UNBIASED ELECTRONIC DICE WITH LEDS

LAB 14 PROJECT

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UNBIASED ELECTRONIC DICE WITH LEDs

ABSTRACT:

In this project, the best way to make a straightforward Unbiased Electronic Dice with LEDs is explained. This project consists of 6 LEDs, a 555 Timer IC and a 4017 Decade Counter IC by which an irregular number is produced somewhere in the range of 1 and 6 by lighting up the corresponding LED. Dice is utilized to play numerous games like snake stepping stool, Ludo and so on. For the most part dice is comprised of wooden or plastic, which gets disfigured with time and gotten one-sided. A Digital dice is a decent option of antiquated dice, it cannot be biased or distorted. To make this high level dice circuit, they have generally used 555 clock IC and 4017 IC. You can similarly check this automated dice circuit using Arduino. This makes the circuit quickly cycle through the dice numbers so a dice number is shown by the LEDs when the push switch is pressed.

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INTRODUCTION:

MOTIVATION AND NEED:

Playing with dice is an age-old game. We all love to play with it too. Playing with dice needs us to pick up a dice and make sure that it is unbiased. Also, the dice can become biased due to deformations. To solve all these problems an electronic dice is made which is completely unbiased and reliable.

PROBLEM DESCRIPTION:

The design of an electronic dice display is invented because of the need of it in indoor games as the dice is used in indoor games. One can even experience the dice getting cost in the game because the dice is very small so if care is not taken it can fall out from the board.

PROBLEM SCOPE:

The device when switched on and push button is pressed it will be rapidly displaying the LEDs lighting up, and LEDs represent the numbers of the dice. So, when the push button is released a particular LED will be on and this is the number the player got.

DESIGN REQUIREMENTS:

This design consists of following components:

1. LEDs X 6
2. 555 Timer IC
3. CD4017 Decade Counter IC
4. Resistors – 2.2KΩ, 100KΩ X 2
5. Capacitors – 1nF and 0.1µF
6. Push Button
7. 9V Battery
8. Breadboard
9. Connecting Wires

DESIGN DESCRIPTION:

OVERVIEW:

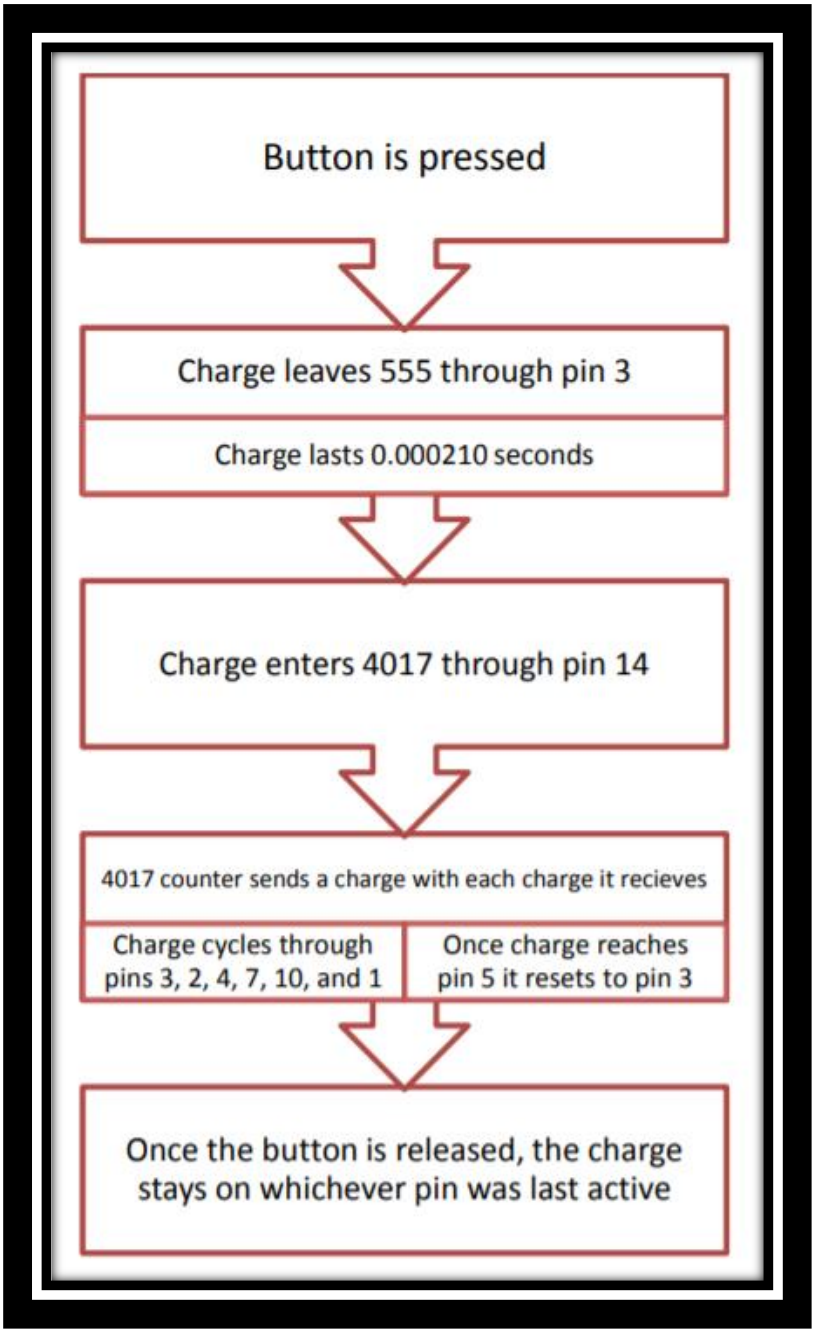
This project involves building your own electronic dice. You can use it instead of an ordinary one. Using a switch developed by you, you can turn the battery on. After that you press the push switch to 'throw' the dice. Some of the LEDs will light up. The LEDs are basically the spots on the dice. The number of LEDs that light up is unpredictable.

DETAILED DESCRIPTION:

In this digital dice circuit, we have used 6 LEDs, each LED represent a number (1-6) of Dice. LEDs start flashing as we press the Push button and stops when we release it. After release, illuminated LED tells the numbers, you got on Dice. Like if fifth no. LED remains ON after releasing the button, means you got 5 on Dice. We have connected 6 LEDs to the output Q0 to Q5, and the seventh output Q6 is connected back to the RESET PIN 15. So that after LED 6 it starts from the First LED at Q0.

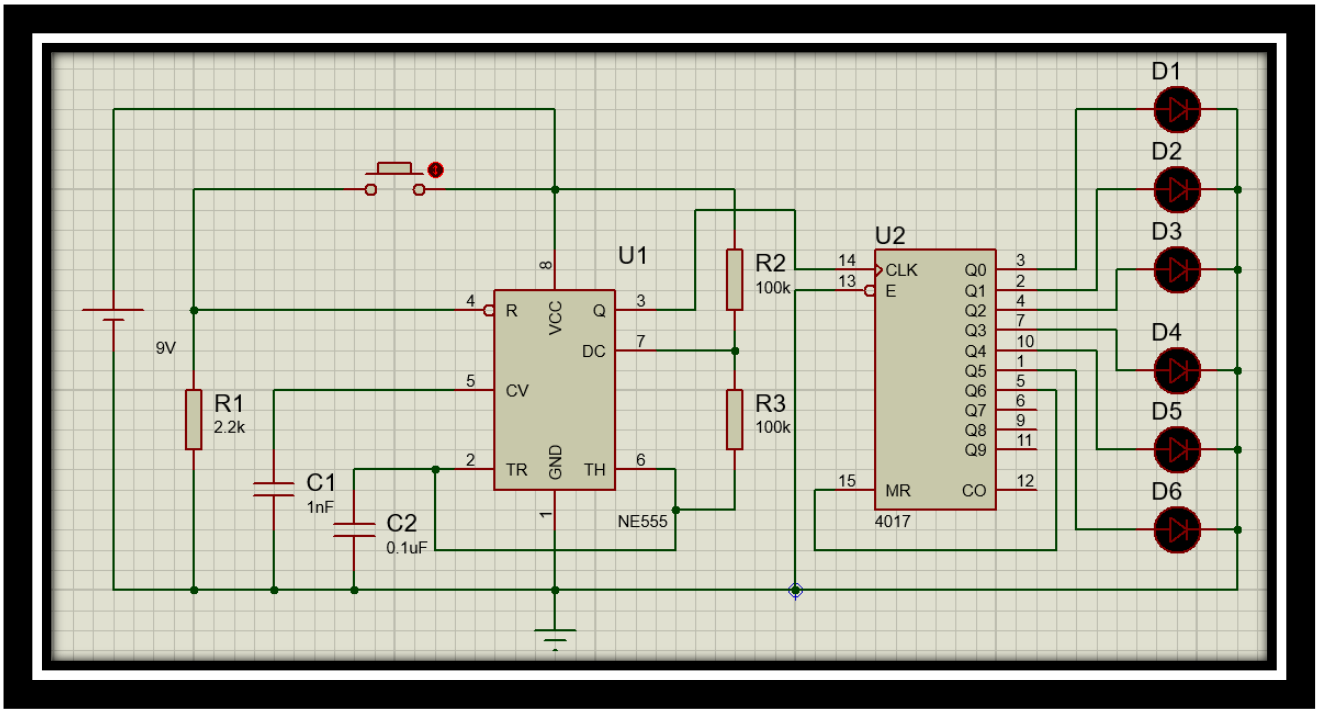
To apply the clock pulse at PIN 14 of 4017 IC, we have used 555 timer IC in 'Astable mode'. The oscillated output generated at PIN 3 of 555 has been applied to the PIN 14 of 4017, so that output can be advanced with each clock pulse. We can control the speed of flashing LEDs by using the potentiometer (RV1), rotating the potentiometer knob will change oscillation frequency of 555 timer, hence the rate of clock pulse. The frequency of the 555 can be calculated using this formula: F=1.44/((R1+2*RV1) *C1)

In this digital dice circuit, we have kept the oscillation frequency so high that no one can cheat. LED flashing speed is directly proportional to oscillation frequency of 555, as High the frequency, as high the speed of flashing. You can increase frequency according to you, by rotating the potentiometer.


Button is pressed
Charge leaves 555 through pin 3
Charge lasts 0.000210 seconds
Charge enters 4017 through pin 14
4017 counter sends a charge with each charge it recieves
Charge cycles through pins 3, 2, 4, 7, 10, and 1
Once charge reaches pin 5 it resets to pin 3
Once the button is released, the charge stays on whichever pin was last active

(Figure 1.1)

PROTOTYPE:



(Figure 1.2)

CONCLUSION & FUTURE WORK:

In this project, the LEDs could be replaced by connecting a 7-segment display converting analogue output to digital that will further minimize the observation errors. Not only this, but it can moreover be upgraded to the output equivalent to two dices as required by the applications e.g., Ludo and Snake and Ladders Game.

REFRENCES:

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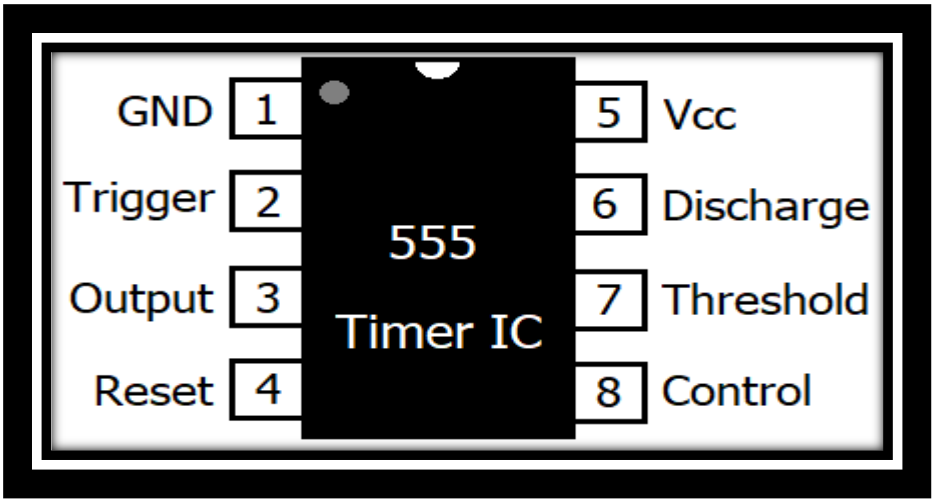
2) https://www.instructables.com/Circuit-Diagram-of-Unbiased-Digital-Dice-with-LEDs/
3) https://www.google.com/amp/s/www.spsvit.com/amp/unbiased-electronic-dice-with-leds
4) https://www.grossarchive.com/upload/1412058694.htm
5) https://www.electricaltechnology.org/2014/12/555-timer.html
6) http://www.learningaboutelectronics.com/Articles/Decade-counter-circuit-with-4017.php

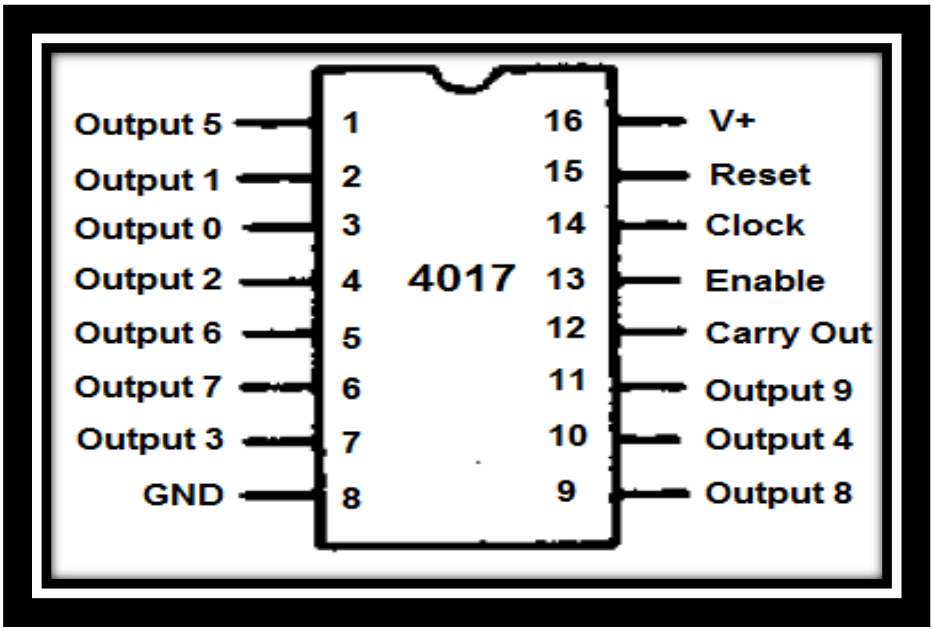
APPENDICES:

555 Timer IC Pin Configuration:



(Figure 1.3)

4017 Decade Counter IC Pin Configuration:



(Figure 1.4)