Design & Interface of Voice Module for Deaf and Dumb

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***Abstract*- The objective of this paper is to build a device that can be controlled by gesture. User is able to control motions of the device by moving the controller and performing predefined gestures. This paper provides a basic platform for many potential applications such as military, gesture human-machine interfacing, etc. This paper is used for physically disabled and old people to operate the device through gestures. This can be done by using accelerometer i.e, based on MEMS technology. For this paper, AT89S52 microcontroller and accelerometer module, speakers is used. This device helps deaf and dumb people to announce their requirements. By this the person who is near can understand their need and help them. This saves the time to understand each other and ease in communication. However, Recognizing the sign or gesture once it has been captured is much more challenging, especially in a Continuous stream. In fact currently, this is the focus of the research.**

***Keywords*:-micro-controller, accelerometer, embedded system.**

I. INTRODUCTION

Embedded systems are a system, which performs a specific or a pre-defined task. It is the combinations of hardware and software. It is a programmable hardware design nothing but an electronic chip.A general-purpose definition of embedded systems is that they are devices used to control, monitor or assist the operation of equipment, machinery or plant. "Embedded" reflects the fact that they are an integral part of the system. At the other extreme a general-purpose computer may be used to control the operation of a large complex processing systems.All embedded systems include microprocessors. Some of these computers are however very simple systems as compared with a personal computer. The very simplest embedded systems are capable of performing only single functions to meet a single predetermined purpose.

In some cases a microprocessor may be designed in such way that application software for a particular purpose can be added to the basic software in a second process, after which it is not possible to make further changes. The applications software on such processors is sometimes referred to as firmware. The simplest devices consist of a single microprocessor (often called a "chip"), which may itself be packaged with other chips in a hybrid systems or Application Specific Integrated Circuit

(ASIC). Its input comes from a detector or sensor and its output goes to a switch or an activator which (for example) may start or stop the operation of a machine or, operating a value, may control the flow of fuel to an engine.

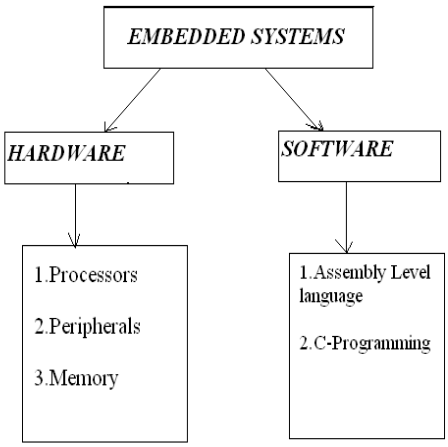


Fig. 1. Types of Embedded Systems

II. OVERVIEW OF EMBEDDED SYSTEM ARCHITECTURE

Every embedded system consists of custom-built hardware built around a Central Processing Unit (CPU). This hardware also contains memory chips onto which the software is loaded. The software residing on the memory chip is also called the 'firmware'.

The operating system runs above the hardware, and the application software runs above the operating system. The same architecture is applicable to any computer including a desktop computer. For applications involving complex processing, it is advisable to have an operating system. In such a case, you need to integrate the application software with the operating system and then transfer the entire software on to the memory chip. Once the software is transferred to the memory chip, the software will continue to run for a long time you don't need to reload new software.

The details of the various building blocks of the hardware of an embedded system. As shown in Fig.1. the building blocks are:

- Central Processing Unit (CPU)
- Memory (Read-only Memory and Random Access Memory)
- Input Devices
- Output devices
- Communication interfaces
- Application-specific circuitry

III. HARDWARE REQUIREMENTS

Microcontroller AT89C51.

Accelerometer.
LED array.
Voice Module
Switching Mode.
Crystal Oscillator.
Liquid Crystal Display.
Speakers.

A.MicrocontrollerAT89S52

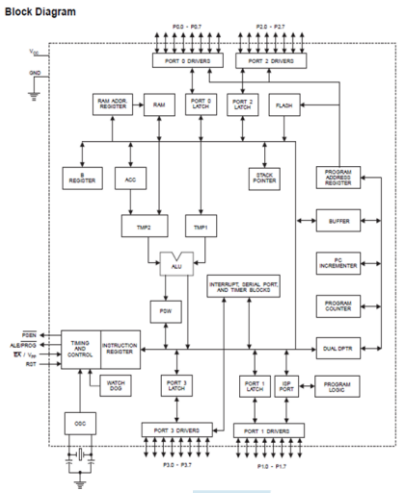


Fig 2.Block diagram for AT89S52

The AT89S52 is a low-voltage, high-performance CMOS 8-bit microcomputer with 4K bytes of Flash programmable memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard MCS-52 instruction set. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcomputer, which provides a highly flexible and cost-effective solution to many embedded control applications.

B. Accelerometer ADXL3XX

An Accelerometer is a kind of sensor.
Image of an Accelerometer shown Fig.3.
The Accelerometer having 6 pin-
1- VDD
2- GND
3- X, Y, Z - outputs
6- ST-sensitivity

Fig. 3. Accelerometer

C.LED Array

It is important to know that each diode will be immediately destroyed unless its current is limited. This means that a conductor must be connected in parallel to a diode. In order to correctly determine value of this conductor, it is necessary to know diode's voltage drop in forward direction, which depends on what material a diode is made of and what colour it is. Values typical for the most frequently used diodes are shown in table below: As seen, there are three main types of LEDs. Standard ones get ful brightness at current of 20mA. Low Current diodes get ful brightness at ten times lower current while Super Bright diodes produce more intensive light than Standard ones.

Here,we use 9 leds for identifying which instruction is running for the required output. As we can read only eight instructions so the 8 leds are categorized for those instructions and among 9,1 led is used for the power supply which is used to identify the led array to be in working condition.

This led array is interfaced with the microcontroller by which the input is given to and the output of this instruction is given to lcd display to notice what is going to action by the speakers.

D. Voice module.

This operation is used for converting machine language into voice which is used as the output for the device. Basically it is defined by coneverting the voice into ASCII code so we use the predefined functions to be interface with the speakers. But in this device we cannot convert and it is already predefined with the set of instructions in the micro-controller.

E. Switching mode

To operate the instructions what are present in the micro-controller. Here we use sign of different eight instructions according to the need of the daf and dumb people. So, basically it operate four instructions at time and the remaining four are operated when the switch mode is applied to it.

F. Crystal oscillator

This is used to provide clock signals to controller. It provides signals ranging from 10 KHz to 100MHz. It is externally connected to Micro Controller.

Fig. 4. Crystal Oscillator

G. Liquid Crystal Display

We are using 16x2 LCD display .
It shows the output about the detection of object.

Fig. 5. Liquid Crystal Display

H. Speakers

To communicate with normal people voice is important to understand what they want to tell. So, we use speakers which is used as the output for this project.

Fig 6. Speakers

IV. CIRCUIT OPERATION

The construction of layout, designing the pcb and then the voltage regulator and microcontroller board is ready. First we interface the microcontroller board (AT89S52) with the system. Through the accelerometer we can change the directions and according to the type of instruction to be operated by placing the direction of the sensor.we can see the what type of instruction is running through the diplay which is interfaced with the micro-controller. As the dumb and deaf people cannot hear the instruction is running through the speakers so this lcd display will show the instruction and there is another type of identifying the instruction through the led array where it glows if the instruction is which type of instruction is running this is also done through interfacing with the micro-controller.

The gestures we give through gesture transmitter which gives an analog data while moving in W,X,Y,Z direction or may be X,Y direction only depends on the type of the sensor. We can see in the image that there are some directions showing if we tilt these sensors in that direction then the data at that corresponding pin will change in the analog form.

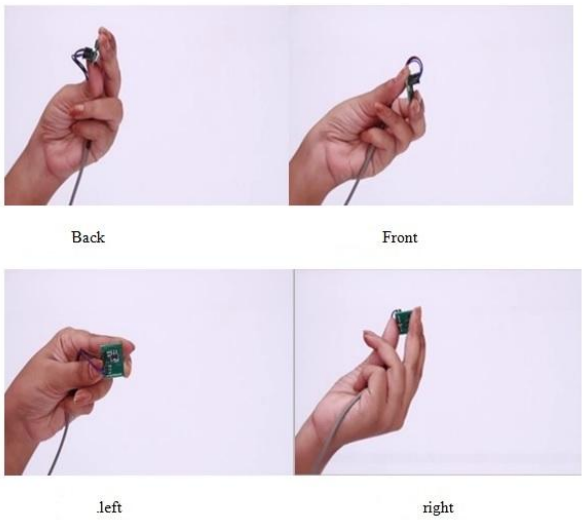


Fig 7. Movement of gesture

That data is appeared on the LCD and in the computer. Now the programming is done using these values and required operation to be performed i.e front, back, left, right motions and we can verify it by switching mode where it operates only four modes at a time. By the help of speakers where the deaf and dumb people can communicate with normal people.

IV. SOFTWARE

Keil development tools for the 8051 microcontroller architecture support every level of software developer from the professional applications engineer to the student just learning about embedded software development.

The industry –standard Keil C compilers, micro assemblers, debuggers, real time Kernels, single-board computers and emulators support all 8051 derivatives and help you to get your completed on schedule.

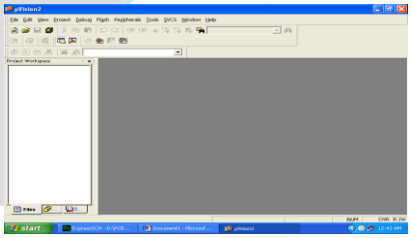
A. Simulation

The µVision Simulator allows you to debug programs using only your PC using simulation drivers provided by Keil and various third-party developers. A good simulation environment, like µVision, does much more than simply simulate the instruction set of a microcontroller — it simulates your entire target system including interrupts, startup code, on-chip peripherals, external signals, and I/O.

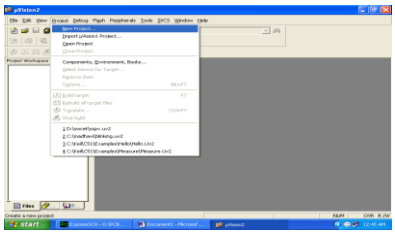
This software is used for execution of microcontroller programs. Keil development tools for the MC architecture support every level of software developer from the professional applications engineer to the student just learning about embedded software development. The industry-standard keil C compilers, macro assemblers, debuggers, real, time Kernels, Single-board computers and emulators support all microcontroller derivatives and help you to get more projects completed on schedule. The keil software development tools are designed to solve the complex operations.

B. Source code

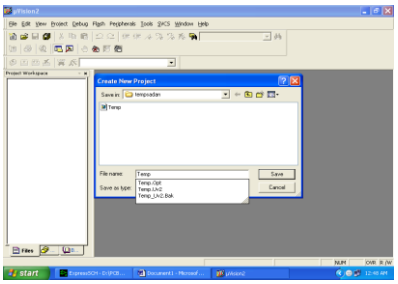
1. Click on the Keil uVision Icon on DeskTop
2. The following fig will appear



3. Click on the Project menu from the title bar
4. Then Click on New Project



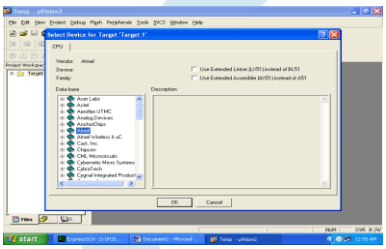
5. Save the Project by typing suitable project name with no extension in u r own folder sited in either C:\ or D:\



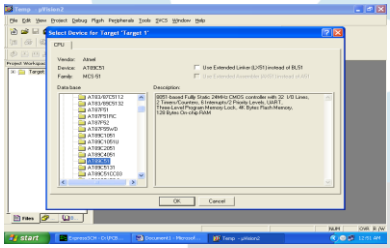
6. Then Click on Save button above.

7. Select the component for your project. i.e. Atmel……

8. Click on the + Symbol beside of Atmel

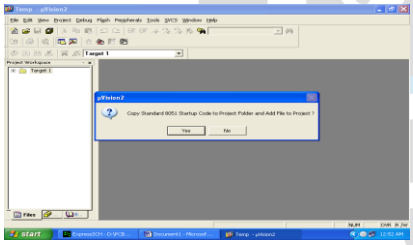


9. Select AT89S52 as shown below



10. Then Click on "OK"

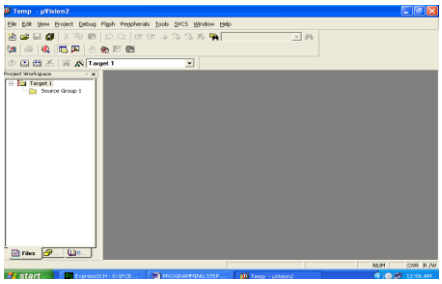
11. The Following fig will appear



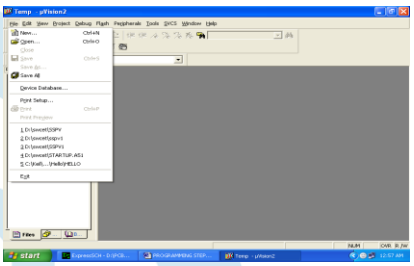
12. Then Click either YES or NO……mostly "NO"

13. Now your project is ready to USE

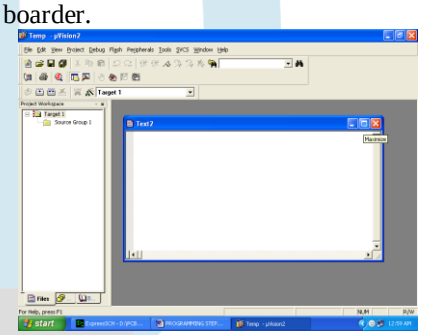
14. Now double click on the Target1, you would get another option "Source group 1" as shown in next page.



15. Click on the file option from menu bar and select "new"

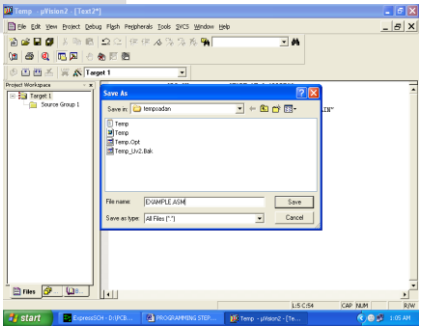


16. The next screen will be as shown in next page, and just maximize it by double clicking on its blue boarder.

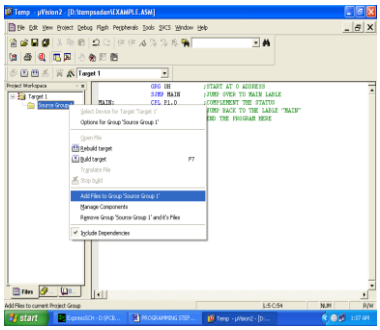


17. Now start writing program in either in "C" or "ASM"

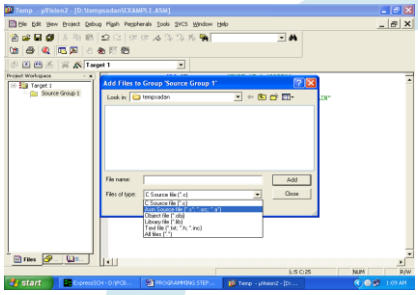
18. For a program written in Assembly, then save it with extension ". asm" and for "C" based program save it with extension " .C"



19. Now right click on Source group 1 and click on "**Add files to Group Source**"



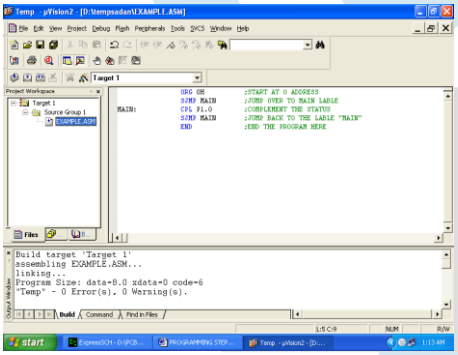
20. Now you will get another window, on which by default "C" files will appear.



21. Now select as per your file extension given while saving the file

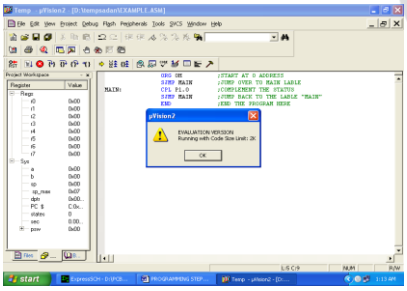
22. Click only one time on option "**ADD**"

23. Now Press function key F7 to compile. Any error will appear if so happen.



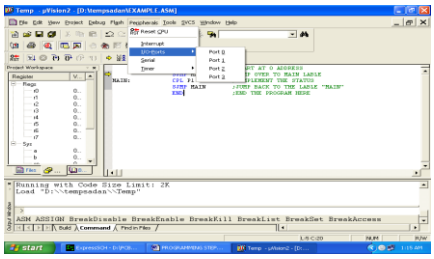
24. If the file contains no error, then press Control+F5 simultaneously.

25. The new window is as follows

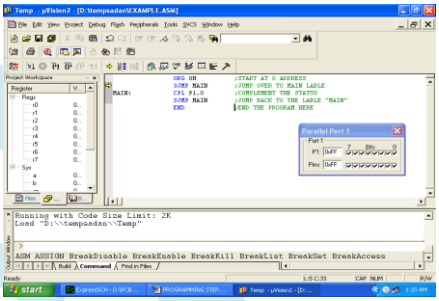


26. Then Click "OK"

27. Now Click on the Peripherals from menu bar, and check your required port as shown in fig below



28. Drag the port a side and click in the program file.



29. Now keep Pressing function key "F11" slowly and observe.

30. You are running your program successfully.

VI. CONCLUSION

The output we required is, whenever the hand gesture is moved forward, backward, left or right according type of situation or the need of the dumb and deaf people and hand gesture is kept back, the switch is operated to another where different instructions are activated. If any delayed in operating the device we can use reset the coding and it comes to first, when another instruction is applied.

VII. FUTURE SCOPE

Furtherly this system can be implemented by performing multiple operations using a 3Dimensional axis of Accelerometer and this can be taken into most advanced technology such as Nano-electromechanical system which are very small in size that is in terms of nanometers.

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