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A Design of GUI Based Wireless Robotic Car

Fadnavis Shubham
Department of Electronics and Communication, Acropolis Institute of Technology and Research, Indore, MP, INDIA

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Abstract

The present paper aim to illustrate a notable application using a microcontroller 8051. This application proposes to a new and unique technique to regulate wireless car with the help of GUI. Presently a wireless car can be control by four different sections; the first controlling section deals with sending of some control signal, which based on input provided by the user by visual basic (VB) tool and then processing section, process on control signal using CMOS to TTL Converter (HIN232CPO531BC8GIC), and the output of this IC act as a input to microcontroller 8051. Transmitter section, transmit the signal through transmitter IC (SM6136B146H0626) and then decoded to suitable voltage levels for relays controller to control the DC motor, after it is received by receiver IC(4060376).

Keywords: GUI (graphical user interface), IC (integrated circuit), microcontroller, receiver, transmitter, visual basic (VB).

Introduction

Necessities are the mother of inventions. Whenever human being finds the need of something it's led to a wonderful invention. As I all know that today is the era of revolution in electronics science and also in engineering is one of the roots of the science. Development in the field of electronic is the reaching far ahead whether it is an embedded system designing or CMOS technology.

With the advancement of software field every all devices are being automated and controlled by GUI system though software application. On continuations with the growing advancement it is proposed to design a control system (robot i.e. car) which is based on combined applications of software as well as hardware. The system is showing in the figure-1.

Figure –1
GUI based Wireless Robotic Car

This project is VB based controlled system titled "GUI based robotic car". Where GUI is controlling tool through VB programming and robot is wireless controlled system. In the system, signals are transmitted through COM port of control system. Basic elements of this project are as follows:

Microcontroller 8051, FM transmitting IC (SM6136B146 H0626), FM receiving IC (4060376), Power supply 9V (DC). This is showing in the process diagram of figure-2.

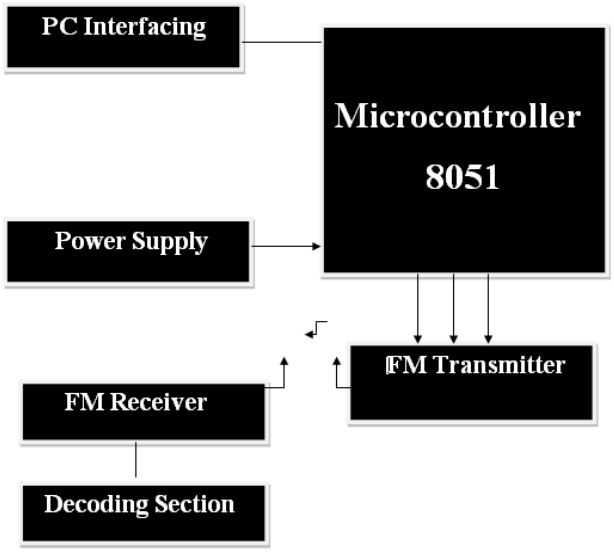

Figure-2
Process Diagram of Robotic Car

System has five different sections as follows: controlling section, processing section, transmitting section, receiving section, decoding section. The block diagram of the project is shown in the figure-3

Here GUI interfacing, GUI is main controlling system of project. The GUI generates four different coded signals which are generated with the help of visual basic. These signals are transmitted through com port of GUI and GUI is interface with microcontroller using DB 9 connector. After process by microcontroller, signal is transmitted through FM modulator

(transmitter). Signal receive by the FM receiver and process for dc motor, +9v (DC) power supply is needed for the DC motor[1].

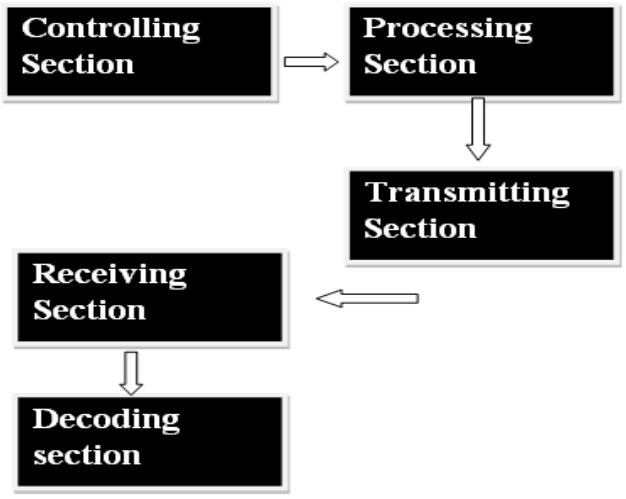

Figure-3
Block Diagram of Robotic Car

Table-1
Detailed List of components used in Project

Transformer	9V
Transistor	L7805CV1
Capacitors	100µf-25V
LED(Light Emitting Diode)	Red
COM port connector	DB9
Microcontroller	AT89C51
Max232IC	HIN2322CP PO531BC8G
Resistances	1Ω, 1MΩ
Preset	1KΩ
Battery	9V(DC)
Driver IC	ULN2003 AG
Relay	DC-5VGS-SH-205T FW
Aerial	---
Receiving IC	4060376
DC Motor	---
Switch	on/off
Transmitter	SM6136B 146H0626
Voltage regulator IC	7805

Material and Methods

Part-I Hardware: Working can be defined with the help of following five sections: controlling section, processing section, transmitting section, receiving section, decoding section.

Controlling Section: Command signals are generated GUI designed using VB tool. Generally five command signals are generated for controlling section to provide following controls: forward control, backward control, left control, right control, stop control.

These signals are define using GUI through which user can generate them as per the requirement. These controlling signals are then connect to microcontroller, PC interface board through DB9 connector.

Processing Section: At the interface level, provide proper signal of +5V (operating frequency of microcontroller). After proper conversion of voltage through step down transformer, bridge rectifier (MIC DB107), voltage regulator (SIF527CHNL), CMOS to TTL converter (HIN232CPO531BC8G). Basically this IC change the voltage level, and the output of this project IC act as a input to microcontroller 8051, on receiving pin no RXD-10 and eight bit information is controlled and processed.

Transmitting Section: After proper signal conditioning the microcontroller gives its output to port no.P2. Then these output signals behave as a feeder to relays (GS-SH-205TFW), which basically works by ULN2003 IC. This is driver for operational four relays. This IC act as a source to drive the relay parts and finally the signal is transmitted through, transmitting IC (SM6136B). This IC provides proper modulation to our control signal to be transmitted through max proper; here the crystal oscillator is used as a source of carrier generator.

Receiving Section: RX-4060376 IC receives the control signal and this IC provides the demodulation of carrier signal. Then again the output of receiver is amplified and filter up to the proper dc level. The signal acts as a source for the DC motor to provide the control movement. Then the whole process governs in this way.

The figure-4 shows the layout of robotic car. With help of this layout any one can be create this model. Figure-5 shows the process, for access the system in proper manner.

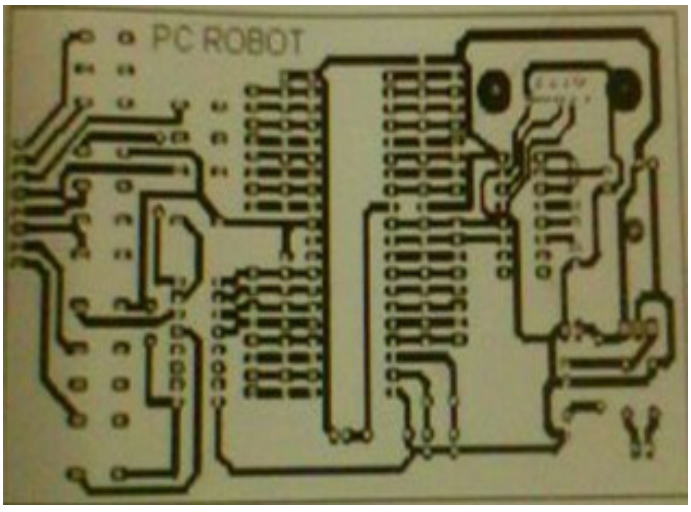

Figure-4
PCB layout of Robotic Car

Part-II Software Section (A): Here using two different tools. The first tool is used for GUI operation (i.e. visual basic) with this design command instruction format like reverse, forward, left, right for robotic car.

Login Form (Coding) To Enter in Control System (in visual basic)

```
Private sub cmdexit_Click()
End
End Sub

Private sub cmdlogin_Click()
If txtpass.Text = "AITR" Then
If txtuser.Text = "AITR" Then
MsgBox "WELCOME TO ROBOTIC CONTROL SYSTEM"
Form2.Hide
Form1.Show
Else
        MsgBox "INVALID USER NAME"
txtuser.Text = ""
txtpass.Text = ""
End If
Else
MsgBox "INVALID PASSWORD"
txtuser.Text = ""
txtpass.Text = ""
End If
End Sub
Dim flag As Integer
Private Sub cmdback_Click()
        flag = 2
        Timer1.Enable = True
End sub
Private Sub cmdforw_Click()
flag = 1
        Timer1.Enable = True
End sub
Private Sub cmdleft_Click()
        flag = 3
        Timer1.Enable = True
End sub
Private Sub cmdright_Click()
flag = 4
        Timer1.Enable = True
End sub
Private Sub cmdstop_Click()
flag = 5
        Timer1.Enable = True
End sub
Private Sub Form_Load()
        MSComm1.commport = 1
        MSComm1.settings = "9600, N, 8, 1"
        MSComm1.PortOpen = true
        MSComm1.InnputLen = 3
End Sub

Private Sub timer1-Timer ()
If (k1<2) then
If (flag = 1) then  'forward
Flag = 1
MSComm1.output = "F"
MSComm1.output = "F"
Text1.Text = flag
End If
If (flag = 2) then  'backward
Flag = 2
MSComm1.output = "B"
MSComm1.output = "B"
Text1.Text = flag
End If
If (flag = 3) then  'left
Flag = 3
MSComm1.output = "L"
MSComm1.output = "L"
Text1.Text = flag
End If
If (flag = 4) then  'right
Flag = 4
MSComm1.output = "R"
MSComm1.output = "R"
Text1.Text = flag
End If
If (flag = 5) then  'stop
Flag = 5
MSComm1.output = "S"
MSComm1.output = "S"
Text1.Text = flag
End If
Else
                K1 = 0

End If
                K1=k1+1
End sub
Private Sub MSComm1_On Comm ()
Text2.Text = Text2.Text and MSComm1.Input
End sub
```

Part-II Software Section (B): Another tool is used for operate microcontroller. For this using two different software. The KEIL software is written in Embedded C language. Compile it to obtain hex code. Burn (through flash magic software) the generated hex code into the microcontroller[2].

The KEIL software is commented and easy to understand. Set pin P2.4 and P2.5 for Left motor and pin P2.6 and P2.7 for Right motor. Program the microcontroller to operate forward motion of motor for input "f". Similarly "b" for backward, "l" for left turn, "r" for right turn and "s" to stop the car.

Code for Keil software

```
#include<reg51.h>
```

```
sbit f=P2^4;
sbit b=P2^5;
sbit l=P2^6;
sbit r=P2^7;

char rec1,rec2;
void delay(unsigned int time)
        {
         int a,b;
         for (a=0;a<=time;a++)
                {
                        for(b=0;b<=1275;b++)
                        {}
                }
        }
unsigned char receive()
        {
                char b;
                RI=0;
        //      buffer
                while(RI==0);
       //       occure
                b=SBUF;
                RI=1;
                return(b);
        }
void main()
{
                f=b=l=r=0;
                TMOD=0x20;      // timer1, 8bit auto reload
                TH1=0xfd;       // 9600 baud rate
                SCON=0x50;      //Transmission Control
                                  Register
                TR1=1;          // start timer
                SBUF=0;
        while(1)
                {
                        rec1=receive();
                        if(rec1=='F')
                                {
                                        f=1;
                                        b=0;
                                        l=0;
                                        r=0;
                                }
                        if(rec1=='B')
                                {
                                        f=0;
                                        b=1;
                                        l=0;
                                        r=0;
                                }
                        if(rec1=='L')
                                {
                                        f=0;
                                        b=0;
                                        l=1;
                                        r=0;
                                }
                        if(rec1=='R')
                                {
                                        f=0;
                                        b=0;
                                        l=0;
                                        r=1;
                                }
                        if(rec1=='S')
                                {
                                        f=0;
                                        b=0;
                                        l=0;
                                        r=0;
                                }
                        delay(10);
                }
}
```

Results and Discussion

For operating these vehicle users operate two formats which are showing in the figure-6 and figure-7 (login and control command format). With the help of these formats the user can be access the system, which having password of the system. Figure- 8 shows the output of the KEIL software after the compiling code and then it converted it to the hex file for microcontroller 8051.

Future enhancement: i. I can connect web cam to our robotic car, which will be able to broadcast the spying scene. ii. I can also attach microphone for sound reception. iii. I can also design a system, which is controlled by mobile.

Conclusion

In this paper shown a notable application of a microcontroller 8051. This application describes how to control a car with the help of graphical user interface. The paper begins by understanding the prevailing problems and suggests appropriate solutions to overcome them.

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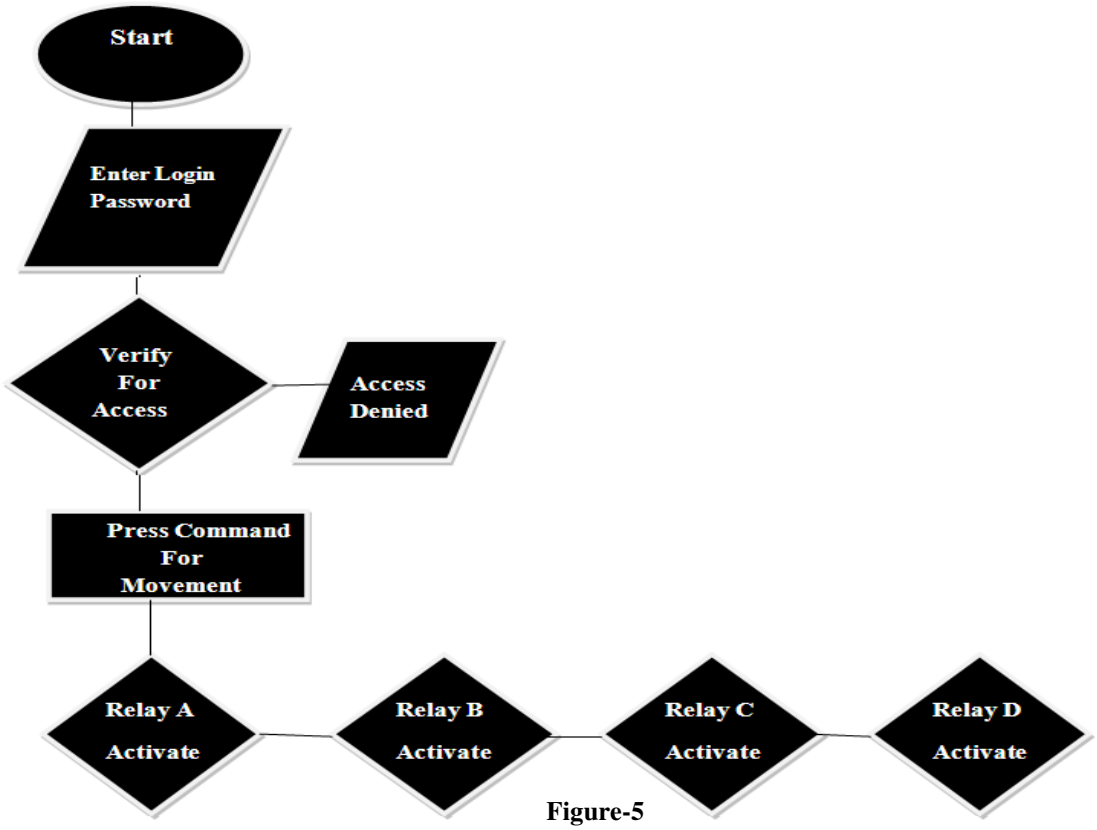

Figure-5
Flow Chart of Robotic Car

Figure-6
Login Format for Robotic Car

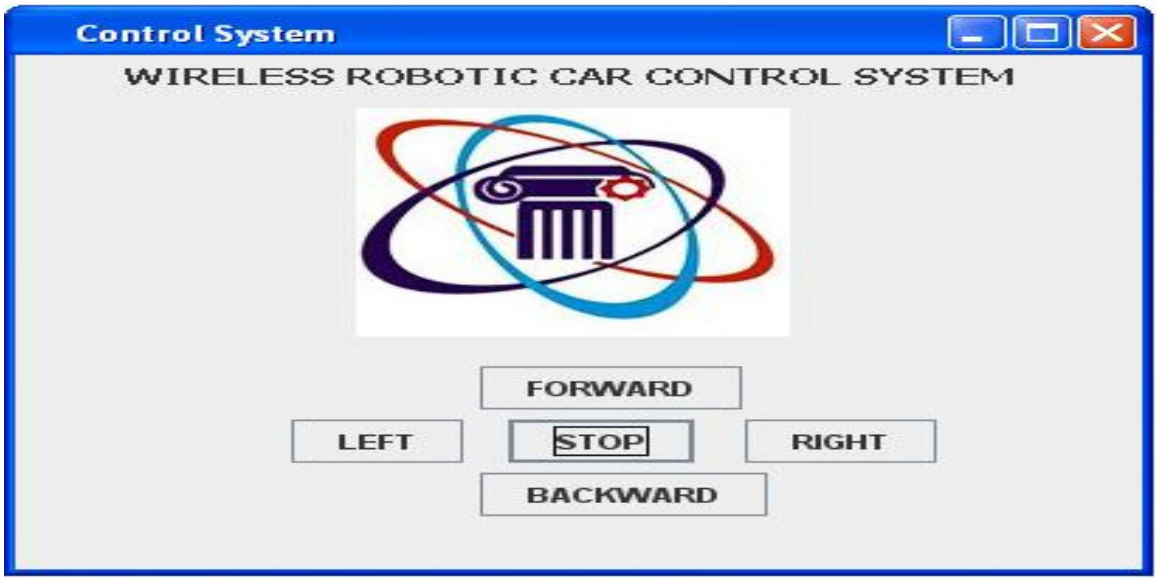

Figure-7
Format for Control Command

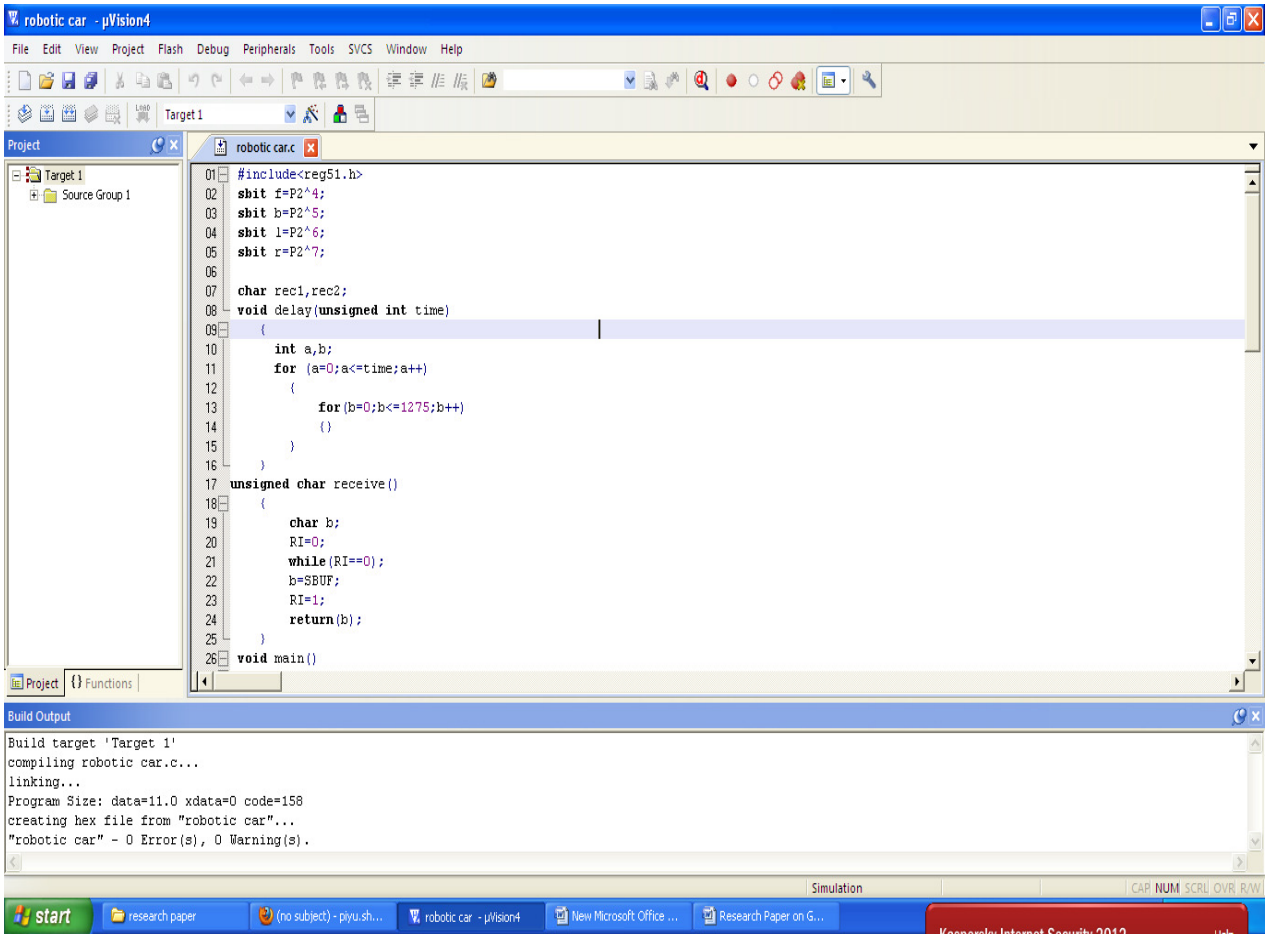

Figure-8
Output of KEIL Software