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IoT Based Multifunctional Robot for Military Applications

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Abstract— In the recent development and trend most of the Defense organization now takes the help of robots to carry out many risky jobs that cannot be done by the soldier. These robots used in Defense are usually employed with the integrated system, including video screens, sensors, metal detector and cameras. The Defense robots also have different shapes according to the purposes of each robot. Here the new system is proposed with the help of wireless camera through we can trace out the intruders and the robot will be employed with integrated systems Thus the proposed system, a Multi-functional Robot using Internet of Things with wireless network GSM through which we can update the data to web page server and control remotely. This is specially designed robotic system to save human life and protect the country from enemies.

Keywords— Robot, Intruder, Internet of Things, GSM.

I. INTRODUCTION

In a developing country like India, Soldiers have a risky time during war times and even during other rescue operations. Robotics has been a staple of advanced manufacturing for over half a century. As robots and their peripheral equipment become more sophisticated, reliable and miniaturized, these systems are increasingly being utilized for entertainment, military, and surveillance purposes. A remote-controlled surveillance robot is defined as robot that is remotely controlled to capture images/video for specific purposes. Mobile robots that are controlled remotely have important rules in area of rescue and military. Military robots are autonomous robots or remote-controlled devices designed for military applications. Such systems are currently being researched by a number of militaries where the main aim of this project is to implement a Wireless multifunctional Defense Robot which can be controlled through smartphone or laptop having locomotion and navigates around the risk prone areas and tries to identify the intruders. Even this proposed work can be used for rescue operations where there will be life threatening situations or places, in addition to this Defense Robot is built with some artificial intelligence for its safety. It has built in with Proximity metal sensor for detecting metal and gas sensor for harmful gas detection. The current technology in our defense is lacking in automated or remote-control robot for the assistance of soldiers as per our knowledge.

II. LITERATURE SURVEY

Somansh Gupta, *et al.,* have proposed *"Mobile operated spy Robot"* [1]. They have proposed a design where a robot which is operated with the help of mobile phone calls based on Dual Tone Multi Frequency (DTMF) code. Here they have DTMF decoder which decodes the frequency of the voice and commands the robot. The main drawback here is that there is chance of signals being misinterpreted.

Dr. S. Bhargavi and S. Manjunath have proposed "*Design of an Intelligent Combat Robot for war fields*" [2] where they have designed a radio operated, self-powered robot which is used to monitor enemy information remotely. These can be used in places where the terrorists have attached and monitor them through the spy camera.

Dr. Meenakshi, *et al.,* have proposed *"Vision Based Robotics System for Military Application-Design Real Time Validation"* [3]in which they have designed a Robot which is based on Image processing technique sum of absolute difference (SAD) algorithm. This proposed work help in detecting the mines in the war field. The images clicked by the cameras will undergo process of SAD algorithm and then the obstacles are determined.

Ankita Patel, *et al.,* have proposed *"Touch Screen Controlled Multipurpose Spy Robot Using Zigbee"* [4]. Where the proposed system is a spy robot which is controlled with the help of touch screen using an touch screen controller. The main drawback here is

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that we need to use a separate touch screen for the control instead we can use IoT to control from our mobile phones.

A.Zanella, *et al*., have proposed *"Internet of Things for Smart Cities"* [5] where they have implemented a design where the introduction of internet of things (IoT) in Urban areas. They are designed to support the Smart City vision, which aims at exploiting the most advanced communication technologies to support value added services for the administration of the city and for the citizens. A smart city is the one which uses different types of electronic data collection sensors to supply information which is used to manage assets and resources efficiently.

III. OBJECTIVES

The objectives of our project are

- To Monitor the location which is under attack.
- Save the lives of people during rescue operations.
- To minimize unauthorized access in sensitive places.
- Detect hazardous and harmful materials.
- To build a system which is possible to do all the things mentioned above with high reliability and low cost.

IV. METHODOLOGY

Nowadays many soldiers are losing their lives in rescue operations and even during the attacks from terrorists. To minimize these kinds of causalities and save the precious lives of our soldiers, we have proposed a system where a place under attack can be remotely monitored or even during the natural disasters. Here Raspberry PI module is the heart of the project and controls all the operations of the system. RFID is used for authentication purpose which means only authorized persons are allowed with RFID, for authorized access it is being implemented where passive tags are being used for our RFID.

The metal detector is used for detecting the bomb that is once the metal sensor detects some moving object by reflection of sound waves, the sensor's output alerts the controller. PIR sensor is for the detection of passive motion of the unauthorized body entry. Meanwhile an alarm is also attached to controlling unit of the project. The L293 is the driver for the DC motor which is used for the motion of the robot. The most advancement in this project is adding camera unit which is an android camera where we have a flexibility to use it with camera or even without it Camera is placed at the controlling unit which can be viewed using laptop or an smartphone with Wi-Fi connection. The data base will be stored in amazon cloud from GPRS technology, for which GSM sim 800C is used where an sim card with an internet connection will be transferring our data from the robot to the cloud storage which is the Amazon web service.

A prototype module will be developed which includes individual PCB boards for all interfaces according to the block diagram. Every PCB will be interconnected with jumper wires. Further it can be extended to make it a standalone robot by adding a laser gun where it can be programed to shoot unauthorized persons at some of the sensitive places.

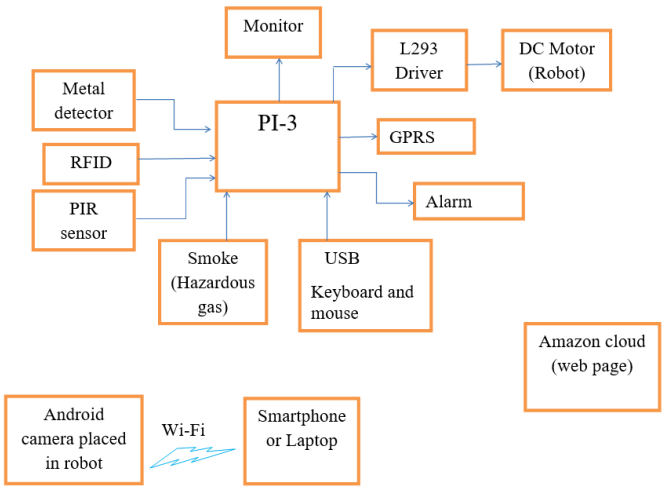

Figure 1. Block Diagram of proposed system

V. HARDWARE COMPONENTS

A. Raspberry PI-3

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SoC: BroadcomBCM2837
CPU: 4× ARM Cortex-A53, 1.2GHz
GPU: Broadcom VideoCore IV
RAM: 1GB LPDDR2 (900 MHz)
Networking: 10/100 Ethernet, 2.4GHz 802.11n wireless
Bluetooth: Bluetooth 4.1 Classic, Bluetooth Low Energy
Storage: microSD upto 8GB can be used
GPIO: 40-pin, where 26 GPIO, 8 GND, 2 : 5V, 2: 3.3V, 2: EEPROM **Ports:** HDMI, 3.5mm analogue audio-video jack, 4× USB 2.0, Ethernet, Camera Serial Interface (CSI), Display Serial Interface (DSI)

Figure 2. Raspberry PI-3 Model B.

B. PIR Sensor

- The PIR Sensor module allows to sense motion.
- It is always used to detect the motion of a human body within the sensor's range.
- It is often referred to used "PIR", "Pyroelectric", "Passive Infrared" and "IR Motion" sensor.
- The module has an on-board pyroelectric sensor, conditioning circuitry and a domb shaped Fresnel lens.
- The Sensitivity and Holding Time Can be Adjusted
- Working Voltage Range: DC 4.5V- 20V
- Detection Range: <140°
- Voltage Output: High/Low level Signal: 3.3V TTL output
- Detection Distance: 3 to 7m (can be adjusted)

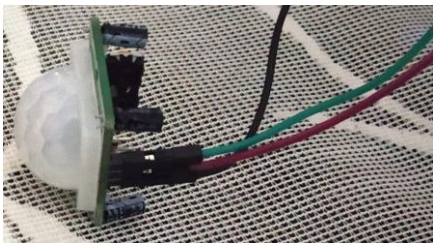

Figure 3. PIR Sensor.

C. Smoke detector – Gas Sensor

- Analog gas sensor.
- Used in gas leakage like smoke, methane and liquefied flammable gas
- Detecting LPG, i-butane, propane, methane, alcohol, hydrogen and smoke.
- Operating voltage: DC 5V
- Analog Output (AO): 0~5V analog output voltage
- Digital Output (DO): 0V or 5V output
- Configuration: Through Potentiometer (adjusts the output level transition)

Figure 4. Smoke Detector

D. RFID RDM 6300

Operating voltage: 4.5~5.2V, Interface logic level: Onboard level converter chip, compatible with 3.3V / 5V. Operating current: 13-26mA, Idle current: 10-13mA, Sleep current: <80uA, Peak current: <50mA, Operating Frequency: 13.56MHz.

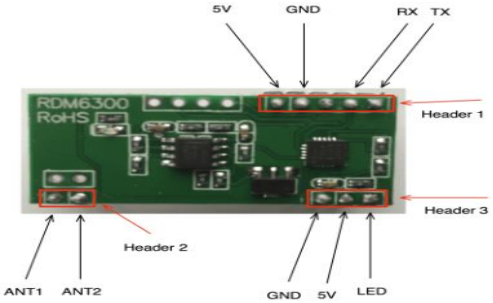

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Figure 5. RFID RDM 6300

E. GSM SIM900 Modem

GSM Sim 800C Modem is used for transferring information from the raspberry Pi module to the amazon cloud. Where AT commands are used for programming.

Figure 6. Shows GSM sim800c Modem

VII. CONCLUSION AND FUTURE SCOPE

When we consider Defense robots today, there has been a huge development as compared to those robots used in earlier times. Today defense ground robots & unmanned vehicles are used worldwide. However, the significant growth of the current Defense robots comes as the nature of combat changes in every region while the globally integrated enterprise replaces nationalistic dominance. It can be said that Defense robot automation of the defense process is the next wave of Defense evolution. This proposed system gives an exposure to design a simple robot that can be used to do multifunction in defense. Manual control is also employed to control the robot from the control room which is located far away from the border area. The system uses non-commercial WIFI standard for wireless communication since this provides access to the as yet unpublished specifications and permission to create. The Multifunction Robot for military application system using Raspberry Pi is very in expensive and it is very useful project for army applications for soldiers, With the help of GPRS we are keeping the database for the further analysis. The camera will be providing instant information of the remote unit for the analysis.

For project demo concern, we have developed a prototype module. In future, this project can be taken to the product level. To make this project as user friendly and durable, we need to make it compact and cost effective. Going further, most of the units can be embedded along with the controller on a single board with change in technology, thereby reducing the size of the system and even make it stand alone by adding a laser gun.

REFERENCES

[1]. Somansh Gupta, *et al.*, "Mobile Operated Spy Robot":International Journal of Emerging Technology and Advance Engineering, volume 3, special issue 2, Jan 2013.

[2]. Dr. S. Bhargavi and S. Manjunath "Design of an Intelligent Combat Robot for War Field" International Journal of Advance Computer Science and Application, volume 2, no.8, 2011.

[3]. Dr. Meenakshi, *et al.*, "Vision Based Robotics System for Military Application-Design Real Time Validation": Fifth International Conferenec on Signal and Image Processing - 2014.

[4]. Ankita Patel, *et al.*, "Touch Screen Controlled Multipurpose Spy Robot Using Zigbee": International Journal of Advanced Research in Computer Engineering and Technology (IJARCET), volume 3, issue 4, march 2014.

[5]. A.Zanella, N. Bui, A. Castellani, L. Vangelista and M. Zorzi, "Internet of Things for Smart Cities," in IEEE Internet of Things Journal, vol. 1, no. 1, pp. 22-32, Feb. 2014

[6]. UNMANNED MULTI-FUNCTIONAL ROBOT USING ZIGBEE ADOPTER NETWORK FOR DEFENSE APPLICATION by Premkumar.

[7]. MULTI FUNCTIONAL DEFENSE ROBOT DhirajKajari, AkshadaYewale, Inderjeet

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Singh, HarshwardhanKavle 4 Department of Electronics &Telecommunication KCCEMSR, Thane, India.

[8]. I.E.M.D. Goonethileke, "Wireless RF Based Surveillance Robot Controlled via Computer": volume 7, Jan 2012.

[9]. Raspberry pi Foundation, https://www.raspberrypi.org/

[10]. Amazon web services.