

Motion of curtains using Natural Language Processing

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INTRODUCTION

This project has certain objectives that will be explained in detail further. The motion of curtains using natural language processing is a hardware oriented project. It was initially designed to overcome the difficulties of the disabled or paraplegic community in our society. This kind of motion is not only confined to the curtains alone, but it can be implemented anywhere, in all aspects of our daily life. The limitations for movement in a disabled person make them unable to do even the minute works in one's life. In order to overcome such difficulties, we can automate all the home systems. Among this curtains are also a matter of concern. Also consider the situations of large indoor stadiums with windows at great heights. Extensive labour and time must be invested in such situations. Then also it is a matter of concern to close such window blinds or curtains manually. In such circumstances motion of curtains/window blinds using natural language processing becomes relevant. The scope of this project is wide and can be modified extensively in various automation methods and also adapted to suit multiple environments. It can be controlled using the voice commands by the user. The same idea can be used to implement automation in all other systems that works on the basis of motion. Here we use Arduino to automate the curtains / window blinds which can cause motion. We are

ABSTRACT

Consider a scenario of a paraplegic person who is on the bed reading a book and wishes to close the door because of the noise outside. The old system would probably comprise of calling someone either the maid, or relative etc. to close the door. This project aims to automate many of the home items by the use of voice. It can be implemented using an embedded system such as a processor capable of processing natural language and a mechanical system to cause motion on the item accordingly. For a user of the system, all the person would need to do is give commands like "Open Door", "Close Door" etc. and the door would perform motion as per the instruction. To demonstrate the concept, we are automating the closing and opening of curtains purely based on voice instructions. Here, voice is taken as input by a microphone, sent to a processor, and is processed.

This project is based on upcoming technologies and has wide scope throughout. Appropriate changes will have to be made depending upon the application and mechanical system used for the implementation but the core concept remains using voice as input to automate items, in particular household items.

KEYWORDS: Arduino, Natural language processing, Bluetooth module, BroXCode Android Application, internet Of Things (IoT)

using Arduino as the microcontroller and Embedded C to program the hardware. The voice is received using the microphone (Smart phone for the time being used as microphone.) An app is used to convert the voice commands into text and the same is transmitted to the input port of Arduino using a bluetooth module. The two servo motors used to move the curtains in a particular degree are controlled using the Arduino. It is an overall cost effective implementation which is affordable and can be controlled by everyone. The setup cost may initially be a bit high, but in the long run it is expected that there will be a reduction in both electricity and paper cost.

EXISTING METHODOLOGY

Before the development of the advanced features that are seen and used nowadays, it was very difficult for a paraplegic person to move as they always needed someone's help. For example, to adjust the curtains as per their requirements and so on. The limitations for their motion made them unable to do even the minute works needed for a healthy satisfying life and so they were always dependent on someone and they needed manual help.

This was the most common method used before any development in advanced technology.

Advantages:

- Here manual help is used. (Eg. Asking someone to do it for you.)
- No use of any technology.
- No use of electrical or some other sources of energy here.

Disadvantages:

- Always there has to be someone to help out the person to perform their necessary task due to their limitations.
- Emotional discomfort

PROPOSED SYSTEM

The currently methodology is completely based on home automation. Our newly proposed system is capable of overcoming all the disadvantages of the previously existing solution. These newly applied technology provides more advantages due to its useful features. Here we have focused on movements of curtain for a paraplegic person for demonstrative purposes. As a paraplegic/old/disabled person cannot perform these tasks like opening door, curtains etc. The technique of automation can be used to help them perform some of the necessary work or tasks by themselves. Here, we are applying motion using natural processing language which is comes under home automation. We are using Arduino as the microprocessor and Embedded C to program the hardware. The voice is received using the microphone (here, we are using Smartphone) and with the help of some applications we can convert the voice commands into text and the same is transmitted to the input port of Arduino using a Bluetooth module (for large scale usage we can use Wi-Fi too). Here we have used two servo motors which helps the movements of the curtains in a particular degree and it can be controlled using the Arduino.

Advantages:

- No need of depending anyone
- Makes a person independent.
- It is reliable.
- Purely controlled by voice
- The concept can be expanded to other spheres of home automation.

Disadvantages:

- It can be costly.
- Cannot be used in situation where voice signal is unavailable.

COMPONENTS

1. Arduino UNO –

It's the most commonly used version of Arduino Boards. Arduino UNO is a microcontroller based on ATmega328. It has 14 digital Input/Output pins out of which 6 are PWM outputs. There are 6 analog inputs. It has a power jack, a USB Connection, 16 MHz quartz crystal, a reset button and an ICSP header. ICSP (In Circuit programming) is a protocol used for programming the microcontroller using another Arduino or to connect it to a computer to upload the program.



2. Jumper Wires –

They are wires which can be used to join two points in a circuit board without soldering. There are 3 types: (i) Male to Male jumper wire, (ii) Female to Female jumper wire and (iii) Male to Female jumper wire.



3. Polystyrene (Thermocol) –

It can be hard and brittle. It's an aromatic hydrocarbon made from styrene monomer. In this project, It's with the help of thermocol, a lightweight chassis of the curtain was made.



4. Synthetic Ribbon –

Servo Motors were used to rotate the curtains. It cannot rotate heavy materials and hence the cloth material used in the curtain was fancy synthetic ribbon.



5. Servo Motors –

They are DC motors that allows precise angular positioning of items. They have a revolution of 90, 180 or 360 degrees. They are small in size and energy efficient. However, they don't have enough strength to handle the weight of real long

curtains. Here in this project we are using one servo motor to demonstrate the voice automation. To handle higher loads, a Stepper motor can be used. It has 3 lines.

WORKING

The system is designed simply by use of a small microcontroller, interfaced with the system and connected on a breadboard. The system comprises simply of an object, which in our case turns out to be a blueprint of a curtain. The curtain is made to rotate enough to lift its blinds or close them. The motion is achieved through using servo motors. The servo motors are programmed using Arduino IDE and the circuit board used Arduino UNO. Since it is voice controlled, Microphones provided in smart phones are used and an android app published by BroXCode is used to convert audio to text. This is transferred via Bluetooth HC-05 bluetooth transceiver to Arduino. The audio is processed and the motion is set.

The language used for coding is Embedded C and this project is mainly hardware. It is implemented by arranging things appropriately. The program is written on Arduino IDE.

The hardware code is loaded into RAM of Arduino. The program ran perfectly and caused the desired motion. It has been tested under various scenarios like under noise, range etc. The testing also included giving random voice commands, recorded voice commands with different dialects etc. and the system developed proved effective.

Program:

//Arduino IDE code

```
#include <Servo.h>
```

```
Servo servoright;
```

```
int i;
```

```
intposl = 0;
```

```
intposr = 270;
```

```
void setup() {
```

```
    Serial.begin(9600);
```

```
    servoright.attach(9);
```

```
    i = 1; }
```

```
void openc() {
```

```
    servoright.write(posr);}
```

```
void closec() {
```

```
    servoright.write(posl);}
```

```
void loop() {
```

```
    if (i==1){
```

```
        servoright.write(270);
```

```
        i=i-1; }
```

```
if (Serial.available())
```

```
{
```

```
    char s = Serial.read();
```

```
    if (s == 'a')
```

```
        Serial.print("opened");
```

```
        openc(); }
```

```
else if (s == 'b') {
```

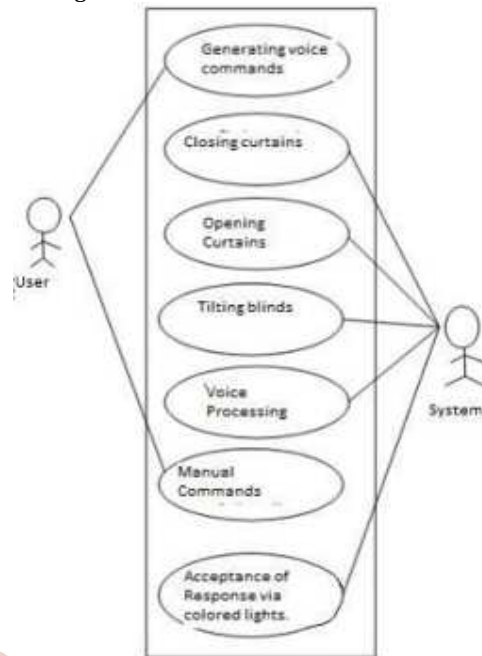
```
    Serial.print("closed");
```

```
    closec(); }
```

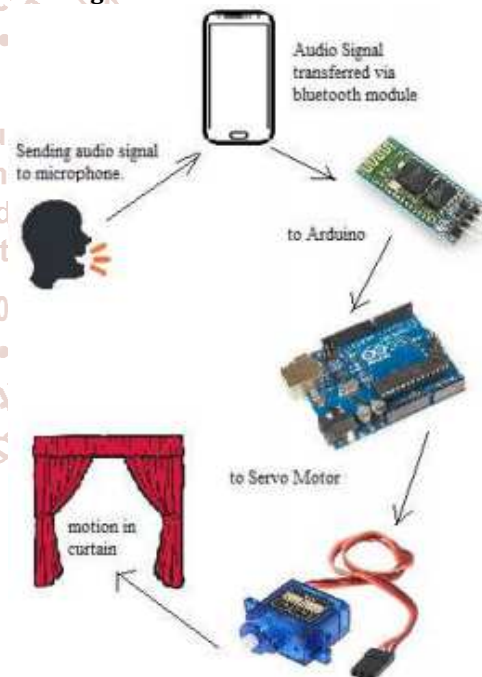
```
}}
```

SYSTEM ARCHITECTURE

Use-case Diagram:



Data flow diagram:



OUTCOME

There are mainly two outcomes are expected from the project. We have collected few data from the electric department and the help from our department for obtaining the required results. Our project aims to automate home items such as closing of curtains based on natural language processing (NLP). It can be implemented using an embedded system having a Natural Language Processor to process the voice signals and an IoT based system to cause movement on the curtains. It can be designed to minimize the human efforts to interact with the other systems. By achieving this, the system will make human life comfortable. It mainly consist of four phases. Firstly, we are sending audio signals to microphone. Then the audio signals are transferred through bluetooth module. This module transfers data to

Arduino for data processing. Arduino gives the commands for motion through the servo motor for causing the motion of curtains. Acknowledgement We acknowledge our Sahridaya College of Engineering and Technology for giving us the opportunity to do our project. We express our whole hearted gratitude to Mr. Krishnadas J, H.O.D. of Computer Science and Engineering department who has a source of constant inspiration and suggestions throughout the project work. We extend our sincere gratitude to our project coordinator, Mrs. Anila Thomas , Assistant Professor, Department of Computer Science and Engineering, SCET for

leading the way for the completion of the project. References [1] Z. Zong and C. Hong, "On Application of Natural Language Processing in Machine Translation," 2018 3rd International Conference on Mechanical, Control and Computer Engineering (ICMCCE), Huhhot, 2018, pp. 506-510. [2] D.Jurafsky & James H. Martin, Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition, Prentice Hall, Second Edition 2009, (J&M) [3] Daniel Jurafsky and James H. Martin (2008). Speech and Language Processing, 2nd edition. Pearson Prentice Hall.

