IEEE - CSULB Branch
March 19, 2021
Kiyo Terao
John Abrahem

Agenda

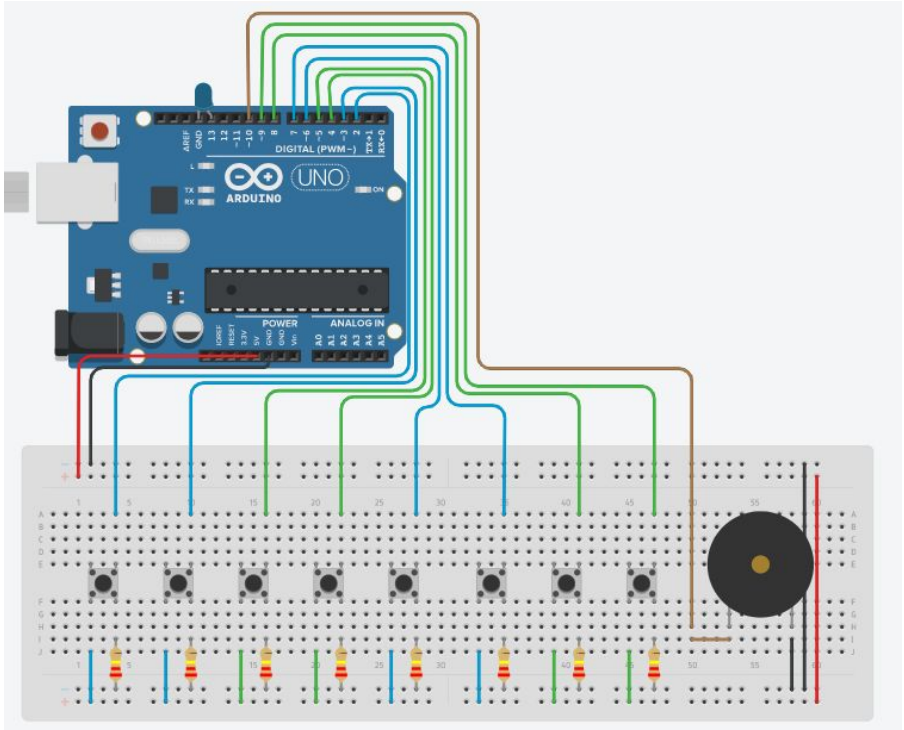
- Project
- Software setup
  - Arduino IDE
- Library
- Arduino Programming Language
  - Define
  - int
  - void setup
  - Void loop
  - pinMode
  - digitalRead
  - digitalWrite
  - tone

Code Link:

IEEE

Project- Arduino Piano

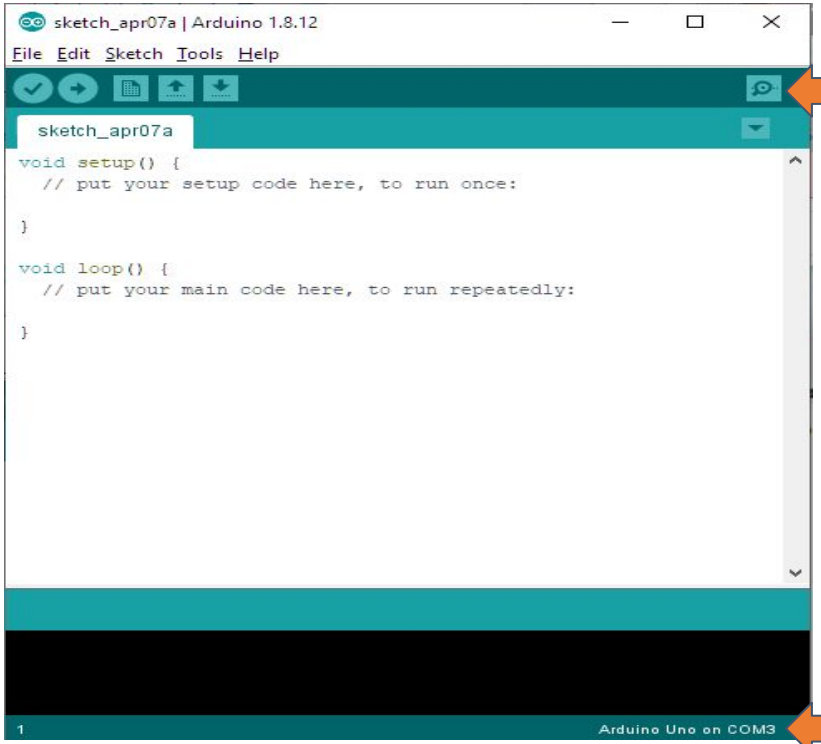
- Sound Reactive Arduino Floor Piano
- Modules used
  - Arduino Uno/nano
- Components
  - Resistors
  - Jumper wires
  - Piezo



Software Setup

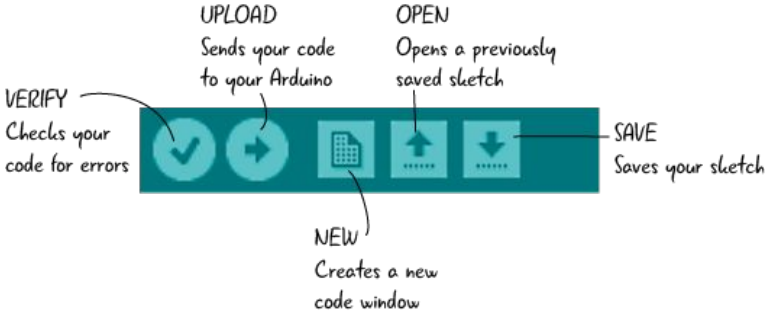
- Google “Arduino IDE”
  - Click on the first link (Software | Arduino)
  - Scroll down and look for “Arduino IDE 1.8.13 “
  - Click on your respective Operating System (i.e. Windows, Apple) to download file.

Software Setup - continued



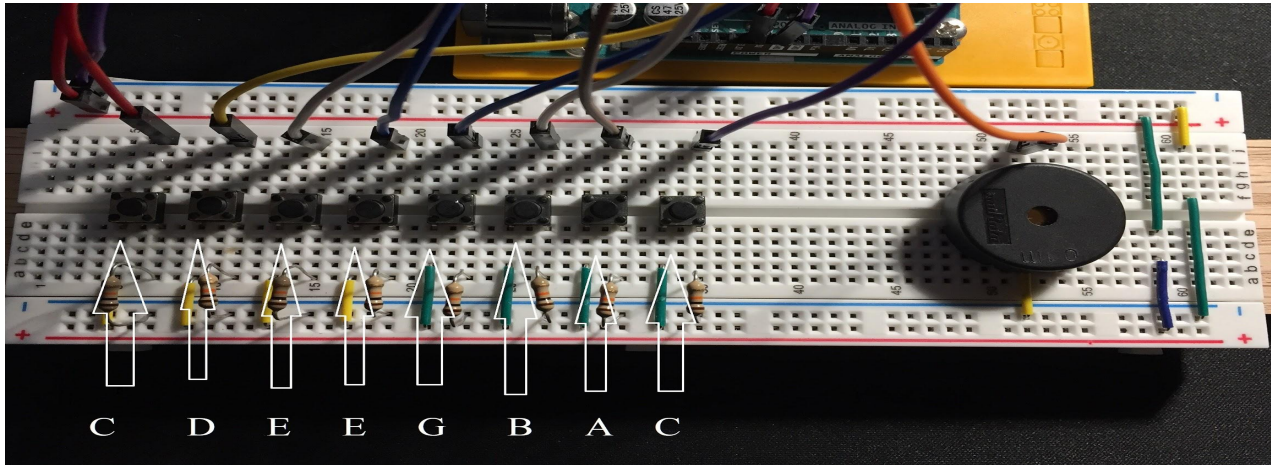
Serial Monitor

Arduino board



Structure > Syntax > #define

- Allows the programmer to give a name to a constant value before the program is compiled.
- We define 7 variables, for the seven piano keys
- cNote for piano key C
- dNote for piano key D
- eNote for piano key E
- fNote for piano key F
- gNote for piano key G
- aNote for piano key A
- bNote for piano key B
- CSNote for piano key C sharp
- Note: cNote is the variable name for input 2



Variable > Data type > int

- Allows for you to store values as integers for specified variable
  - int c = 296.33
  - int d = 264
  - int e = 332.62
  - int f = 352.40
  - int g = 395.56
  - int a = 444
  - int b = 498.37
  - int CS = 523.25

$$f(n) = \left(\sqrt[12]{2}\right)^{n-49} \times 440\,\text{Hz}$$

- Note: these values are the frequency value for each of the middle piano keys

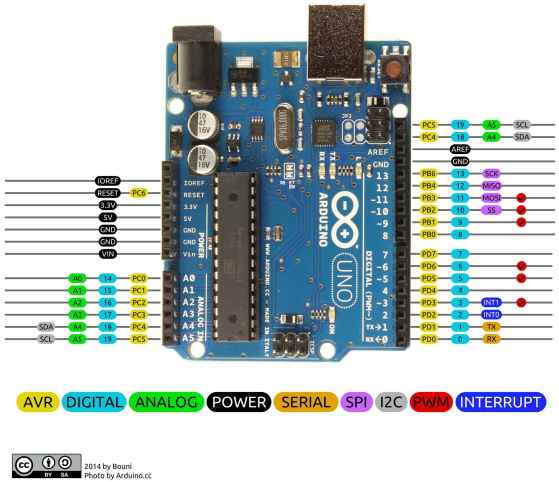
setup() & pinMode()

```
void setup()
{
  pinMode(cNote, INPUT);        -Declaring cNote as an input
  pinMode(dNote, INPUT);        -Declaring dNote as an input
  pinMode(eNote, INPUT);        -Declaring eNote as an input
  pinMode(fNote, INPUT);        -Declaring fNote as an input
  pinMode(gNote, INPUT);        -Declaring gNote as an input
  pinMode(aNote, INPUT);        -Declaring aNote as an input
  pinMode(bNote, INPUT);        -Declaring bNote as an input
  pinMode(CNote, INPUT);        -Declaring CNote as an input

  pinMode(Piezo, OUTPUT);       -Declaring Piezo, which is our speaker, as an output
  pinMode(LED, OUTPUT);         -Declaring LED, which is our LED light bulbs, as an output

  Serial.begin(9600);
}
```

Arduino Uno R3 Pinout



digitalRead()

```
Serial.println(digitalRead(cNote));  -the program reads the value for cNote
 Serial.println(digitalRead(dNote)); -the program reads the value for dNote
 Serial.println(digitalRead(eNote)); -the program reads the value for eNote

 Serial.println(digitalRead(fNote)); -the program reads the value for fNote

 Serial.println(digitalRead(gNote)); -the program reads the value for gNote

 Serial.println(digitalRead(aNote)); -the program reads the value for aNote

 Serial.println(digitalRead(bNote)); -the program reads the value for bNote

 Serial.println(digitalRead(CNote)); -the program reads the value for CNote
```

digitalWrite()

```
digitalWrite(LED,HIGH);                          - assign LED a value of high
  }else if (digitalRead(fNote) == 1) {
    tone(Piezo, f, 250);  // plays note f
    digitalWrite(LED,HIGH);                      - assign LED a value of high
  }else if (digitalRead(gNote) == 1) {
    tone(Piezo, g, 250);  // plays note g
    digitalWrite(LED,HIGH);                      - assign LED a value of high
  }else if (digitalRead(aNote) == 1) {
    tone(Piezo, a, 250);  // plays note a
    digitalWrite(LED,HIGH);                      - assign LED a value of high
  }else if (digitalRead(bNote) == 1) {
    tone(Piezo, b, 250);  // plays note b
    digitalWrite(LED,HIGH);                      - assign LED a value of high
  }else if (digitalRead(CNote) == 1) {
    tone(Piezo, C, 250);
```

tone()

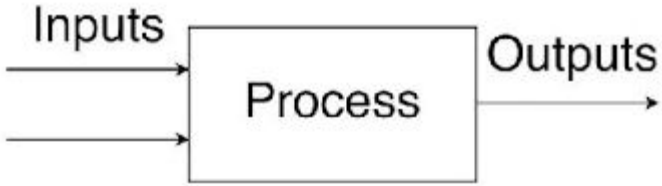
```
digitalWrite(LED,HIGH);
  }else if (digitalRead(fNote) == 1) {
    tone(Piezo, f, 250);  // plays note f     - plays note f on the speaker for 0.25s
    digitalWrite(LED,HIGH);
  }else if (digitalRead(gNote) == 1) {
    tone(Piezo, g, 250);  // plays note g     - plays note g on the speaker for 0.25s
    digitalWrite(LED,HIGH);
  }else if (digitalRead(aNote) == 1) {
    tone(Piezo, a, 250);  // plays note a     - plays note a on the speaker for 0.25s
    digitalWrite(LED,HIGH);
  }else if (digitalRead(bNote) == 1) {
    tone(Piezo, b, 250);  // plays note b     - plays note b on the speaker for 0.25s
    digitalWrite(LED,HIGH);
  }else if (digitalRead(CNote) == 1) {
    tone(Piezo, C, 250);                    - plays note C on the speaker for 0.25s
```

Function > Digital io > pinMode()

- Indicates a specified pin to either act as an input or an output
- Inputs act as data that is analyzed and used to contribute to an output
- Outputs are products of inputs and manipulations in a process that are ordered by program

➢ Ex: This is programming the arduino to have “cNote” as one of the inputs.

```
void setup()
{
  pinMode(cNote, INPUT);
```



Structure > Sketch> void setup()

- The code that is run at the beginning of a program and is run once.
- We want the arduino to take in inputs, and deliver outputs.
  - So we use pinmode() for void setup function to instruct which pin on the arduino is either an input or output.

➢ Ex: This is programming the arduino to have “cNote” as one of the inputs.

```
void setup()
{
  pinMode(cNote, INPUT);
```