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Deaf Mute Communication Interpreter System based on Hand Gesture Recognisation

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***Abstract*—** Remote control with switches on fingertips is a wireless gesture input system that enables a person to use a computer by performing intuitive hand motions in the air. The user can move the cursor by forming a pointing gesture and click by using right and left click keys in the keypad. Having this device on the hand allows the user to type different keys connected in different portions of the hand.

The keys are connected to the programmed microcontroller pins and the microcontroller communicates to the computer wirelessly through a base station. This system does not require the installation of additional drivers.

Our gesture input system can be conveniently used by anyone who wishes not to be tied down to a desk when using a computer, making it perfect for giving presentations or web surfing from the couch. The intuitive hand motion controls also allow it to serve as an alternative video game controller.Since it does not exert any pressure on wrist of the hand, it avoids carpel tunnel syndrome.

***Keywords*—** Remote control, Microcontroller, Communicates, Motion controls etc

I. INTRODUCTION

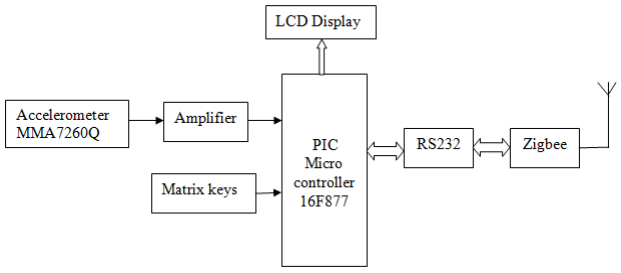
At present, industry is increasingly shifting towards automation. Two principle components of today's industrial automations are programmable controllers and robots. In order to aid the tedious work and to serve the mankind, today there is a general tendency to develop an intelligent operation.

The proposed system "REMOTE CONTROL WITH SWITCHES ON FINGERTIPS" is designed and developed to accomplish the various tasks in an adverse environment of an industry. This prototype system can be applied effectively and efficiently in an expanded dimension to fit for the requirement of industrial, research and commercial applications.

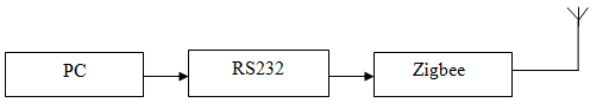
Microcontroller is the heart of the device which handles all the sub devices connected across it. We have used pic microcontroller. It has flash type reprogrammable memory. It has some peripheral devices to play this project perform. It also provides sufficient power to inbuilt peripheral devices. We need not give individually to all devices. The peripheral devices also activates as low power operation mode.

II. HARDWARE DESCRIPTION

A. BLOCK DIAGRAM OF TRANSMITTER AND RECEIVER SECTION



TRANSMITTER SECTION



RECEIVER SECTION

RECEIVER SECTION

FIGURE NO 2.1 Block diagram of Transmitter and Receiver section

B. ACCELEROMETER

An accelerometer is a device that measures proper acceleration, the acceleration experienced relative to free-fall.Single- and multi-axis models are available to detect magnitude and direction of the acceleration as a vector quantity, and can be used to sense orientation, acceleration, vibration shock, and falling. Micro machined accelerometers are increasingly present in portable electronic devices and video game controllers, to detect the position of the device or provide for game input.

1) Physical principles

An accelerometer measures proper acceleration, which is the acceleration it experiences relative to free-fall and is the acceleration felt by people and objects. Put another way, at any point in space-time the equivalence principle guarantees the existence of a local inertial frame, and an accelerometer measures the acceleration relative to that frame. Such accelerations are popularly measured in terms of g-force.

An accelerometer at rest relative to the Earth's surface will indicate approximately.1 g upwards, because any point on the Earth's surface is accelerating upwardsrelative to the local inertial frame (the frame of a freely falling object near the surface). To obtain the acceleration due to motion with respect to the Earth, this "gravity offset" must be subtracted and corrections for effects caused by the earth's rotation relative to the inertial frame.

The reason for the appearance of a gravitational offset is Einstein's equivalence principle,which states that the effects of gravity on an object are indistinguishable from acceleration. When held fixed in a gravitational field by, for example, applying a ground reaction force or an equivalent upward thrust, the reference frame for an accelerometer (its own casing) accelerates upwards with respect to a free-falling reference frame. The effects of this acceleration are indistinguishable from any other acceleration experienced by the instrument, so that an accelerometer cannot detect the difference between sitting in a rocket on the launch pad, and being in the same rocket in deep space while it uses its engines to accelerate at 1 g. For similar reasons, an accelerometer will read zero during any type of free fall. This includes use in a coasting spaceship in deep space far from any mass, a spaceship orbiting the Earth, an airplane in a parabolic "zero-g" arc, or any free-fall in vacuum. Another example is free-fall at a sufficiently high altitude that atmospheric effects can be neglected.

However this does not include a (non-free) fall in which air resistance produces drag forces that reduce the acceleration, until constant terminal velocityis reached. At terminal velocity the accelerometer will indicate 1 g acceleration upwards. For the same reason a skydiver, upon reaching terminal velocity, does not feel as though he or she were in "free-fall", but rather experiences a feeling similar to being supported (at 1 g) on a "bed" of up rushing air.Acceleration is quantified in the SI unit metres per second per second (m/s2), in the cgs unit gal (Gal), or popularly in terms of g-force.

For the practical purpose of finding the acceleration of objects with respect to the Earth, such as for use in an inertial navigation system, knowledge of local gravity is required. This can be obtained either by calibrating the device at rest, or from a known model of gravity at the approximate current position.

2) Structure

Conceptually, an accelerometer behaves as a damped mass on a spring. When the accelerometer experiences acceleration, the mass is displaced to the point that the spring is able to accelerate the mass at the same rate as the casing. The displacement is then measured to give the acceleration.

In commercial devices, piezoelectric, piezoresistive and capacitive components are commonly used to convert the mechanical motion into an electrical signal. Piezoelectric accelerometers rely on piezoceramics (e.g. lead zirconatetitanate) or single crystals (e.g. quartz, tourmaline). They are unmatched in terms of their upper frequency range, low packaged weight and high temperature range. Piezoresistive accelerometers are preferred in high shock applications. Capacitive accelerometers typically use a silicon micro-machined sensing element. Their performance is superior in the low frequency range and they can be operated in servo mode to achieve high stability and linearity.

Modern accelerometers are often small micro electro-mechanical systems (MEMS), and are indeed the simples' t MEMS devices possible, consisting of little more than a cantilever beam with a proof mass (also known as seismic mass).

Damping results from the residual gas sealed in the device. As long as the Q-factor is not too low, damping does not result in a lower sensitivity.

Under the influence of external accelerations the proof mass deflects from its neutral position. This deflection is measured in an analog or digital manner. Most commonly, the capacitance between a set of fixed beams and a set of beams attached to the proof mass is measured. This method is simple, reliable, and inexpensive. Integrating piezoresistors in the springs to detect spring deformation, and thus deflection, is a good alternative, although a few more process steps are

needed during the fabrication sequence. For very high sensitivities quantum tunnelling is also used; this requires a dedicated process making it very expensive. Optical measurement has been demonstrated on laboratory scale.

Another, far less common, type of MEMS-based accelerometer contains a small heater at the bottom of a very small dome, which heats the air inside the dome to cause it to rise. A thermocouple on the dome determines where the heated air reaches the dome and the deflection off the centre is a measure of the acceleration applied to the sensor.

Most micromechanical accelerometers operate in-plane, that is, they are designed to be sensitive only to a direction in the plane of the die. By integrating two devices perpendicularly on a single die a two-axis accelerometer can be made. By adding an additional out-of-plane device three axes can be measured. Such a combination always has a much lower misalignment error than three discrete models combined after packaging.

C.AMPLIFIER

An electronic amplifier is a device for increasing the power of a signal. It does this by taking energy from a power supply and controlling the output to match the input signal shape but with larger amplitude. In this sense, an amplifier may be considered as modulating the output of the power supply.

Here we use inverting amplifier as a gain amplifier. We can change the gain by adjusting the value of feedback resistance value.

As the open loop DC gain of an operational amplifier is extremely high we can afford to lose some of this gain by connecting a suitable resistor across the

amplifier from the output terminal back to the inverting input terminal to both reduce and control the overall gain of the

amplifier. This then produces and effect known commonly as Negative Feedback, and thus produces a very stable Operational Amplifier system.

Negative Feedback is the process of "feeding back" some of the output signal back to the input, but to make the feedback negative we must feed it back to the "Negative input" terminal using an external Feedback Resistor called Rf. This feedback connection between the output and the inverting input terminal produces a closed loop circuit to the amplifier resulting in the gain of the amplifier now being called its Closed-loop Gain.

D. PIC MICROCONTROLLER

1) CORE FEATURES

- High-performance RISC CPU
- Up to 8K x 14 words of Flash Program Memory
- Up to 368 x 8 bytes of Data Memory (RAM)
- Up to 256 x 8 bytes of EEPROM data memory
- Interrupt capability (up to 14 internal/external
- Power-on Reset (POR)
- Power-up Timer (PWRT) and Oscillator Start-up Timer (OST)
- Watchdog Timer (WDT) with its own on-chip RC Oscillator for reliable operation
- Power saving SLEEP mode
- In-Circuit Serial Programming (ICSP) via two pins
- Only single 5V source needed for programming capability
- Low-power, high-speed CMOS EPROM/EEPROM technology
- Processor read/write access to program memory
- Wide operating voltage range: 2.5V to 5.5V
- Pin out compatible to the PIC16C73/74/76/77
- Interrupt capability (up to 14 internal/external
- Eight level deep hardware stack
- Only 35 single word instructions to learn
- All single cycle instructions except for program branches which are two cycle
- Operating speed: DC - 20 MHz clock input
  DC - 200 ns instruction cycle

2) INTERNAL ARCHITECTURE

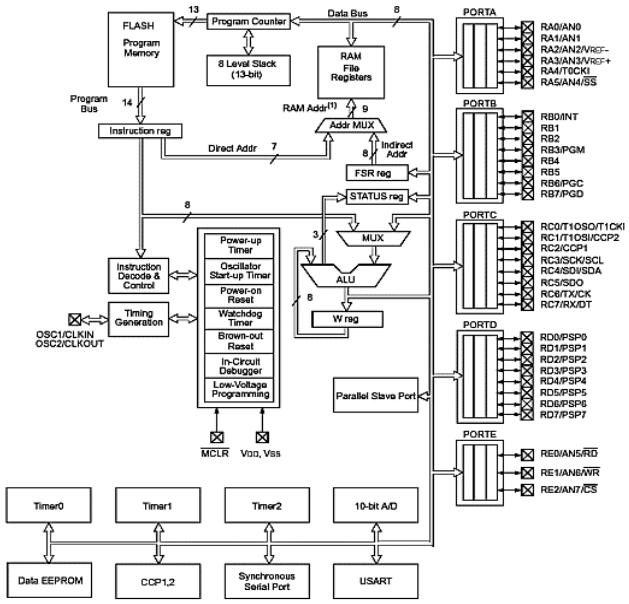


FIGURE NO 2.4.2 Internal architecture

3) PIN DIAGRAM OF PIC 16F877

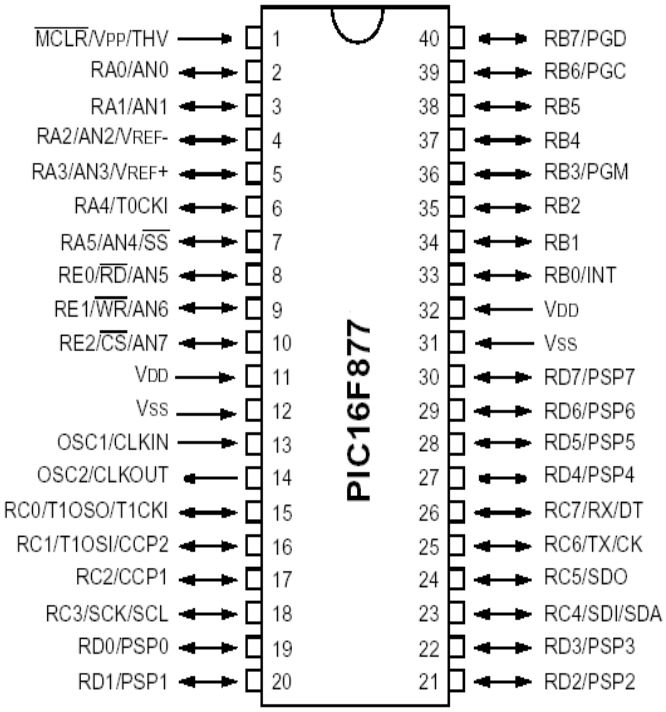


FIGURE NO 2.4.3 Pin diagram of PIC 16F877

4) PIN DESCRIPTION

TABLE NO 2.4.4.1 Pin description (1-12)

Name	Number (DIP 40)	Function	Description
RE3/MCLR/Vpp	1	RE3	General purpose input Port E
		MCLR	Reset pin. Low logic level on this pin resets microcontroller.
		Vpp	Programming voltage
RA0/AN0/ULPWU/C12IN0-	2	RA0	General purpose I/O port A
		AN0	A/D Channel 0 input
		ULPWU	Stand-by mode deactivation input
		C12IN0-	Comparator C1 or C2 negative input
RA1/AN1/C12IN1-	3	RA1	General purpose I/O port A
		AN1	A/D Channel 1
		C12IN1-	Comparator C1 or C2 negative input
RA2/AN2/Vref-/CVref/C2IN+	4	RA2	General purpose I/O port A
		AN2	A/D Channel 2
		Vref-	A/D Negative Voltage Reference input
		CVref	Comparator Voltage Reference Output
		C2IN+	Comparator C2 Positive Input
RA3/AN3/Vref+/C1IN+	5	RA3	General purpose I/O port A
		AN3	A/D Channel 3
		Vref+	A/D Positive Voltage Reference Input
		C1IN+	Comparator C1 Positive Input
RA4/T0CKI/C1OUT	6	RA4	General purpose I/O port A
		T0CKI	Timer T0 Clock Input
		C1OUT	Comparator C1 Output
RA5/AN4/SS/C2OUT	7	RA5	General purpose I/O port A
		AN4	A/D Channel 4
		SS	SPI module Input (*Slave Select*)
		C2OUT	Comparator C2 Output
RE0/AN5	8	RE0	General purpose I/O port E
		AN5	A/D Channel 5
RE1/AN6	9	RE1	General purpose I/O port E
		AN6	A/D Channel 6
RE2/AN7	10	RE2	General purpose I/O port E
		AN7	A/D Channel 7
Vdd	11	+	Positive supply
Vss	12	-	Ground (GND)

TABLE NO 2.4.4.2 Pin description (13-26)

Name	Number (DIP 40)	Function	Description
RA7/OSC1/CLKIN	13	RA7	General purpose I/O port A
		OSC1	Crystal Oscillator Input
		CLKIN	External Clock Input
RA6/OSC2/CLKOUT	14	OSC2	Crystal Oscillator Output
		CLKO	Fosc/4 Output
		RA6	General purpose I/O port A
RC0/T1OSO/T1CKI	15	RC0	General purpose I/O port C
		T1OSO	Timer T1 Oscillator Output
		T1CKI	Timer T1 Clock Input
RC1/T1OSO/T1CKI	16	RC1	General purpose I/O port C
		T1OSI	Timer T1 Oscillator Input
		CCP2	CCP1 and PWM1 module I/O
RC2/P1A/CCP1	17	RC2	General purpose I/O port C
		P1A	PWM Module Output
		CCP1	CCP1 and PWM1 module I/O
RC3/SCK/SCL	18	RC3	General purpose I/O port C
		SCK	MSSP module Clock I/O in SPI mode
		SCL	MSSP module Clock I/O in I^2C mode
RD0	19	RD0	General purpose I/O port D
RD1	20	RD1	General purpose I/O port D
RD2	21	RD2	General purpose I/O port D
RD3	22	RD3	General purpose I/O port D
RC4/SDI/SDA	23	RC4	General purpose I/O port A
		SDI	MSSP module *Data* input in SPI mode
		SDA	MSSP module *Data* I/O in I^2C mode
RC5/SDO	24	RC5	General purpose I/O port C
		SDO	MSSP module *Data* output in SPI mode
RC6/TX/CK	25	RC6	General purpose I/O port C
		TX	USART Asynchronous Output
		CK	USART Synchronous Clock
RC7/RX/DT	26	RC7	General purpose I/O port C
		RX	USART Asynchronous Input
		DT	USART Synchronous Data

TABLE NO 2.4.4.3 Pin descripton (27-40)

Name	Number (DIP 40)	Function	Description
RD4	27	RD4	General purpose I/O port D
RD5/P1B	28	RD5	General purpose I/O port D
		P1B	PWM Output
RD6/P1C	29	RD6	General purpose I/O port D
		P1C	PWM Output
RD7/P1D	30	RD7	General purpose I/O port D
		P1D	PWM Output
Vss	31	-	Ground (GND)
Vdd	32	+	Positive Supply
RB0/AN12/INT	33	RB0	General purpose I/O port B
		AN12	A/D Channel 12
		INT	External Interrupt
RB1/AN10/C12INT3-	34	RB1	General purpose I/O port B
		AN10	A/D Channel 10
		C12INT3-	Comparator C1 or C2 Negative Input
RB2/AN8	35	RB2	General purpose I/O port B
		AN8	A/D Channel 8
RB3/AN9/PGM/C12IN2-	36	RB3	General purpose I/O port B
		AN9	A/D Channel 9
		PGM	Programming enable pin
		C12IN2-	Comparator C1 or C2 Negative Input
RB4/AN11	37	RB4	General purpose I/O port B
		AN11	A/D Channel 11
RB5/AN13/T1G	38	RB5	General purpose I/O port B
		AN13	A/D Channel 13
		T1G	Timer T1 External Input
RB6/ICSPCLK	39	RB6	General purpose I/O port B
		ICSPCLK	Serial programming Clock
RB7/ICSPDAT	40	RB7	General purpose I/O port B
		ICSPDAT	Programming enable pin

E. LCD DISPLAY

A liquid crystal display (LCD) is a thin, flat electronic visual display that uses the

light modulating properties of liquid crystals (LCs). LC's do not emit light directly.

They are used in a wide range of applications including: computer monitors, television, instrument panels, aircraft cockpit displays, signage, etc. They are common in consumer devices such as video players, gaming devices, clocks, watches, calculators, and telephones. LCDs have displaced cathode ray tube(CRT) displays in most applications. They are usually more compact, lightweight, portable, less expensive, more reliable, and easier on the eyes. They are available in a wider range of screen sizes than CRT and plasma displays, and since they do not use phosphors, they cannot suffer image burn-in.LCDs are more energy efficient and offer safer disposal than CRTs. Its low electrical power consumption enables it to be used in battery-powered electronic equipment. It is an electronically-modulated optical device made up of any number of pixels filled with liquid crystals and arrayed in front of a light source (backlight) or reflector to produce images in colour or monochrome. The earliest discovery leading to the development of LCD technology, the discovery of liquid crystals, dates from 1888. By 2008, worldwide sales of televisions with LCD screens had surpassed the sale of CRT units

F. RS232

In telecommunications, RS-232 is a standard for serial binary data interconnection between a DTE (Data terminal equipment) and a DCE(Data Circuit-terminating Equipment). It is commonly used in computer serial ports.

Scope of the Standard:

The Electronic Industries Alliance (EIA) standard RS-232-C as of 1969 defines:

- ❖ Electrical signal characteristics such as voltage levels, signalling rate, timing and slew-rate of signals, voltage withstand level, short-circuit behaviour, maximum stray capacitance and cable length
- ❖ Interface mechanical characteristics, pluggable connectors and pin identification
- ❖ Functions of each circuit in the interface connector
- ❖ Standard subsets of interface circuits for selected telecom applications

The standard does not define such elements as character encoding (for example, ASCII, Baudot or EBCDIC), or the framing of characters in the data stream (bits per character, start/stop bits, parity). The standard does not define protocols for error detection or algorithms for data compression.

The standard does not define bit rates for transmission, although the standard says it is intended for bit rates lower than 20,000 bits per second. Many modern devices can exceed this speed (38,400 and 57,600 bit/s being common, and 115,200 and 230,400 bit/s making occasional appearances) while still using RS-232 compatible signal levels.

Details of character format and transmission bit rate are controlled by the serial port hardware, often a single integrated circuit called a UART that converts data from parallel to serial form. A typical serial port includes specialized driver and receiver integrated circuits to convert between internal logic levels and RS-232 compatible signal levels.

G.ZIGBEE

The mission of the ZigBee Working Group is to bring about the existence of a broad range of interoperable consumer devices by establishing open industry specifications for unlicensed, untethered peripheral, control and entertainment devices requiring the lowest cost and lowest power consumption communications between compliant devices anywhere in and around the home.

The ZigBee specification is a combination of HomeRF Lite and the 802.15.4 specification. The spec operates in the 2.4GHz (ISM) radio band - the same band as 802.11b standard, Bluetooth, microwaves and some other devices. It is capable of connecting 255 devices per network. The specification supports data transmission rates of up to 250 Kbps at a range of up to 30 meters. ZigBee's technology is slower than 802.11b (11 Mbps) and Bluetooth (1 Mbps) but it consumes significantly less power.

ZigBee/ General Characteristics:

- ❖ Dual PHY (2.4GHz and 868/915 MHz)
- ❖ Data rates of 250 kbps (@2.4 GHz), 40 kbps (@ 915 MHz), and 20 kbps (@868 MHz)
- ❖ Optimized for low duty-cycle applications (<0.1%)
- ❖ CSMA-CA channel access Yields high throughput and low latency
- ❖ Low power (battery life multi-month to years)
- ❖ Multiple topologies: star, peer-to-peer, mesh
- ❖ Optional guaranteed time slot for applications requiring low latency
- ❖ Fully hand-shacked protocol for transfer reliability
- ❖ Range: 50m typical (5-500m based on environment)

H.MATRIX KEYPAD

A **keypad** is a set of buttons arranged in a block or "pad" which usually bear digits, symbols and usually a complete set of alphabetical letters. If it mostly contains numbers then it can also be called a numeric keypad**.** Here we are using 3 X 4 matrix keypad.

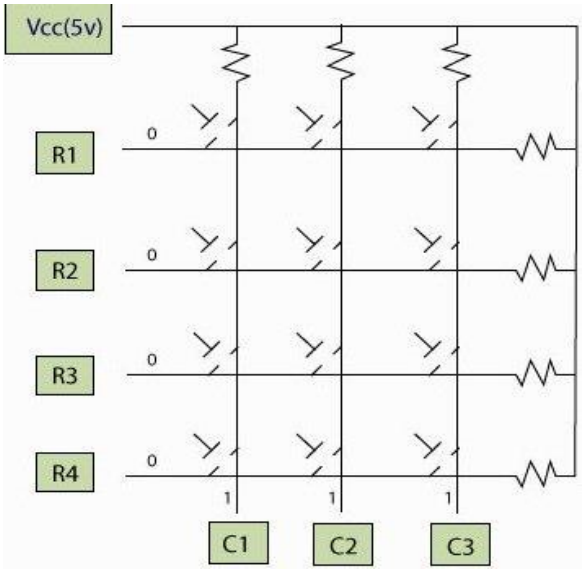


FIGURE 2.8 MATRIX KEYPAD

III. SOFTWARE DESCRIPTION

A. MPLAB

MPLAB IDE is an integrated development environment that provides development engineers with the flexibility to develop and debug firmware for various Microchip devices**.** MPLAB IDE is a Windows-based Integrated Development Environment for the Microchip Technology Incorporated PIC microcontroller (MCU) and ds PIC digital signal controller (DSC) families. In the MPLAB IDE, you can:

- ❖ Create source code using the built-in editor.
- ❖ Assemble, compile and link source code using various language tools. An assembler, linker and librarian come with MPLAB IDE.
- ❖ Debug the executable logic by watching program flow with a simulator, such as MPLAB SIM, or in real time with an emulator, such as MPLAB ICE. Third party emulators that work with MPLAB IDE are also available.
- ❖ Make timing measurements.
- ❖ View variables in Watch windows.
- ❖ Program firmware into devices with programmers such as PICSTART Plus or PRO MATE II.

1) MPLAB SIMULATOR

MPLAB SIM is a discrete-event simulator for the PIC microcontroller (MCU) families. It is integrated into MPLAB IDE integrated development environment. The MPLAB SIM debugging tool is designed to model operation of Microchip Technology's PIC microcontrollers to assist users in

debugging software for these devices.
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2) IC PROG

The PRO MATE II is a Microchip microcontroller device programmer. Through interchangeable programming socket modules, PRO MATE II enables you to quickly and easily program the entire line of Microchip PIC micro microcontroller devices and many of the Microchip memory parts.

PRO MATE II may be used with MPLAB IDE running under supported Windows OS's (see Read me for PRO MATE II.txt for support list), with the command-line controller PROCMD or as a stand-alone programmer

3) COMPILER-HIGH TECH C

A program written in the high level language called C; which will be converted into PIC micro MCU machine code by a compiler. Machine code is suitable for use by a PIC micro MCU or Microchip development system product like MPLAB IDE.

4) PIC START PLUS PROGRAMMER:

The PIC start plus development system from microchip technology provides the product development engineer with a highly flexible low cost microcontroller design tool set for all microchip PIC micro devices. The PICstart plus development system includes PIC start plus development programmer and MPLAB IDE.

The PIC start plus programmer gives the product developer ability to program user software in to any of the supported microcontrollers. The PIC start plus software running under MPLAB provides for full interactive control over the programmer.
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B. VISUAL BASIC

Visual Basic (VB) is a third generationevent driven programming language and integrated development environment (IDE) from Microsoft for its COM programming model first released in 1991. Visual Basic is designed to be relatively easy to learn and use. Visual Basic was derived from BASIC and enables the rapid application development (RAD) of Graphical User Interface (GUI) applications, access to databases using Data Access Objects, Remote Data Objects, or ActiveX Data Objects, and creation of ActiveX controls and objects. Scripting languages such as VBA and VBScript are syntactically similar to Visual Basic, but perform differently.

A programmer can put together an application using the components provided with Visual Basic itself. Programs written in Visual Basic can also use the Windows API, but doing so requires external function declarations. Though the program has received criticism for its perceived faults, from version 3 Visual Basic was a runaway commercial success, and many companies offered third party controls greatly extending its functionality.

The final release was version 6 in 1998. Microsoft's extended support ended in March 2008 and the designated successor was Visual Basic.NET (now known simply as Visual Basic).

Like the BASIC programming language, Visual Basic was designed to be easily learned and used by beginner programmers. The language not only allows programmers to create simple GUI applications, but to also develop complex applications. Programming in VB is a combination of visually arranging components or controls on a form, specifying attributes and actions of those components, and writing additional lines of code for more functionality. Since default attributes and actions are defined for the components, a simple program can be created without the programmer having to write many lines of code. Performance problems were experienced by earlier versions, but with faster computers and native code compilation this has become less of an issue.

Although VB programs can be compiled into native code executable from version 5 onwards, they still require the presence of runtime libraries of approximately 1 MB in size. Runtime libraries are included by default in Windows 2000and later, however for earlier versions of Windows, i.e. 95/98/NT, runtime libraries must be distributed together with the executable.

Forms are created using drag and drop techniques. A tool is used to place controls (e.g., text boxes, buttons, etc.) on the form (window). Controls have attributes and event handlers associated with them. Default values are provided when the control is created, but may be changed by the programmer. Many attribute values can be modified during run time based on user actions or changes in the environment, providing a dynamic application. For example, code can be inserted into the form resize event handler to reposition a control so that it remains centred on the form, expands to fill up the form, etc. By inserting code into the event handler for a key press in a text box, the program can automatically translate the case of the text being entered, or even prevent certain characters from being inserted.

Visual Basic can create executable (EXE files), ActiveX, or DLL files, but is primarily used to develop Windows applications and to interface database systems. Dialog boxes with less functionality can be used to provide pop-up capabilities. Controls provide the basic functionality of the application, while programmers can insert additional logic within the appropriate event handlers. For example, a drop-down combination box will automatically display its list and allow the user to select any element. An event handler is called when an item is selected, which can then execute additional code created by the programmer to perform some action based on which element was selected, such as populating a related list.

Alternatively, a Visual Basic component can have no user interface, and instead provide ActiveX objects to other programs via Component Object Model (COM). This allows for server side processing or an add-in module.

The runtime recovers unused memory using reference counting which depends on variables passing out of scope or being set to "Nothing", resulting in the very common problem of memory leaks. There is a large library of utility objects, and the language provides basic object oriented support. Unlike many other programming languages, Visual Basic is generally

not case sensitive, although it will transform keywords into a standard case configuration and force the case of variable names to conform to the case of the entry within the symbol table. String comparisons are case sensitive by default.

IV. CIRCUIT AND DESCRIPTION

A. INTRODUCTION ABOUT CIRCUIT

An electronic circuit is a complete course of conductors through which current can travel. Circuits provide a path for current to flow. To be a circuit, this path must start and end at the same point. In other words, a circuit must form a loop. An electronic circuit and an electrical circuit has the same definition, but electronic circuits tend to be low voltage circuits.

For example, a simple circuit may include two components: a battery and a lamp. The circuit allows current to flow from the battery to the lamp, through the lamp, then back to the battery. Thus, the circuit forms a complete loop.

B. CIRCUIT WORKING DESCRIPTION

1) POWER SUPPLY Block diagram

The ac voltage, typically 220vrms.is connected to a transformer, which steps that ac voltage down to the level of the desired dc output. A diode rectifier then provides full-wave rectified voltage that is initially filtered by a simple capacitor filter to produce a dc voltage. This resulting dc voltage usually has some ripple or ac voltage variation.

A regulator circuit removes the ripples and also remains the same dc value even if the input dc voltage varies, or the load connected the output dc voltage varies. This voltage regulation is usually obtained using one of the popular voltage regulator IC units.

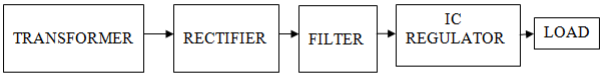

FIGURE 4.2.1 Block diagram of power supply

2) WORKING PRINCIPLE

a) Transformer

The potential transformer will step down the power supply voltage (0-230V) to (0-6V) level. Then the secondary of the potential transformer will be connected

to precision rectifier, which is constructed with the help of op-amp. The advantage of using precision rectifier is it will give peak voltage output as DC, rest of the circuit will give only RMS output.

b) Bridge Rectifier

When four diodes are connected as shown in the fig, the circuit is called as bridge rectifier. The input to the circuit is applied to the diagonally opposite corners of thenetwork, and output is taken from the remaining two corners.

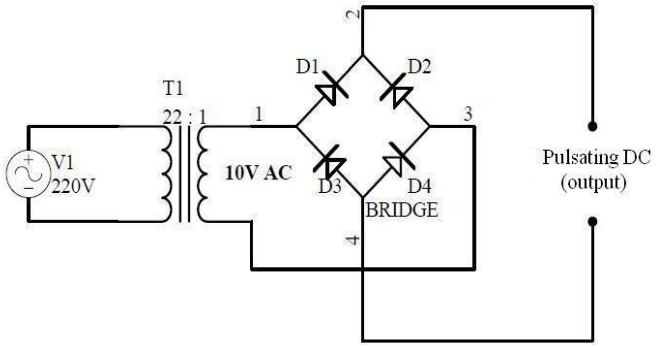

FIGURE 4.2.2 Bridge rectifier

Let us assume that the transformer is working properly and there is a positive potential, at point A and a negative potential at point B.The positive potential at A will forward bias D3 and reverse bias D4.

The negative potential at point at point B will forward bias D1 and reverse D2.At this time D3 and D1 are forward biased and will allow current flow to pass through them;D4 and D2 are reverse biased and will block current flow.

The path for current flow is from point B through D1,up through RL,through

D3, through the secondary of the transformer back to point B.This path is indicated by the solid arrows. Waveforms (1) and Waveforms (2) can be observed across D1 and D3.

One half -cycle later the polarity across the secondary of the transformer reverse , forward biasing D2 and D4 and reverse biasing D1 and D3. Current flow will now be from point A through D4, up through RL, through D2, through the secondary of D1 and back to point A.This path is indicated by broken arrows. Waveforms (3) and (4) can be observed a cross D2 and D4. The current flow through RL is always in the same direction. In flowing through RL this current develops a voltage corresponding to that shown waveform(5). Since current flows through the load (RL) during both half cycles of the applied voltage, this bridge rectifier is a full-wave rectifier.

One advantage of a bridge rectifier over a conventional full-wave rectifier is that with a given transformer the bridge rectifier produces a voltage output that is nearly twice that of the conventional full-wave circuit.

This may be shown by assigning values to some of the components shown in views A and B. Assume that the same transformer is used in both circuits. The peak voltage developed between point X and Y is 1000 volts in both circuits. In the conventional previous circuits shown in view A, the peak voltage from the centre tap to either X or Y is 500 volts. Since only one diode can conduct at any instant, the maximum voltage that can be rectified at any instant is500 volts.

The maximum voltage that appears across load resistor is nearly-but never exceeds-500 volts, as result of same voltage

drop across the diode. In the bridge rectifier shown in View B the maximum voltage that can be rectified is the full secondary voltage, which is 1000 volts. Therefore, the peak output voltage across
31
the load resistor is nearly 1000 volts. With both circuits using the same
transformer, the bridge rectifier circuit provides a high output voltage than the conventional full- wave rectifier circuit.

c) IC Voltage regulator

Voltage regulators comprise a class of widely used IC's.Regulator units contain the circuitry for reference source, comparator amplifier, control device and overload protection all in a single IC.IC units provide regulation of a fixed positive voltage, a fixed negative voltage or an adjustable set voltage. The regulators can be selected for operation with load currents from hundreds of milli amperes to tens of amperes, corresponding to power ratings from milli watts to tens of watts.
A fixed three-terminal voltage regulator has an unregulated dc input voltage
Vi, applied to one input terminal, a regulated dc output voltage Vo, from a second terminal, with the third terminal connected to ground.
The series 78 regulators provide fixed positive regulated voltages from 5 to 24 volts. Similarly, the series 79 regulators provide fixed negative regulated voltages from 5 to 24 volts.

d) RS232

The standard does not define bit rates for transmission, although the standard says it is intended for bit rates lower than 20,000 bits per second. Many modern devices can exceed this speed (38,400 and 57,600 bit/s being common, and 115,200 and 230,400 bit/s making occasional appearances) while still using RS-232 compatible signal levels.
Details of character format and transmission bit rate are controlled by the serial port hardware, often a single integrated circuit called a UART that converts data from parallel to serial form. A typical serial port includes specialized driver and receiver integrated circuits to convert between internal logic levels and RS-232 compatible signal levels

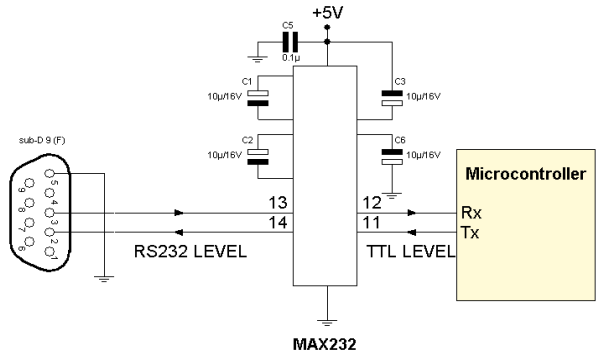

FIGURE 4.2.3 RS232 Circuit

e) Logic Level Converter

The MAX232 IC used as logic level converter. The MAX232 is a dual driver/receiver that includes a capacitive voltage generator to supply EIA-232 voltage levels from a single 5v supply. Receiver converts EIA-232 to 5v TTL/CMOS levels and driver converts TTL/CMOS input levels into EIA-232 levels. The microcontroller transmitter pin is connected to the MAX232 T2IN pin which converts input 5v TTL/CMOS level to RS232 level. Then T2OUT pin is connected to receive pin of 9 D type serial connector which is directly connected to PC. In PC the transmitting data is given to R2IN of MAX232 through transmittingpin of 9 D type connector which converts the RS232 level to 5v TTL/CMOS level. The RS232 pin is connected to receiver pin of the microcontroller. Likewise the data is transmitted and received between the microcontroller and PC.

f) Interfacing Keypad With Pic Microcontroller

In our proposal, we have used 3×4 matrix keypad. All the rows and columns are connected to the input port.Pressed keys can be detected by Scanning. Matrix keypad offers more input to the microcontroller with lesser I/O pins.There is a switch connecting each row and column. So the combinations of rows and columns make up the 12 inputs.Initially all the switches are open (not connected). When you pressed either one buttons, the switch is now closed (connected). Now there is a connection between the row and column.

g) Working Of Transmitter And Receiver Section

The microcontroller circuit is connected with reset circuit, crystal oscillator circuit and LCD circuit. The reset circuit is the one which is an external interrupt which is designed to reset the program. And the crystal oscillator circuit is the one used to generate the pulses to microcontroller and is also called as the heart of the microcontroller here we have used 12MMZ crystal which generates pulses up to 12000000 frequency which is converted to machine cycle frequency when divided by 12 which is equal to 1000000HZ to find the time we have to invert the frequency so that we get one micro second for each execution of the instruction.
The LCD that is liquid crystal display which is used to display the what we need the LCD has fourteen pins in which three pins for the command and eight pinsfor the data. If the data is given to LCD it is write command which is configured the programmer otherwise it is read command in which data read to microcontroller the data pins are given to the port0 and command pins are given to the port2. Other than these pins, one pin configured for the contrast of the LCD, thus the microcontroller circuit works.

The input is given to the PIC microcontroller through the matrix keypads and the mouse movements through the accelerometer. Both the input value and the values of x,y and z axis of the accelerometer are displayed in the LCD display. The signals of accelerometer are amplified to increase the gain before giving it to the microcontroller. In the microcontroller, the coding's developed according the various input values.

And here the source codes are converted to machine codes which are sent via zigbee from the transmitter to the receiver.

Zibgee module in the receiver section receives the information and through the RS232 it is connected to the PC where software called Visual Basic is installed and programs are developed. Using this, machine codes are converted to the form understandable by the system. Thus the input values are finally displayed in the PC as a result. With the accelerometer the mouse movements are performed.

C.ADVANTAGES AND APPLICATIONS

ADVANTAGES

- ❖ Our input system does not exert pressure on the median nerve at the wrist.
- ❖ It avoids carpel tunnel syndrome.
- ❖ System can be controlled at any dimension within the maximum distance of 10m.

APPLICATIONS

- ❖ Perfect for giving presentation.
- ❖ Wireless mouse.
- ❖ Audio visual system.
- ❖ The controls were quite responsive and made for a novel and intuitive game experience.
- ❖ Household remote control.

V.RESULT

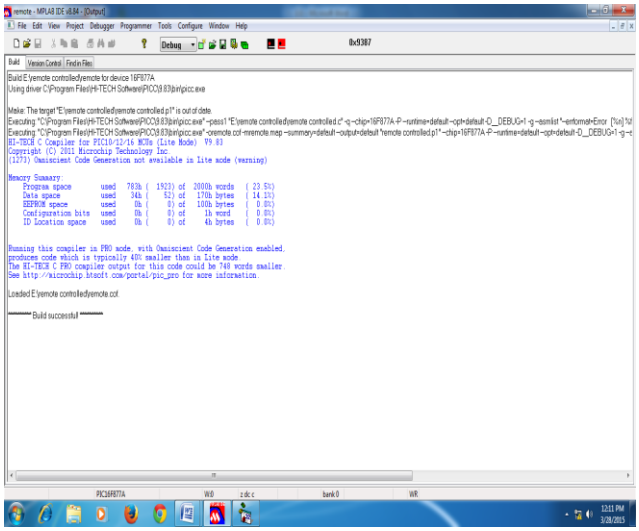

FIGURE 5.1 Coding verification

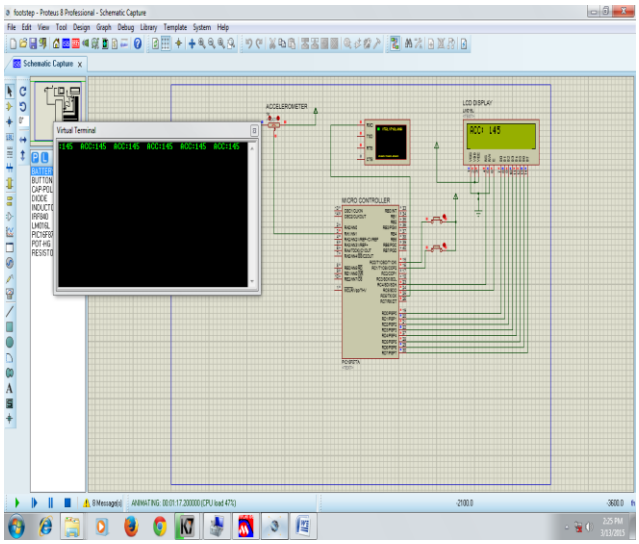

FIGURE 5.2 Simulation result

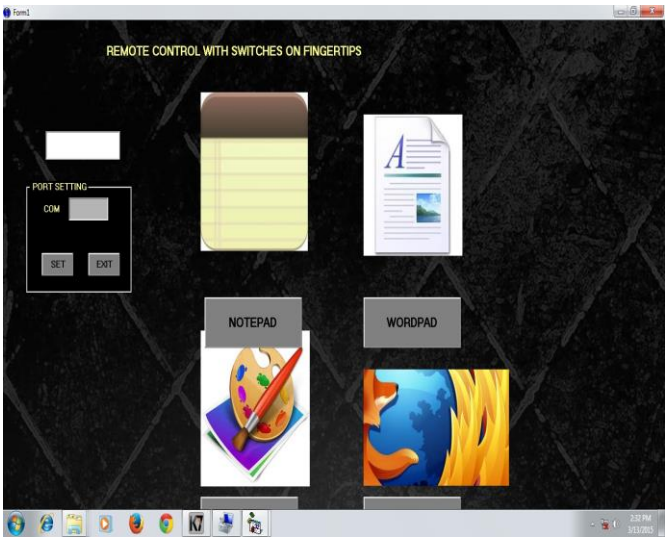

FIGURE 5.3 Demonstration page

VI. CONCLUSION

Overall, the results of our met our expectations outlined in our project proposal. Our final prototype is able to effectively control mouse movements. With a steady hand, the cursor can be moved a single pixel at a time.The slight delay added to control mouse movements.

The proposed system based on PIC microcontroller is found to be more compact, user friendly and less complex, which can readily be used in order to perform, several tedious and repetitive tasks. Though it is designed keeping in mind about the need for industry, it can extended for other purposes such as commercial & research applications. Due to the probability of high technology (Atmel microcontroller) used this"REMOTE CONTROL WITH SWITCHES ON FINGERTIPS" is fully software controlled with less hardware circuit. The feature makes this system is the base for future systems.

VII. FUTURE SCOPE

All keys of keyboard can be implemented using ARM controller. Because PIC microcontroller consist of only 40 pins, we had used only few keys such as alphabets,digits, caps lock,spacebar,right click,left click,backspace and mouse move operations. Delay in the data transmission can be reduced. Speed and sensitivity of the accelerometer can be improved. Programmable gesture combinations can be developed.

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