

Paper Piano

Demo

https://www.youtube.com/watch?v=6a_rykLIN3k

How it works

The keys are covered by tin foil. All the keys are connected to 3.3 Volt that is supplied by the 3V pin of the microbit. There are 3 strips of tin foil laying under the keys perpendicularly. Each strip is connected to a digital input pin on the microbit. When a key is pressed it connects 3V to the digital input through the tin foils. The way microbit can recognize the different keys is that every key can contact to different combination of strips as we cover some of the strips with paper (see picture in the Instruction). When the key is pressed microbit will read 0 where the strip is covered and 1 where it is not.

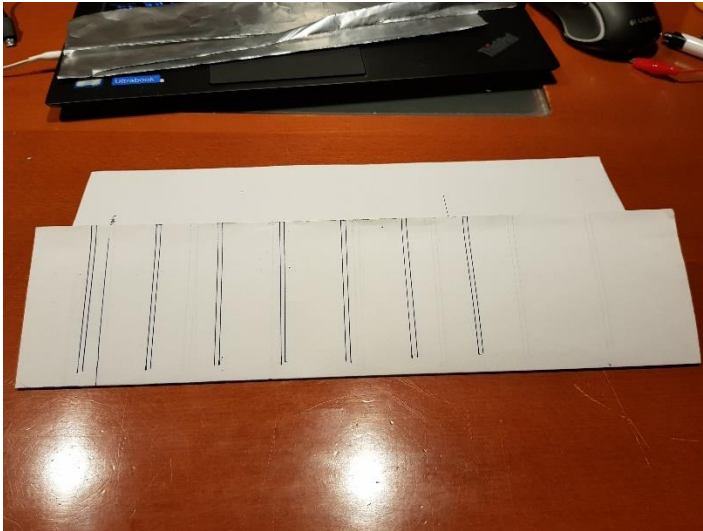
Key	code	Note
-	000	silence
Key1	001	C
Key2	010	D
Key3	011	E
Key4	100	F
Key5	101	G
Key6	110	A
Key7	111	B

What you need

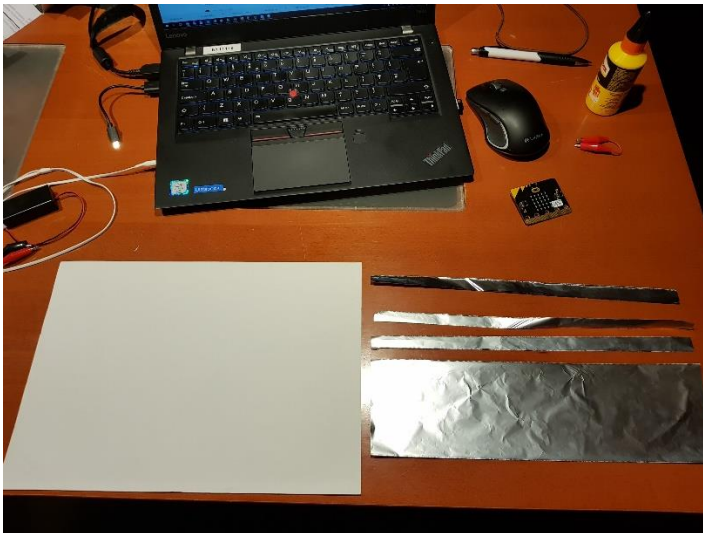
- microbit
- A4 paper
- Tin foil
- Glue
- 6x crocodile jumper wires
- Headset

Instructions

1. Draw 7 keys on the paper, leave thin space between the keys so when you press one key it does not drag the neighbouring key with it. Fold the keys up, then back.



2. Cut 4 tinfoil strips. Three thin ones about 1cm wide and one thick one which should be as wide as the keys are long + 1 cm



3. Glue the tin foil strips to the paper. Leave few millimetres between them. The thick foil should cross the fold.

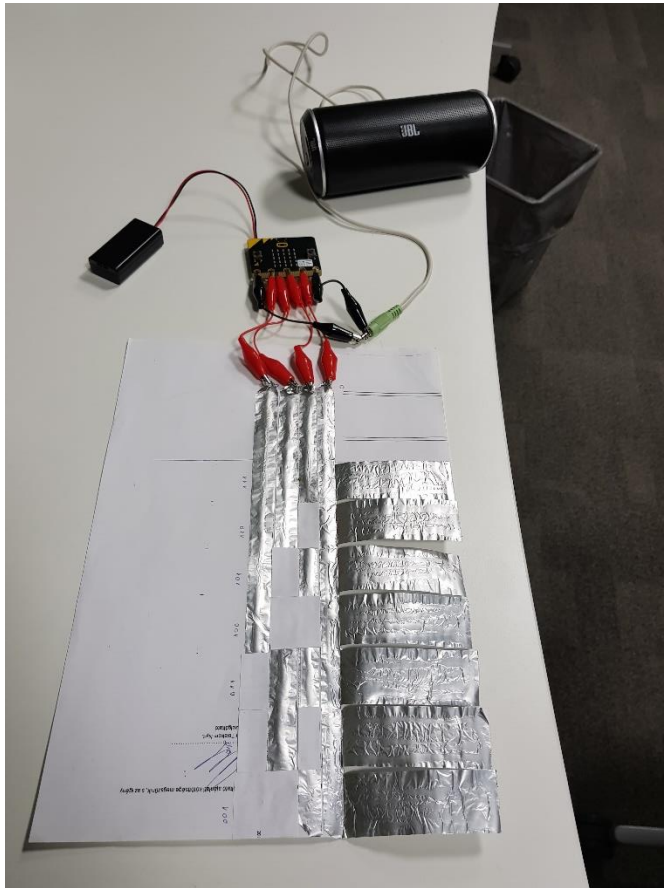


4. The end of the tin foil strips, where we will connect the microbit, should not be glued to the paper. Rumples these ends as seen on the picture.



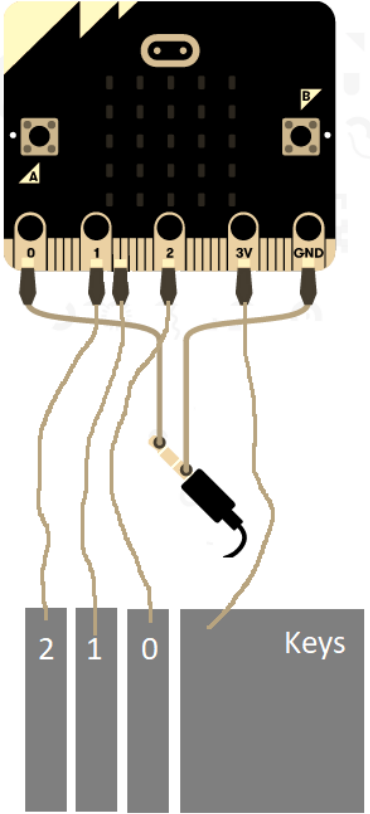
5. Fold the paper and cut the keys.
Glue paper on the thin tin foil strips under every key as it is shown on the picture below. This way each key will get a unique code. Code 000 is silence.

Note	code
Key1	001
Key2	010
Key3	011
Key4	100
Key5	101
Key6	110
Key7	111



6. Connect the microbit to the paper piano and to the headset.

Microbit pin	Piano	Hedset
P0		See picture
P1	Strip 2	
P8	Strip 1	
P2	Strip 0	
3V	Thick strip (keys)	
GND		See picture



Code

https://makecode.microbit.org/_17mWagHDFLhr

The code is measuring the pins twice, leaving 30 ms between them. The reason is that the key has mechanical constraint which makes it difficult to press a key in a way that all the strips (called lines in the code) contact to 3V in the same time. The second read will actually set the note.

```
forever loop
  set line0 to digital read pin P2
  set line1 to digital read pin P8
  set line2 to digital read pin P1
  if (line0 or line1 or line2)
    then
      pause (ms) 30
      set line0 to digital read pin P2
      set line1 to digital read pin P8
      set line2 to digital read pin P1
      if (not line2 and (not line1 and line0))
        then play tone Middle C for 1/2 beat
      if (not line2 and line1 and not line0)
        then play tone Middle D for 1/2 beat
      if (not line2 and line1 and line0)
        then play tone Middle E for 1/2 beat
      if (line2 and (not line1 and not line0))
        then play tone Middle F for 1/2 beat
      if (line2 and (not line1 and line0))
        then play tone Middle G for 1/2 beat
      if (line2 and line1 and not line0)
        then play tone Middle A for 1/2 beat
      if (line2 and line1 and line0)
        then play tone Middle B for 1/2 beat
```