

# **PROJECT NAME : SIMPLE HAND GLOVES MUSICAL PIANO USING ARDUINO**

Course no: CSE 3204

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## Objectives :

- To learn about Arduino UNO and its different Pin functionalities.
- To learn about Audio Speaker (8 ohm, 0.5 watt) and it's operation without any noise.
- To learn about LM386 Audio Amplifier and Potentiometer to control sound.

## Introduction Of The Project :

The aim of this project is to make an **Arduino Based Piano** which can be operated through **Hand Gloves**. In a typical harmonium we create different types of tones or musics or lyrics. In our project we used this concept, we used their consecutive time periods or tone frequency to make the same (sa ,re , ga ,ma, pa, dha, ni , sa) tone so that this can be used to create some musics or musical tones. It's like a Small Digital Harmonium! In a typical harmonium we use our fingers to create musical sounds likewise here we used Handgloves to make tones. When one finger touch another finger corresponding tone will be sounded.

## Apparatus:

### Hardware :

- **Arduino UNO.**
- **8 Ohm, 0.5 Watt Speaker.**
- **LM386 Audio Amplifier ( Low Power Audio Amplifier )**
- **10k Potentiometer.**
- **Two Hand gloves.**
- **Alluminium Foil.**
- **8 Registers (330 ohm each )**
- **Capacitors (10  $\mu$ F, 470 pf, 0.1  $\mu$ F )**
- **Connecting Wires**

### Software :

- **Arduino IDE**

## How It Works :

Our piano has the basic 8 notes. They are "C" , "D", "E", "F", "G", "A", "B", "C". These 8 notes denote (sa, re, ga, ma, pa, dha, ni, sa) and their corresponding time periods are 3830, 3400, 3038, 2864, 2550, 2272, 2028, 1912 milliseconds. We use the formula to calculate TimeHigh period :

$$\text{TimeHigh} = ( \text{TimePeriod} / 2 )$$

For example:

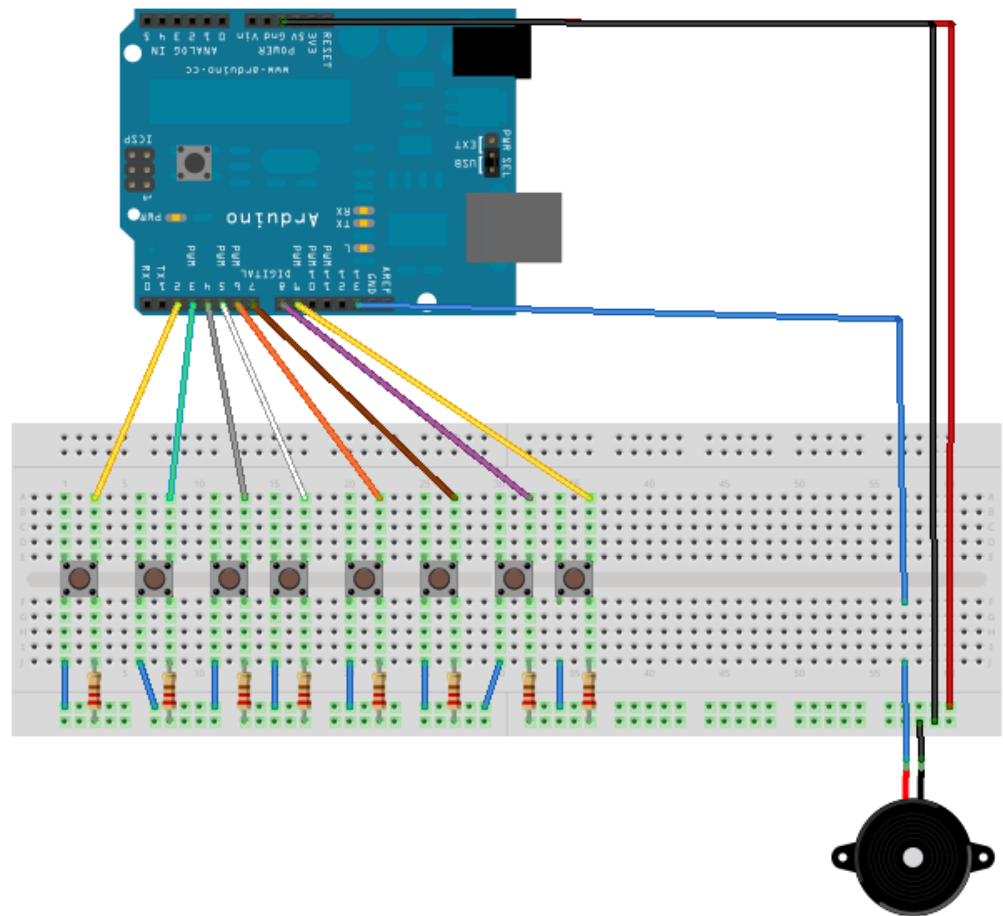
$$\begin{aligned} \text{For "A" : TimeHigh} &= ( 3830 / 2 ) \\ &= 1915 \text{ milliseconds} \end{aligned}$$

When Vcc touches one of the 8 notes corresponding note sounded. To make a good quality of audio sound we use a **(0.5 watt, 8 ohm) Audio Speaker**. To minimize noise in the speaker we used 10 330ohm registers. To amplify the sound we use a sound **Amplifier (LM386)** , to control volume we used a **potentiometer ( 10K )**.

Finally we used two **Hand Gloves** to operate it easily and enjoyably. 4 of the 8 notes one hand along with a Vcc and other hand got same notes and a Vcc. When one finger touch another finger which carrying Vcc, corresponding note sounded. The rest of the notes on other fingers works in same manner.



## Circuit Connectivity :



Made with  Fritzing.org

## Arduino Code :

```
int button_C = 2;
```

```
int button_D = 3;
```

```
int button_E = 4;
```

```
int button_F = 5;
```

```
int button_G = 6;
```

```
int button_A = 7;  
int button_B = 8;  
int button_Cup = 9;
```

```
int speaker = 13;
```

```
int buttonstate_C = 0;  
int buttonstate_D = 0;  
int buttonstate_E = 0;  
int buttonstate_F = 0;  
int buttonstate_G = 0;  
int buttonstate_A = 0;  
int buttonstate_B = 0;  
int buttonstate_Cup = 0;
```

```
//NOTES      'c' , 'd', 'e', 'f', 'g', 'a', 'b', 'C'
```

```
int tones[] = { 1915, 1700, 1519, 1432, 1275, 1136, 1014, 956 }; //freq
```

```
int Cur_tone = 0;
```

```
void setup()
```

```
{  
  pinMode(button_C, INPUT);  
  pinMode(button_D, INPUT);  
  pinMode(button_E, INPUT);  
  pinMode(button_F, INPUT);  
  pinMode(button_G, INPUT);  
  pinMode(button_A, INPUT);  
  pinMode(button_B, INPUT);
```

```
pinMode(button_Cup, INPUT);
```

```
pinMode(speaker, OUTPUT);
```

```
}
```

```
void loop()
```

```
{
```

```
    buttonstate_C = digitalRead(button_C);
```

```
    buttonstate_D = digitalRead(button_D);
```

```
    buttonstate_E = digitalRead(button_E);
```

```
    buttonstate_F = digitalRead(button_F);
```

```
    buttonstate_G = digitalRead(button_G);
```

```
    buttonstate_A = digitalRead(button_A);
```

```
    buttonstate_B = digitalRead(button_B);
```

```
    buttonstate_Cup = digitalRead(button_Cup);
```

```
    if((buttonstate_C == HIGH) || (buttonstate_E == HIGH) ||
```

```
        (buttonstate_G == HIGH) || (buttonstate_D == HIGH) ||
```

```
        (buttonstate_F == HIGH) || (buttonstate_A == HIGH) ||
```

```
        (buttonstate_B == HIGH) || (buttonstate_Cup == HIGH) )
```

```
    {
```

```
        if (buttonstate_C == HIGH)
```

```
        {
```

```
            Cur_tone = tones[0];
```

```
        }
```

```
        if (buttonstate_E == HIGH)
```

```
        {
```

```
            Cur_tone = tones[1];
```

```
}  
if (buttonstate_G == HIGH)  
{  
    Cur_tone = tones[2];  
}  
if (buttonstate_D == HIGH)  
{  
    Cur_tone = tones[3];  
}  
if (buttonstate_F == HIGH)  
{  
    Cur_tone = tones[4];  
}  
if (buttonstate_A == HIGH)  
{  
    Cur_tone = tones[5];  
}  
if (buttonstate_B == HIGH)  
{  
    Cur_tone = tones[6];  
}  
if (buttonstate_Cup == HIGH)  
{  
    Cur_tone = tones[7];  
}  
  
digitalWrite(speaker, HIGH);  
delayMicroseconds(Cur_tone);
```

```

        digitalWrite(speaker, LOW);

        delayMicroseconds(Cur_tone);

    }

    else //in case no button is pressed , close the piezo

    {

        digitalWrite(speaker, LOW);

    }

}

```

## Some Future Plans :

- ❖ Get better touch sensors, buy some bend sensors and an accelerometer, maybe some Bluetooth, and make a smarter glove
- ❖ Skip the glove, use the aluminium foil as a close proximity distance sensor, use it in applications that involve varying distance (maybe to zoom in and out of a game or model), taking advantage of those analog values.
- ❖ Move onto cooler, more sophisticated, and smarter wearable technology like interactive LED fashion, 3D printed wearable devices, or a Raspberry Pi wearable computer.

## Discussion :

This Handgloves Piano is just a fun type project. But while completing this project we learned a lot about Arduino, how arduino works, How to interface a audio speaker with arduino along with Amplifier, potentiometer, registers, capacitors etc. Basically, this course helped us greatly to make small hardware project which can make our life more easy and more comfortable. And also very grateful to our respected Honorable Course Teachers.