

ZigBee controlled Dumpster Robot

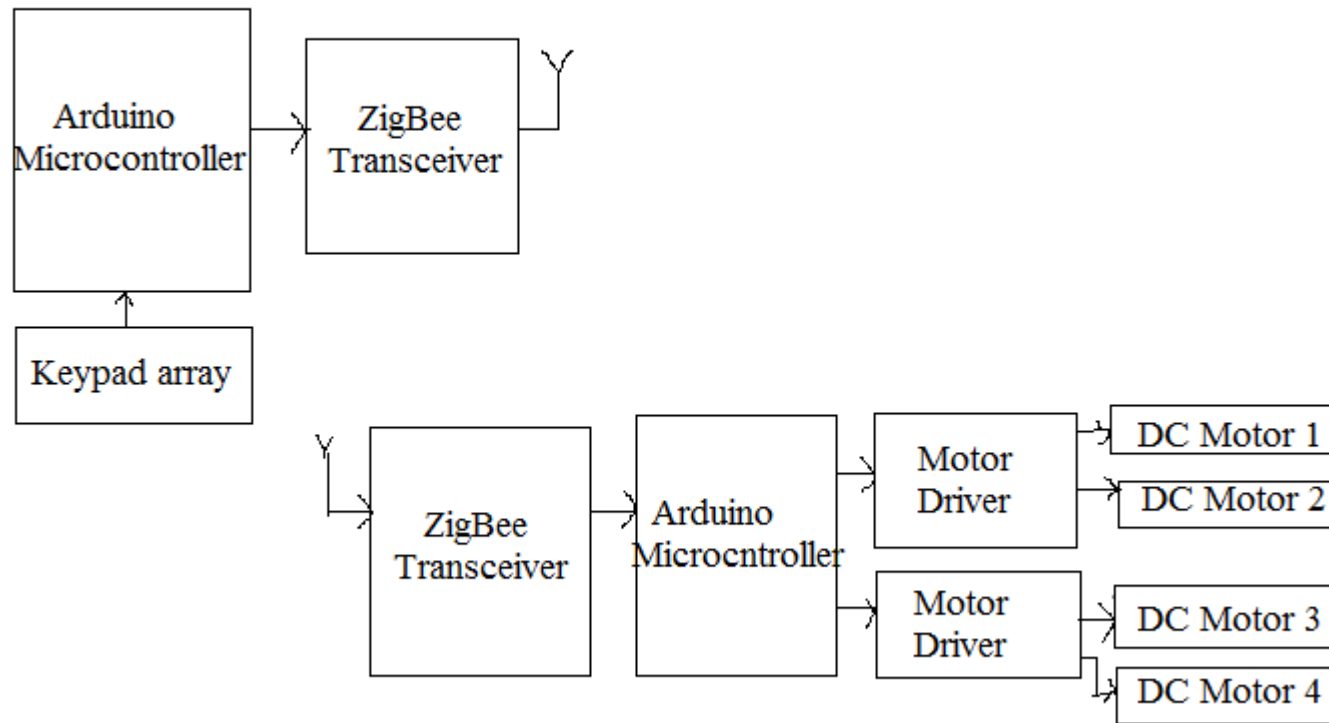
Overview

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Introduction

- Functions as a Bull Dozer robot.
- For dumping it has a bucket which is lifted with the help of a gear box.
- Thus it can lift heavy loads.
- Wireless communication is used to control the robot.
- ZigBee is the protocol used.

Block Diagram



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

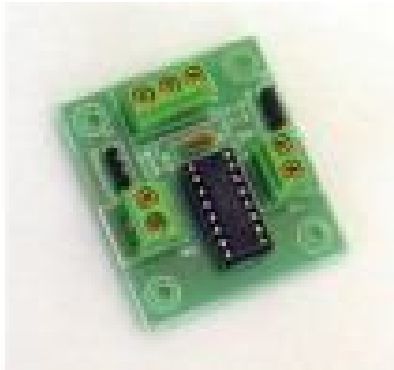
- 8-bit microcontroller
- 8KB ROM
- 256 bytes RAM
- 3 timers
- 32 I/O pins
- 1 serial port
- 8 interrupt sources

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



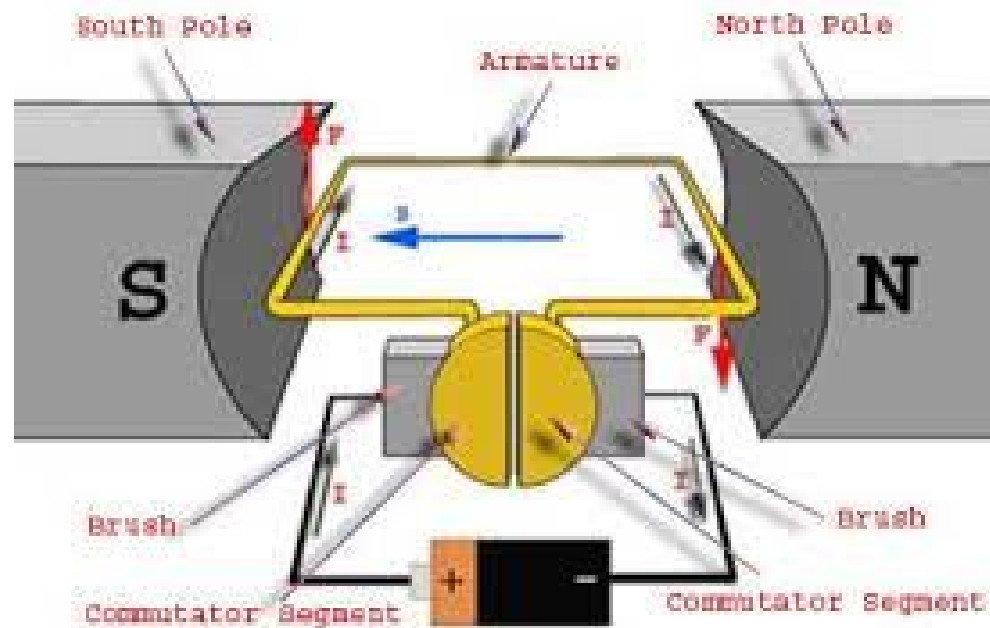
- This Motor Driver Board is designed to Work with L293D IC.
- This can control 2 DC Motors, their direction using control lines and their speed using PWM.

DC Motor

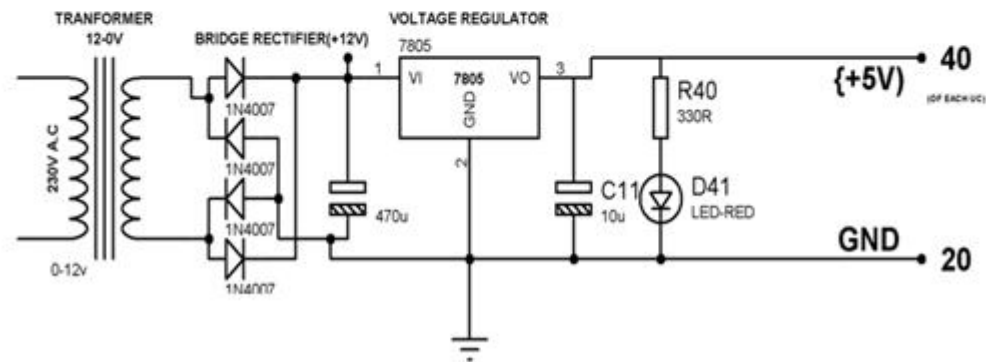
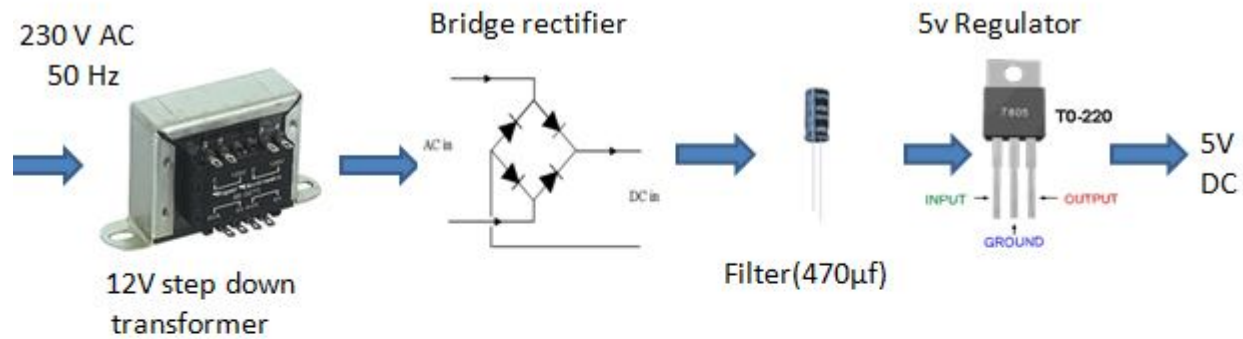


- Converts direct current electrical power into mechanical power
- The very basic construction of a dc motor contains a current carrying armature which is connected to the supply end through commutator segments and brushes are placed within the north south poles of a permanent or an electro-magnet

DC Motor - Construction



Power Supply



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

Future Work

- The robotic system can also be integrated with a programmable logic controller (PLC) to customize the process of industrial automation.

Conclusion

- ZigBee based dumpster robot is designed and developed
- The robot can be used for loading and unloading of products

References

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- www.engineerprojects.info
- www.wikipedia.org