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WIRELESS CONTROLLED ROBOT FOR EXPLOSIVE DETECTION AND DIFFUSION USING GSM MODULE

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ABSTRACT

A Land Rover robot (LRR) is actively being developed for both civilian and military use to mainly perform in dangerous activities. Predominantly these vehicle are used to replace human in hazardous. Lately LRR are the focus of many research projects for military and civilian applications like military, surveillance, security service, riot control, hostage situation, police, law enforcement, border patrol, etc.

Keyword :Land Rover Robot, Semiautomatic explosive detection land rover robot.

I. INTRODUCTION

Three U.S. Department of Homeland Security (DHS) component agencies carry out the majority of border-security missions: the U.S. Coast Guard (USCG), U.S. Customs and Border Protection (CBP), and Immigration and Customs Enforcement (ICE). A universal and more open world creates a growing need for more effective ways to control borders.

The implementation of Multitasking Robotic system into defence field is advancement over the application specific robot systems used in defence sector. This system is called as the Multitasking defence robot in accordance to its functionalities. In comparison to application specific robot systems, these multi-tasking robots ensure more capabilities in the times of need rather than depending upon multiple working systems of extreme bulk and numerous procedures. They also reduce the human intervention both on field and off field to offer assistance to defence personnel at a greater extent. These multiple tasks include Surveillance, Defence and Attack. The major application of this robot combination system would be in the country borders & sensitive regions.

Therecent accidents including border security forces and central reserve police force in regions of regular terrorist attacks as well as militant attacks and the sensitive country border areas where the constant danger of fire as well as natural calamities are claiming hundreds of precious life's at the borders. The idea of the project was to come up with a novel and approachable idea to safeguard the people at the country borders. The idea is

more of a precautionary step towards their safety rather than a aide after attack. it is considered to be a dependable support system to fight against violence and dangers befalling our soldiers.

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. One of the most important things about these robots is that they have the capability to perform missions remotely in the field, without any actual danger to human lives (5). This shows a great impact of military robots. These robots are sturdier and more capable of with-standing damage than human. Therefore they give greater chances of success in dangerous environment. Whenever, a robot is shot down, the military simply roll out a new one. But one should not forget about the certain effects and impact of military robots. In 2009, academics & technical professionals held a conference and discussed the impact of the speculative possibility that robots and computers could become self- sustaining and able to make their own decisions (1). They briefly discuss about the effects of military robots. Experts have also jotted that some robots have acquired several forms of semiautonomous, which includes the ability to find power sources on their own and the ability to select target to attack independently. They also noted that some computer viruses can avoid elimination (4). Besides this, they also considered self-awareness as depicted in science-fiction is probably unlikely, but that there were other potential hazards and pitfalls. Some experts and academics have questioned the use of robots for military combat, especially when such robots are given some degree of autonomous functions. 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. Military robot is a robot that can perform a task given such as locomotion, sensing, localization, and motion planning without a control from the human during the task in progress.The soldiers may sometimes cross their area limit without their knowledge. This causes a lot of problems. They may be caught by the other peoples. This project is developed for the soldiers to find out the bombs in border areas.

Border patrol systems have recently achieved interest to address the concerns about national security. The major problem in protecting long stretches of borders is the need for large human involvement in patrolling the premises. In our border patrol system consists of security checkpoints and border troops. All vehicle traffic is need to stop in security check points which are set up on the international roads to detect and apprehend illegal aliens, drugs, and other illegal activity. The border troop watches and maintain control in a specific section of the border. The troops patrol the border according to predetermined route and time interval [1]. Under the conventional border patrol system, even modest-sized areas require large human resources if manual patrolling is considered alone. To monitor the border in real-time with accuracy and minimize the need for human support, multiple surveillance technologies, which complement each other are required. To address the challenges still facing by the existing surveillance techniques, we introduce Border security robot, a new border patrol system framework based on hybrid wireless sensor networks, which can accurately detect the border intrusion with minimum human involvements. Border security robot utilizes the PIR sensor for human detection and a metal detector for explosive detection. Also a wireless camera is used to continuously monitor the border. While the potential benefits of Border security are significant, several research challenges need to be addressed before a practical realization.

II. METHODOLOGY

This whole module is embedded on robotic module. This project is developed for the soldiers to find out the bombs in border areas. The main modules in this project are ARM Processor unit and LCD display. The robot movement will be controlled wirelessly by DTMF Technology. The concern person has to make a call to this module and has to press the required button in his mobile to control the robot movement. DTMF Decoder receives that encoded signal from mobile and sends that to ARM via interfacing stage i.e., Buffer, Driver and Relay unit. Buffer is used for temporary storage, driver is used to drive the relay and Relay is used for switching operation. ARM controls the Robot movement in several directions like Right, Left, Front and Back. The chemical and metal bomb detector sensor will be used to detect the respective bombs in the border areas. If the bomb detected in the border areas then this module sends that bomb detection information to ARM. ARM analyses the signal and activates the GPS to read location of that particular area with respect to latitude and longitude. ARM sends that location information to concern person via GSM. Wireless camera will be used to monitor the border area visually. The visual information of border area will be captured by camera and that captured information will be send to base station wirelessly.

III. BLOCK DIAGRAM

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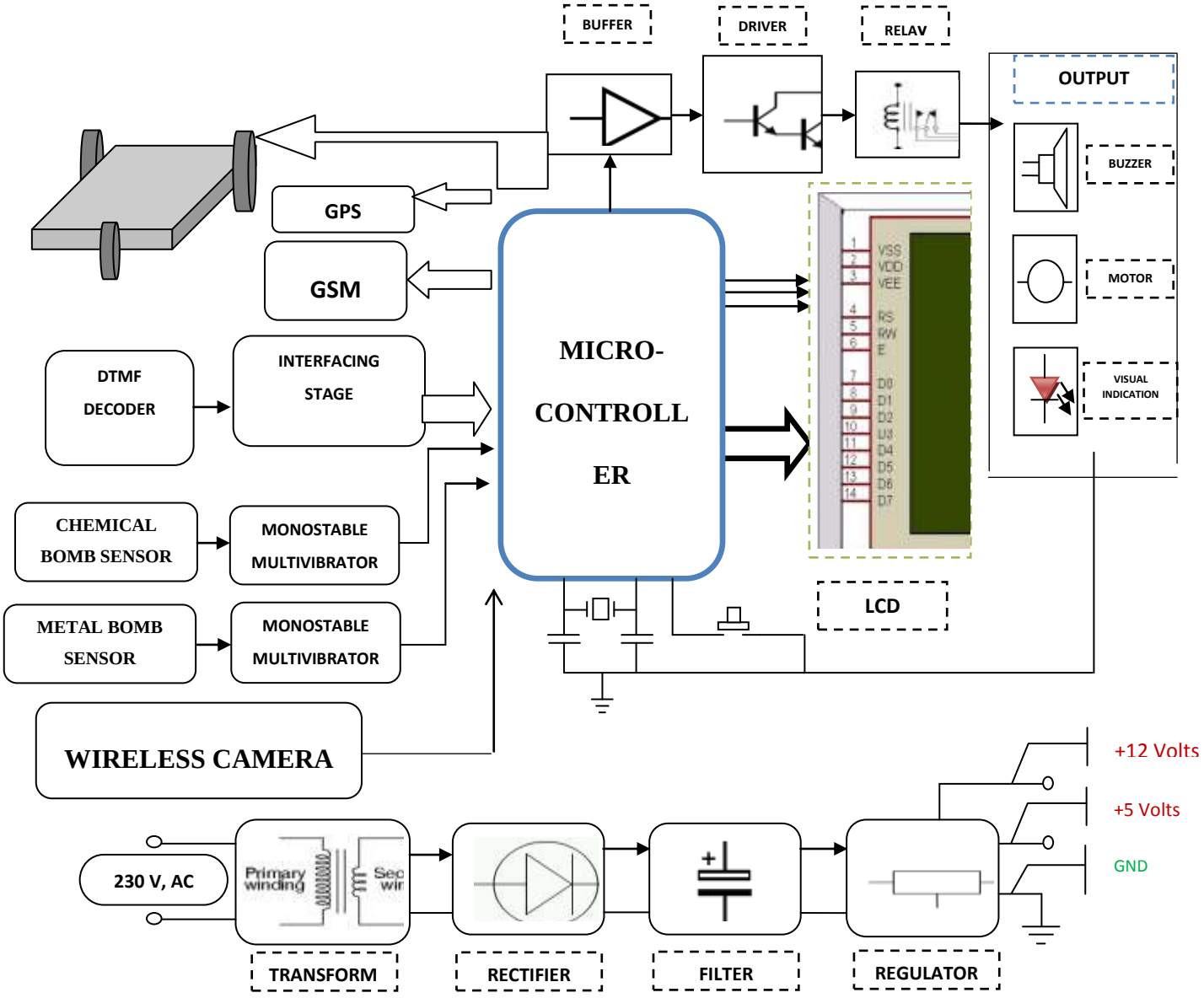

Fig 1.Block Diagram of Land Rover Robot.

IV. GLOBAL POSITIONING SYSTEM (GPS)

This is a GPS Receiver (5V Serial) with high gain having 4 Pin 2.54mm pitch strip. The third generation POT (Patch Antenna on Top) is used by the receiver for the GPS module. It can be interfaced with normal 5V ARM7 with the help of the in built 3V-5V converter. The interfacing is made easier with the help of low pin count (4 pin) strip. The 4 Pins are 5V, TX, RX, and GND. This standalone 5V GPS Module does not require external components .It consists of internal RTC Back up battery and can be directly connected to USART of the ARM7.

The current date, time, longitude, latitude, altitude, speed, and travel direction / heading among other data, are provided by the module and can be used in a many applications including navigation, fleet management, tracking systems, mapping and robotics. The GPS solution enables small form factor devices which deliver major advancements in GPS performances, accuracy, integration, computing power and flexibility.

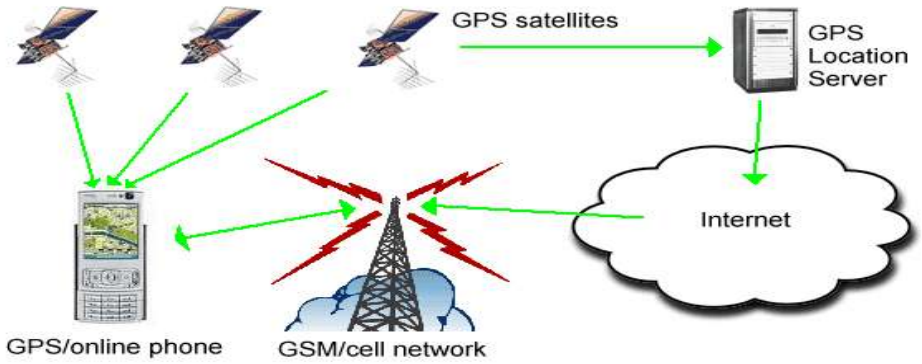

Fig 2. Global Positioning System of The Robot.

V.DTMF DECODER

The DTMF decoder is used to convert the DTMF tone into its equivalent binary digit and this binary digit is sent to the microcontroller. The DTMF decoder circuit is shown in Fig 3. Here, the microcontroller is pre-programmed in order to take up any decision for the given input which is an electrical signal (audio signal). The output is sent to the motor driver so as to move the motor for forward or backward motion or a turn.

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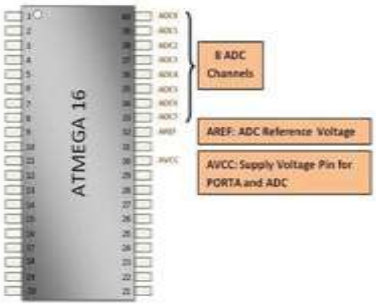

Fig 3.DTMF Decoder Fig 4. ATMEGA 16 microcontroller

The ATMEGA 16 microcontroller IC is shown in Fig. 4. A specific frequency is assigned by DTMF, which consists of two different tones so that it can be easily identified by the electronic circuit. The Tone assignment table is shown in Fig. 5.

Tones and Assignments in a DTMF System

Frequencies	1209 Hz	1336 Hz	1477 Hz	1633 Hz
697 Hz	1	2	3	A
770 Hz	4	5	6	B
852 Hz	7	8	9	C
941 Hz	*	0	#	D

Fig 5: Tones and Assignments in a DTMF System

The signal generated by the DTMF encoder is a direct algebraic summation, in real time, of the amplitudes of two sine (cosine) waves of different frequencies. For instance, if key "3" is pressed, it will send the tone made by adding 697 Hz and 1477 Hz to the other end of the line..

VI.HALL EFFECT SENSOR

There is emission of magnetic fields from the explosive material, which can be detected by Hall Effect sensor. The Hall Effect sensor is a transducer which varies the output voltage which changes with magnetic field.

The magnetically encoded signal is encoded by the magnetic sensor into electrical signal, so that it can be used by the electronic circuit. The output of this sensor is the function of magnetic field density around the device. The magnetic field is detectable in two ways:

1. Head on detection
2. Sideways detection

When the magnetic fields are perpendicular to the Hall Effect sensing device, its approach seems to be "head on" approach onto the active face. This is known as head-on detection. The output voltage depend magnetic field and the distance of the linear device from the sensor as explained in Fig. 6. Nearer the linear device therefore higher is the magnetic field, due to which the output voltage will be greater in magnitude, vice versa.

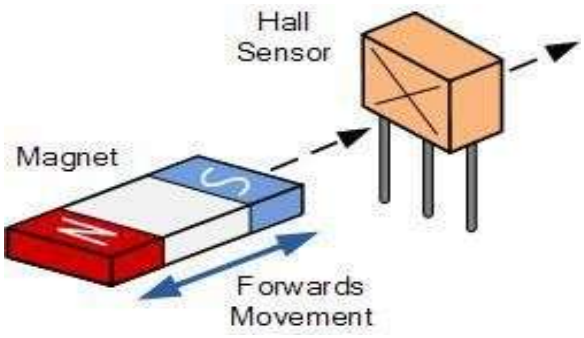

Fig 6.Head on detection.

When the magnet is moved across the face of Hall-effect element in sideways, this motion is known as sideways detection as shown in Fig 7.

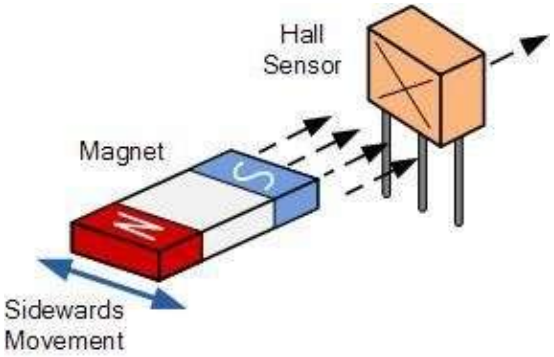

Fig 7.Sideways detection.

VII.ADVANTAGES

1. Protecting borders and other strategic areas are key to preventing these illegal activities and maintaining tight national security.
2. Secure and reliable communication.

VII.LIMITATIONS OF EXISTING SYSTEM

1. One time investment cost.
2. It has to be planted throughout the border area.

IX.APPLICATIONS

1. This project can be implemented to provide a security for Home, Schools, Colleges, and Companies.
2. Restricted zones.
3. Wherever security is important there we can implement this project.

X.CONCLUSION

There is a role and place for both unmanned and manned systems on the future battlefield. While operating unmanned systems can prove costly, keeping people out of harm's way is priceless. The use of unmanned systems brings many benefits, but they should be seen as complementary to rather than replacements for existing manned systems. The IUARs are used in different kind of applications like military, surveillance, security service, riot control, hostage situation, police, law enforcement, border patrol, etc. They work more effectively in environmental extremes such as heat, cold, or nuclear, chemical and biological contamination.

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