

# The Music Box.

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section D



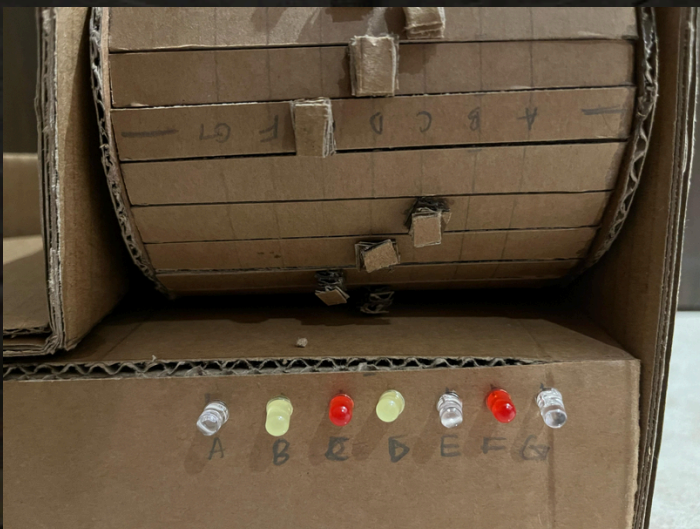
# The Idea.

I've always wanted to make a music box there's just something magical about them. Music has been a huge part of my life, so when this opportunity came up, I knew I had to take it. More than that, I've always wanted to gift a music box to my sister, and I realized that creating one myself would make it even more special.

## Components.

- LEDs
- TouchPad
- Stepper Motor
- power supply

## The Mechanism.



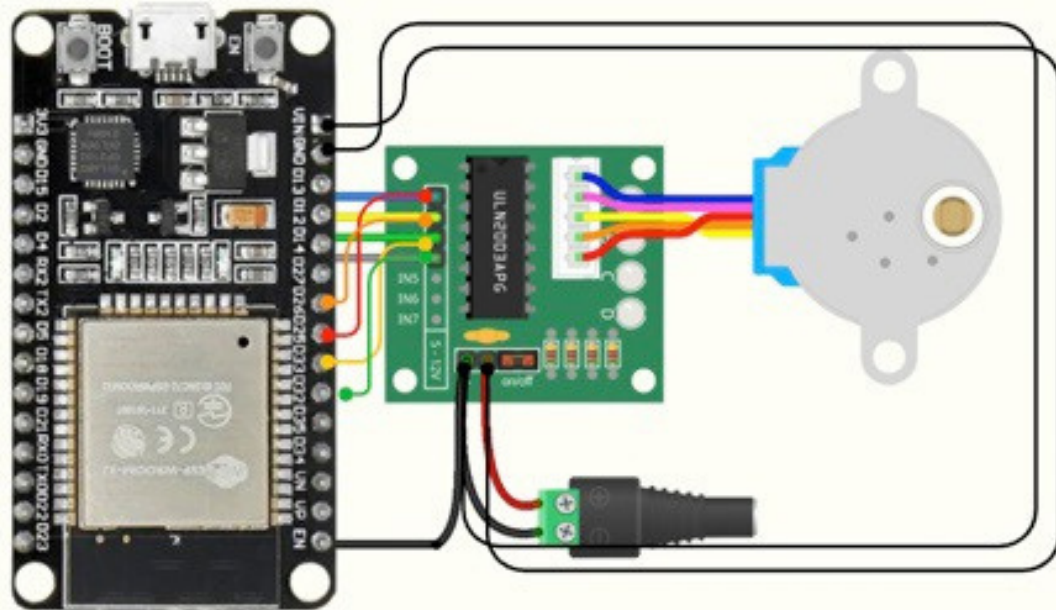
as the cylinder rotates with the help of the motor, the small rectangles will touch the touch pins.  
on touching the touch pins, the buzzer will make the sound of that particular note and the LED bulb for that note will glow



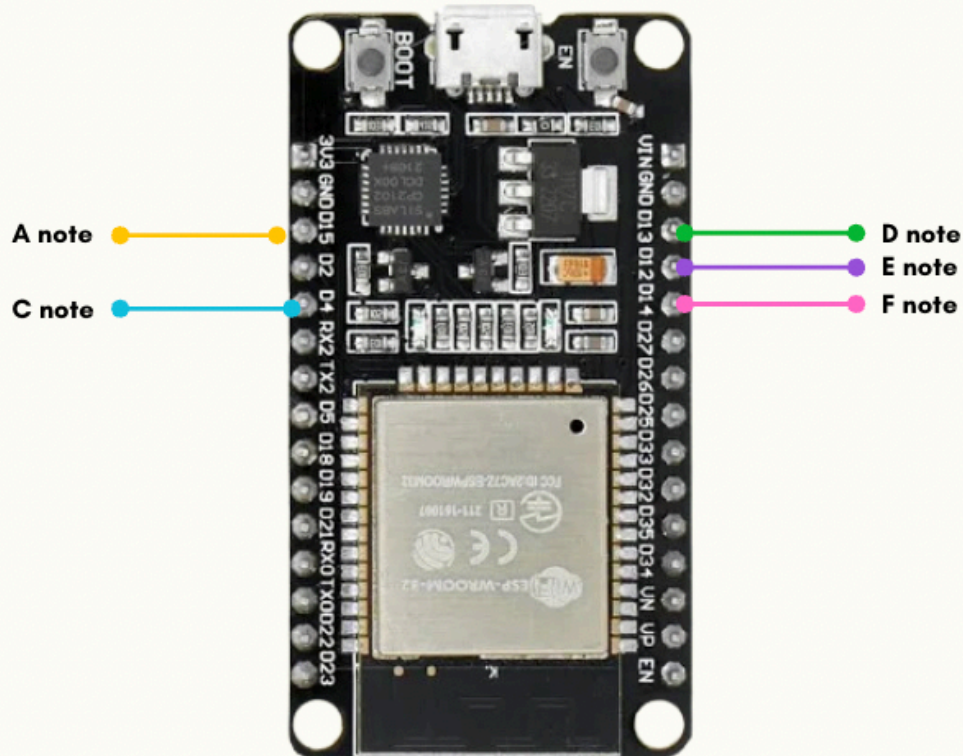


# Circuit Diagram.

## Stepper motor

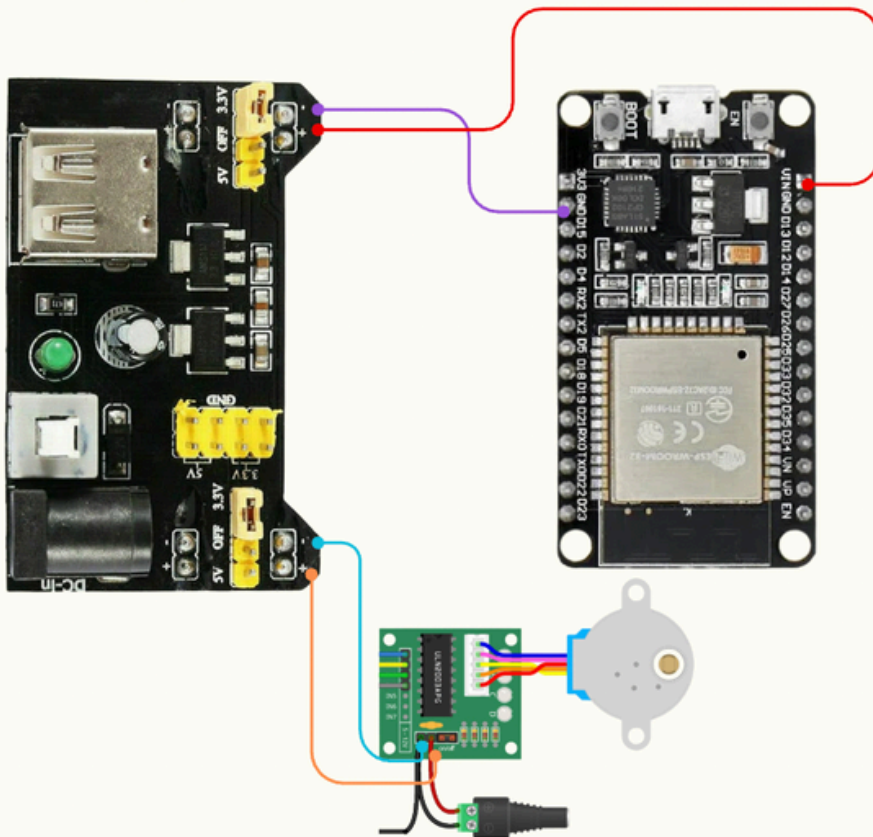


## touch pad

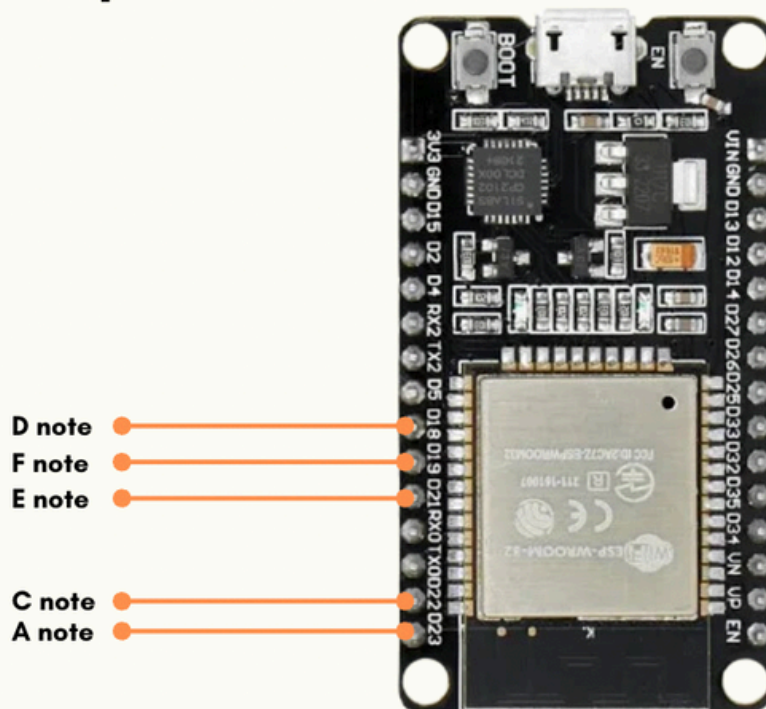


# Circuit Diagram.

## power supply

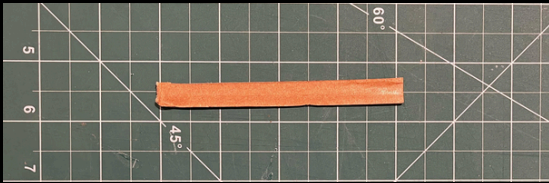


## LED pins

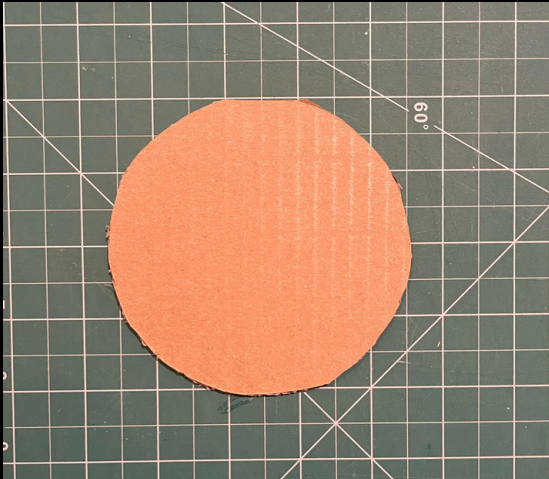




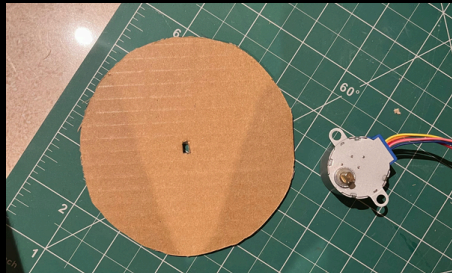
# how i made it?



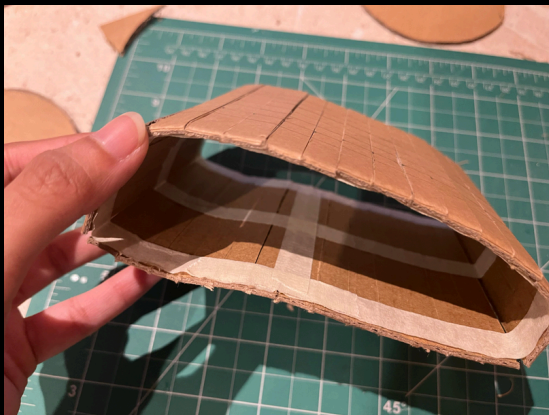
cut up 32 rectangles



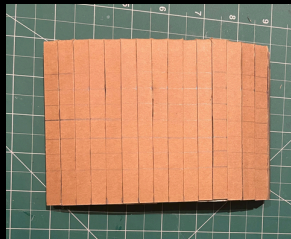
cut 2 circles



make a hole in one circle to fit the motor



connected the 32 rectangles to make a cylinder



stick the 2 circles on both the ends of the cylinder



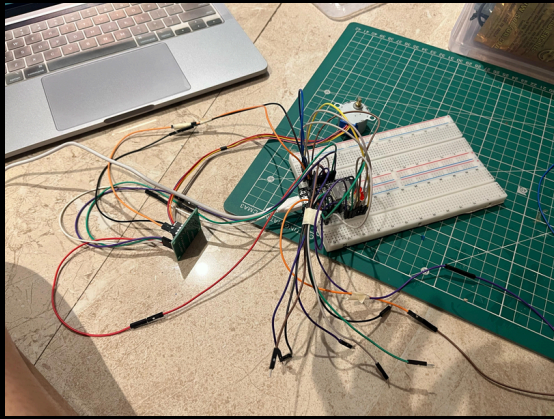
measured a box to fit the bread board



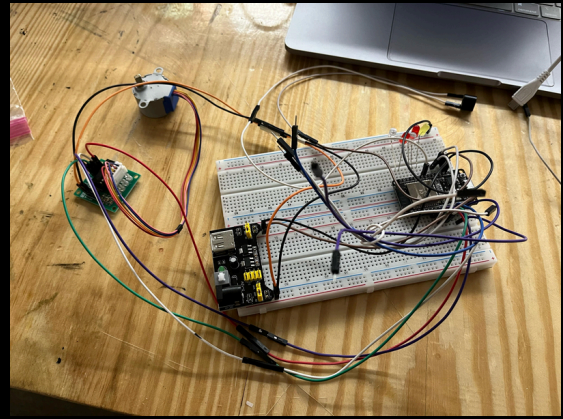
breadboard and circuit inside here

created a box like so





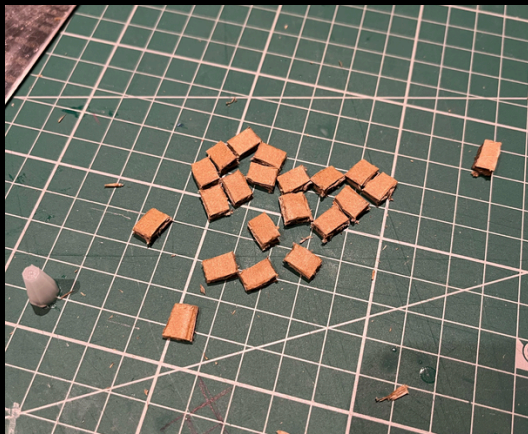
testing of code #1



testing of code #2



created a hole on the side to fit the motor



cut up 96 small rectangles

$32 \times 3 = 96$   
for each note 3 rectangles

pile 3 rectangles together



fix the small rectangles on each note that is to be played according to the tune

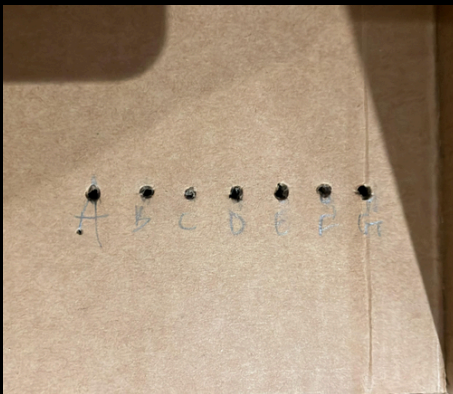




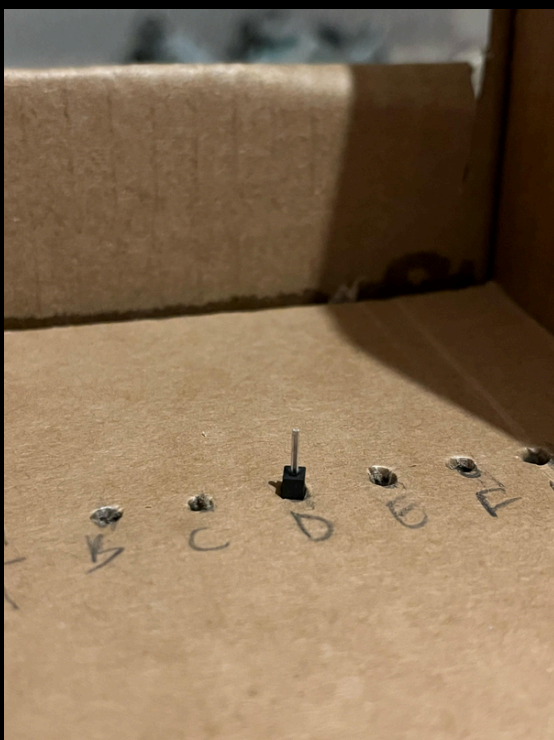
add another hole for  
the skewers in each  
circle



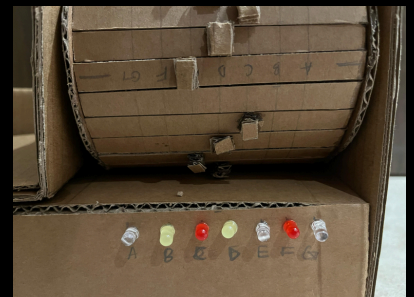
skewers added



poke holes for all the notes  
on top and on the side



push the touch pins from the  
bottom to the top



do this for every note



# final product

heres a video of how i would like it to move

[click here](#)





# Code.

[view my code - here](#)

```
1 from machine import Pin, PWM, TouchPad
2 import time
3
4 # Stepper motor control pins
5 IN1 = Pin(25, Pin.OUT)
6 IN2 = Pin(26, Pin.OUT)
7 IN3 = Pin(33, Pin.OUT)
8 IN4 = Pin(32, Pin.OUT)
9
10 # Stepper motor sequence
11 step_sequence = [
12     [1, 0, 0, 0],
13     [1, 1, 0, 0],
14     [0, 1, 0, 0],
15     [0, 1, 1, 0],
16     [0, 0, 1, 0],
17     [0, 0, 1, 1],
18     [0, 0, 0, 1],
19     [1, 0, 0, 1]
20 ]
21
22 # Notes Frequencies (Hz)
23 notes_freq = {
24     "A": 440,
25     "B": 494,
26     "C": 523,
27     "D": 587,
28     "E": 659,
29     "F": 698,
30     "G": 784,
31 }
32
33 # touch pins
34 touch_pins = {
35     "A": TouchPad(Pin(15)),
36
37     "C": TouchPad(Pin(4)),
38     "D": TouchPad(Pin(13)),
39     "E": TouchPad(Pin(12)),
40     "F": TouchPad(Pin(14))
41 }
42 }
```

```
44 #LEDs for each note
45 led_pins = {
46     "A": Pin(23, Pin.OUT),
47
48     "C": Pin(22, Pin.OUT),
49     "D": Pin(18, Pin.OUT),
50     "E": Pin(21, Pin.OUT),
51     "F": Pin(19, Pin.OUT),
52 }
53
54 # Buzzer
55 buzzer = PWM(Pin(5))
56 buzzer.freq(15)
57 buzzer.duty(0)
58
59 # Touch threshold value
60 threshold = 300
61
62 #to rotate stepper motor
63 def rotate_stepper(steps=100, delay=0.0008):
64     for _ in range(steps):
65         for step in step_sequence:
66             IN1.value(step[0])
67             IN2.value(step[1])
68             IN3.value(step[2])
69             IN4.value(step[3])
70             time.sleep(delay)
71
72 # to play note
73 def play_note(note):
74     buzzer.freq(notes_freq[note])
75     buzzer.duty(512)
76     led_pins[note].value(1)
77     time.sleep(0.2)
78     print('hi')
79     buzzer.duty(0)
80     led_pins[note].value(0)
81
82 --
```

```
86 # Main loop
87 while True:
88     rotate_stepper(steps=5, delay=0.0015)
89     for note, touch in touch_pins.items():
90         print(touch.read())
91         if touch.read() < threshold:
92             play_note(note)
93             print(note)
94     time.sleep(0.1)
95
```

# Video.

[view my video - here](#)

working of the code with the circuit only



# Reflection.

Creating this music box has been one of the most valuable learning experiences for me. It wasn't a smooth journey there were plenty of challenges along the way, and at times, I felt stuck.

Initially, I struggled with several issues in my model, unsure of what was going wrong. Eventually, I realized that the **touch pins were placed too close together**, causing unintended interactions.

The stepper motor also proved to be a challenge, often behaving unpredictably. I then figured out that the IN pins were placed closely which created a problem as well

On top of that, figuring out the right threshold value was frustrating I kept adjusting it but couldn't quite get the right threshold value to make the model function.

Despite these setbacks, each obstacle pushed me to think critically and refine my approach. Through trial and error, I learned how small technical details can significantly impact the overall functionality. Looking back, these struggles weren't just roadblocks they were stepping stones that helped me understand the mechanics more deeply and made the final outcome even more rewarding.

in the end although i wasnt able to make the code work along with the model, im glad the way this has turned out.

I will work on this project again and make it work completely!  
:)