



Electronic dice

Schematic description

Dice construction generates random numbers from 1 to 6 after the button is pressed. These numbers are shown using LED diodes in the same way as on classic dice. Transistor Q1 is opened by pressing the button. Capacitor C1 gets charged and U1 timer starts to generate fast pulses for the counter. Piezo buzzer beeps with each pulse. Capacitor C1 and resistors R2 and R1 keep Q1 open even if the button is released. However, the capacitor slowly discharges, and the transistor is closing. This causes U1 timer frequency decrease and stop after some time.

Johnson counter U2 takes care of drawing random numbers. Its output Q6 is connected to RESET input. This assures counting between number 1 to 6. Correct number display as on classic dice is achieved using transistors Q2 and Q3. They work as logical OR.

Construction

Caution: Capacitor C2 is not populated.

We populate components by their height from the lowest to the highest. We start by resistors and continue by capacitors, sockets for integrated circuits, transistors, terminal and piezo buzzer. Then we populate LED diodes. There is a plastic spacer to assure correct placement and the same height.

Switch SW2 and button SW1 is populated last. Integrated circuits are placed into sockets.

How to get it into service

It should work on the first try when everything was soldered well. Random number shall appear after power up. Then the number shall quickly change after button is pressed. Dice shall stop after some time.

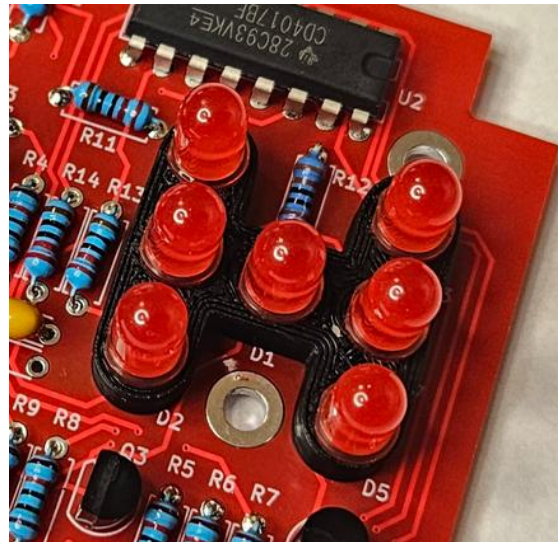
Bill of materials

| Annotation | Value | Qty |
|--------------------------|----------------------|-----|
| BZ1 | Buzzer | 1 |
| C1,C3 | 1uF | 2 |
| C2 | 1uF | 1 |
| D1,D2,D3,D4,D5,D6,D7 | 5mm, R | 7 |
| J1 | Screw_Terminal_01x02 | 1 |
| Q1 | BC556 | 1 |
| Q2,Q3 | BC546 | 2 |
| R1,R2 | 1M | 2 |
| R3,R4,R5,R6,R7,R8,R9,R10 | 10k | 8 |



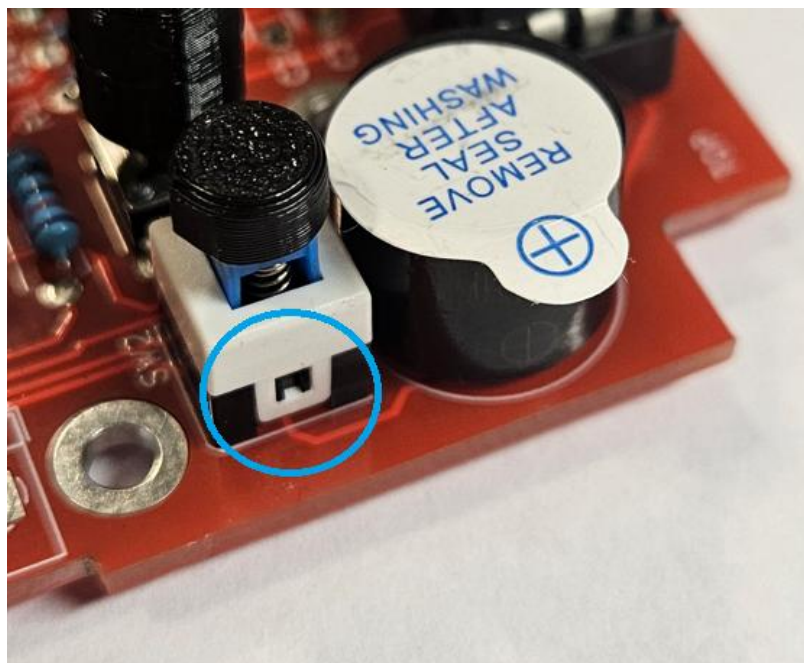
| | | |
|-------------|-------------------|---|
| R11,R13,R14 | 220R | 3 |
| R12 | 1k | 1 |
| SW1 | Push 6x6, H13mm | 1 |
| SW2 | DPDT 7x7mm, Turbo | 1 |
| U1 | NE555P | 1 |
| U2 | 4017 | 1 |

LED diodes



Switch

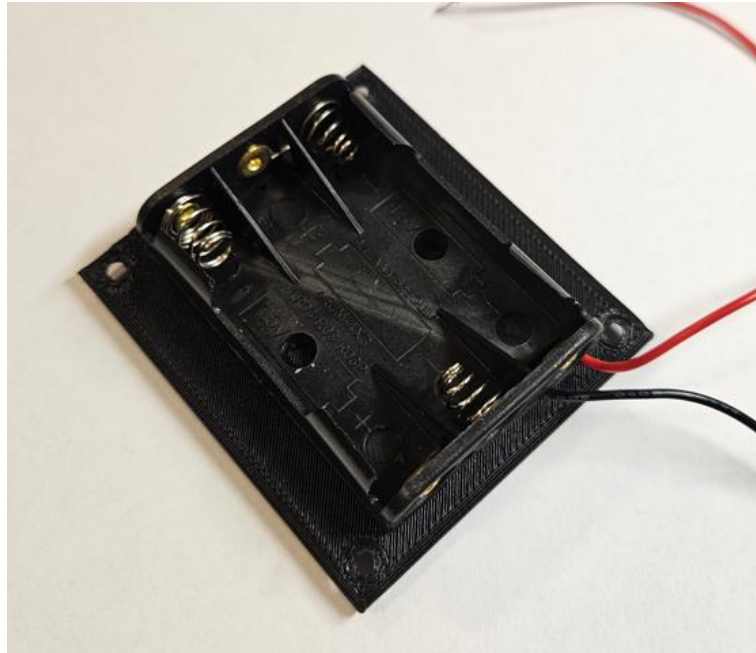
Switch orientation is important. Populate it as shown in the photo.





Mechanical assembly

Battery holder should be glued to the bottom box part using double sided tape. It should be centered as well as possible.



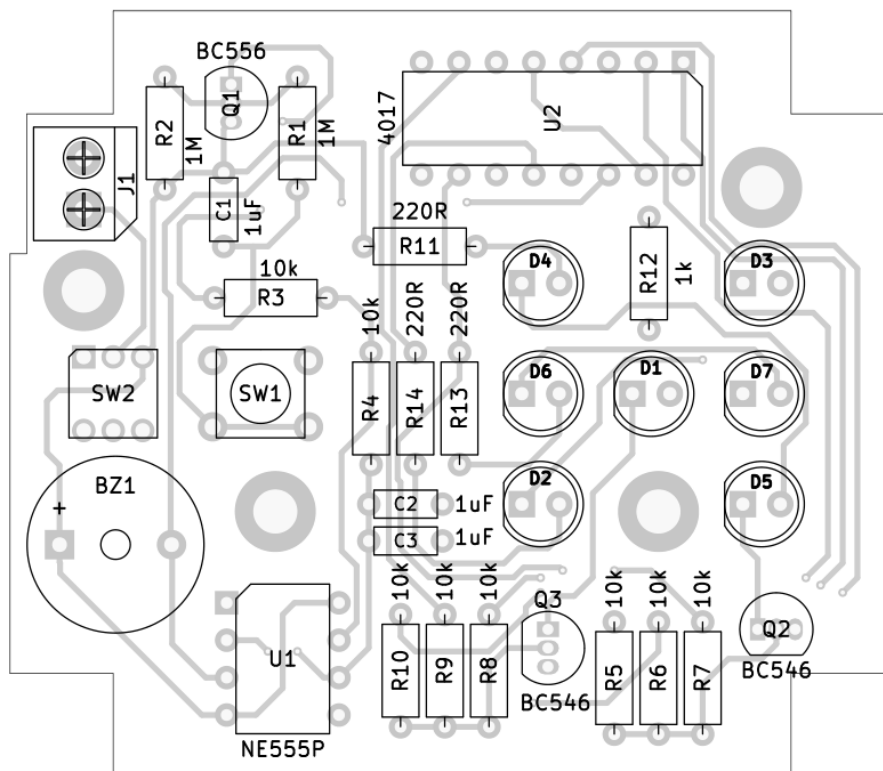
Then PCB should be fastened using smaller screws to the top box part.



Place batteries to the battery holder and fasten bottom box part to the top using bigger screws. Plastic legs should be glued.



PCB assembly





Schematic

