

ZigBee Omni Directional Robot

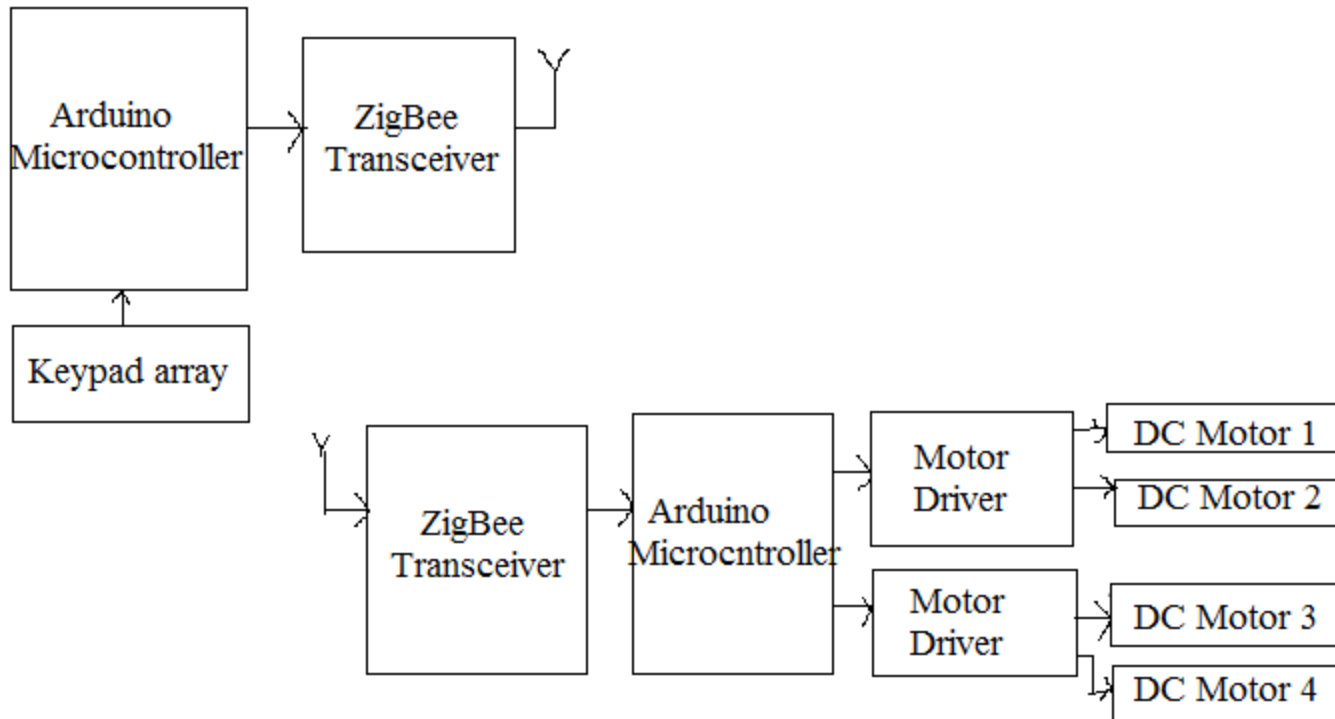
Overview

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Introduction

- Robots reduces human efforts
- Wireless communication is used to control the robot
- ZigBee is the protocol used
- ZigBee protocol stack optimized for wireless networking

Block Diagram

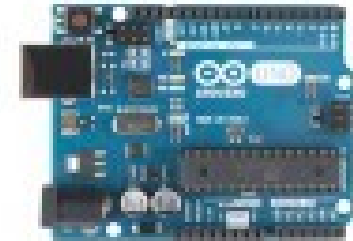


Hardware requirements

- Microcontroller board – Arduino Uno
- ZigBee transceiver – XBee S1
- Motor driver IC
- DC Motor
- Omni Wheels
- Power Supply

Arduino Uno Features

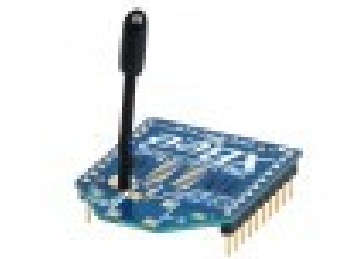
- ATmega328P microcontroller
- Input voltage - 7-12V
- 14 Digital I/O Pins (6 PWM outputs)
- 6 Analog Inputs
- 32k Flash Memory
- 16Mhz Clock Speed



ATmega328P

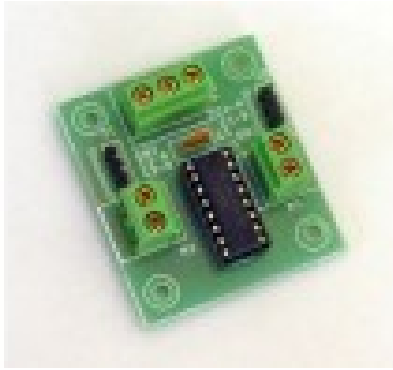
- 8-bit microcontroller
- 8KB ROM
- 256 bytes RAM
- 3 timers
- 32 I/O pins
- 1 serial port
- 8 interrupt sources

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



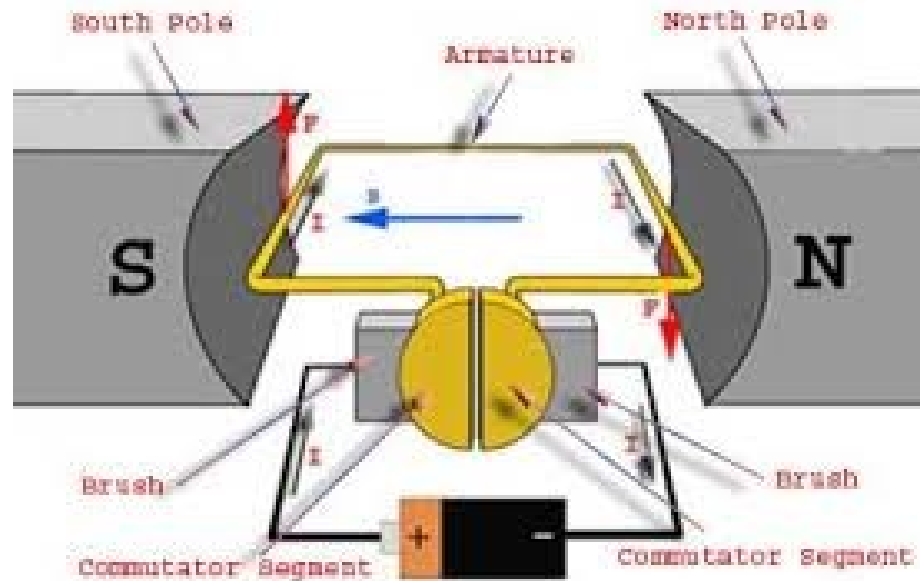
- This Motor Driver Board is designed to Work with L293D IC.
- This can control 2 DC Motors, their direction using control lines and their speed using PWM.

DC Motor

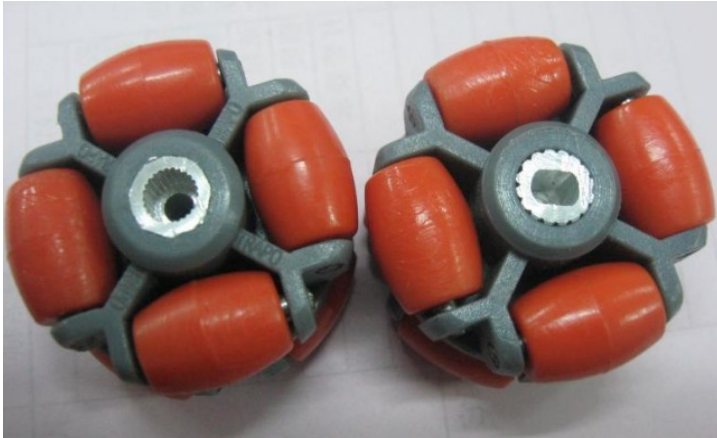


- Converts direct current electrical power into mechanical power
- The very basic construction of a dc motor contains a current carrying armature which is connected to the supply end through commutator segments and brushes are placed within the north south poles of a permanent or an electro-magnet

DC Motor - Construction

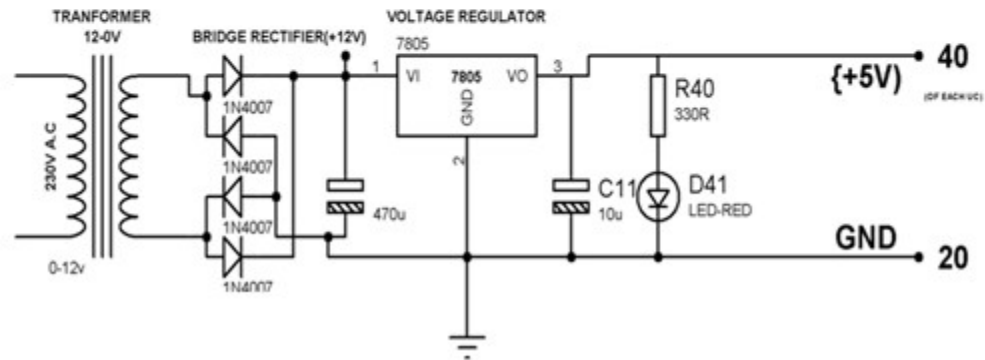
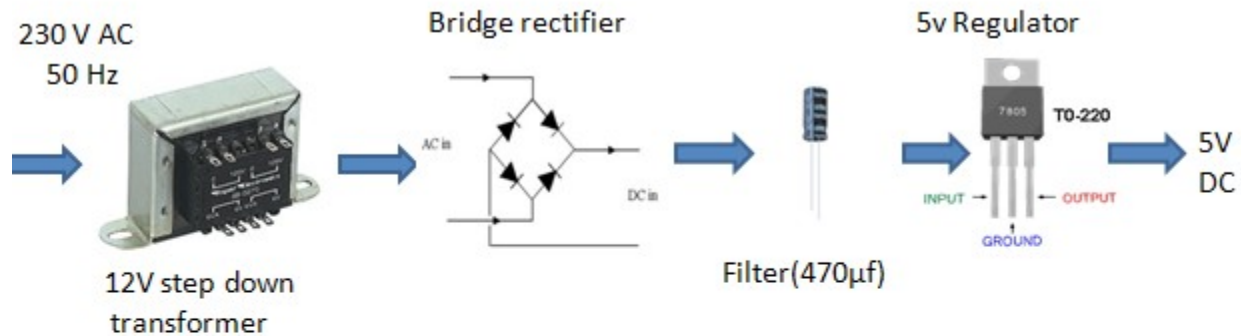


Omni Wheels



- Similar to Meccanum wheels, are wheels with small discs around the circumferences which are perpendicular to the turning direction.
- The effect is that the wheel can be driven with full force but will also slide laterally with great ease.
- These wheels roll forward like normal wheels, but slide sideways with almost no friction (no skidding during turns)

Power Supply



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
- It can move in all 8 directions i.e., in 360 degrees.

Conclusion

- The project designed a ZigBee controlled omni directional robot using Arduino
- User can use several commands like move left, right, forward, backward and diagonally

References

- www.elementzonline.com
- www.engineersgarage.com
- www.engineerprojects.info
- www.wikipedia.org