Arduino 5-Button Synthesizer – Pin Connections

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Description:

An interactive mini synthesizer using the Arduino Uno R3 from the ELEGOO Super Starter Kit. Press buttons to play musical notes, and use a potentiometer to bend the pitch. Now with two versions: a basic model and an amplified final version using a PN2222 transistor. The following are the components and their descriptions.

Components:

Component	Quantity	Notes
Arduino Uno R3	1	From ELEGOO kit
Passive Buzzer	1	Sound output
Push Buttons	5	Trigger 5 notes
Potentiometer (10kΩ)	1	Pitch shift (optional)
220Ω resistor	1	Used in initial version
PN2222 Transistor	1	Used in final version
1kΩ resistor	1	For transistor base
Breadboard + Wires	–	Standard prototyping setup

Push Buttons (5 total)

Each button has two legs. Connect as follows:

Button	Arduino Pin	Other Leg →
Btn 1	D2	GND (blue rail)
Btn 2	D3	GND
Btn 3	D4	GND

Btn 4	D5	GND
Btn 5	D6	GND

- Buttons go across the breadboard trench (each side on a different row).
- Use INPUT_PULLUP in code (so no resistors needed).
- Each button's signal leg connects to its digital pin (D2–D6).

Piezo Buzzer

Use the passive buzzer.

Pin	Connects To
Buzzer +	D9 (Arduino)
Buzzer –	GND (Arduino or breadboard rail)

- Put a 220Ω resistor between D9 and the buzzer + leg to limit current.

Potentiometer (Optional: pitch shifting)

Connect the three pins of the pot:

Pot Pin	Connects To
Left	5V
Middle	A0
Right	GND

- You can swap left/right; it just changes rotation direction.

Arduino Pin Mapping Summary

Arduino Pin	Connected Component
D2	Button 1
D3	Button 2
D4	Button 3
D5	Button 4
D6	Button 5
D9	Piezo buzzer (+)

A0	Potentiometer center (optional)
GND	Buttons, buzzer, potentiometer
5V	Potentiometer

With amplified volume:

Component	Connects To
Potentiometer +	→ 5V pin
Buzzer +	→ 5V pin (same rail)
Piezo –	→ PN2222 collector
PN2222 emitter	→ GND
Arduino D9	→ 1kΩ resistor → PN2222 base

Code:

```
const int buzzerPin = 9;
const int buttonPins[5] = {2, 3, 4, 5, 6};
const int notes[5] = {262, 294, 330, 349, 392}; // C4–G4
const int potPin = A0; // for pitch shift

void setup() {
 pinMode(buzzerPin, OUTPUT);
 for (int i = 0; i < 5; i++) {
   pinMode(buttonPins[i], INPUT_PULLUP); // Buttons active LOW
 }
}

void loop() {
 int pitchShift = map(analogRead(potPin), 0, 1023, -30, 30); // +/-30Hz range

 for (int i = 0; i < 5; i++) {
   if (digitalRead(buttonPins[i]) == LOW) {
     tone(buzzerPin, notes[i] + pitchShift);
     delay(200); // debounce + hold tone
     noTone(buzzerPin);
```
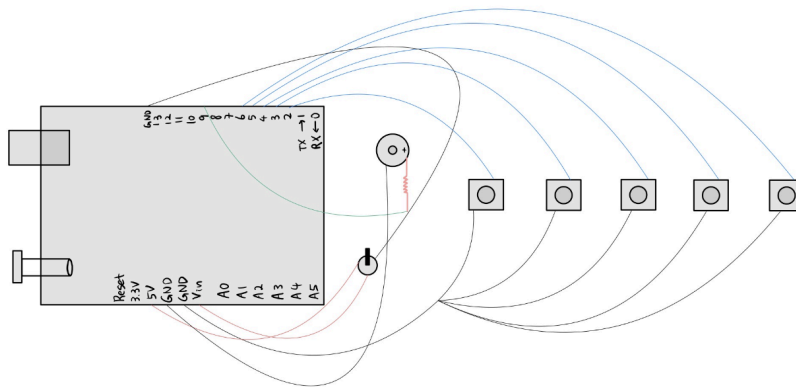
```
    }
  }
}
```

Project Presentation:

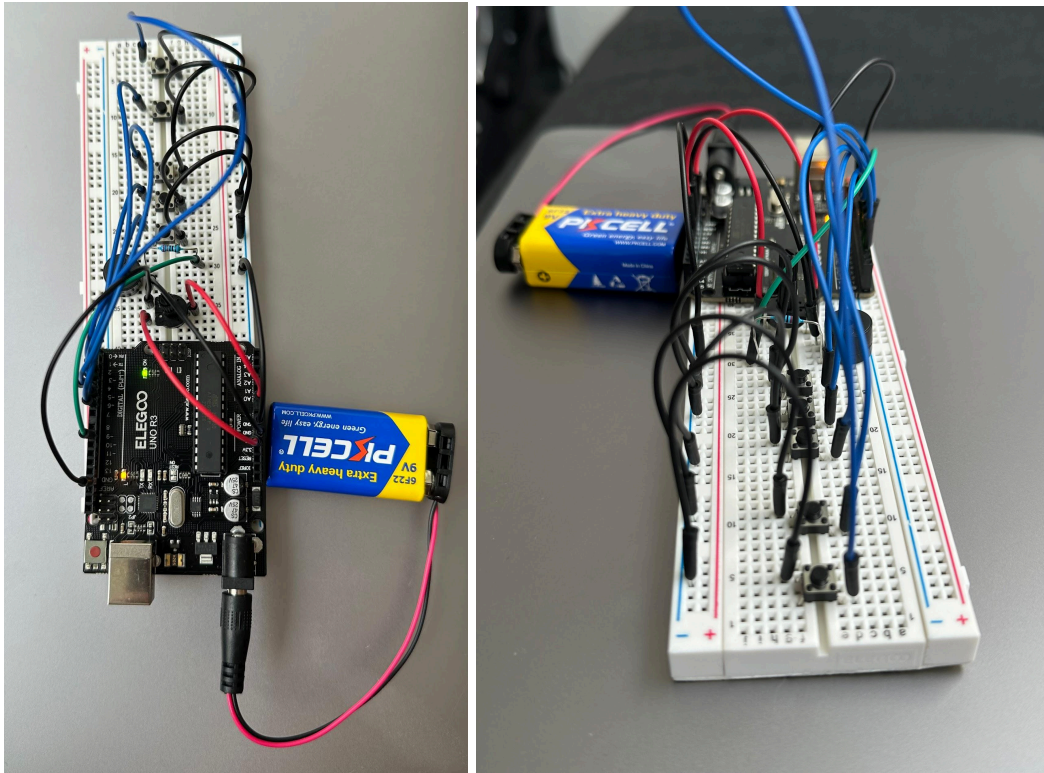Video of initial version:

Visual Circuit Diagram of first version:

Initial Version

Color Code:
Black — grounding
Blue — buttons
Red — Potentiometer
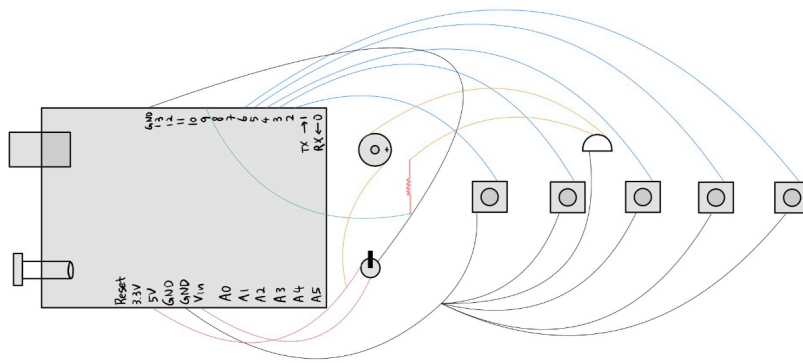Green — piezo buzzer (passive)
Pink — Resistor (220 Ω)

Images of first version:

Video of final version: https://youtube.com/shorts/pOszIoqsiSE?si=DbRVh_SzJPX34rm-

Visual Circuit Diagram of final version:

Final Version
(with amplified Volume)

Color Code:
Black — grounding
Blue — buttons
Red — Potentiometer
Green — piezo buzzer (passive)
Pink — Resistor (1KΩ)
Orange — transistor (PN2222)

Images of final version: