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Automatic Braille

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Abstract—With the ever increasing pace of modern technology ,many visually impaired feel themselves incapable to catch up. Thus this paper proposes a cheap and efficient method to convert any standard input like PDF or any scanned source to braille. Also we have kept in mind the ease of usability and designed the model accordingly :



Fig. 1. Group Photograph : Group 7 team

I. INTRODUCTION

A. Motivation

Visually impaired people are an integral part of the society. However, their disabilities have made them to have less access to computers and Internet than the people with clear vision. Overtime Braille system has been used by them for written communication. Braille is a system of writing that uses patterns of raised dots to inscribe characters on paper. This allows visually impaired people to read and write using touch instead of vision. It is the way for blind people to participate in a literate culture. First developed in the nineteenth century, Braille has become the pre-eminent tactile alphabet. Its characters are six- dot cells two wide by three tall which can be used to imprint 64 combinations. Thus we developed a system that could make any english input convert to their corresponding braille text.

B. Materials Used

We needed the following to create a working model electrical components :

- Arduino Mega
- Relay Switch 5V 8 channel
- jumper wires
- Bread board
- 12V 7A adapter

mechanical components :

- An Enclosing box
- Push-type Solenoid motors
- We also needed arduino IDE to control and code the system

II. COMPONENTS DETAIL

A. Arduino

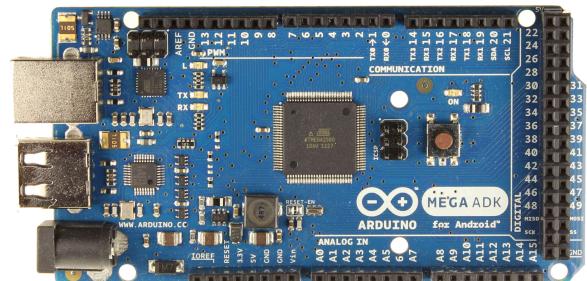


Fig. 2. arduino

The Arduino Mega is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins, 16 analog inputs, 4 hardware serial ports, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It is very easily programmable and flexible to use.

B. Relay Switch

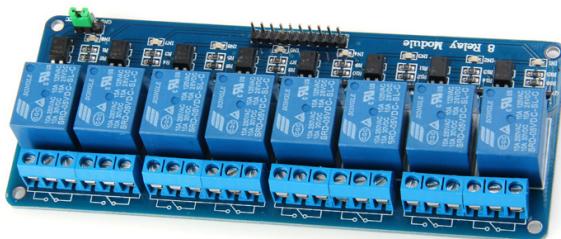


Fig. 3. Relay Switch

Relay is an electrically operated switch which works on electromagnetism. It became vital for our project as we had to control the high current motors from a low power source like arduino.

C. jumper wires

these electrical wires come in 3 types and greatly help in wiring and cable management
male to male
male to female
female to female

D. bread board

It is a solderless connection board used for creating temporary connections.

E. Push-Type Solenoid Motors



Fig. 4. Solenoid motor

We needed 6- push type solenoid motors. These are basically Linear actuator motor electromagnet, i.e. they have a big coil of copper wire with an armature in middle which does an push or pull motion on application of current.

III. DESIGN AND STRUCTURE

Arduino reads the input string and according sends the signal to the relay to open or break connections for the motor.

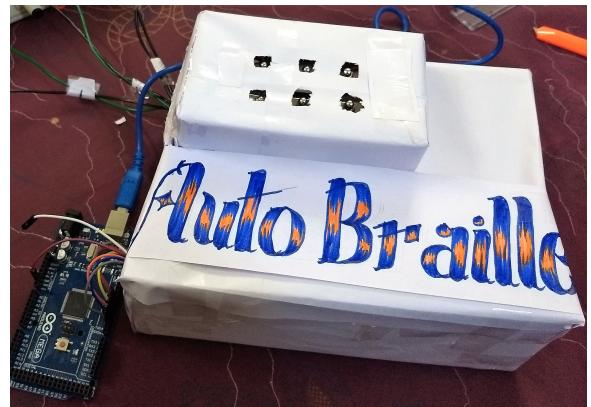


Fig. 5. Auto Braille

A. circuit

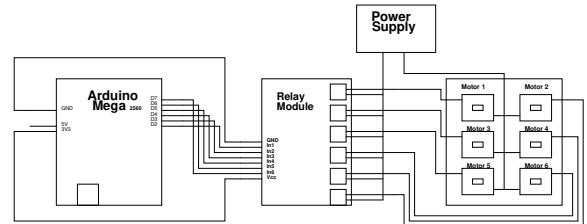


Fig. 6. schematic diagram of project

The circuit consists of relay board ,arduino and the motors powered by the power source. Motors are numbered and connected accordingly to the corresponding ports in the relay board powered by the source which again are connected to correct inputs from arduino.

The relay board works on the principle that if a low voltage is applied ,it closes the circuit as the electromagnet switch is pulled in place and if High voltage is given the switch is broken and the circuit becomes open.

Thus it becomes crucial to provide correct input from arduino to operate the motors.

B. Working Example

Let us take an example of an input character like 'L'. When the arduino receives a signal of 'L' from the string it sends the high voltage signal to relay switch 2 , 4 , 6 and low voltage signal to 1, 3 , 5 . Now the relay board switches ON the switch for motor 1 , 3 , 5 and switches OFF the switch for motor 2 , 4 , 6. Thus providing us desired impressions.

C. Code Snippet

```

if(thisChar==70 || thisChar==108){
    digitalWrite(2, HIGH);
    digitalWrite(6, HIGH);
    digitalWrite(4, HIGH);
    delay(2000); // wait for a second
    digitalWrite(1, LOW);
    digitalWrite(3, LOW);
    digitalWrite(5, LOW);
    delay(1000);
}

```

Fig. 7. Code Snippet

The controlling code for all the characters (alphabets, numeric ,etc) is made using arduino IDE software. Code read the input string character by character and gave the high and low voltage signal to corresponding pins . There was time delay of 1 sec between reading each character giving enough time for the user to feel and understand the imprints.

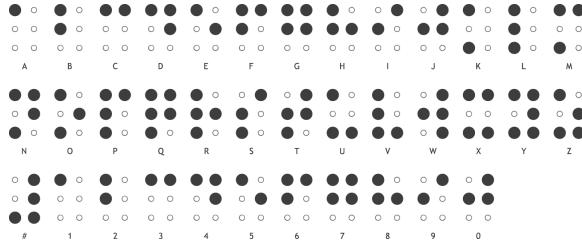


Fig. 8. Braille alphabets

IV. APPLICATION

This machine can be used for the following purposes :

- For teaching enthusiastic people who are new to braille.
- Teacher can now teach large batch of visually impaired by just using giving instructions on his/her laptop.
- Can be used for real time reading assist of article and news from internet or any other source.

V. IMPROVEMENTS

These are the following areas we believe improvements can be made :

- Multiple braille cells can be used for increasing efficiency

- Machine can be made wireless for better portability
- We can use as low power motors as possible
- We can also use sound module to spell each characters for better experience

VI. WHAT WE HAVE LEARNT

The project gave us insight to problems of various electrical aspects like power consumption, thus enriching our experience and making us better prepared for such projects in the future.

- Most importantly we somewhat learnt braille and were able to praise the tactile writing system
- We learnt how to control and operate arduino and to do some various functioning
- We learnt the working of relay switch and many electronic elements that we have used in our project
- Learning about the benefits and limitations of the current state-of-the art technologies for conversion applications

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