

Military Companion Robot

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Abstract—Military Companion robot is designed for mainly military use to perform activities in hazardous situations. This robot act as a companion to our soldiers, with its sensor-based robotic system which helps them to perform better in unexpected or hazardous conditions. It has military as well as civilian applications too like surveillance, temperature and humidity detector, metal detector, hostage situation, border patrolling etc. This paper is to design and build manually controlled surveillance robot with the help of low power zigbee wireless sensor network to track out the intruders. By varying size of this robot, we can cope the situation accordingly like supply capability, hospitality, life support, communication center etc...This robot is capable of performing multiple functions in war field since it comprises a gun, metal detector, and camera in it. It can silently enter into the enemy area and spy on them. It can collect information about the enemy with the help of camera in it. It will play a vital role in the future military generation.

IndexTerms: ATmega 16, Camera, LCD, Laser Gun, Sensors, Zigbee.

I. INTRODUCTION

From the early stage, many army men die for their countries. If one cannot create life it means one does not possess the right to destroy it. As a result, many countries has started using robots in the war field, There is a possibility to lose our soldier in the war situation. So our idea is to deploy this robot before soldiers that mean robot will be our first line of defense. We are concentrating on securing the base of army from intruders and sometimes it can also act as an intruder. Soldiers say one of the biggest advantages to having this “Is the ability for this vehicle to stop out enemy snipers in the area. The remote control station and the robot play very important role in the future military operations. The idea of introducing robot in the army is proposed to save the life of men and women. In the existing system, our soldiers have to stand in the border for the long time in rotational timings not only this problem, they have to bare the climatic conditions which are the great problem to face. Whenever the enemy enters the border our soldier has to fight with them. The possibility of defeating them depends on one may survive or they may. Anyway, a human loss will happen. Military Companion Robot can be used for different kind of applications like border surveillance, security services, intruder, life safer, communication centre and can provide various type of capabilities, to army men during a hazardous situation.

II. OBJECTIVE

Our Project mainly aims for the protection of soldiers at war or border security. The sub-objectives are given below-

- Interfacing with computation should be as natural as interfacing with people.
 1. Modality-opportunistic
 2. Mixed-initiative
 3. Multi-lingual
- Military “robots” today lack autonomy
 1. Currently, many soldiers operate one robot
 2. Want few soldiers working with a team of agile robots, to achieve forces multiplication even in harsh environment
 3. Put fewer soldiers in harm’s way
- Better robots for monitoring- enables soldiers with persistent and pervasive intelligence, surveillance and reconnaissance (ISR), including from hard to reach
- Better robotics for logistics can replace soldiers in the supply chain with capable autonomous robots.

III. BLOCK DIAGRAM

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. The working of robot mainly relies on command provided by user from the application on personal computer. The robot is equipped with necessary sensors and peripherals needed to drive the bot and to sense various environmental data which can be used for surveillance of that area. In this system two geared DC motor are drive by microcontroller using DC motor driver IC L293D in order to move robot in forward reverse left and right direction. Similarly a servo motor is used to rotate the camera precisely from 0 degree to 180 degree. Multiple sensors like temperature and humidity are interfaced with the ADC of microcontroller. All this hardware is backed by a massive 12 V lead acid battery which provide

enough power for robot to operate. A fully functional solar panel system is installed to make robot completely autonomous. With all this peripherals initialized robot waits for any command from PC through zigbee a wireless transceiver connected on both ends for wireless communication. Every button clicked on the application software transmits a character wirelessly to the zigbee on the robot end, a microcontroller read this character and checks if this character is meant for some function. If character matches the defined function code related to that particular function gets executed. For example if read sensors button is clicked a character is received on robot tell robot to read the sensors values and re-transmit it to PC. Same goes for forward reverse left and right directions. This way the robot works on command executed from PC remotely and in order to surveillance a particular region a separate wireless camera is installed which transmits video and audio signals from robot to PC end using RF transmitter and receiver.

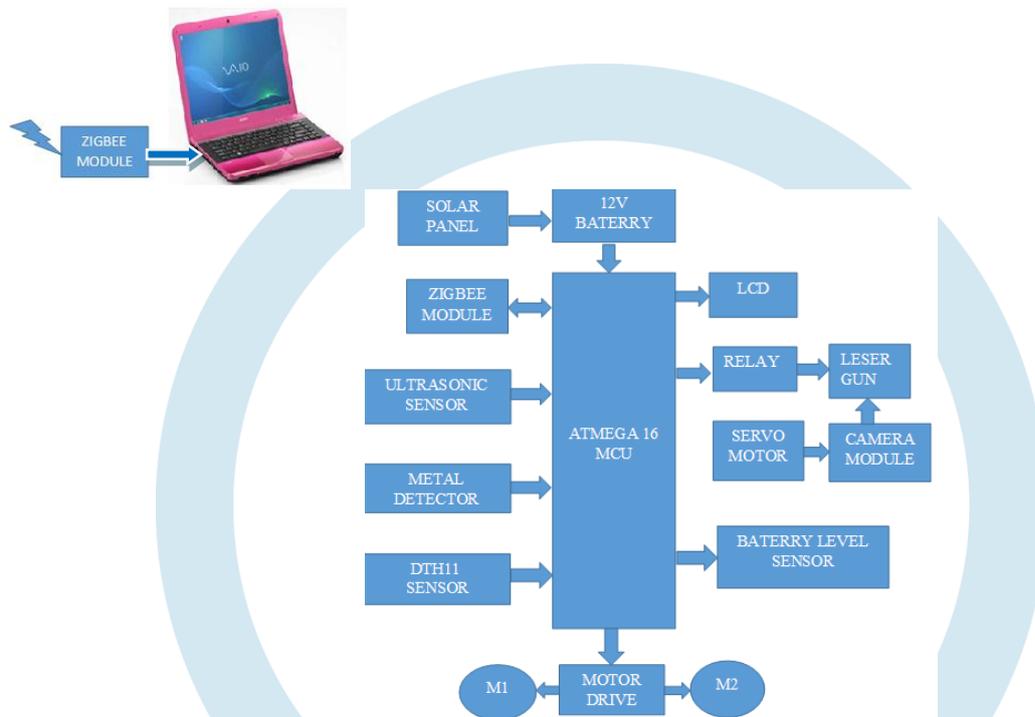


Fig. 1: Block Diagram of the Robotic System

IV. 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.

V. 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:

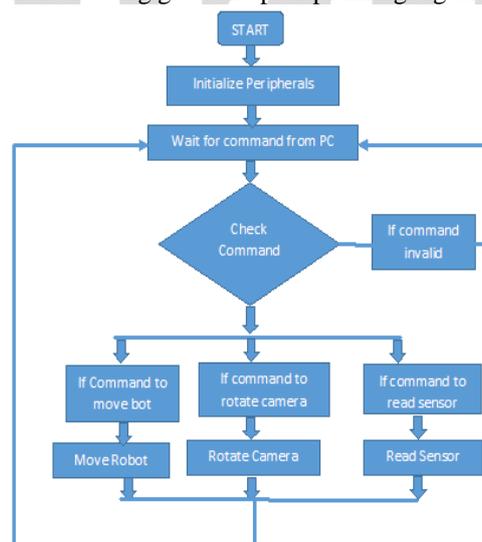


Fig.3: Path planning algorithm

VI. 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.

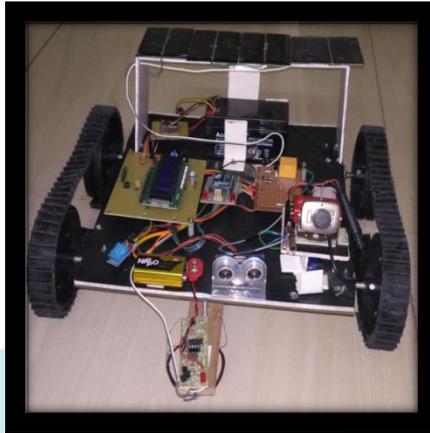


Fig.4: Proposed Model of Intelligent Robot

VII. 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.

VIII. 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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