VOICE RECOGNITION BASED DOOR CONTROL SYSTEM USING MATLAB

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Abstract— **This paper is dealing with voice recognition based door control system. MATLAB software and embedded hardware is interfaced together to form a complete module. Commands are given in MATLAB which is converted into embedded C using USB to UART module. The voice command is checked by MATLAB software and the door is controlled by the controller using motor driver L239D. The controller gives proper output to control the door and other interface and communicate with PC.**

Keywords: MATLAB 7.1, AT89S8253 microcontroller, L293D motor driver.

1. INTRODUCTION

As we are seeing that the best way of communication is to communicate someone by saying something or by speech communication. At the starting of civilisation, the invention of telephones, audio phonic storage, radio all is based on the speech communication. Speech communication is the best way for communication instead of communicating by writing something or by sign language.

Voice recognition technology uses only the voice of the particular person as a command given to the computer. In this technology only voice of the particular person is required, in his / her voice he / she can say any word for opening and closing of the door. But the voice of a particular person matched with the stored voice at the time of commanding the door for opening and closing. This technology is also helpful in security purpose because for opening and closing of the door we require the matching of voice instead of word.

This system is divided into two parts one is hardware part and another one is software part. In software part we are using MATLAB and in hardware part we are using AT89S8253 microcontroller, L293D and UART module. With the help of the microcontroller we can perform UART communication and L293D is used for controlling dc motor for opening and closing of the door.L239D and UART module both are connected to the microcontroller. UART module is in the form of USB which is connected to the PC, command is given on the computer and that command is converted into serial data which is given to the controller through UART module. Controller converts that serial data into 4-bit parallel data on port0-port4 and this four bit data is fed to the motor driver.

2. EXPERIMENTAL SETUP

A sliding door is sticked on ply wood with its extra circuitry. Extra circuitry involves two PCB plates, one PCB plate has microcontroller and other PCB plate has L239D which is a motor driver .Microcontroller is used for serial connection which occur with the help of USB to UART module which is connected with pc and microcontroller has also connection with motor driver for delivering command.

Figure (1) shows the complete experimental setup .The DC motor of sliding door is operated by L293D motor driver and this motor driver is connected to microcontroller on another PCB. This microcontroller is controlling all the operation of door and converting the serial data of USB to UART module into parallel data.
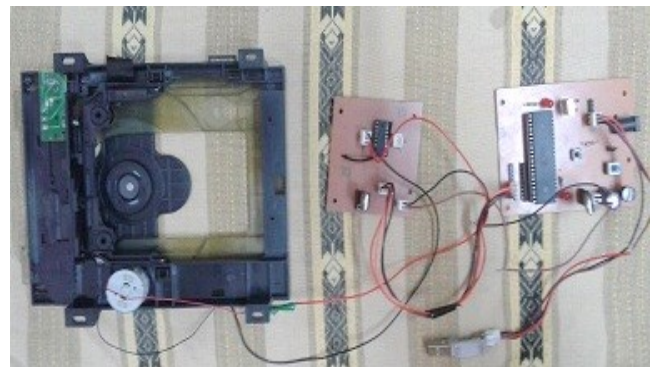

Fig.1 Experimental setup

Figure (2) shows the circuit arrangement for microcontroller AT89S8253. Here first we have power circuitry for microcontroller, the AC input is converted into DC by using bridge rectifier, and then to remove the ripples an electrolytic capacitor and voltage regulator is used. We have also used crystal oscillator and two equal magnitude unpolarised capacitors to control power supply of microcontroller. We have used crystal oscillator because it has negative feedback which reduces error chances and power dissipation is minimum compared to RC circuit. The microcontroller converts serial data into parallel data and give its output to motor driver.
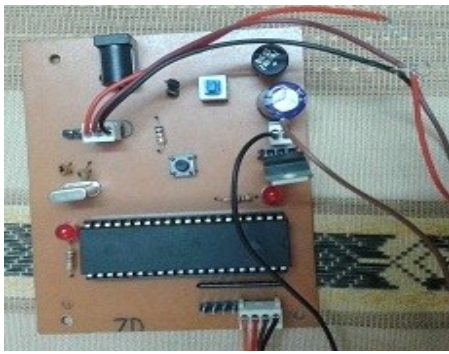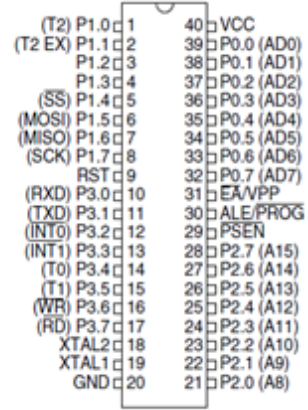
Fig.2 Circuit arrangement for microcontroller

Figure (3) shows the PCB which has L293D motor driver. Here it is used to control the bidirectional movement of DC motor. This driver can be used for driving two motors but here we are using only one. This PCB also contains a voltage regulator for maintaining the voltage of motor driver.

Fig.3 Circuit arrangement for the L239D

3. HARDWARE DESCRIPTION

i. Microcontroller

Microcontroller which is used is of the model of AT89S8253 which is basically from the 8051 family, from the model name AT denotes the company of the microcontroller that is ATMEL. This device is manufactured using Atmel's high density non –volatile memory technology. This microcontroller is of 8 bit microcontroller and having 12 Kbyte flash memories for storing programs. This microcontroller provides programmable UART serial communication. It has 32 bit programmable input-output lines. Operating clock frequency of this microcontroller is 0-24 Mhz. It has 2Kbytes EEPROM data memory. Here we using microcontroller for serial communication and for the transmission of the data.

Fig.4 AT89S8253

ii. Motor driver(L239D)

The L239D is an integrated circuit motor driver which is used for simultaneous, bidirectional control of two small motors. From the name of the motor driver that is L239D, where L293 is denote h-bridge and D denotes dual means L239D is made up of from two h-bridge. H-bridge has the bidirectional control on the motors. Most common method to drive motor in two- direction under the control of computer is with an h-bridge motor driver.
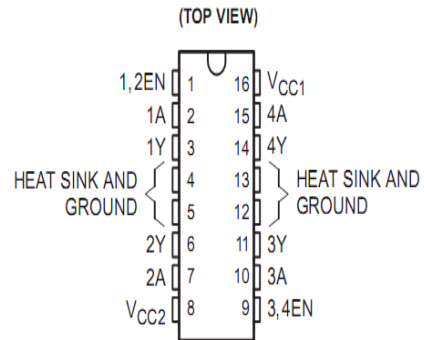

Fig.5 L239D

Drivers are enabled in the pairs with driver 1 and 2 are enabled by 1, 2 EN and driver 3and 4 are enabled by 3,4 EN .When enabled input is high , then the associated drivers are enabled and their outputs are active in phase with their inputs.

iii. Voltage Regulator

A voltage regulator is designed to automatically maintain a constant voltage level. It may be used to regulate one or more AC or DC voltages.LM7805 is the IC number of voltage regulator which is used in this project. In LM7805, LM denotes manufacture's code, 78 denotes positive voltage regulator and 05 denotes the output voltage.LM78XX shows the series of the positive regulator and LM79XX shows the series of negative voltage regulator .Voltage regulator may be installed at a substation or along distribution line so that the customers receive steady voltage independent of how much power is drawn from line. Voltage regulator include hole for attaching heat sink if necessary.
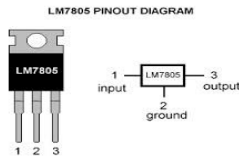
1130

Fig.6 Voltage Regulator

iv. USB to UART driver

This driver is used for the serial communication and it contains 6 pins. Here, basically we are using three pins these are transmitter pin, receiver pin and ground pin. UART (universal asynchronous receiver/ transmitter) is a piece of computer hardware that translates data between parallel and serial forms. UART consist shift register which is a fundamental method of conversion between serial and parallel forms. UART are commonly used in conjunction with communication standard such as RS232.The UART usually does not directly generate or receive the external signal used between different items of equipment. Separate interface devices are used to convert the logic level signal of the UART to and from the external signal levels.

v. Diode bridge

It is an arrangement of four diode in a bridge circuit configuration that provide same polarity of output for either polarity of input. It is basically used for common application for the conversion of the alternating current input to the direct current output. In this project we used the integrated circuit of the diode bridge instead of using four diodes.

vi. Crystal oscillator

Crystal oscillator is an electronic circuit that uses the mechanical resonance of vibrating crystal of piezoelectric material to create an electrical signal with very precise frequency. This frequency is commonly used to keep track of time to provide stable clock signal for digital integrated circuits, and to stabilise frequency for radio transmitter and receiver. The most common type of piezoelectric resonator used is quartz crystal. As microcontroller has in built crystal oscillator but it requires a external crystal oscillator because external crystal oscillator has negative feedback system to make the circuit error free.

Fig.7 Crystal oscillator

4. RESULT AND DISCUSSION

The door system has been controlled by the voice command. First a codebook is generated in MATLAB by giving voice samples for open and close, we have taken 12 samples for each. Then the samples are filtered and normalized and mahalanobis distance is calculated and stored. When the input command is given, again mahalanobis distance is calculated, this input distance is compared with stored distance and accordingly output is send to USB to UART module, which converts the parallel data to serial data and provide input to microcontroller. The microcontroller controls further operation and door operation.

5. CONCLUSION

In now days as everything gets automatic it is also one of the example in which door is opening and closing automatically by giving command.

This paper is helpful in the security purpose door gets open and close if only if the voice of the individual person is match with stored voice of the person, therefore this project has security purpose advantages.

This project has the following advantages:

a. Different of appliances can be controlled very easily by voice.
b. It is helpful for military purposes.
c. It can be implemented into robots which are controlled by voice.

6. FUTURE ASPECTS

This project can be improved in following ways:

a. This project can be implemented by using face recognition.
b. This project can be implemented by using fingerprint recognition.

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