

Computerised Controlled Robotic Vehicle

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Abstract— A robot can talk, walk, run and do anything as per developed embedded software and hardware. Robot can be controlled by different ways and it seems a useless thing if it is uncontrollable. Controlling a robot is the important and main task which has to be considered while designing any application of robotics. The main objective of this research topic is to develop robot with help of an embedded system tools, which can be used to control the robot using PC.

In this research work, we will design a PC controlled robot with the help of arduino microcontroller. And we will use the PC keyboard as the input device to drive the robot in different direction. PC will send ASCII value of pressed key value to the microcontroller through its serial port.

Keywords— PC, Zigbee, arduino, L293D Driver.

I. INTRODUCTION

In this research project, we will develop a PC controlled robot with arduino microcontroller. Robot will be controlled through PC keyboard to drive the robot in different direction. PC will send the ASCII value of pressed key value to arduino microcontroller through its serial port. Again, Serial cable output cannot be connected to microcontroller directly as the output voltage of Serial port corresponds to RS-232 level. But the microcontroller needs TTL voltage levels. To convert RS232 voltage levels to TTL MAX-232 voltage converter will be used and vice-versa. The arduino will read the serial output of MAX-232 through its USART and it will process it to know which key of the PC keyboard is pressed. A per received character microcontroller will send the required control signal to the DC motor driver L293D of the robot to drive the robot in the specific direction. The control keys for the robot are A, B, C and D to drive the robot in forward, backward, left, right direction and to stop it respectively.

II. TECHNICAL DETAILS

This project is divided into three different parts. Parts are - sensor module, control module and driver module.

PC module: In this module, PC is used to send command through serial port to arduino. We sends command to arduino by typing a character on hyper terminal or any other serial terminal like hyper terminal and arduino's serial terminal etc.

Control module: In this project, Arduino microcontroller is used to control whole control action of robot. . Arduino reads commands sent by serial terminal and received command is compared and according to match character robot motion is controlled.

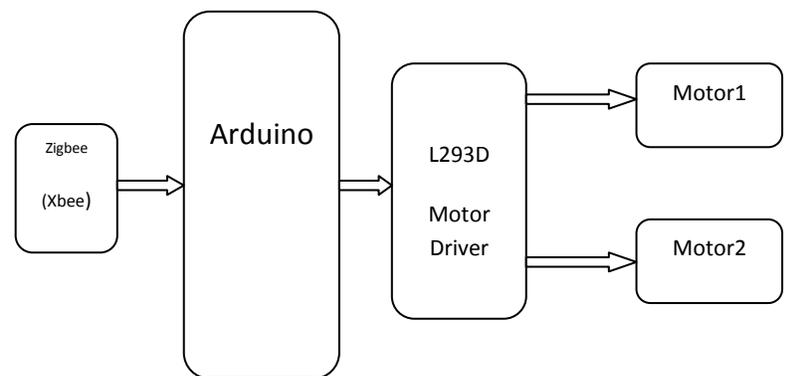
Driver module: This consists a L293D motor driver IC and two DC motors. Motor driver is used for driving motors because arduino microcontroller cannot provide sufficient current and cannot provide protection from back EMF. So we used motor driver.

III. BLOCK DIAGRAM OF ROBOT

Transmitter:



Receiver Robot:



I. Arduino Microcontroller:

Arduino uno is microcontroller board based on ATmega328. Its operating voltage is 5v. Arduino Uno has 14 digital input/output pins,6 analog inputs,16 MHz crystal oscillator,USB connection,ICSP header and it also has 6 PWM pins.



Figure: Arduino Uno

II. Zigbee Module technology

In communication, **serial communication** is the process of sending data one bit at a time, sequentially, over a **communication** channel or computer bus. This is in contrast to parallel **communication**, where several bits are sent as a whole, on a link with several parallel channels. **ZigBee** is the name of a specification for a suite of high level communication protocols using small, low-power digital radios based on the IEEE 802.15.4 standard for wireless personal area networks, such as wireless headphones connecting with cell phones via short-range radio.



Figure: Zigbee Module

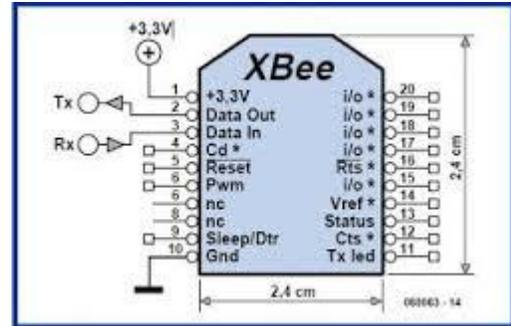


Figure: Zigbee Module Pinout

IV. MOTOR DRIVER

In this research topic L293D motor driver is used; the function of motor drivers is to provide high current and to protect circuit from back EMF. In a single l293d chip there two h-Bridge circuit inside the IC which can rotate two dc motor independently. Due its size it is very much used in robotic application for controlling DC motors.

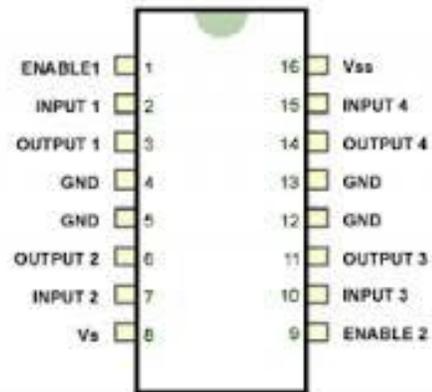


Figure: L293D Pin out

V. ALGORITHM

1. The commands are sent from PC keyboard to arduino.
2. These binary values are transmitted via zigbee module which is a transceiver.
3. The transmitted character values are then received by another zigbee module which is present on the receiver side.
4. Microcontroller will take those received binary values and execute required action according to the binary values.

VI. WORKING

This project is divided into two parts first part is mobile robot and PC with transceiver zigbee module. The robot is controlled by remote PC connected with zigbee module. Serial commands are sent from arduino serial terminal. This robot motions are controlled by following characters which are sent from serial terminal:

1. Moves forward :Send 'F'
2. Moves backward : Send 'B'
3. Turn right: Send 'R'
4. Turn left: Send 'L'

VII. CONCLUSION

We successfully developed PC control robot using arduino, zigbee module, motor driver as well as interfaced DC motor, zigbee module with arduino. We also controlled robot from PC successfully. . Based on the obtained results of this research project, the objective of developing wireless PC control mobile robot using Zigbee protocol has been achieved.

Zigbee has been proven real time practical solution for controlling robotics applications using arduino microcontroller. We tested that when 'F' is sent robot moves forward and performs required motion as per the received character.

VIII. FUTURE SCOPE

Current robot is PC controlled, In future we are planning to use this robot for mapping purpose. This can be used to plot map of unknown area.

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