

Designing of Pick and Place Robotic Arm

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Abstract: The project is designed to developed a pick and place vehicle for picking and placing objects. Robotic vehicle is based on Bluetooth technology as we have already seen mobile controlled robot using dtmf technology and wireless controlled robots using rf modules having their own limitations. At the transmitting end robot is controlled by android device with an application installed in it working as a remote control to move forward backward left or right. At the receiving end five motors are used where two motors are used for body movement and remaining three motors are used for arm and gripper movement Bluetooth receiver receives the commands and gives it to the microcontroller circuit to drive the motors.This project is not limited to picking and placing but it can be enhanced to pick sensitive objects like bomb and can also be interfaced with camera so that user can view and control the operation from distance.

Keywords:Android, pick and place, Bluetooth

I. Introduction

Pick and place robots are widely used in manufacturing industries for material handling applications with the evolution in the field of robotic system and artificial intelligence made the scientific world automated. Robotic system reduces the human efforts in the risky operations and lifting weights for example to pick the items from conveyor belt and place them for packaging in hazardous environment conditions where human can not involve a robot can work while implementing the robotic systems cost also will be a major concern cost of the system depends upon the size of vehicle and how much weight it can lift. most advanced feature of our robotic system is its control with an android device main advantage of using android device is that today everyone has smart phones user just need to install an application to make the device a remote controller for the system.

Robotic system consists of dc motors gets direction through a motor driver circuit(relays) from the microcontroller. We used 8051 microcontrollers. Communication technology between robot and android device is Bluetooth this technology is cheaper than other wireless technologies like Wi-Fi, ZigBee.

II. Literature Review

The research has been done on robotics for implementing this system study starts from mechanical working principle of dc motors referred from K. SFu&R.C Gonzalez and C.S. G Lee,Robotics:controls sensing,intelligence. Selection of dc motors depends on requirements like speed of robot movement and weight to be carried in our robotic system motors are used having high torque. The study next focused on the wireless communication technology for picking and placing. We are considering Bluetooth as a remote-control communication technology a android based mobile phone with an app installed in it acting as a remote controller

III. System Architecture

The system architecture consists of the main parts included in robotic system the microcontroller used is 8051 has 128 bytes of ram,8 bytes of on chip rom,32 programmable input output lines apart from this system uses android device, Bluetoothreceiver, LCDdisplay, motor driver IC2003, dc gear motors, relay, regulator 7805, resistance, capacitor, transistor, diode, battery 12v, 4.5 amp, cutoff switch, wheel(2), free wheel(1). Below circuit diagram for the system is shown.

Motor Driver IC 2003

Robotic system uses the series ULN20xxA/L having the following features

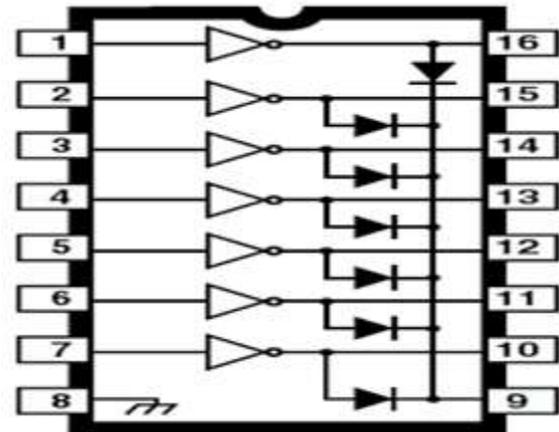
CMOS compatible inputs

Output current to 500mA

output voltage to 95V

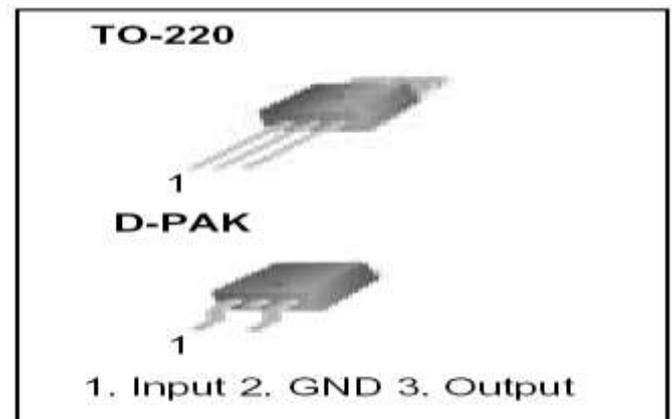
Transient protected output

Small outline IC package



DC Gear Motor

DC motor has a rotating armature acting as a electromagnet and a rotary switch called commutator which reverse the direction of electric current twice every cycle. when current passes through the coil a magnetic field is generated in armature which causes the rotation our system used a dc motor of weight 16.5KG providing maximum speed of 2rpm.

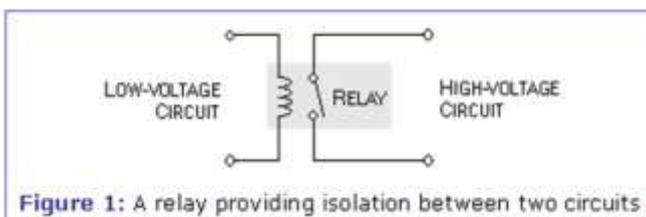


Battery

System uses a battery of 12V providing 4.5amp current

Relay

Sometimes it is essential to isolate one circuit electrically from another but still allowing the first circuit to control the second relays does that work.



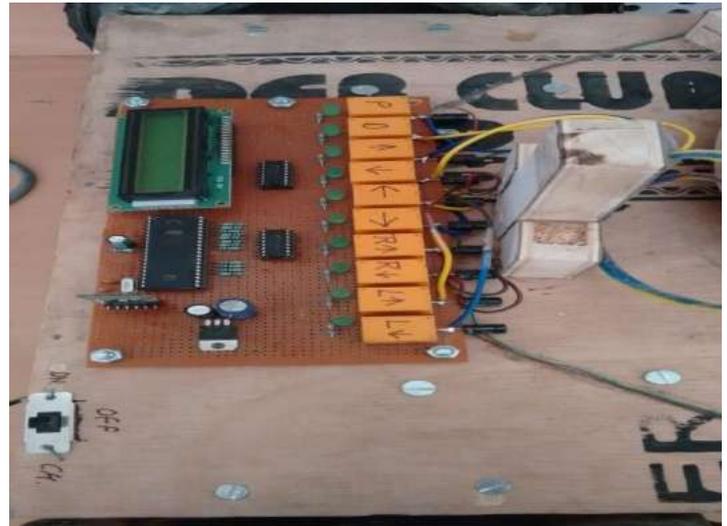
Regulator

System uses 3 terminal 1A positive voltage regulator having following features output current of 1A, thermal overload protection, short circuit protection



IV. Working Discription

Robotic system starts working when it gets instruction from the smart phone the android app consists of dedicated buttons to control the system while pressing the perticular button app sends an ASCII command to the bluetooth module after that controller compares the received character and perform the corresponding functions on the robotic wheels and pick and place arms. Below figure shows the screeshot of application



V. Result

The following pictures shows the experimental results of the Pick and Place robot.



VI. Conclusion

The pick and place robot having android application control is a smart implementation in the field of robotics it will be very useful in industrial purposes this robotic system is economic as well and can be enhanced by adding others smart features like fire sensor and camera.

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