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Article

Design of Micro Controller based Adjustable Arm for Robotic Picking and Placing Operation

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A B S T R A C T

PC based remote control car using hyper terminal deals with the 8051 micro controller programming, DC motors of 500 R.P.M. & 60 R.P.M. The base of the circuit also deals with the robot arm. The main aim of the arm deals with the DC motor. The main function of the arm is that it picks up the obstacle coming near robot and place side to it. In another way the arm acts as the obstacle removal coming to the path of robot. Its main application can be compared with JCB Crane which is used for the construction sites. The main requirement is the rough surface for the wheels and the some 10 to 100 grams of obstacle to show the demonstration. This application can also be used for the picking up of the house hold works like picking up the small application. The maximum weight that the robotic arm can pick up is 100 gram.

Keywords Embedded System, Micro controller, Robotic Arm

Introduction

This project deals with the control of a four degree of freedom autonomous robotic arm hyper terminal of the computer by programming the IC 89s51 micro controller, with using different electronic peripheral. Control of the robotic arm has been achieved successfully using eight dc motors (2 for the vehicle and six motors of robotic arm), each of which in corporates high resolution quadrature encoders. The robotic arm is equipped with a pair of connecting wires. The micro controllers implement inverse kine matics algorithms and implement position control on the motors. The motors are actuated using the internal programming of IC 89s51. These coordinates are fed to the controller directly using a keyboard. The robotic arm has a load.[1] bearing capacity of 100gms and a maximum workspace of 650mm along the horizontal plane. Nowadays the robotic arm plays an important role in many of the fields like automotive companies, medical equipment's, in rocket launcher, biomedical field etc.

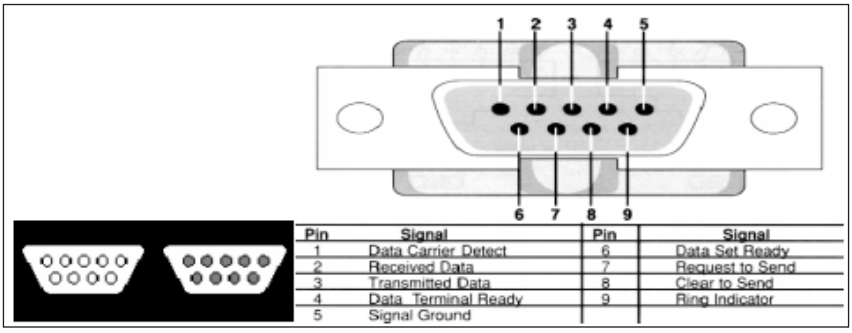


Figure 1.D-sub 9 Male & 9 Female Connector

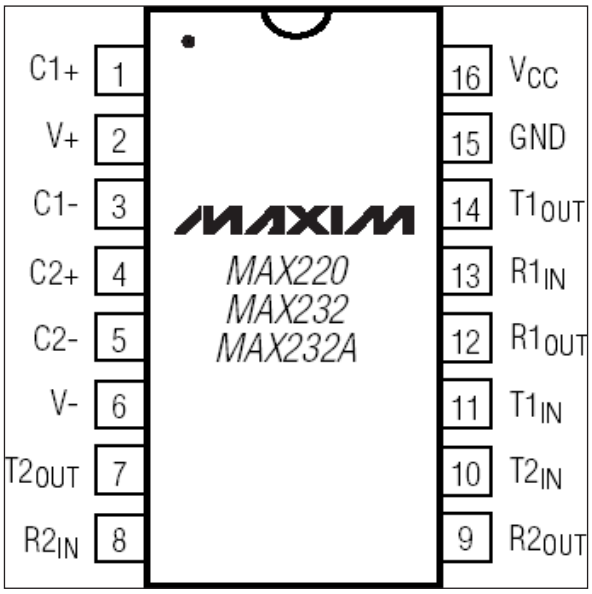
Introduction to Components

Introduction to DB-9 Male Female Connector. The DE-9 D-sub 9-pin connector is frequently incorrectly described to as the DB-9 connector. The E refers size shell, A DB-25 connection has a B size shell, but the ordinary nine pin connector is less significant and has an E size shell. This connector (whatever what you call it) is utilized for a range of purposes. Two ordinary uses are RS-232, EIA-232 (serial) connections (plus UPS cables), a assortment of video interfaces on the IBM PC. Here's a good set of figures for D-sub 9 male and female connectors, as viewed from the pin side (not the solder side) along with it table given.[2]

Introduction to MAX-232

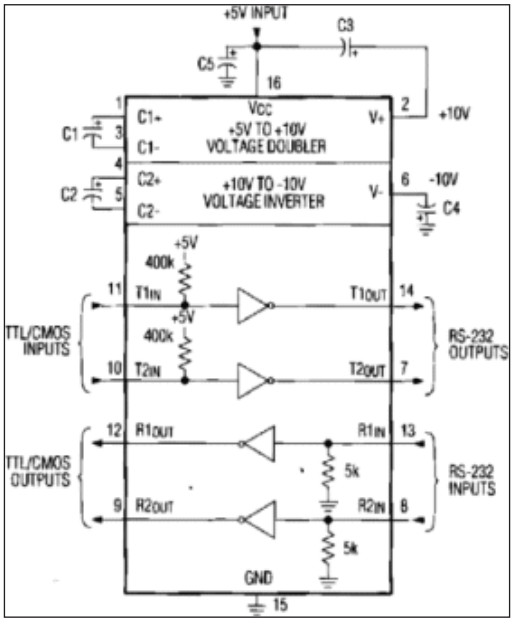
DB-25	D-sub-9	Signal Direction	Signal Name
1		x	Protective Ground
2	3	DTE-to-DCE	Transmitted Data
3	2	DCE-to-DTE	Received Data
4	7	DTE-to-DCE	Request To Send
5	8	DCE-to-DTE	Clear To Send
6	6	DCE-to-DTE	Data Set Ready
7	5	x	Signal Ground
8	1	DCE-to-DTE	Received Line Signal Detector (Carrier Detect
20	4	DTE-to-DCE	Data Terminal Ready
22	9	DCE-to-DTE	Ring Indicator

The MAX 232 is a double driver receiver that incorporates



a capacitive voltage generator to supply.[3,4]

TIA EIA-232-F voltage levels from a specific 5-V supply. Every receiver switches TIA EIA-232-F inputs to 5-V TTL CMOS levels. The receivers has a with a normal maximum of 1.3 V, an hysteresis of 0.5 V, be able to receive ±30-V inputs. Every driver transforms TTL/CMOS input amounts into TIA/EIA-232-F levels.



Function Tables

EACH DRIVER

INPUT TIN	OUTPUT TOUT
L	H
H	L

H = high level, L = low level

EACH RECEIVER

INPUT RIN	OUTPUT ROUT
L	H
H	L

H = high level, L = low level

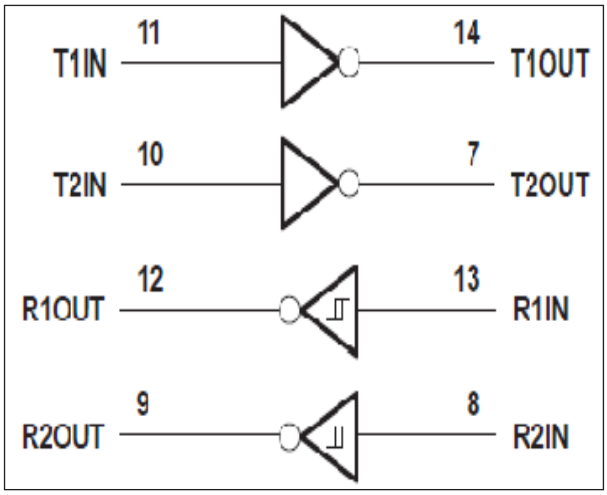
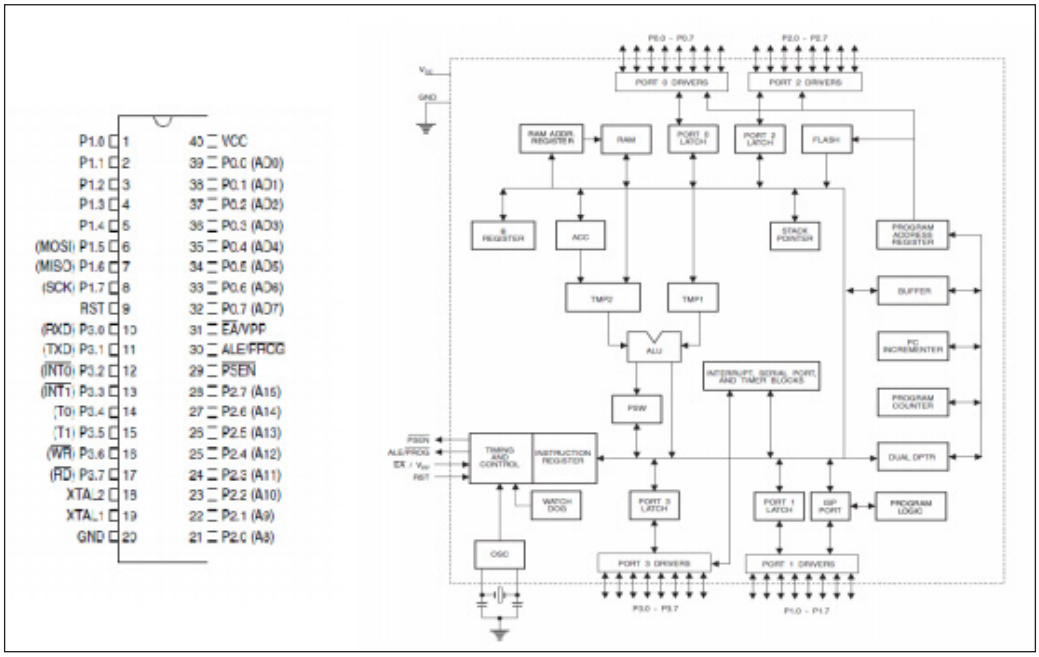


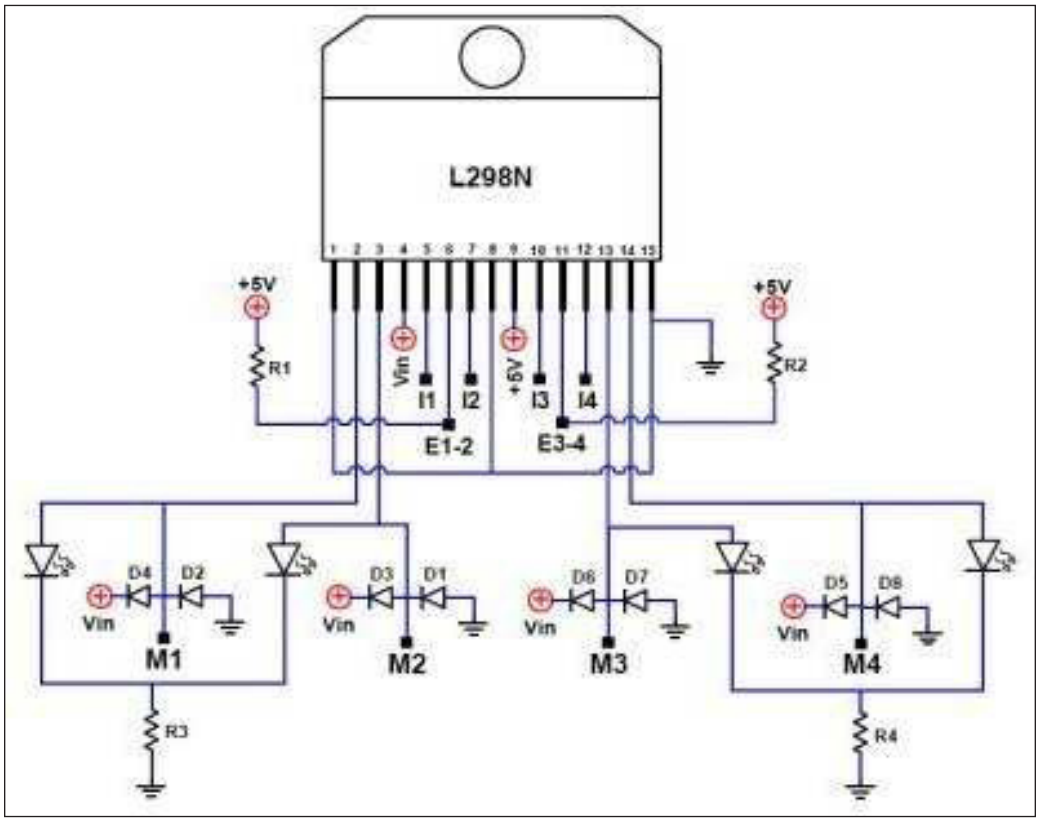
Figure 2.Logic Diagram for MAX-232

Introduction to IC 89S51

The gadget is a solid coordinated high voltage, high ebb



and flow four channel driver intended to acknowledge standard DTL or TTL rationale levels and drive inductive loads, (for example, transfers solenoids, DC and venturing engines) and exchanging power transistors to streamline use as two extensions each pair of channels is outfitted with an empower input.[5] A distinct supply input is accommodated the rationale, permitting activity at a lower voltage and inward clasp diodes are incorporated. This gadget is appropriate for use in exchanging applications at frequencies up to 5 kHz. The L293D is gathered in a 16 lead plastic bundle which has 4 focus pins associated together and utilized for heat sinking The L293DD is collected in a 20 lead surface mount which has 8 focus pins associated together and utilized for heat sinking.[6]



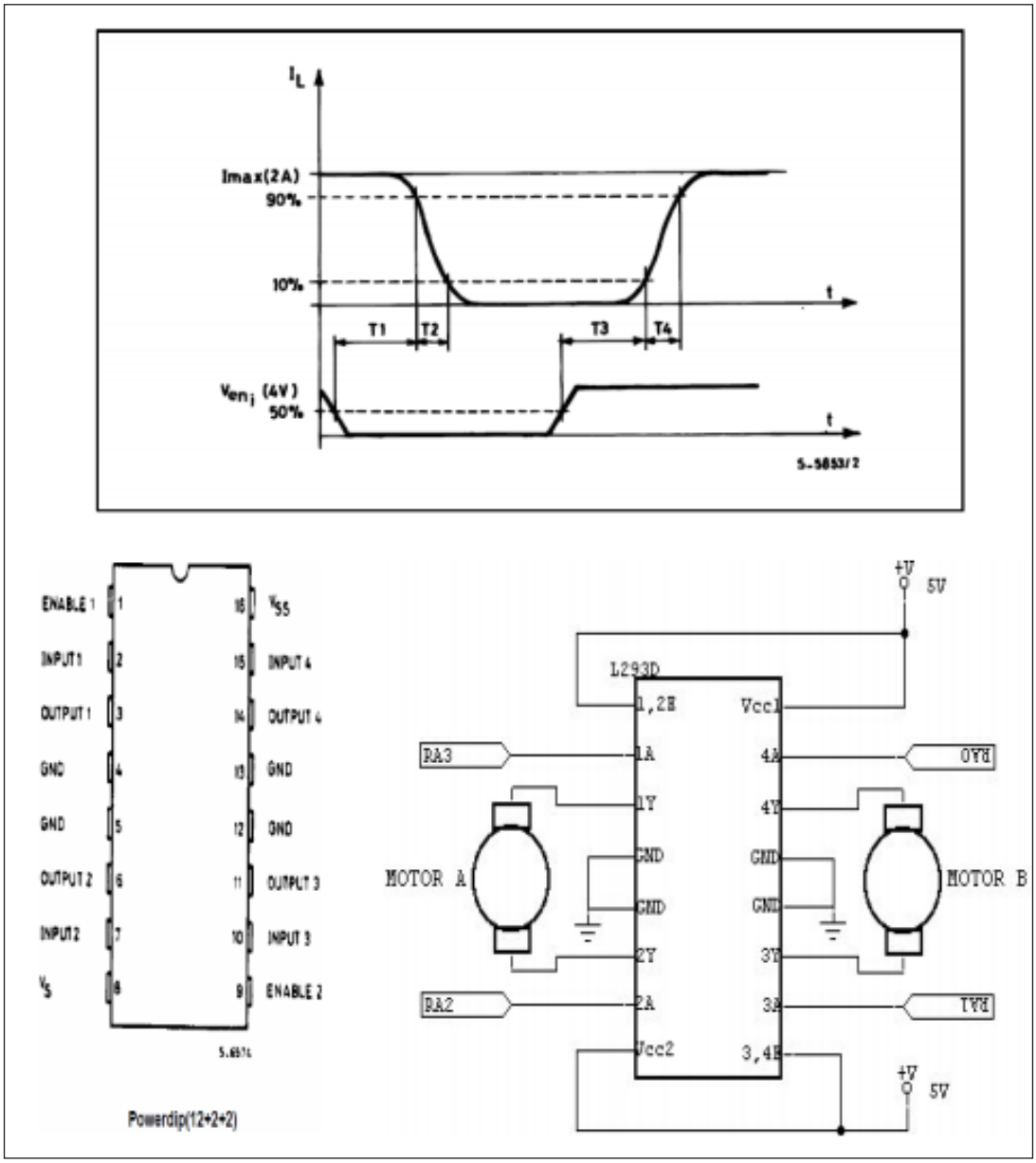


Figure 3.IC L293D and L293D Driver Circuit

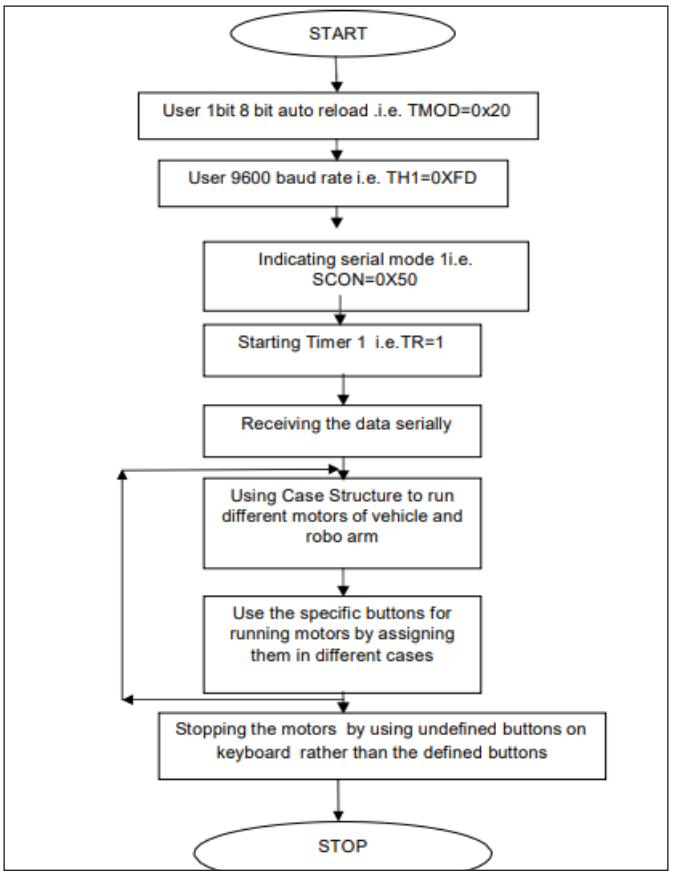
TRUTH TABLE (one channel)

Input	Enable (*)	Output
H	H	H
L	H	L
H	L	Z
L	L	Z

Z = High output impedance
(*) Relative to the considered channel

Implementation of Hardware

Flowchart

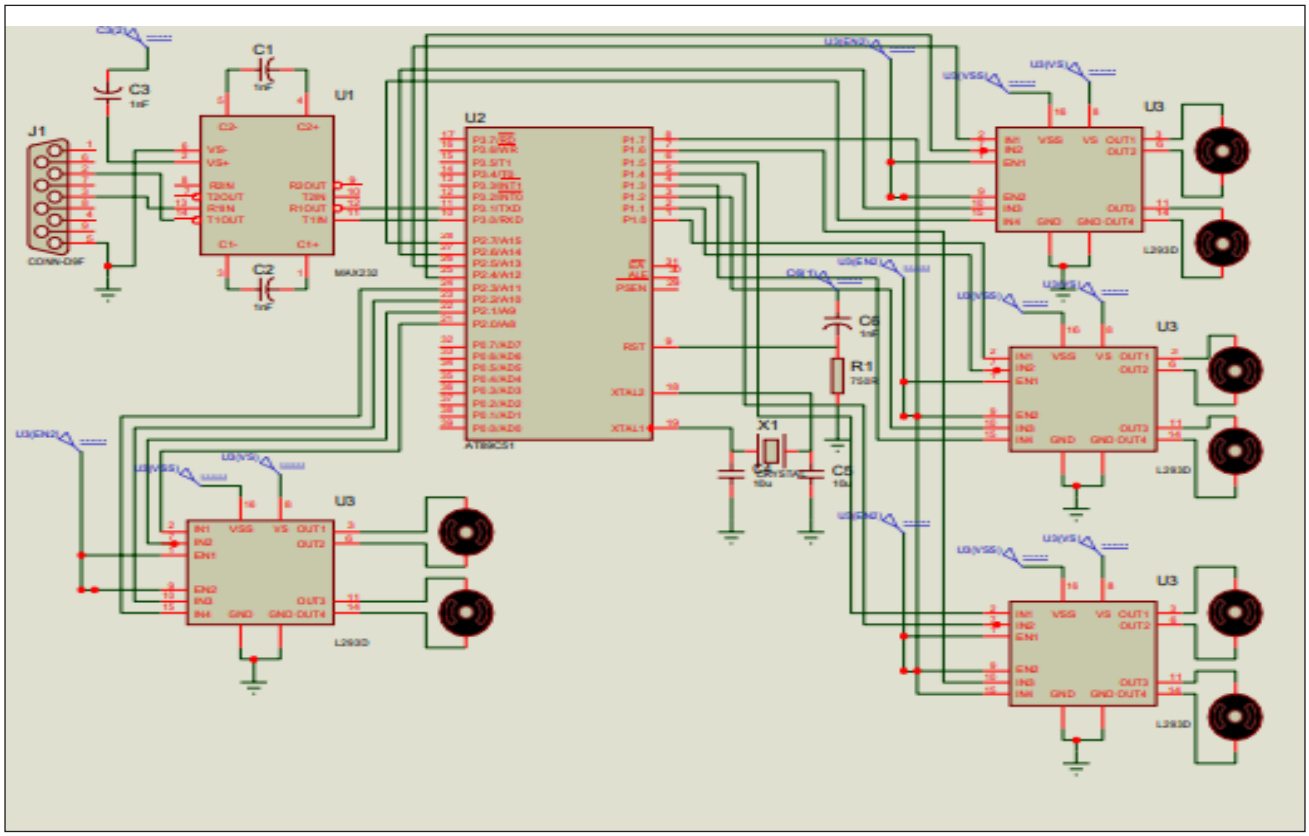


Implementation on KEIL Software

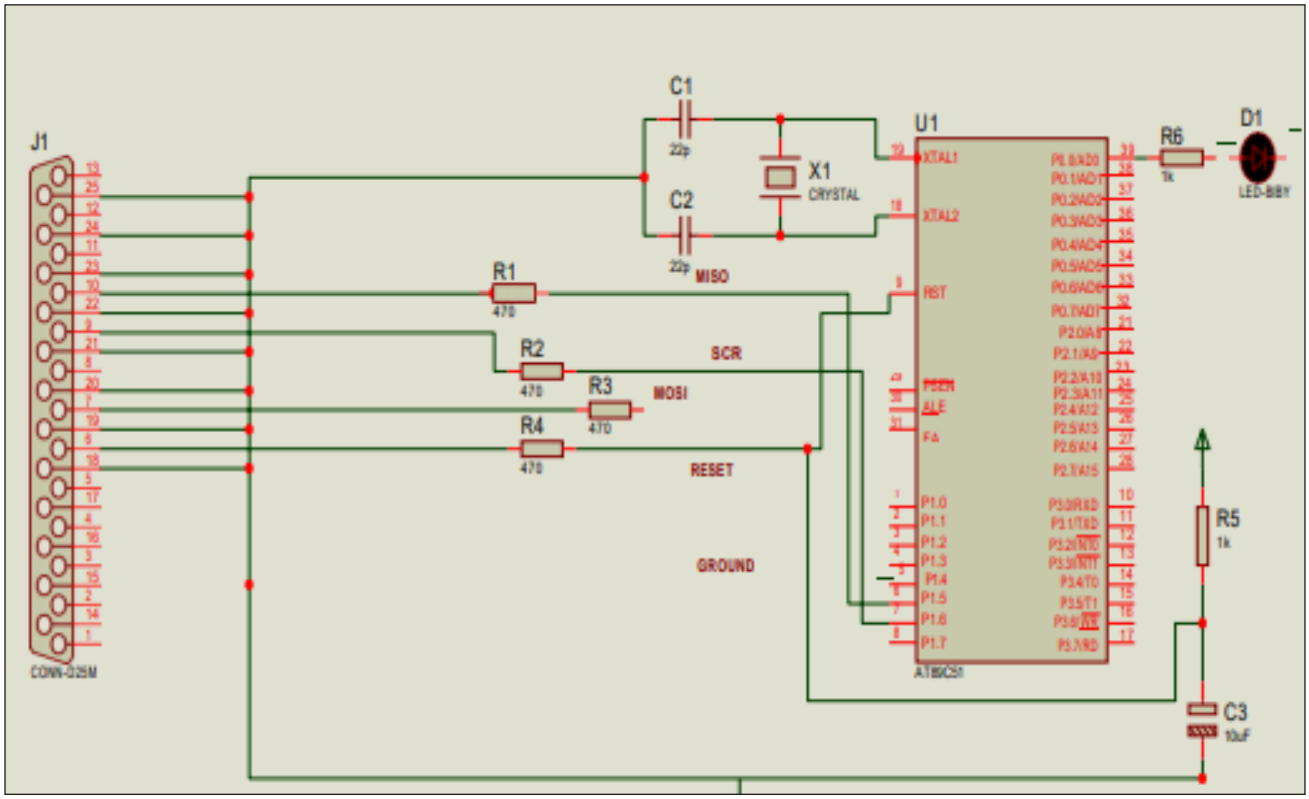
```
#include <reg51.h>
int main()
unsigned char rx_byte;
TMOD=0x20;//use timer 1 8 bit auto related
TH1=0xFD;//9600 baud rate
SCON=0x50; //indicating the serial mode 1 where an 8 bit
data is start and stop bit
TR1=1;//start the timer 1;
while(1)
while(RI==0);
rx_byte = SBUF;
RI = 0;
switch(rx_byte)
case w
P2=0x05; //both the wheels forward direction
break
case s
P2=0x0A;//reverse both the wheels
break
case a P2=0x01;//left side
break
case d P2=0x04;//right side
break
case 1 P2=0x10;//motor 1 clock wise
break
case 2 P2=0x20;//motor 1 anticlockwise
break
case 3 P2=0x40;//motor 2 clockwise
break
case 4 P1=0x80;//motor 2 anticlockwisebreak
case 5 P1=0x01;//motor 3 clockwise
break
case 6 P1=0x02;//motor 3 anticlockwise
break
case 7 P1=0x04;//motor 4 clockwise
break
case 8 P1=0x08;//motor 4 anticlockwise
break
case 9 P1=0x10;//motor 5 clockwise
break
case 0 P1=0x20;//motor 5 anticlockwise
break
default
P2=0x00
break
return 0
```

Implementation & Result

Robo Arm with the Robo Vehicle

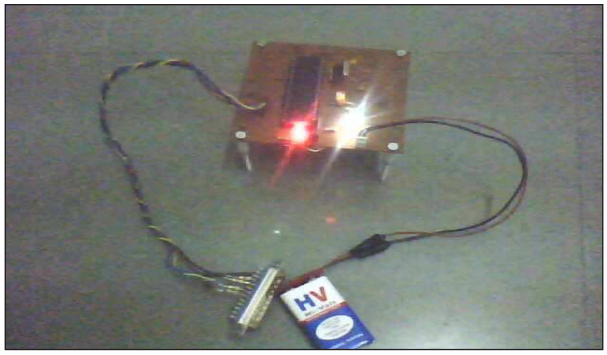


IC Programmer



Result

Thus the robo arm and the IC code dumper project is completed.



IC Programmer

Robo Arm with the Robo Vehicle

Conclusion

The Project work on Robo arm and IC code dumper on hardware platform is completed successfully. For this work 8051 programming is implemented and tested on the following platforms Proteus & Keil Software. From result of this study we can say that the platform with parallel execution capability have better performance compare to platform with sequential way of execution. So, we can try to check the performance of this project on platforms like FPGA.

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