

INTELLIGENT ROBOT FOR SURVEILLANCE

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Abstract - Life is workbook of problem to be solved. In our technical world invention of new technology is increase day by day. The robotics is top most important technology which is used to surveillance purpose of detecting the occurrence relevant events. As we know that Robot perform surveillance task quite well with integrating action by using surveillance system. 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. This robot is capable of performing multiple function in border area since metal detector, temperature and humidity detector and camera in it, it can silently enter into enemy area and send us the live information about the opponents with the help of camera attached to the laser gun which set the target. This robot act as a companion to our soldier with the sensor based robotic system. If there were something wrong we should only loss the money of the robot instead of losing the soldier life.

Key Words: ATmega 16, Camera, LCD, Laser Gun, Sensors, Zigbee.

1. INTRODUCTION

Once can fashion the life then no one is rights to wipe out it. Security is the basic could do with for all country. Chuck are the mother of inventions. Whenever human being finds the need of something, it will lead to a brilliant invention. After the 26/11 attack in INDIA, all country started focusing on how to control the attack of terrorism and how to improve the security to a nation. As a result some nations started using of robots in the guard field. Since tracking of enemies at different areas are very much difficult for soldiers. There is a possibility of loss of soldier at the war situation. So our idea is to replace the soldier with the robot soldier. Hence, today is the era of revolution in the field of robotics. The word robot was first used in 1927 play titled R.U.R. Rossum's Universal Robots, by Karel Capek. Robotics a Czech word meaning "worker". With the gradual enlargement of technology that gives the various ideas for improvement in robot. The robot is a contraption or device that is basically place or mounted on a movable platform. Many of the complex robots that we see now have originated from the simple robot. In today's life military robot is vary consequence for soldier. Our life is dazzling and all human wants to enjoy it. These our yearning is become true only solders. The military robot is the autonomous robot that consist wireless camera that human able to monitor via computer as a spy. Today wireless system have been widely used by many company because wireless can save cost of wiring, easy to install, occupy lesser space, easy for maintenance and more reliable.

In this paper the Zigbee is choose as transmission tool since it is hasty and it can work in the absence of the Wi-Fi connection in border area. Again advantage of this system is based to sense temperature and humidity for monitoring the environmental condition. The ultrasonic sensor, metal detector are easily get output .The control mechanism is provided along with video transmission is practically achieved through high swiftness image transmission. The lesser gun is attach to the camera to find the target as well as move with the camera. The panic is always India's first rival so, the robots are going to use for saving human life. Some days ago India are faced ZARKHAND coercion from terrors. Not only in ZARKHAND but also Kashmir and Mumbai terror attack have consummated that as far as possible the future of warfare will be handle by robot to protect human life. All these functions are done automatically or manually with the help of software which is to be installed in host system.

2. PROPOSED CIRCUIT DESIGN OF ROBOTIC VEHICLE

The block diagram of the hardware implementation of the entire system is as shown in the Figure1

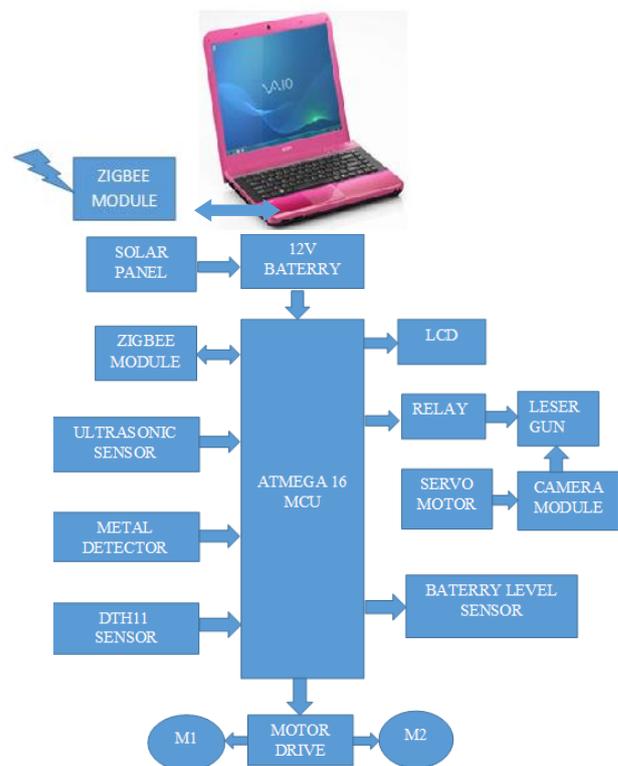


Fig.1: Hardware implementation of entire system

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 entire control is resided with the microcontroller. In addition to this, metal detection, temperature detection, humidity detection, live human body detection and pressure gun are included. The control of the robot from remote location is done with a computer. The information to the computer is carried out by the advanced technology named Zigbee Technology. When control signal is given from computer it is transmitted with the help of Zigbee. Video receiver receives the video signals from camera. The system also sense the environmental parameter with the help of sensors.

3. HARDWARE SPECIFICATION

A. ATmega 16

ATmega16 is an 8-bit high performance microcontroller of Atmel's Mega AVR family with low power consumption. Atmega16 can work on a maximum frequency of 16MHz. It is the heart of our system which control the whole functions of robot.

B. 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.

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. Metal detector consists of an oscillator producing an alternating current that passes through a coil producing an alternating magnetic field. If the current carrying metal is close to it, eddy currents will be induced in the metal and this produces a magnetic field. Magnetometer is used to measure the magnetic field, the change in magnetic field indicates the metal present inside the surface.

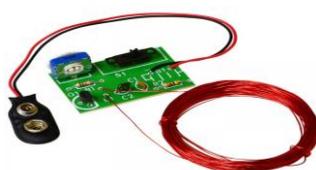


Fig.2: Metal Detector

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. The following fig.3 shows the ultrasonic sensor



Fig.3: Ultrasonic Sensor

E. DTH11 Sensor

The DHT11 is a basic, ultra low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor 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. A high-performance 8-bit microcontroller is connected.

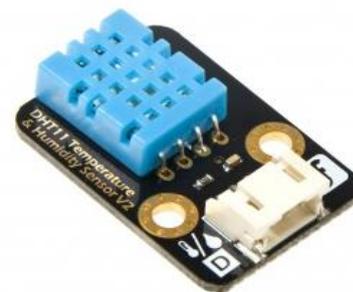


Fig.4: DTH11 Sensor

F. LCD

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters, animations and so on

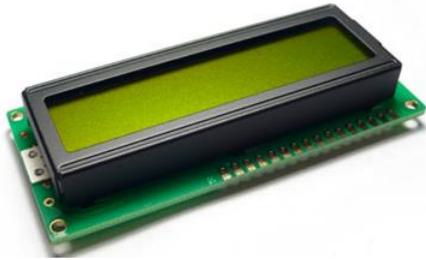


Fig.5: LCD

G. Camera Module

Wireless technology is being applied to just about everything these days, and video surveillance takes good advantage of it.



Fig.6: Camera Module

A wireless camera includes a built-in transmitter to send video over the air to a receiver instead 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.7 shows the camera module. These devices work on a simple principle. The camera contains a wireless radio (RF) transmitter. This transmitter broadcasts the camera's video, which can be picked up by a receiver, which will be connected to a monitor or recording device. Some receivers have built-in storage, while others must be connected to a DVR.

H. 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 drive the motors. L293D contains two inbuilt 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 corresponding motor. Logic 01 and 10 will rotate it in clockwise and anticlockwise directions, respectively.

I. 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 come in a whole

host of shapes, sizes and designs, and have 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.

J. 12v Battery

In the current market, lead-acid is the only available battery technology for electric vehicle conversion. The following is a list of criteria to use in selecting an electric vehicle battery.

- **Voltage.** Batteries are available in both 6V and 12V units. Most standard, wet-cell, golf cart batteries are 6V units. Most sealed batteries are 12V units.
- **Amp-hour rating.** The capacity of a battery is rated in amp-hours. This rating must be specified with a given discharge rate.
- **Discharge rate.** The discharge rate of a battery is the minimum length of time during which the battery must be discharged in order to meet the specified amp hour rating.
- **Watt-hour rating.** The watt-hour rating is a true indication of the energy Capacity of a battery, like the amp hour rating, this rating must be specified with a discharge rate. The watt-hour rating of a battery is the amp-hour rating multiplied by the specified voltage of the battery. Following fig.9 shows the 12v battery

K. Laser Gun

A laser is a device that emits light through a process of optical amplification based on the stimulated emission of photons. Laser light is notable for its high degree of spatial and temporal coherence. The term laser originated as an acronym for light amplification by stimulated emission of radiation.



Fig.7: 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. Following fig.10 shows the laser gun.

L. 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. The reduction in battery is indicated by low battery indicator in order to provide consistent output to user. Following fig.11 shows solar cell

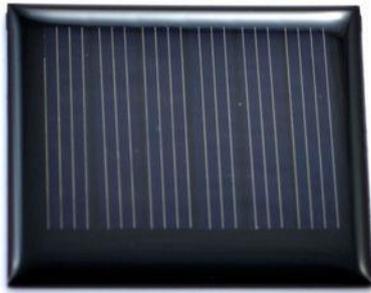


Fig.8: Solar cell

4. SYSTEM OPERATION

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.

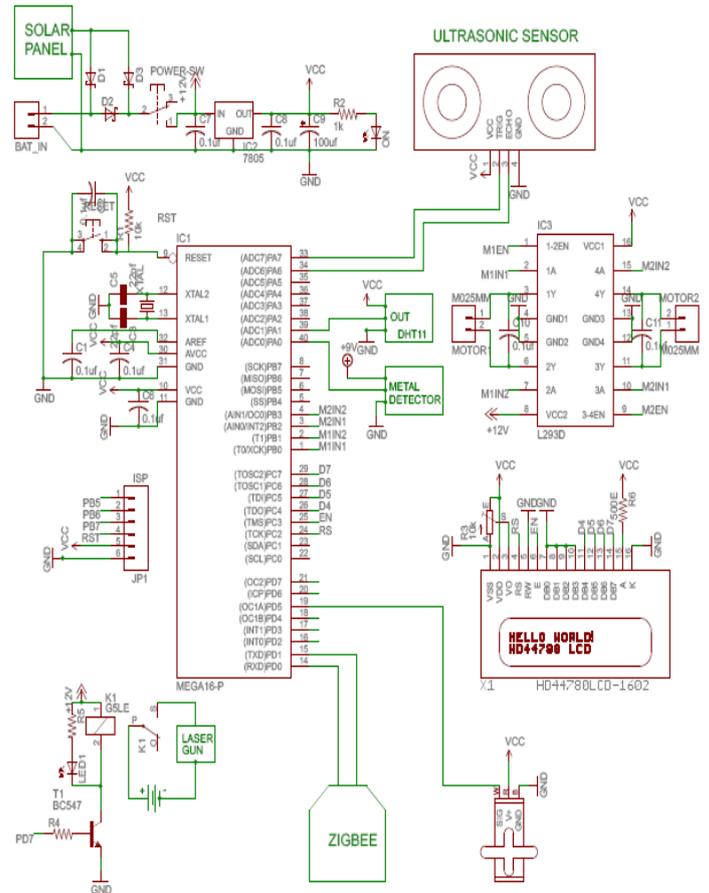


Fig.9: Circuit Diagram of Overall System

5. SOFTWARE DESIGN

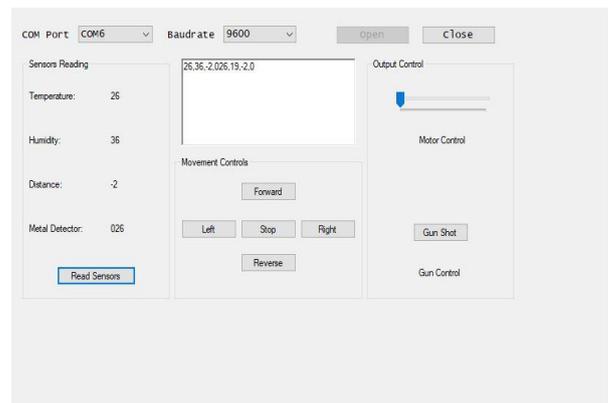


Fig.10: Screenshot of Output

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:

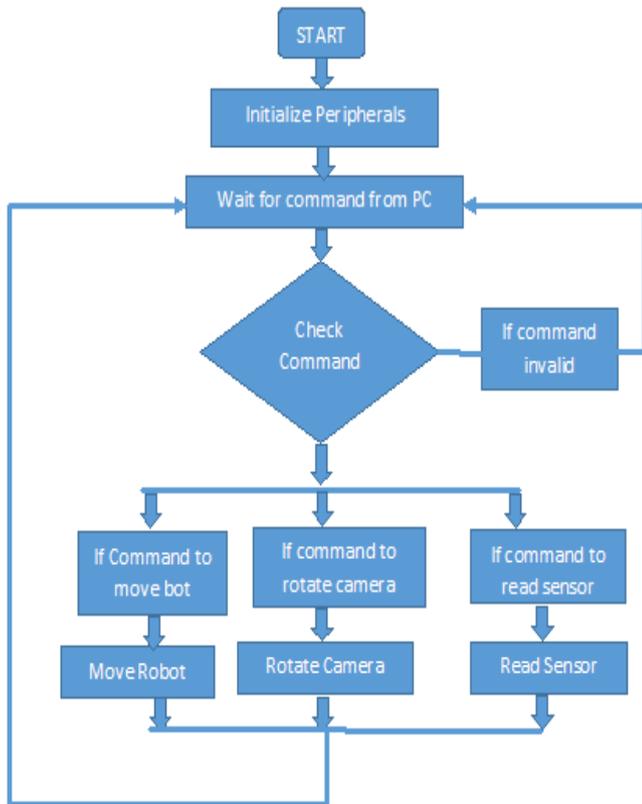


Fig.11: Path planning algorithm

6. RESULT

In this paper, we have developed a robotic system which is operated using zigbee. A software code embedded into microcontroller controls the working of various sensors and weapons embedded on the robot. DTH11 sense the temperature and humidity, ultrasonic sensors detect the obstacles on the way in the manual mode. Metal and magnetic detection sensor detects the metal. Laser gun attached works when any adverse condition happens or robot is being attacked by any person. Video receivers receives the video signals from camera and video shown on the pc with the help of TV tuner.

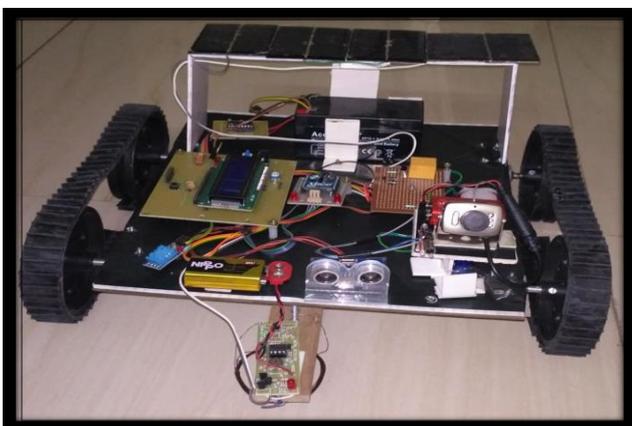


Fig.12: Proposed Model of Intelligent Robot

7. CONCLUSION

In the vicinity of upcoming armed robots will be used in the war field in order to save the life of soldiers. This bread of robot well suited for surveillance, to reduce the casualties and attack the enemies in military. The additional wireless control is one of the most important basic needs for all the people all over the world. But unfortunately the technology is not fully utilized due to huge amount of data and communication over heads. Generally many of the wireless controlled robots use. But this paper for robotic zigbee technology is choose as transmission tool since it is hasty. The control mechanism is provided along with video transmission is practically achieved through high swiftness image transmission.

8. FUTURE SCOPE

Our future aim to focus on artificial intelligence, an effort that could improve and other military function. And this robot can be modify by using number of sensors for multiple function.

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