ZigBee Robot using Arduino
Overview

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Introduction

• Robots reduce human efforts

• ZigBee-based robots can be used for military purposes

• ZigBee protocol stack optimized for wireless networking

• A keypad array used to control robot movements

• Arduino microcontroller drives the robot motors
ZigBee Protocol

- Technological Standard Created for Control and Sensor Networks
- Based on the IEEE 802.15.4 Standard
- Operates at ISM 2.4GHz frequency
- Low data rate
- Low power consumption
- Small packet devices
Hardware requirements

• Microcontroller board – Arduino Uno

• ZigBee transceiver – XBee S1

• Motor driver IC

• DC Motor

• Power Supply
Arduino Uno Features

- ATmega328P microcontroller
- Input voltage - 7-12V
- 14 Digital I/O Pins (6 PWM outputs)
- 6 Analog Inputs
- 32k Flash Memory
- 16Mhz Clock Speed
ATmega328P

- 8-bit microcontroller
- 8KB ROM
- 256 bytes RAM
- 3 timers
- 32 I/O pins
- 1 serial port
- 8 interrupt sources
XBee S1

- operate with Zigbee protocol
- operate within the ISM 2.4 GHz frequency band
- used in low cost low power wireless sensor networks
Motor Driver IC

• This Motor Driver Board is designed to Work with L293D IC.

• This can control 2 DC Motors, their direction using control lines and their speed using PWM.
DC Motor

• Converts direct current electrical power into mechanical power

• The very basic construction of a dc motor contains a current carrying armature which is connected to the supply end through commutator segments and brushes are placed within the north south poles of a permanent or an electro-magnet
DC Motor - Construction
Power Supply

230 V AC
50 Hz

12V step down transformer

Bridge rectifier

Filter (470μf)

5v Regulator

5V DC
Software requirements

• Tool
  Arduino IDE

• Programming languages used
  Embedded C/C++
Advantages

- Code compatibility and expandability across different Arduino boards
- Cost is less as Arduino is open source
- The schematic of Arduino is open source. So for future enhancement of the project, the board can be extended to add more hardware features
- Low Power consumption
- ZigBee has 255 subchannels. Allows simultaneous connectivity to multiple hardware devices
- ZigBee is ideal for military purposes since the protocol stack is very reliable
Future Work

• ZigBee robots can be used for wide applications

• Remote control vehicles like unmanned aerial vehicles in space exploration and military

• IR sensors can be added to detect obstacles

• Camera can be used to monitor surroundings
Conclusion

• ZigBee based robot using Arduino microcontroller developed

• ZigBee is very reliable protocol for military purposes
References

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