Automated Voice Based Home Navigation System the Elderly and the Physically Challenged

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Abstract: The term “Embedded” itself represents an inclusion of several independent devices in to a single chip, which is also called a system on chip. With the invention of VLSI technology it became possible to develop high speed, low cost, low power, and small in size type integrated circuits. The Micro controller, that used for this purpose is called IBP (Itty Bitty Processor) or embedded processor. The multi task oriented systems that cause time delays, which may be inefficient in some application, in such case, the micro controllers which can play an important role as an embedded system design is more suitable one. Here, we design a general purpose embedded system application “voice controlled wheel chair Robot” is the evidence for the efficient use of automation, and is constructed around the microcontroller and VRC is (Voice/speech Recognizer kit). Our aim of in this project is we control our wheel chair robot through our speech recognizer by speak commands to the speech recognizer and then pass the commands in our speech recognizer can have command like forward, backward, left, right operations can be recorded and playback done and wirelessly control wheel chair robot position through RF interfacing with Speech recognizer. In receiver section RF receiver can receive the commands from the RF transmitter .Wheel chair can move according to the commands. This project uses regulated 5V, 750mA power supply. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac output of secondary of 230/18V step down transformer.

Keywords: VRS (Voice Recognition Software); Microcontroller; Speech Recognition; Transmitted; Receiver.

I. INTRODUCTION

The heart of the circuit is the voice recognition software. This provides the options of recognizing either forty .96 second words or twenty 1.92 second words. The job of listening and the recognizing occupies any of the computers time. The voice controlled wheel robot project today needs to make use of the latest technological components available. In this paper, we present the design and implementation of a voice based wheel chair system. Speech recognition is classified into two categories, speaker dependent and speaker independent. Speaker dependent systems are trained by the individual who will be using the system. The systems are capable of achieving a high command count and better than 95% accuracy forward recognition. The drawback to this approach is that the system only responds accurately to the individual who trained the system. Here in this paper we are using AT89C52, The AT89C52 is 80C51 microcontrollers with 256kB Flash and 1024 bytes of data RAM.A key feature of the AT89C52 is its X2 mode option.

The design engineer can choose to run the application with the conventional 80C51 clock rate (12 clocks per machine cycle) or select the X2 mode (6 clocks per machine cycle) to achieve twice the throughput at the same clock frequency. Another way to benefit from this feature is to keep the same performance by reducing the clock frequency by half, thus dramatically reducing the EMI. The Flash program memory supports both parallel programming and in serial In System Programming (ISP). Parallel programming mode offers gang-programming at high speed, reducing programming costs and time to market. ISP allows a device to be reprogrammed in the end product under software control. The capability to field/update the application firmware makes a wide range of applications possible. The AT89C52 is also In-Application Programmable (IAP), allowing the Flash program memory to be reconfigured even while the application is running. This project is an example of embedded system where the voice recognition software is embedded in hardware trainer kit.

II. EMBEDDED SYSTEMS

Embedded System is a combination of hardware and software used to achieve a single specific task. An embedded system is a microcontroller-based, software driven, reliable, real-time control system, autonomous, or human or network interactive, operating on diverse physical
variables and in diverse environments and sold into a competitive and cost conscious market. An embedded system is not a computer system that is used primarily for processing, not a software system on PC or UNIX, not a traditional business or scientific application. High-end embedded & lower end embedded systems. High-end embedded system - Generally 32, 64 Bit Controllers used with OS. Examples Personal Digital Assistant and Mobile phones etc. Lower end embedded systems. Examples Small controllers and devices in our everyday life like Washing Machine, Microwave Ovens, where they are embedded in.

III. BLOCK DIAGRAM

From the block diagram the Micro Controller is the main block. This block includes the basic block of the osc i.e. the oscillator. This block provides the clock to the Micro Controller. When the Micro Controller gives dc voltage to this block, it will have the internally a crystal. This crystal gives the clock to the Micro Controller. The next block is reset logic. This block produces high signal for two machines for protection of the internal program to the Micro Controller from power spikes. MAX 232 block is used to synchronize the data from the Micro Controller to the personal computer for data communication. The entire logic signals will be coming from the local or remote computer. The data will transmit to the Micro Controller with the help of the MAX 232. The Micro Controller can understand only the low level data. So this block is converting the high level data to the low level data. Display block is used to display the controlled information for the user interface. This display displays the data in alpha numeric form. Power supply block is used to convert the AC voltage coming from the line in to 12V DC and 5V DC for the power supply requirement to the electronic components

A. Micro Controller (AT89C52)

The AT89C52 is 80C51 microcontrollers with 128kB Flash and 1024 bytes of data RAM. Here AT stands for Atmel and 89 stands for flash memory, C stands for dynamic RAM and 52 is nothing but the extension of 8051 series. The Flash program memory supports both parallel programming and in serial In-System Programming (ISP). Parallel programming mode offers gang-programming at high speed, reducing programming costs and time to market. ISP allows a device to be reprogrammed in the end product under software control. The capability to field/update the application firmware makes a wide range of applications possible. The AT89C52 is also In-Application Programmable (IAP), allowing the Flash program memory to be reconfigured even while the application is running.

1) Power-On reset code execution

Following reset, the AT89C52 will either enter the Soft ICE mode (if previously enabled via ISP command) or attempt to auto baud to the ISP boot loader. If this auto baud is not successful within about 400 ms, the device will begin execution of the user code.

2) In-System Programming (ISP)

In-System Programming is performed without removing the microcontroller from the system. The In-System Programming facility consists of a series of internal hardware resources coupled with internal firmware to facilitate remote programming of the AT89C52 through the serial port. This firmware is provided by Atmel and embedded within each AT89C52 device. Input/output (I/O) ports 32 of the pins are arranged as four 8-bit I/O ports P0–P3. Twenty-four of these pins are dual purpose with each capable of operating as a control line or part of the data/address bus in addition to the I/O functions. Details are as follows:

Port 0: This is a dual-purpose port occupying pins 32 to 39 of the device. The port is an open-drain bidirectional I/O port with Schmitt trigger inputs. Pins that have 1s written to them float and can be used as high-impedance inputs. The port may be used with external memory to provide a multiplexed address and data bus. In this application internal pull-ups are used when emitting 1s. The port also outputs the code bytes during EPROM programming. External pull-ups are necessary during program verification.

Port 1: This is a dedicated I/O port occupying pins 1 to 8 of the device. The pins are connected via internal pull-ups...
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and Schmitt trigger input. Pins that have 1s written to them are pulled high by the internal pull-ups and can be used as inputs; as inputs, pins that are externally pulled low will source current via the internal pull-ups. The port also receives the low-order address byte during program memory verification. Pins P1.0 and P1.1 could also function as external inputs for the third timer/counter i.e.: (P1.0) T2 Timer/counter 2 external count input/clock out (P1.1) T2EX Timer/countr2 reload/capture/direction control.

**Port 2:** This is a dual-purpose port occupying pins 21 to 28 of the device. The specification is similar to that of port 1. The port may be used to provide the high-order byte of the address bus for external program memory or external data memory that uses 16-bit addresses. When accessing external data memory that uses 8-bit addresses, the port emits the contents of the P2 register. Some port 2 pins receive the high-order address bits during EPROM programming.

**Port 3:** This is a dual-purpose port occupying pins 10 to 17 of the device. The specification is similar to that of port 1. These pins, in addition to the I/O role, serve the special features of the 80C51 family B.

**IV.CIRCUIT DESCRIPTION**

![Circuit Diagram](image)

**A. Circuit Description**

The circuit diagram shows the wiring connections of the web based home automation. From the circuit 5v dc and 12 v dc is required to drive the all the components. The mains give the 230V ac. So first we step down the 230V ac in to 12V ac by using step down transformer. Then the output is given to the full wave rectifier as given in the circuit diagram. The rectifier is eliminating the negative peek voltage of the input voltage. The output of the rectifier is
the pulsating dc as shown in the block diagram of the rectifier. The error pulses are eliminated by using the capacitor filter. Then the output at the parallel of the capacitor is the 12v dc. But the Micro Controller is work on 5V dc so convert the 12V dc in the 5v dc we are using regulator (7805). The output of the regulator is constant irrespective of the input voltage.

The Micro Controller requires the preset logic circuit for protection of the internal program and internal clock when in the power failure. A sudden change in the power may cause data error. These types of the errors will corrupt the internal program. For this purpose we must use reset logic. The reset logic circuit contains one capacitor and a resistor. This arrangement is shown in the Micro Controller circuit. XTAL1 and XTAL2 are the input and output, respectively. An inverting amplifier which is configured an on-chip oscillator, as shown in Figure 1. Either a quartz crystal or ceramic resonator may be used. To drive the device from an external clock source, XTAL2 should be left unconnected while XTAL1 is driven as shown in Figure 2. There are no requirements on the duty cycle of the external clock signal, since the input to the internal clocking circuitry is through a divide-by-two flip-flop, but minimum and maximum voltage high and low time specifications must be observed. The driver circuit generally made up by using one transistor and one relay. The driver circuit is mainly operated by the Micro Controller. The Micro controller changes the state of the output pin from the low to high i.e., from 0'level to the 1'level. By using this sequence to control the base of the transistor, the transistor will act as an ON/OFF switch corresponding to the input of the base. If the base current of the transistor will high the transistor is under ON condition else it is in OFF state. These conditions will be used to control the relay. The remote PC can transfer the data to the Micro Controller by using Visual basic. This software can produce related binary code to the MAX 232 input pins of 7 and 8. This MAX 232 controller IC can produce the baud rate to set the baud rate creating the buffering technique to the Micro Controller from the MAX 232 IC.

The MAX232 is an integrated circuit that converts signals from an RS-232 serial port to signals suitable for use in TTL compatible digital logic circuits. The MAX232 is a dual driver/receiver and typically converts the RX, TX, CTS and RTS signals. The received data from the PC to the Micro Controller via MAX 232 is given to the 10 and 11 pins of the Micro Controller. The internal Micro Controller program will find the data from the input port of the 10 and 11 pins and found which operation will be done. If the pc sends the data of first device is ON then the Micro Controller will find that data and give the data 1 to the output port of the first relay driver connected. That is given to the ULN 2003 IC this IC internal construction is Darlington array of two transistors. This construction can provide the rotation or stability to the output logic. If the signal one is given to the first pin of the ULN 2003 IC. The output is taken from the 16th pin of the IC and is given to the first relay coil to convert the relay from OFF condition to the ON condition. The data from the micro controller to the ULN 2003 IC is the digital data. This data is related to the condition of the input signal. Each appliance data is from respective pin of port 1 in the micro controller. The basic information of this total circuit is display in the LCD display. This display can display the alphanumeric information related to the conditions of the relay with respect to the PC data. This display is having 16 pins. In this 1st pin is GND 2nd pin is Vcc and 3rd pin is contrast after that 3 pins are used control the data to display the data in which location can be set by these pins. The 15th and 16th pins are used for the back light LED. The remaining 8 pins of the display are for data. These pins are used to transfer the data that is to be displayed.

V. RS-232

Information being transferred between data processing equipment and peripherals is in the form of digital data which is transmitted in either a serial or parallel mode. Parallel communications are used mainly for connections between test instruments or computers and printers, while serial is often used between computers and other peripherals. Serial transmission involves the sending of data one bit at a time, over a single communications line. In contrast, parallel communications require at least as many lines as there are bits in a word being transmitted (for an 8-bit word, a minimum of 8 lines are needed). Serial transmission is beneficial for long distance communications, whereas parallel is designed for short distances or when very high transmission rates are required.

9-Pin "AT" Style

![RS-232-PIN](image)

VI. TECHNOLOGY TO IMPROVE MOBILITY

In order to increase the mobility of wheel chair technology used is MEM stands for Micro-Electro Mechanical Systems. MEMS techniques allow both electronic circuits and mechanical devices to be manufactured on a silicon chip, similar to the process used for integrated circuits. This allows the construction of items such as sensor chips with...
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built-in electronics that are a fraction of the size that was previously possible.

Micro electro mechanical systems (MEMS) are small integrated devices or systems that combine electrical and mechanical components. They range in size from the sub micrometer (or sub micron) level to the millimeter level and there can be any number, from a few to millions, in a particular system. MEMS extend the fabrication techniques developed for the integrated circuit industry to add mechanical elements such as beams, gears, diaphragms, and springs to devices. Examples of MEMS device applications include inkjet-printer cartridges, accelerometers miniature robots, micro engines, locks, inertial sensors, micro transmissions, micro mirrors, micro actuators optical scanners, fluid pumps, transducers, and chemical, pressure and flow sensors. New applications are emerging as the existing technology is applied to the miniaturization and integration of conventional devices.

These systems can sense, control, and activate mechanical processes on the micro scale, and function individually or in arrays to generate effects on the macro scale. The micro fabrication technology enables fabrication of large arrays of devices, which individually perform simple tasks, but in combination can accomplish complicated functions. MEMS are not about any one application or device, nor are they defined by a single fabrication process or limited to a few materials. They are a fabrication approach that conveys the advantages of miniaturization, multiple components, and microelectronics to the design and construction of integrated electromechanical systems. MEMS are not only about miniaturization of mechanical systems; they are also a new paradigm for designing mechanical devices and systems.

The Intel 8052 is Harvard architecture, single chip microcontroller (μC) which was developed by Intel in 1980 for use in embedded systems. It was popular in the 1980s and early 1990s, but today it has largely been superseded by a vast range of enhanced devices with 8052-compatible processor cores that are manufactured by more than 20 independent manufacturers including Atmel, Infineon Technologies and Maxim Integrated Products. 8052 is an 8-bit processor, meaning that the CPU can work on only 8 bits of data at a time. Data larger than 8 bits has to be broken into 8-bit pieces to be processed by the CPU. 8052 is available in different memory types such as UV-EPROM, Flash and NVRAM. The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel’s high-density non-volatile memory technology and is compatible with the industry standard 80C51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional non-volatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications. The AT89S52 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, a six vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry. In addition, the AT89S52 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes.

The APR9600 device offers true single-chip voice recording, non-volatile storage and playback capability for 40 to 60 seconds. The device supports both random and sequential access of multiple messages. Sample rates are user-selectable, allowing designers to customize their design for unique quality and storage time needs. Integrated output amplifier/microphone amplifier, and AGC circuits greatly simplify system design. The device is ideal for use in portable voice recorders, toys, and many other consumer and industrial applications. APLUS integrated achieves these high levels of storage capability by using its proprietary analog/multilevel storage technology implemented in an advanced Flash non-volatile memory process, where each memory cell can store 256 voltage levels. This technology enables the APR9600 device to reproduce voice signals in their natural form. It eliminates the need for encoding and compression, which often introduce distortion. Output from APR is fed to speaker for movement announcement. If the movement is wrong or movement button is press by unintentionally then this movement can be stop by reset button otherwise depend upon command movement continues.

Fig.4. Block Diagram of system

Fig.4 shows the schematic diagram of movement based voice enabled robotic chair for physically challenged. It has following important blocks

International Journal of Scientific Engineering and Technology Research
Volume.02, IssueNo.13, October-2013, Pages:1499-1504
Motor Driver L293D this is a monolithic integrated high voltage, high current four channel driver designed to accept standard DTL or TTL logic levels and drive inductive loads (such as relays solenoids, DC and stepping motors) and switching power transistors. To simplify use as two bridges each pair of channels is equipped with an enable input. A separate supply input is provided for the logic, allowing operation at a lower voltage and internal clamp diodes are included. This device is suitable for use in switching applications at frequencies up to 5 kHz. The L293D is assembled in a 16 lead plastic package which has 4 center pins connected together and used for heat sinking. The L293DD is assembled in a 20 lead surface mount which has 8 center pins connected together and used for heat sinking.

![Block Diagram of L293D](image)

Fig.5. Block Diagram of L293D

![Flow Chart of System](image)

Fig.6. Flow Chart of System

**VII. CONCLUSION**

In this paper we have discussed about voice based elderly assistance which can be used by anyone who requires the help of others in day to day life. This low cost system is very helpful for elderly and physically challenged as it is controlled by voices so it is very user friendly system and moreover it is a wireless system.

**VIII. REFERENCES**

[1] Special Needs and Daily living Special needs Solutions for all.


[5] Donald P. Massa, _Choosing an Ultrasonic Sensor for Proximity or Distance Measurement Part 1: Acoustic Considerations_.


[7] Pei Jia, Huosheng H Hu, Tao Lu Kui Yuan, _Head gesture recognition for hands-free control of an intelligent wheelchair_,