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MULTIPLE ADJUSTMENT WHEEL CHAIR WITH WIRELESS ALERT

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***Abstract*— This paper deals a project with the interface of different modules including RF transceiver, Pulse Rate sensor, Relay module, DC motor, 16*LCD display and GSM (Global System for mobile communication) this Technology plays a vital role in modern world communication, like in medical emergencies. This project multiple adjustment wheel chair with wireless alert is introduced for specially challenged people for their better convenience in their daily activities. To solve this problem, multiple adjustment wheel chair with wireless alert is implemented. The control operation is given from RF transmitter. A pulse rate sensor is mounted on the wheel chair's handle which continuously monitors the pulse rate of the user and displays in 16*2 LCD and if the condition is abnormal, a message will be sent to the registered mobile number through GSM SIM300 module.**

***Keywords*— GSM Module, Transformer, Micro controller, modulation, Photo plethysmography, Display, RF transceiver.**

I. INTRODUCTION

The wheelchair is an important way of transfer for handicapped and aged people. The Multiple adjustment wheel chair with wireless alert has the ability to control the position of the backrest and the footrest using a RF remote. It also has a LCD which shows the pulse rate of the person who sits on the chair. Multiple stages of back rest and foot rest is achieved by rotating motors in clock wise and anti-clock wise direction. Every stage has 30° angle. The motors are driven by motor drivers which fetch the control from microcontroller.

In this wheel chair, a sensor is attached to the handle which helps to recognize the pulse rate of a person who sits on the wheel chair. The monitored pulse rate will be displayed on a LCD and if the pulse rate is gone abnormal a message will be sent to registered mobile number through a GSM 300 module. GSM SIM300 is a plug and play GSM Modem with a simple to serial interface. Uses it to send SMS, make and receive calls, and do other GSM operations by controlling it through simple AT commands from microcontroller. A PIC16F877Ais

used as a brain of our project. All the modules are connected to the microcontroller which performs the output as per the instructions given to it.

II. BATTERY CHARGER

FIGURE 1: BATTERY CHARGER MODULE

This battery charger circuit is mainly involves two sections, power supply section and load comparison section. The main supply voltage 230V, 50Hz is connected to the primary winding of the center tapped transformer to step down the voltage to 18-0-18V. The output of the transformer is connected to the diodes. Here diodes are used to convert low AC voltage to pulsating DC voltage. This process is also called as rectification. The pulsating DC voltage is applied to the capacitor to remove the AC ripples. Thus the output of the capacitor unregulated Dc voltage. This unregulated DC voltage is no applied to the LM317 variable voltage regulator to provide the regulated DC voltage.

Lm317 voltage regulator output is applied to the battery through the diode and resistor. Here diode is used to avoid the discharge of battery when main supply fails. If the battery voltage is below 12V, then the current from LM317 IC flows through the resistor and diode to the battery. When the battery voltage rises to 13.5V, the current flow to the battery .Now the base of the transistor gets the sufficient current to turn ON. So that the output current from LM317 voltage regulator is grounded through the transistor Q1. For charging 12V battery charger circuit of 13.5V is required, it is because for charging a cell i.e. for 2V it required 2.25V so for charging 12V it requires 6×2.25V = 13.5V. A blocking diode is used in the circuit for blocking the reverse flow of charge from the battery when power is not there (if the charger is connected only). As the diode has a voltage drop of 0.7V the output of the charger should be 13.5 + 0.7 = 14.2V. The transformer used here is 230/15V, 1A four diodes are connected as such they form a bridge rectifier which increases the efficiency of the power supply around 80%.

III. MICROCONTOLLER POWERSUPPLY

7805 is a 5V fixed three terminal positive voltage regulator IC. The IC has features such as safe operating area protection, thermal shut down, internal current limiting which makes the IC very rugged. Output currents up to 1A can be drawn from the IC provided that there is a proper heat sink. ICs regulator is mainly used in the circuit to maintain the exact voltage which is followed by the power supply. A regulator is mainly employed with the capacitor connected in parallel to the input terminal and the output terminal of the IC regulator. For the checking of gigantic alterations in the input as well as in the output filter, capacitors are used. While the bypass capacitors are used to check the small period spikes on the input and output level.

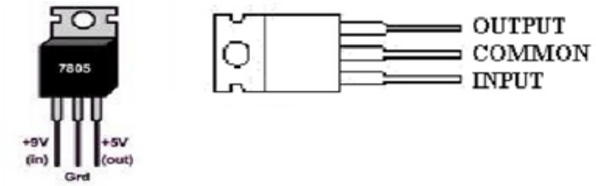


FIGURE 2: 7805 VOLTAGE REGULATOR

We are using regulator ICs to maintain a constant output voltage in a power supply circuit. Regulator IC 7805 is used for getting 5V. The IC7805 is simple to use. Connect the positive lead form unregulated DC power supply to the input pin, connect the negative lead to the common pin and then turn on the power, a 5-volt supply from the output pin will be obtained.

Circuit design:

The required output voltage is 5V/500 mA

J13 and J14 are 2 way 5A terminal.

P=V*I=3.8x500mA=1.9W

There for the available regulator for the specification 5V/500mA/3W is 7805 T0220 package

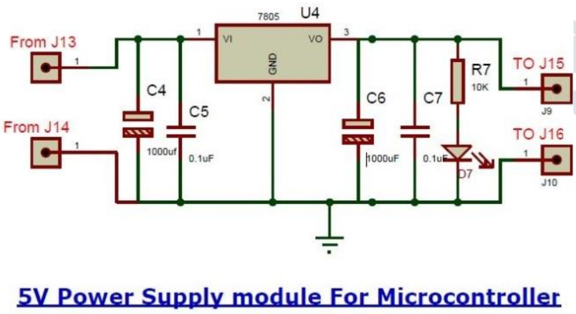


FIGURE 3: POWER SUPPLY CIRCUIT.

IV. MICROCONTROLLER UNIT

Microprocessors brought the concept of programmable devices and made many applications of intelligent equipment. Most applications, which do not need large amount of data and program memory, tended to be costly. The microprocessor system must satisfy the data and program requirements so, sufficient RAM and ROM are used to satisfy most applications. The peripheral control equipment also need to be satisfied. Therefore, almost all-peripheral chips were used in the design. Because of these additional peripherals cost will be comparatively high. In comparison, a midrange Microcontroller PIC16F877A chip has all that and it has some another additional feature also. On comparing a board full of chips (Microprocessors) with one chip with all components in it (Microcontroller).

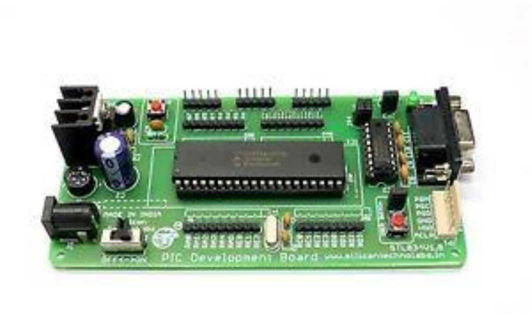


FIGURE 4: MICROCONTROLER MODULE.

Advantages:

- Less number of instructions to learn.
- RISC architecture.
- Built-in oscillator with selectable speeds.
- Easy entry level, in-circuit programming plus in-circuit debugging PIC kit units available for less than 2000.
- Inexpensive microcontrollers.
- Wide range of interfaces including I²C, SPI, USB, USART, A/D, programmable comparators, PWM, LIN, CAN, PSP, and Ethernet.
- Availability of processors in DIL package make them easy to handle.

V. MICROCONTROLLER PIC16F877A

The controller unit controls the entire movement of the hovercraft. So, PIC16F877A is used as our controller. PIC16F877A is a MICROCHIP family microcontroller used to control the movement of the hovercraft. It is a low power, high performance CMOS 8-bit microcontroller with 8k bytes programmable memory. The PIC16F877A belongs to the PIC family of Microcontrollers. It features all the components which modern microcontrollers normally have. For its low price, wide range of application, high quality and easy availability, it is an ideal solution in applications such as:

The control of different processes in industry. Machine control devices, Measurement of different values etc. The PIC16F877A CMOS FLASH-based 8-bit Microcontroller is upward compatible with the PIC16C5x, PIC12Cxxx and PIC16C7x devices.

It features 20 ns instruction execution, 256 bytes of EEPROM data memory, self- programming, an ICD, 2 comparators, 8 channels of 10-bit Analog-to-Digital (A/D) converter, 2 capture/ compare/ PWM functions, a synchronous serial port that can be configured as either 3-wire SPI or 2-wire I2C bus, a USART, and a parallel slave port. Register-bank switching is required to access the entire RAM of any devices. Operations and registers are not orthogonal; some instructions can address RAM and/or immediate constants, while others can use the accumulator only. These are it's, limitations. Lots of Microprocessor circuitry and program to debug. In Microcontroller, there is no Microprocessor circuitry to debug.

A. INPUT/OUTPUT PORTS OF PIC16F877A

PIC16F877A series normally has five input/output ports. They are used for input/output interfacing with other devices/circuits. Most of these port pins are multiplexed for handling alternate function for peripheral features on the devices. All ports in a PIC chip are bidirectional. When the peripheral action is enable in a pin. It may not be used as its general input/output functions. The PIC 16F877A chip basically has 5 input/output ports. The 5 input /output ports and its functions are given below.

B. PORTA AND TRISA REGISTERS

PORTA is 16-bit wide bi-directional port; the direction of this port is controlled by TRISA data direction register. Setting a TRISA (=1) makes corresponding PORTA pin as an input, clearing the TRISA (=0) making the corresponding PORTA pin as an output. Pin RA4 is multiplexed with the "Timer0" module clock input to become the RA4 /T0CKI pin and functioning either input/output operation or timer 0 clock functioning module. The RA4/TOCKI is Schmitt Trigger input and an open-drain output.

Other PORTA pins in this microcontroller multiplexed with analog inputs and the analog $V_{ref\ input}$ for both the A/D converters and the Comparators. The operation of each pin is selected by clearing/ setting the appropriate control bits in the ADCON1 and/or CMCON registers. The TRISA register control the direction of the PORT pins even when they are being used as analog inputs. The user must ensure the bits in the TRISA register are maintained set when using them as analog inputs.

C. PORTB AND TRISB REGISTERS

PORTB is also an 8-bit bi-directional PORT. Its direction is controlled and maintained by TRISB data direction register. Setting the TRISB into logic '1' makes the corresponding "PORTB" pin as an input. Clearing the TRISB bit make PORTB as an output. Three pins of the PORTB are multiplexed with the In-circuit debugger and low-voltage programming function: RB3/PGM, Rb6/PGC and RB7/PGD for performing its alternate functions.

D. PORTC AND TRISC REGISTERS

PORTC is an 8-bit wide, bi-directional PORT which controlled and maintained by TRISC data direction register. Setting a TRISC bit (= 1) will make the corresponding PORTC pin an input (i.e., put the corresponding output driver in a high-impedance mode). Clearing a C bit (= 0) will make the corresponding PORTC pin an output PORTC also multiplexed with several peripheral functions. PORTC pins have Schmitt Trigger input buffers. When enabling peripheral functions, more care should be taken in defining TRIS bit for each PORTC pin as compared to other. Some peripheral override the TRIS bit to make a pin an output, while other peripheral override the TRIS bit to make a pin an input.
Since the other TRIS bits override is an effect while the peripheral is enabled, read-modify write instruction (BSF, BCF and XORWF) with TRISC as the destination, should be avoided. The user should prefer to the corresponding peripheral section for the correct TRIS bit settings.

E. PORT D AND TRIS D REGISTERS

PORTD is an 8-bit PORT with bi-directional nature. This PORT also with Schmitt Trigger input buffers, each pin in this PORTD individually configurable as either input or output. PORTD can be configured as an 8-bit wide microprocessor PORT (functioning as parallel slave PORT) by setting control bit, PSP mode (TRIS E <4>). In this mode, the input buffers are TTL.0.

F. PORT E AND TRIS E REGISTERS

PORT E has only three pins (RE0/RD/AN5, RE1/WR/AN6 and RE2/CS/AN7) which are individually configurable as inputs or outputs. These pins controllable by using its corresponding data direction register "TRISE". These pins also have Schmitt Trigger input buffers. The PORTE pins become I/O controls inputs for the Microprocessor PORTS when bit PSP mode is set. In this mode, the user must make certain that TRISE bits are set and that pins are configured as digital inputs. Also, ensure that ADCON1 is configured for digital I/O.

In this mode, the input buffers are TTL. TRISE registers which also controls the parallel slave PORT operation. PORTE pins are multiplexed with analog input. When selected for analog inputs, these pins will read as '0's. TRIS E controls the direction of the RE pins, even when they are being used as analog inputs. The user must make sure to keep the pins configured as inputs when using them as analog inputs.

G. PROGRAM MEMORY (FLASH)

It is used for storing a written program. Since memory is made in FLASH technology and can be programmed and cleared more than once, it makes this microcontroller suitable for device development.

H. EEPROM

Data memory that needs to be saved when there is no supply. It is usually used for storing important data that must not be lost if power supply suddenly stops. For instance, one such data is an assigned temperature in temperature regulators. If during a loss of power supply this data was lost, we would have to make the adjustments once again upon return supply. Thus, our device losses self-reliance.

I. INTERRUPTS

Interrupt is the signal sent to the microcontroller to make the event that requires immediate attentions, interrupt is requesting the processor to stop to perform the current program and to make time to execute a special code. In fact, the method interrupt defines the option to transfer the information generated by internal or external system.

They are two types of interrupts Hardware and Software interrupts. Software interrupts come from a program that runs by the processor and requests the processor to stop running the program. Hardware interrupts these are sent microcontroller by hardware devices as third party, some of them can be masked by interrupt enable bit.

J. PIN CONFIGURATION

The PIC16F877a is a 40 pin microcontroller IC. It consists of two 8 bit and one 16 bit timer. Capture and compare modules, serial ports, parallel ports and five input/output ports are also present in it.

PIC16F887 is one of the latest products of Microchip. It features all the components which upgraded microcontrollers normally have. For its low price, wide range of application, high quality and easy availability, it is an ideal solution in applications such as: control of different processes in industry, machine control device, measurement of different values etc.

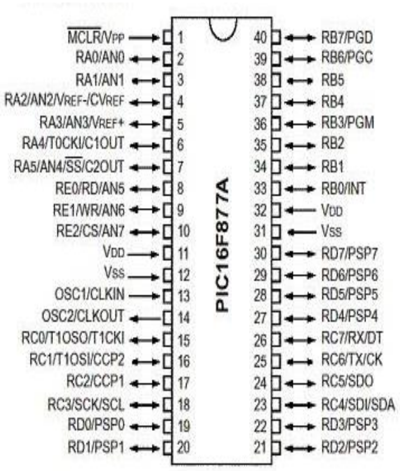


FIGURE 5: PIN DIAGRAM OF PIC16F877A

VI. RF RECEIVER

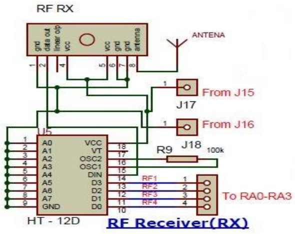
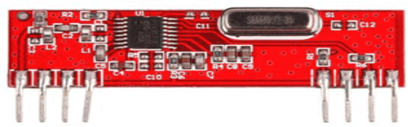


FIGURE 6: RF RECIVER MODULE

The 433MHz wireless module is one of the cheap and easy to use modules for all wireless projects. These modules can be used only in pairs and only simplex communication is possible. Meaning the transmitter can only transmit information and the receiver can only receive it, so you can only send data from point A to B and not from B to A. The module could cover a minimum of 3 meters and with proper antenna a power supplies it can reach up to 100 meters theoretically. But practically we can hardly get about 30-35 meters in a normal test conditions.

FIGURE 7:RF RECIVER CIRCUIT

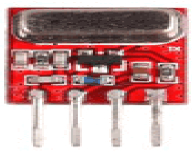


The RF receiver module consists of receiver and decoder. By using the HT12D decode can receive12 bits of data serially. HT12D converts 12-bit serial data in to parallel output which is received by RF receiver. The 100k resistor connected across the oscillator (OSC1 and OSC2) circuit in HT12D is activating the decoder circuit. ASK RF Receiver receives the data transmitted using ASK RF Transmitter. HT12D decoder will convert the received serial data to 4 bit parallel data D0 – D3. The status of these address pins A0-A7 should match with status of address pin in the HT12E at the transmitter for the transmission of data. The LED connected to the above circuit glows when valid data transmission occurs from transmitter to receiver. 51KΩ resistor will provide the necessary resistance required for the internal oscillator of the HT12D. The decoder circuit compares the address pin of transmitter circuit and when it matches with address pins of encoder, the serial data converted into parallel.

The module itself cannot work on its own as it required some kind of encoding before being transmitter and decoding after being received; so it has to be used with an encoder or decoder IC or with any microcontroller on both ends. The simplest way to use it is with the HT12E Encoder and HT12D Decoder IC. The module uses ASK (Amplitude shift keying) and hence it's easy to interface with microcontrollers as well. However you cannot expect noiseless data for a long distance form this module as this is very much susceptible to noise. The rage depends on the voltage supplied to Receiver and the noise present in the environment.

VII.RF TRANSMITTER

FIGURE 8: RF TRANSMITTER MODULE



The RF module, as the name suggests, operates at Radio Frequency. The corresponding Frequency ranges vary between 30 kHz & 300GHz.In this RF system, the digital data's represented as variations in the amplitude of carrier wave. This kind of modulation is known as Amplitude Shift Keying (ASK).Transmission through RF is better than IR (infrared) because of many reasons. Firstly, signal through RF can travel through larger distance making it suitable for long range applications. Also, while IR mostly operates in line of sight mode, RF signals can travel even when there is an obstruction between transmitter & receiver. RF transmission is more strong and reliable than IR transmission. RF communication uses a specific frequency unlike IR signals which are affected by other IR emitting sources.

This RF module comprises of an RF transmitter and an RF receiver. The transmitter /receiver (TX/RX) pair operates at a frequency of 434mhz.An RF transmitter receives serial data and transmits it wirelessly through RF through its antenna connected at pin4.The transmission occurs at the rate of 1kbps-10kbps.

The transmitted data is received by an RF receiver operating at the same frequency as of the transmitter. The RF module is often used along with a pair of encoder/decoder. The encoder is used for encoding parallel data for transmission feed while reception is decoded by a decoder.HT12E-HT12D; HT640-HT648, etc. are some commonly used encoder/decoder pair ICs.

A push-button or simple button is a switching mechanism for controlling some aspect of a machine or a process. Buttons are typically made from hard material, usually plastic or metal. The surface is usually flat or shaped to accommodate the human finger or hand, to be easily depressed or pushed. Buttons are most often biased switches, though even many un-biased buttons (due to their physical nature) require a spring to return to their un-pushed state.

In this project, there are 4 push button switches and one. These push buttons play an important role in this project. All the four-push button serves as control switches for the wheel chair. Two switches are used to control the thrust motor to help move the wheel chair forward and backward, And the other two push button are used to control the motor which controls the backrest and footrest of the wheelchair. All this push button's output is connected to the RF transmitter module.

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The system allows one-way communication between two nodes, namely, transmission and reception. The RF module has been used in conjunction with a set of four channel encoder/decoder ICs. Here HT12E & HT12D have been used as encoder and decoder respectively. The encoder converts the parallel inputs (from the remote switches) into serial set of signals. These signals are serially transferred through RF to the reception point. The decoder is used after the RF receiver to decode the serial format and retrieve the original signals as outputs. Transmitter, upon receiving serial data from encoder IC (HT12E), transmits it wirelessly to the RF receiver. The receiver, upon receiving these signals, sends them to the decoder IC (HT12D). When no signal is received at data pin of HT12D, it remains in standby mode and consumes very less current (less than 1µA) for a voltage of 5V. When signal is received by receiver, it is given to HT12D. On reception of signal, oscillator of HT12D gets activated. IC HT12D then decodes the serial data and checks the address bits three times.

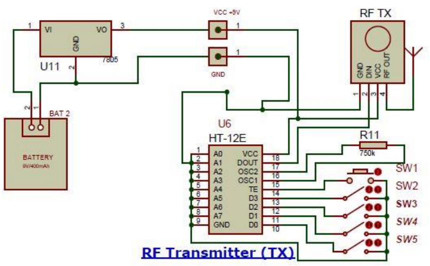

FIGURE 9: RF TRANSMITTER CIRCUIT

If these bits match with the local address pins of HT12D, then it puts the data bits on its data pins (pins 10-13) and makes the VT pin high. An LED is connected to VT pin of the decoder.

This LED works as an indicator to indicate a valid transmission. The corresponding output is thus generated at the data pins of decoder. To summarize, on each transmission, 12 bits of data is transmitted consisting of 8 address bits and 4 data bits. The signal is received at receiver's end which is then fed into decoder IC. If address bits get matched, decoder converts it into parallel data and the corresponding data bits get lowered. In this project, RF is used to transmit the signals from remote to hovercraft unit

VIII. DC MOTOR AND RELAY DRIVER

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch.

Relays are used where it is necessary to control a circuit by a separate low-power signal, or where several circuits must be controlled by one signal. Relays are used to couple two circuits, either of different power requirement or same power requirement. A type of relay that can handle the high power required to directly control an electric motor or other loads is called a contactor. In this case, relays are used to couple microcontroller with solenoid valves to transmit signals.

Relays with calibrating operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overload or faults; in modern electric power systems these functions are performed by digital instruments still called "Protective Relays".

DC motors are used for a variety of purposes, such as robot kits, boats, sometimes planes and individuals wishing to develop their own electric vehicle. The simple design and reliability of a DC motor makes it a good choice for many different uses, as well as a fascinating way to study the effects of magnetic fields. A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor. DC motors were the first type widely used, since they could be powered from existing direct-current lighting power distribution systems.

A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight motor used for portable power tools and appliances. Larger DC motors are used in propulsion of electric vehicles, elevator and hoists, or in drives for steel rolling mills.

The advent of power electronics has made replacement of DC motors with AC motors possible in many applications.

Coils of wire with a current running through it generate an electromagnetic field aligned with the centre of the coil. The direction and magnitude of the magnetic field produced by the coil can be changed with the direction and magnitude of the current flowing through it. A simple DC motor has a stationary set of magnets in the stator and an armature with one or more windings of insulated wire wrapped around a soft iron core that concentrates the magnetic field.

The windings usually have multiple turns around the core, and in large motors there can be several parallel current paths. The ends of the wire winding are connected to a commutator.

The commutator allows each armature coil to be energized in turn and connects the rotating coils with the external power supply through brushes. (Brushless DC motors have electronics that switch the DC current to each coil on and off and have no brushes.)

The total amount of current sent to the coil, the coil's size and what it's wrapped around dictate the strength of the electromagnetic field created. The sequence of turning a particular coil on or off dictates what direction the effective electromagnetic fields are pointed. By turning on and off coils in sequence a rotating magnetic field can be created. These rotating magnetic fields interact with the magnetic fields of the magnets (permanent or electromagnets) in the stationary part of the motor (stator) to create a force on the armature which causes it to rotate.

In some DC motor designs the stator fields use electromagnets to create their magnetic fields which allow greater control over the motor. At high power levels, DC motors are almost always cooled using forced air. Different number of stator and

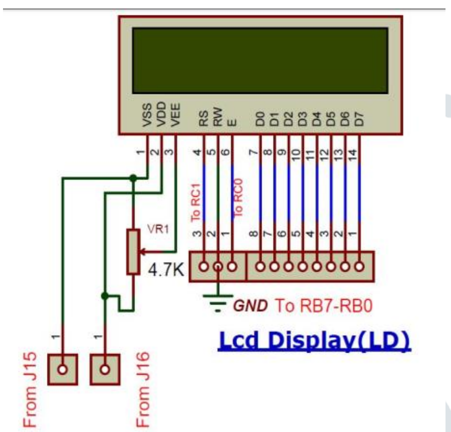

FIGURE 10: CIRCUIT OF RELAY AND MOTOR INTERFACE

armature fields as well as how they are connected provides different inherent speed/torque regulation characteristics. The speed of a DC motor can be controlled by changing the voltage applied to the armature. The introduction of variable resistance in the armature circuit or field circuit allowed speed control. Modern DC motors are often controlled by power electronics systems which adjust the voltage by "chopping" the DC current into on and off cycles which have an effective lower voltage. If external mechanical power is applied to a DC motor it acts as a DC generator, a dynamo. This feature is used to slow down and recharge batteries on hybrid car and electric cars or to return electricity back to the electric grid used on a street car or electric powered train line when they slow down.

This process is called regenerative braking on hybrid and electric cars. In diesel electric locomotives they also use their DC motors as generators to slow down but dissipate the energy in resistor stacks. Newer designs are adding large battery packs to recapture some of this energy.

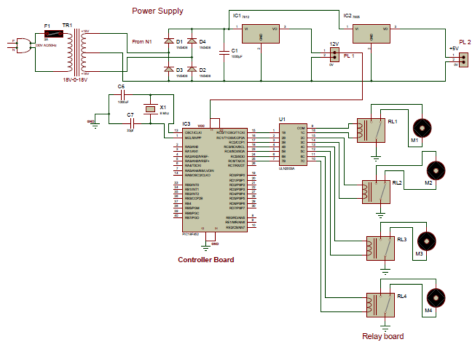

FIGURE 11: 16*2 LCD DISPLAY MODULE

IX. LCD DISPLAY

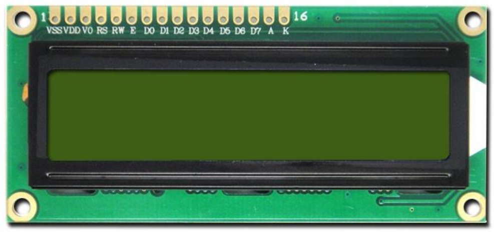

FIGURE 12: LCD DISPLAY INTERFACE CIRCUIT

The LCD (liquid crystal display) is the technology used for displays in notebook and other smaller computers. Like light-emitting diode (LED) and gas-plasma technologies, LCDs allow displays to be much thinner than cathode ray tube (CRT) technology. LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs.

It has a mirror (A) in back, which makes it reflective. Then, add a piece of glass (B) with a polarizing film on the bottom side, and a common electrode plane (C) made of indium-tin oxide on top. A common electrode plane covers the entire area of the LCD. Above that is the layer of liquid crystal substance (D).

A standard television receiver screen, an LCD panel today in 2017, has over six million pixels, and they are all individually powered by a wire network embedded in the screen. The fine wires, or pathways, form a grid with vertical wires across the whole screen on one side of the screen and horizontal wires across the whole screen on the other side of the screen. To this grid each pixel has a positive connection on one side and a negative connection on the other side. So the total amount of wires needed is 3 x 1920 going vertically and 1080 going horizontally for a total of 6840 wires horizontally and vertically.

X. PULSE RATE SENSOR

FIGURE 13: PULSE RATE SENSOR MODULE

The new version uses the TCRT1000 reflective optical sensor for photo plethysmography. The use of TCRT1000 simplifies the build process of the sensor part of the project as both the infrared light emitter diode and the detector are arranged side by side in a leaded package, thus blocking the surrounding ambient light, which could otherwise affect the sensor performance. A pulse, an indication of a heart rate when counted over the time span of a minute, can be detected in several ways. From electro-piezo touch heart-rate monitors to chest-strap monitors to PPG (photo plethysmography) or optical heart rate detection there is a lot of opportunity to expand current implementations for sensing heart rate in a new way.

The cardiovascular pulse is generated in the heart, when the chambers contract and blood bursts into the aorta from the left chamber. The blood travels through the arterial network and returns back to the heart through the vein network. The wrist in the human hand offers a fascinating location for a noninvasive measurement device. The main arteries in the wrist, especially the radial artery, are close to the skin surface and consequently pulsation can be easily detected. In addition, the wrist bone under the radial artery offers good mechanical support for the measurement device. From a practical point of view, the measurement location is very handy, since the pulsation is easily detected and the measurement device is easy to put on. Therefore you don't need any special skills to use the device.

FIGURE 14: PULSE RATE SENSOR CIRCUIT

XI.GSM MODULE

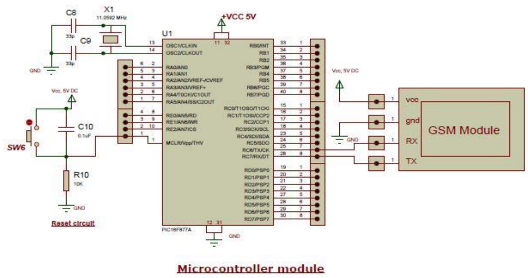

FIGURE 15: GSM MODULE

GSM/GPRS module is used to establish communication between a computer and a GSM-GPRS system. Global System for Mobile communication (GSM) is an architecture used for mobile communication in most of the countries. Global Packet Radio Service (GPRS) is an extension of GSM that enables higher data transmission rate. GSM/GPRS module consists of a GSM/GPRS modem assembled together with power supply circuit and communication interfaces (like RS-232, USB, etc.) for computer. GSM/GPRS MODEM is a class of wireless MODEM devices that are designed for communication of a computer with the GSM and GPRS network. It requires aSIM (Subscriber Identity Module) card just like mobile phones to activate communication with the network. Also they have IMEI (International Mobile Equipment Identity) number similar to mobile phones for their identification. A GSM/GPRS MODEM can perform the following operations:

1. Receive, send or delete SMS messages in a SIM.

2. Read, add, search phonebook entries of the SIM.

3. Make, Receive, or reject a voice call.

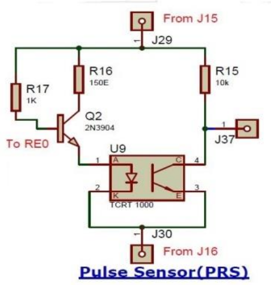

FIGURE 16: GSM MODULE INTERFACE CIRCUIT

XII. PROGRAM:

```
#include <htc.h>

#define _XTAL_FREQ 8000000

#define LcdDataBus PORTB

#define RS RC0

#define EN RC1

int time=0, flag=0;

Void LCD_CmdWrite (char Cmd)

{LcdDataBus=Cmd;RS=0;EN=1;__delay_ms(98);EN=0;}

void LCD_DataWrite(char dat)

{LcdDataBus=dat;RS=1;E=1;__delay_ms (98);EN=0;}

Char UART_Data_Ready ()

{  return RCIF;}

char UART_Read (){  while(!RCIF); //Waits for Reception to complete  return RCREG; //Returns the 8 bit data}

void UART_Write(char data){  while(!TRMT); //Waiting for Previous Data to Transmit completely

  TXREG = data; //Writing data to Transmit Register, Starts transmission}void UART_Write_Text(char *text)

{int i;for(i=0;text[i]!='\0';i++)UART_Write(text[i]);}

char UART_Init(const long int baudrate){unsigned int x;

x = (_XTAL_FREQ - baudrate*64)/(baudrate*64); //SPBRG for Low Baud Rateif(x>255) //If High Baud Rate required

{x = (_XTAL_FREQ - baudrate*16)/(baudrate*16); //SPBRG for High Baud RateBRGH = 1; //Setting High Baud Rate}

if(x<256){SPBRG = x; //Writing SPBRG register

SYNC = 0; //Selecting Asynchronous Mode

SPEN = 1; //Enables Serial Port

TRISC7 = 1;

TRISC6 = 1;

CREN = 1; //Enables Continuous Reception

TXEN = 1; //Enables Transmission

return 1;}

return 0;}

void delay(int n){

int a=0;

for(a=0;a<n;a++){__delay_ms(1000);}

if(time == 20){flag=1;}else

{time++;}}

void initialize_module(){UART_Init(9600);

UART_Write_Text("AT");

UART_Write(0x0D);

__delay_ms(10);

UART_Write_Text("AT+CMGF=1");

UART_Write(0x0D);

__delay_ms(10);

UART_Write_Text("AT+CSMP=17,167,0,16");
```

```
UART_Write(0x0D);
__delay_ms(10);
UART_Write_Text("AT+CMGS=+918015827308");
UART_Write(0x0D);__delay_ms(10);
UART_Write_Text("GSM READY");UART_Write(0x0D);
UART_Write(26);__delay_ms(40);__delay_ms(40);
__delay_ms(40); }
void main(){int k;iitialize_module();
char c[] = {"PULSE RATE"};
char d[] = {"WELCOME    "};
y:TRISB=0;//LCD O/P
TRISC=0;//MOTOR DRINER
PORTC=0;
TRISC6=1;// GSM
TRISC7=1;//GSM
TRISD=0;//MOTOR DRIVER
PORTD=0;
RD7=1;//M1 ENADLE
RD0=1;//M2 ENABLE
TRISA =1;//INPUT PORT
PORTA=0;
ADCON1=0X0E;//PORT A AS DIGITAL PORT
LCD_CmdWrite(0x38);
LCD_CmdWrite(0x01);
LCD_CmdWrite(0x0e);
LCD_CmdWrite(0x84);
for (k=0;k<16;k=k+1)
{LCD_DataWrite(d[k]);}
while(1){ while(RA1==1 && RA2==1)// FOOTREST FWD
{RD3=1;RD4=0;}
while(RA3==1 && RA4==1)//BACKREST BWD
{RD3=0;RD4=1;}
 while(RA1==1)//VEHICLE FWD
{RC2=1;RC3=0;}
while(RA2==1)//VEHICLE BWD
{RC2=0;RC3=1;}
while(RA3==1)// BACKREST FWD
{RC4=1;RC5=0;}
while(RA4==1)//BACKREST FWD
{RC4=0;RC5=1;}goto y;}
if(flag == 1)
{int SensorOut=0;GO_nDONE=1;while(GO_nDONE); //Wait
for A/D Conversion to complete
SensorOut=((ADRESH<<8)+ADRESL); //Returns Result
LCD_CmdWrite(0x82);
LCD_CmdWrite(0x01);
for (k=0;k<16;k=k+1)
{LCD_DataWrite(c[k]);}
LCD_CmdWrite(0xC0);
LCD_DataWrite(0X30+(SensorOut));
if(SensorOut <4 && 3<SensorOut )
```

{UART_Write_Text("ABNORMAL PULSE RATE CARE IS REQUIRED IMMEDITELY"); }

UART_Write(0x0D);__delay_ms(10);time=0;

flag=0;

XIII. APPLICATIONS

1.Can be used by physically challenged people.

2. Can be used in home for the old peoples.

3. Patients.

4. Hospitals.

INSTRUCTIONS

- Turn on the remote ON to drive the vehicle.

NOTE: The wheelchair doesn't move until you turn the remote ON.

- Press the button01 of the remote to move Wheelchair forward.
- Press the button 02 of the remote to move Wheelchair back.
- Press the button 03 of the remote to move Backrest Down.
- Press the button 04 of the remote to move Backrest Up.
- Press the both 01&02 buttons of the remote to move Footrest Down.
- Press the both 03&04 buttons of the remote to move Footrest Up.

CONCLUSION:

Many emerging technologies in this new era , where a simple solution makes things better as in this project too, Hence it is concluded that this project is capable of adjusting the back rest and foot rest with the help of RF Transceiver module.

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