCEMENT

Advanced robotic arms can be designed like the human hand which can be easily controlled using hand gestures. The controller of the robot wears the sensor gloves and the robotic arm will mimic the movement of the controller. Advanced robotic arms embedded on the robot can perform complex and hazardous tasks with ease. The next enhancement could be that the system detects the faces of terrorist using image processing (OpenCV) and alerts the controlling unit about the details of the recognised terrorist.

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