Intelligent Surveillance Robot for Military Using Camera and Zigbee Module

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***Abstract*— An Intelligent Robot is actively being developed for both civilian and military use to mainly perform in dangerous activities predominantly these robot are used to replace human in hazardous. The main issue in every country is border problems, due to this problems border guarding force of army men are implemented for guarding land border during calm time and surveillance of border to preventing international crime and to monitor thesaurus like terrorist and civilian of other country. During surveillance operation many army men wounded and shot dead in borders by the attack of terrorist and army of opponent country, so to protect the precious life of army men and women. This robotic vehicle is a new method to trace out the enemies and use that information to make a tactical move. It is having all the necessary accessories to trace enemies like camera and sensors. Robotic Surveillance project is to implement a system that can be used for military real time applications. The whole system can be visualized through the camera that use transceiver and laser gun for focusing target. The distance of the enemy can be determined by ultrasonic sensor, and is transmitted to the laptop via Zigbee module.**

***Index Terms*- Camera, Laser Gun, Sensors, Solar Cells, Zigbee Module**

I. INTRODUCTION

Due to gradual rise in technology, robotics also extends its applications in military field which is called as Military robots. The utilization of robots in military is not latest idea. Daksh was developed by Defense Research and Development Organization (DRDO) which utilize by Indian army to detect and diffuse bombs. Presently, the Indian Army has 20 Daksh robots to oppose terror attacks. As there is continuous growth in technology India has also engaged for developing an armed infantry robot which has capability to track, pursue and engage with terrorists and militants in all over India, but mostly in Kashmir. Due to continuous growth in technology, there is also gradual rise in development of military robots to reduce grievance and death of soldiers in the war fields. Thus for border surveillance and to detect landmines and bombs these unmanned vehicles are used by various military forces. Robots in defense areas are miniature in size so they have capability to enter in small building and space.

Automation is replacing the humans in hazardous work environments enabling to create safe work environments, border patrolling or surveillance is one workplace where automation can be used for better and safe environment for the solider work. Sensor network for environment monitoring system using IOT and device control system. The system is combined with the microcontroller programmable technology and intelligent device specification. By detecting the values of sensors it can easily find out the temperature, light, gas present in the given area. So that critical condition can be avoided and preventive measures are successfully implemented. In system Zigbee is used as wireless module at both ends for transferring the data from one section to other section. It deals with manufacturing environment monitor and device control using microcontroller. In industries there is need for data monitoring efficiency and safety .Performance of the proposed system is verified and good effects are achieved in realistic application.

II. . PROPOSED CIRCUIT DESIGN OF ROBOTIC VEHICLE

The block diagram of the hardware implementation of the entire system is as shown in the Figure1 In proposed system, Solar panel is used as renewable resource of power supply and the communication can be done with the help of the Zigbee wireless communication network. In this system, the robot is monitored using the CMOS camera. The intact control is resided with the microcontroller. In accumulation to this, metal detection, temperature detection, moisture detection, live human body detection and laser gun are integrated. The control of the robot from remote location is done with a computer. The information to the computer is carried out by the superior technology named Zig-bee Technology. When control signal is given from computer it is transmitted with the help of Zig-bee. Video receiver receives the video signals from camera. The system also senses the ecological parameter with the help of sensors.

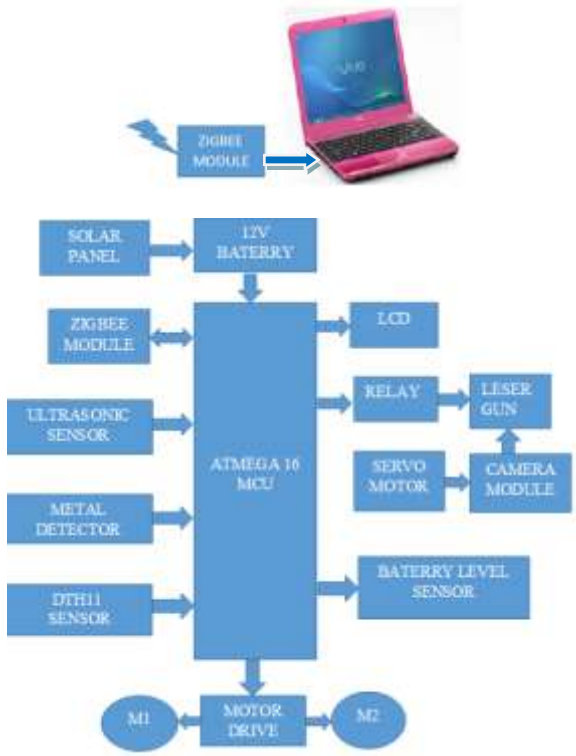

Figure 1: Block Diagram of the Robotic System

III. HARDWARE DESCRIPTION

A. Zigbee Module

ZigBee is used to transfer the data from the control unit to the rover unit and vice-versa. It uses mesh topology which allows Zig-Bee devices to automatically connect with and transmit data through one another without the need of central gateway like a router. It has low power consumption and low data rate. Hence it is easy and efficient to send the instructions like turn on the device, rotate right, left, etc.

B. Camera Module

Wireless technology is being applied to just about everything these days, and video surveillance takes good advantage of it. A wireless camera includes a integrated transmitter to send video over the air to a receiver as an alternative of through a wire. Many people aren't aware that there are multiple types of wireless technology in use, each with unique advantages and disadvantages. Above fig.2 shows the camera module.

Fig.2: Camera Module

C. Metal Detector

Metal detectors are useful for finding metal enclosure hidden within the object or metal objects buried underground. Metal detector is used here as a bomb detector. Inductively coupled coil is used to find out the metal present inside the ground. It absorbs the magnetic field comes out from the metal and gives the acknowledgement to the control unit.

D. Ultrasonic Sensor

The ultrasonic sensor is the eyes of the robot. They help detect objects/ personnel in front of its immediate vicinity up to 400 centimeters. The detection range however is limited to 25-30 centimeters to ensure proper and timely interaction with the robot.

E. DTH11 Sensor

The DHT11 is a basic, ultra low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermostat to measure the surrounding air, and spits out a digital signal on the data pin (no analog input pins needed). It's fairly simple to use, but requires careful timing to grab data. Its technology ensures the high reliability and excellent long-term stability.

F. L293D

L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to coerce the motors. L293D contains two intrinsic H-bridge driver circuits. In its common mode of operation, two DC motors can be driven simultaneously, both in forward and reverse direction. The motor operations of two motors can be controlled by input logic at pins 2 & 7 and 10 & 15. Input logic 00 or 11 will stop the consequent motor. Logic 01 and 10 will rotate it in clockwise and anticlockwise directions, respectively.

G. Relay

Relays are electromechanical devices that use an electromagnet to operate a pair of movable contacts from an open position to a closed position. The electro-mechanical relay is an output device (actuator) which comes in a entire multitude of shapes, sizes and designs, and has many uses and applications in electronic circuits. But while electrical relays can be used to allow low power electronic or computer type circuits to switch relatively high currents or voltages both "ON" and "OFF", some form of relay switch circuit is required to control it.

H. Laser Gun

Laser target designator is a low power laser pointer used to indicate a target for precision guided munitions. When a targets marked by a designator, the beam is invisible and does not shine continuously. Instead, a series of coded pulse of laser light are fired.

I. Solar cells

This robot uses four solar cells of 3 volt as renewable resource of power supply .As the solar cells is not able to provide continuous power to robot, a rechargeable battery is used to provide constant power to vehicle which is connected to solar cells through charge controller. Charge controller is required prevent over charging of battery in order to increase life span.

IV. SOFTWARE DESIGN

In this paper windows application software is created using visual studio with the help of visual basic language for programming. The software is based on Microsoft .NET framework. The software allow the user to control robot remotely using the navigation keys present in software itself. Following gives the path planning algorithm of robot:

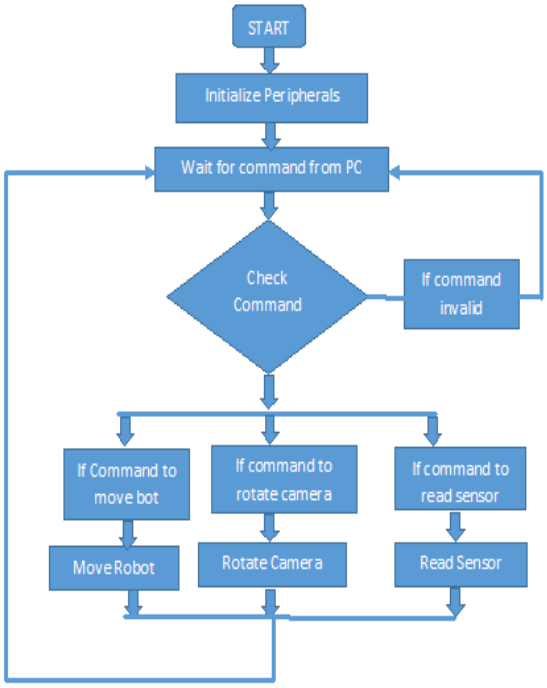

Fig.7: Path planning algorithm

V. RESULT

In this paper, we have developed a robotic system which is operated using zigbee. A software code entrenched into microcontroller controls the working of various sensors and weaponry embedded on the robot. DTH11 sense the temperature and

humidity, ultrasonic sensors become aware of the obstacles on the way in the manual mode. Metal and magnetic recognition sensor detects the metal Video receivers receive the video signal from camera and video shown on the pc with the help of TV tuner.

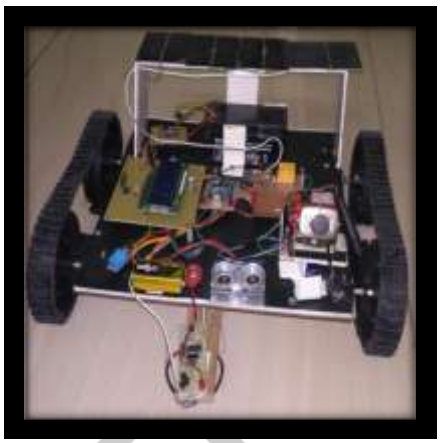

Fig.8: Proposed Model of Intelligent Robot

VI. CONCLUSION

The future of human world will be more secure if the modifications are achieved in the Robotic World. The main advantage of this robot is that the user will be able to get notified prior about the intruder in his premises. And it also helps to sense the different parameters from its surrounding. Where the user can control the movement of robot by getting live video of surrounding as feedback. Use of renewable source of energy, makes it effective compared to existing robot. Generally many of the wireless controlled robots use. But this paper for robotic zigbee technology is choosing as transmission tool since it is hasty.

VII. FUTURE SCOPE

Our future aim to focus on artificial intelligence, an effort that could improve and other military function. This robot can be modifying by using number of sensors for multiple function. As the technology proliferates rapidly, IOT dimension to world of Information, communication. Currently, the use of Intern our daily life and it would lead to development which machines, RFID tags, Sensors and Thing communicate with each other through Internet of Things (IOT). IOT is emerging technology has certain challenges providing unique address to each thing, so access over has ubiquities the internet.

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