ZigBee All Terrain Robot using Arduino

Overview

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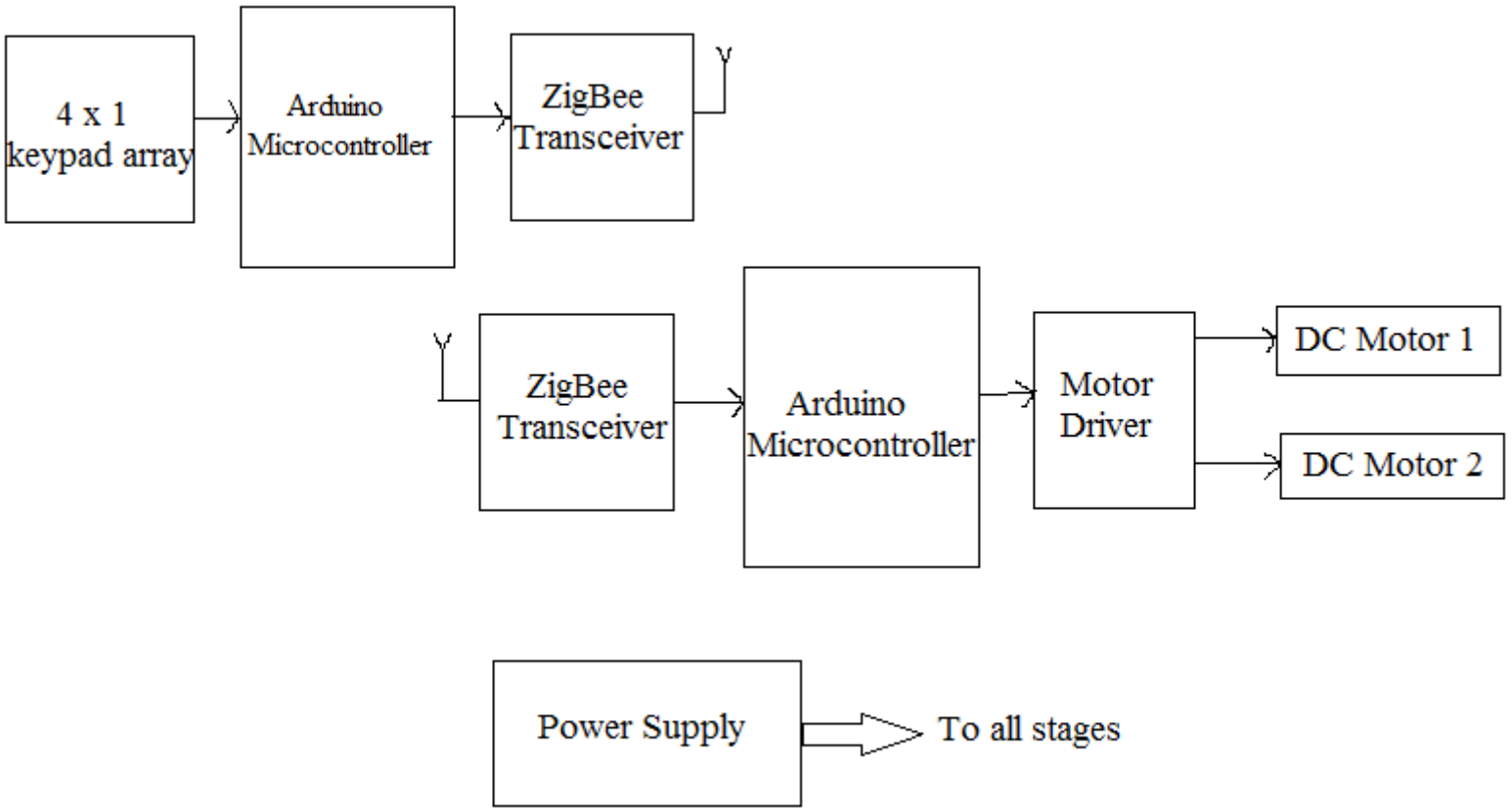
Introduction

- Robots reduces 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
- All-terrain robot can move steadily in different types of terrain

Block Diagram



ZigBee Protocol

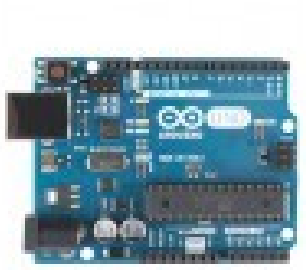
- Technological Standard Created for Control and Sensor Networks
- Based on the IEEE 802.15.4 Standard
- Operates at ISM 2.4GHz frequency
- Low data rate
- Low power consumption
- Small packet devices

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



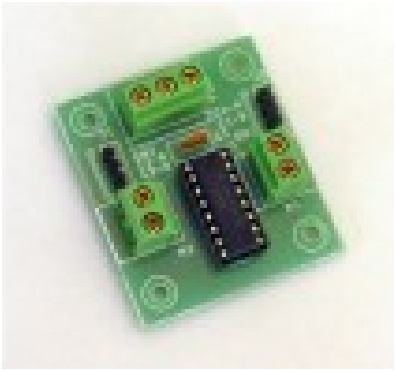
ATmega328P

- 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



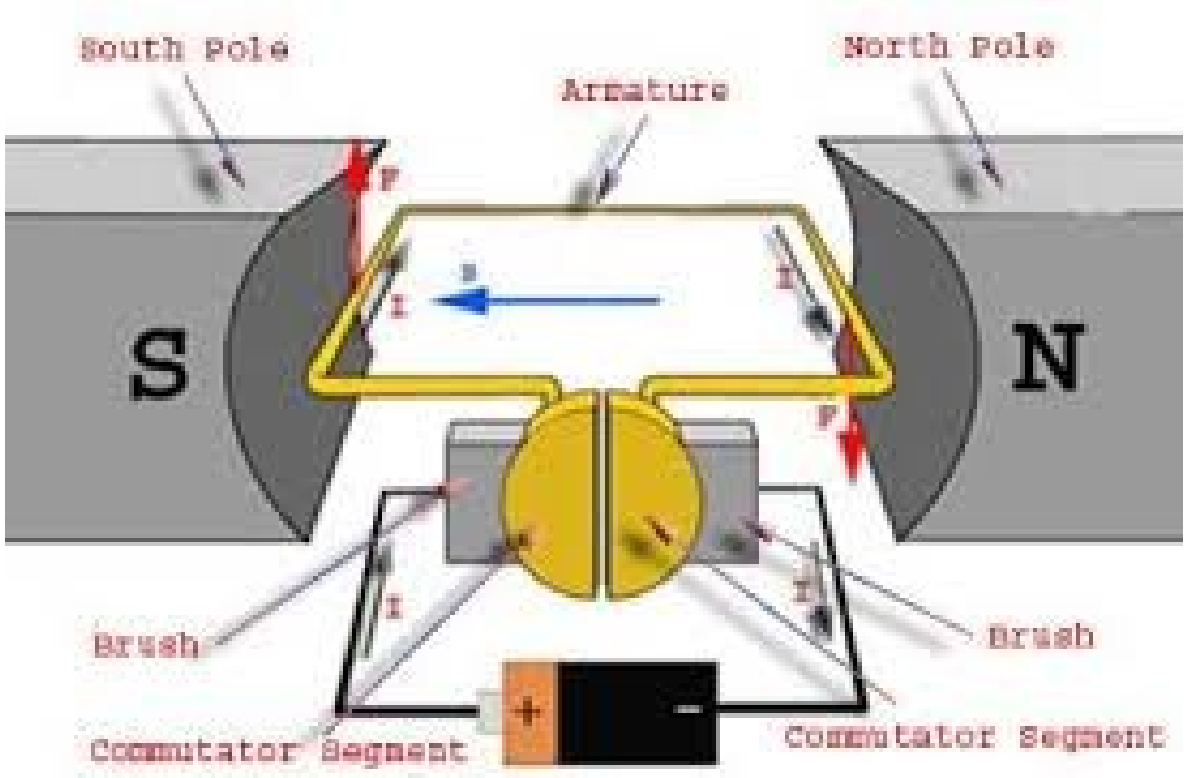
- This Motor Driver Board is designed to Work with L293D IC.
- This can control 2 DC Motors, their direction using control lines and their speed using PWM.

DC Motor

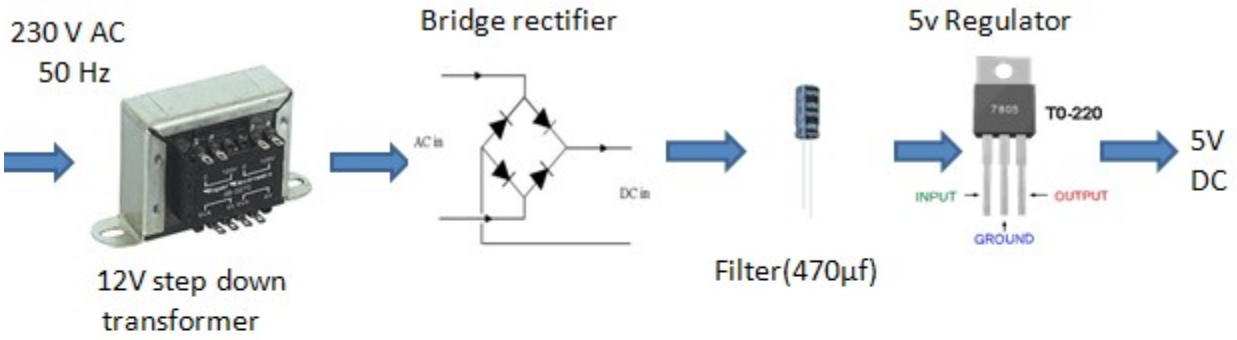
- Converts direct current electrical power into mechanical power

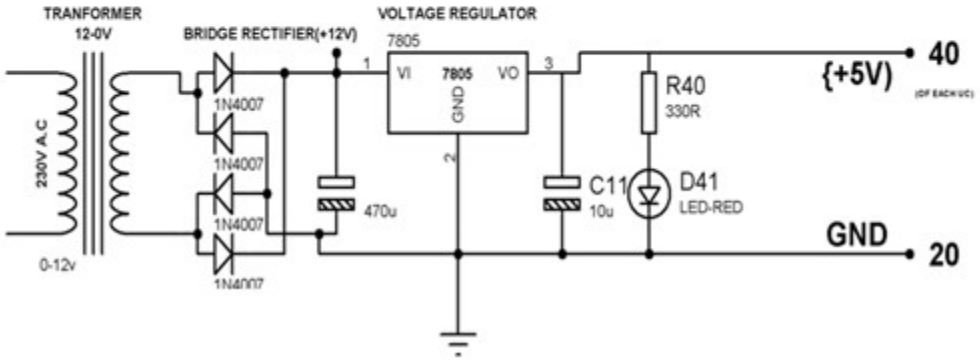
- The very basic construction of a dc motor contains a current carrying armature which is connected to the supply end through commutator segments and brushes are placed within the north south poles of a permanent or an electro-magnet

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

Conclusion

- ZigBee based all terrain robot using Arduino microcontroller developed

References

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