PC Controlled Bomb Detection and Diffusion Robot

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Abstract: The work is designed to develop a War field robot which is capable of detecting bombs land mines in its path and which is wirelessly controlled through PC using Zigbee technology. It is a very low cost robot used to monitor the Warfield. The robot can be moved in all the directions using the PC wirelessly. The robot system is also used for bomb detection and diffusion using robotic arm.The controlling device of the whole system is a Microcontroller. Whenever the user presses a button in the PC, the data related to that button is sent through Zigbee module interfaced to PC. This data will be received by the Zigbee module in the robot system and feds this to Microcontroller which judges the relevant task to the information received and acts accordingly. Whenever, land mines or bombs are detected, it alerts through buzzer alarm system and also diffuses the bomb using robotic arm. The Microcontrollers used in the project are programmed using Embedded C language.

I.INTRODUCTION

The advent of new high-speed technology and the growing computer Capacity provided realistic opportunity for new robot controls and realization of new methods of control theory. This technical improvement together with the need for high performance robots created faster, more accurate and more intelligent robots using new robots control devices, new drives and advanced control algorithms. This project describes a new economical solution of robot control systems. The presented robot control system can be used for different sophisticated robot applications.

The project aims in designing a Bomb Detecting and diffusion wireless controlled War field Robot through PC which is capable of detecting human beings and land mines in its path and which is wirelessly controlled through PC using Zigbee technology. It is a very low cost robot used to monitor the Warfield. The robot can be moved in all the directions using the PC wirelessly. The robot system is also used for bomb detection and diffusion using robotic arm.

II.CURRENT BOMB DISPOSAL METHODS

Practices Recent developments in robotics have yielded renewed interest in bomb disposal techniques and robots. There are two main goals in improving bomb disposal practices: to disarm the device with as little human contact as possible and to save the evidence contained in the bomb. In the past, the first problem has been solved by making robots that can detonate the bomb. This, however, works against the second goal because it destroys the evidence contained within the bomb that can provide law enforcement with the opportunity to find the maker of the bomb.

To do this, the bomb must be disarmed without being detonated, a task which is currently almost entirely manual. There is a potential for vast improvement in the ability to accomplish these goals of bomb disposal by using new technology to improve bomb disposal robots and allowing humans to keep a safe distance from the explosives in more situations.

III.WORKING

Proposed system consists of an PIC 16F877A Micro controller IC,Zigbee modules, four DC Motors with driver IC,relays and power supply.The robot consists of a robotic arm placed on a robotic base.The vehicle is able to move along any type of surfaces irrespective of it is smooth or rough.It uses two motors for the operation and a belt type tyre is attached to the vehicle like in the tanks, forthe smooth and reliable operation. The robot uses four motors

for the operation of the system, two for theoperation of moving vehicle and two for the arm operation.The robotic arm consists of an arm assembly with a jaw, which is only able to move in up and down directionand other for jaw opening and closing.The maximum upward and downwardmotion is limited by a mechanical push buttontype switches. It breaks the motor circuit when the arm is at its maximumposition beyondwhich the motor does not rotates. For the controlling of motor, motor drivers and PIC 16F877A micro controller is used.The input signal or controlling signal is given from a PC, which is interfaced with the microcontroller by a zigbee module.
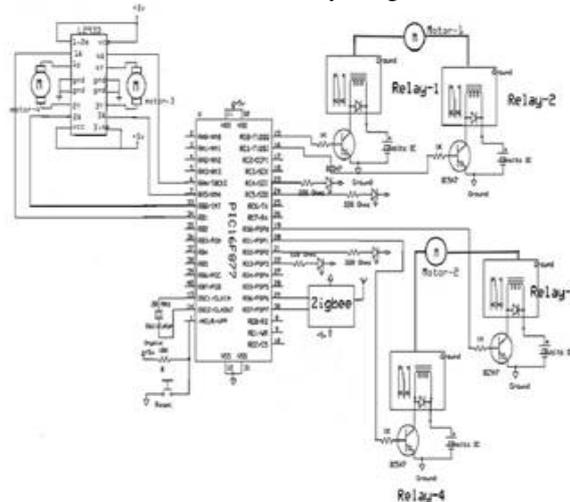

Figure 1.Block Diagram

The program is so written i.e., while executed it sends commands to the motor drivers as per its requirement for running the motor for the movement of the robot. An application called Hyperterminal in the PC is used for sending commands for left, right, forward ,backward,stop,up,down,open,close through zigbeesystem.A12V battery powers the circuit in series with a capacitor filter that nearly provides 5V through regulator IC LM 7805 for the microcontroller which has standard connections like crystal, reset arrangement indication LED etc.,

A zigbee module interfaced to the microcontroller that after being paired with any device communicates with this zigbee module for taking appropriate actions as per the commands made on the PC. The work uses relays for the arm up and down / open and close duty interfaced to the microcontroller.The program is so written that for instructions from the smart phone results in command being sent through the ZigBee module, on O=open, C=close, U=up and D=down number upon microcontroller developing appropriate rotation of the motor.
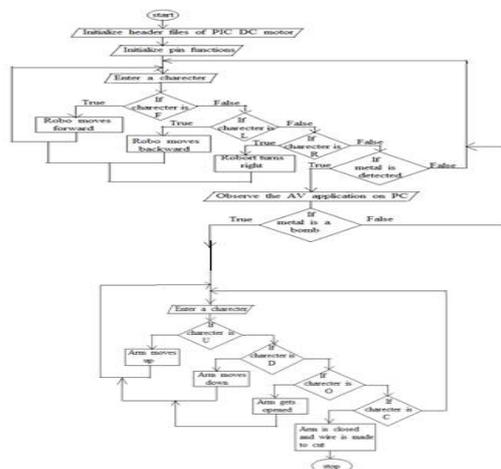

Figure 2.Flow Chart

A metal detector is placed on the robotic base. Whenever a metal is detected, the PC operator must check if it was bomb.When C command is given in the PC robotic arm cuts the wire of the bomb, where the PC is operated by the bomb squad. Thus, bomb is detected and diffused.

IV. DESIGN AND PROGRAMMING

The main components used in this work are the DC motors, Microcontroller (PIC 16F877A), ZigBee modulesand PC application (Hyperterminal).

PIC 16F877A Micro controller:
PIC stands for Peripheral Interface Controller given by Microchip Technology to identify its single-chip microcontrollers. These devices have been very successful in 8-bit microcontrollers. The main reason is that Microchip Technology has continuously upgraded the device architecture and added needed peripherals to the microcontroller to suit customers' requirements.

DC Motors:
DC motors with built in gearing Arrangement is used in this work. It is because it is simple to control and have highertorque compared to servomotors. To use a DC motor, we need motor driver IC.To drive the motor simply connect theone wireto one of the driver terminals and the other to other terminal.

ZigBee:
ZigBee is such a standard for embedded application software and has been ratified in late 2004 under IEEE 802.15.4 Wireless Networking Standards. ZigBee is an established set of specifications for wireless personal area networking (WPAN), i.e., digital radio connections between computers and related devices.ZigBee is the newest and provides specifications for devices that have low data rates, consume very low power and are thus characterized by long battery life.

Hyperterminal application:
HyperTerminal is a communications and terminal emulation program that comes with the Windows operating system, beginning with Windows 98. HyperTerminal can be used to set up a dial-upconnection to another computer through the internal modem using Telnet or to access a bulletin board service (BBS) in another computer. It can also be used to set up a connection for data transfer between two computers (such as your desktop computer and a portable computer) using the serial ports and for serial-port control of external devices or systems such as scientific instruments, robots, or radio communications stations.

V.RESULTS

In this work we made a bomb detection and diffusion robot controlled by an Zigbee.We know that the whole the digital devices in the world are transformed in to wireless systems ,as it is more versatile, flexible and easy to control and it is an open source network.Here the robot is controlled wirelessly by zigbee called through zigbee modules.

The main feature of this robot is the wire cutter at robotic arm. We know that whenhandling the explosive items like bomb it should be handled carefully. Excessive pressure will cause explosion. It is a very low cost robot used to monitor the Warfield. The robot can be moved in all the directions using the PC wirelessly. The robot system is also used for bomb detection and diffusion using robotic arm.

This robot has metal detector which can detect bombs.The robotic arm movements can be observed by a wireless camera and commands were given furtheraccordingly.The hardware model functioned as desired and is shown in Figure 3 .
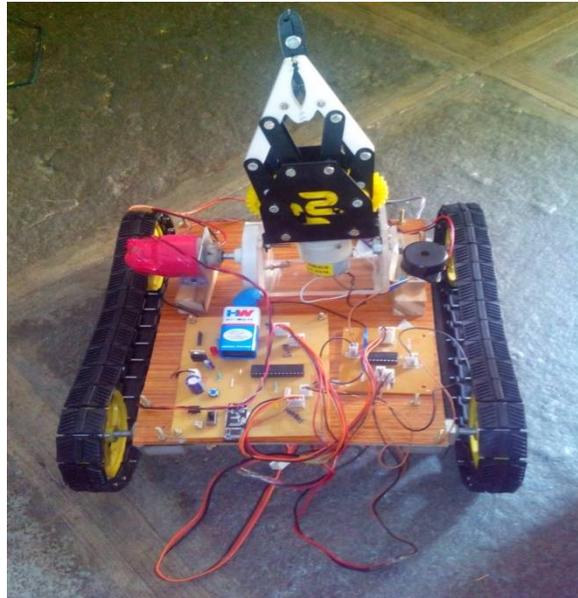
Figure 3.Working model

VI.CONCLUSION

Overall, an autonomous robot with a wire cutter that perform diffusion operation has been successfully built. The robot has been able to detect and diffuse bombs effectively. The robot been made is a working prototype of the bomb detection and diffusion robot vehicle. By using PIC microcontroller, the robot have performed it task perfectly according to the program that being made. Further developments like, introducing usage of other connections like GSM will be advantageous in the respect of range.

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