

DESIGN PROJECT REPORT (CLA 4)

on

DIGITAL DICE USING ARDUINO

by

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For the Course

18EEEC201J –Analysis of Electric Circuits

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ABSTRACT

Dice are usually cubes of a homogeneous material. Symmetry suggests that a homogeneous cube has the same chance of landing on each of its six faces after a vigorous roll, so it is said to be fair. Similarly the four other regular solids-the tetrahedron, octahedron, dodecahedron and icosahedron are fair. Are there any other fair polyhedra?

To answer this question we must first define what we mean by fair. We shall say that a convex polyhedron is fair by symmetry if and only if it is symmetric with respect to all its faces. This means that any face can be transformed into any other face by a rotation, a reflection, or a combined rotation and reflection, which takes the polyhedron into itself. The collection of all these transformations of a given polyhedron is called its symmetry group. The fact that some transformation in the group takes any given face into any other given face is expressed by saying that the group acts transitively on the faces. Thus we can say that a convex polyhedron is fair by symmetry if and only if its symmetry group acts transitively on its faces. In the next section we shall determine all such polyhedra. Then in the final section we shall show that there are other polyhedra which are fair, but not fair by symmetry. A traditional die is a cube with each of its six faces marked with a different number of dots (pips) from one to six. When thrown or rolled, the die comes to rest showing a random integer from one to six on its upper surface, with each value being equally likely. Dice may also have polyhedral or irregular shapes, may have faces marked with numerals or symbols instead of pips and may have their numbers carved out from the material of the dice instead of marked on it. Loaded dice are designed to favor some results over others for cheating or entertainment.

1. INTRODUCTION

Dice (singular die or dice[1]) are small, throwable objects with marked sides that can rest in multiple positions. They are used for generating random values, commonly as part of tabletop games, including dice games, board games, role-playing games, and games of chance.

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Dice are thrown onto a surface either from the hand or from a container designed for this (such as a cup or tray). The face of the die that is uppermost when it comes to rest provides the value of the throw. The result of a die roll is determined by the way it is thrown, according to the laws of classical mechanics. A die roll is made random by uncertainty in minor factors such as tiny movements in the thrower's hand; they are thus a crude form of hardware random number generator.

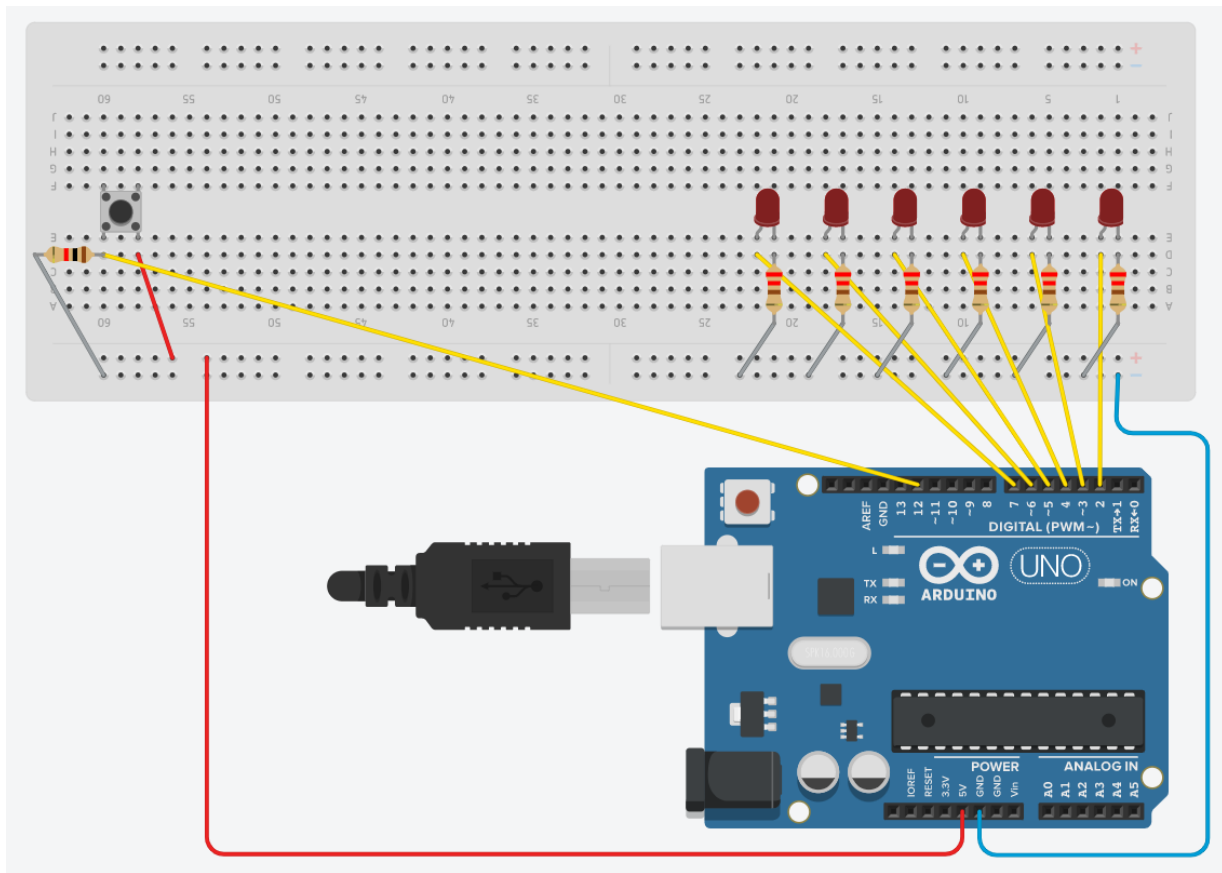
One typical contemporary dice game is craps, where two dice are thrown simultaneously and wagers are made on the total value of the two dice. Dice are frequently used to introduce randomness into board games, where they are often used to decide the distance through which a piece will move along the board (as in backgammon and Monopoly).

2. Principle of operation

The process of operation is depends on the microcontroller Arduino we utilise to get the dice working which has been coded in a way that it throws a random number in the range of 1-6 just like in a conventional dice. Here to do so we utilise “Initialize random number generator” function of C++ programming. The pseudo-random number generator is initialized using the argument passed as seed. For every different seed value used in a call to srand, the pseudo-random number generator can be expected to generate a different succession of results in the subsequent calls to rand. Two different initializations with the same seed will generate the same succession of results in subsequent calls to rand. If seed is set to 1, the generator is reinitialized to its initial value and produces the same values as before any call to rand or srand. In order to generate random-like numbers, srand is usually initialized to some distinctive runtime value, like the value returned by function time (declared in header <ctime>).The pseudo-random number generator should only be seeded once, before any calls to rand(), and at the start of the program. It should not be repeatedly seeded or reseeded every time you wish to generate a new batch of pseudo-random numbers. This is distinctive enough for most trivial randomization needs.

Through this Random number we gain input and interpret it as asignal in the code which intitializes the code to propogate and display the number which we got in terms of number of leds lighting up.srand() uses its argument seed as a seed for a new sequence of pseudo-random numbers to be returned by subsequent calls to rand(). If srand() is not called, the rand() seed is set as if srand(1) was called at program start. Any other value for seed sets the generator to a different starting point. The rand() function generates pseudo-random numbers.

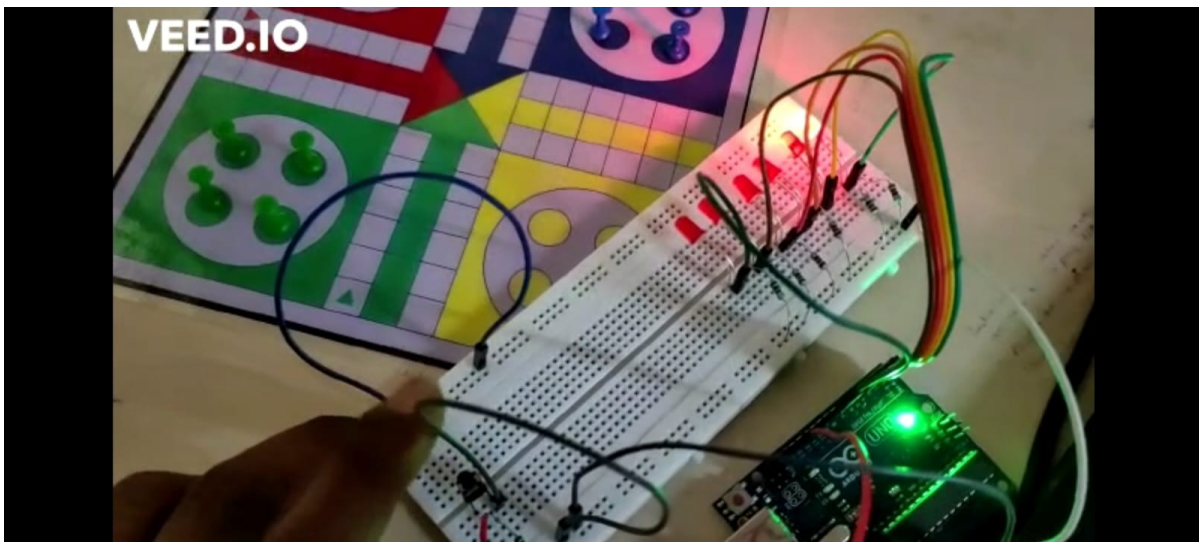
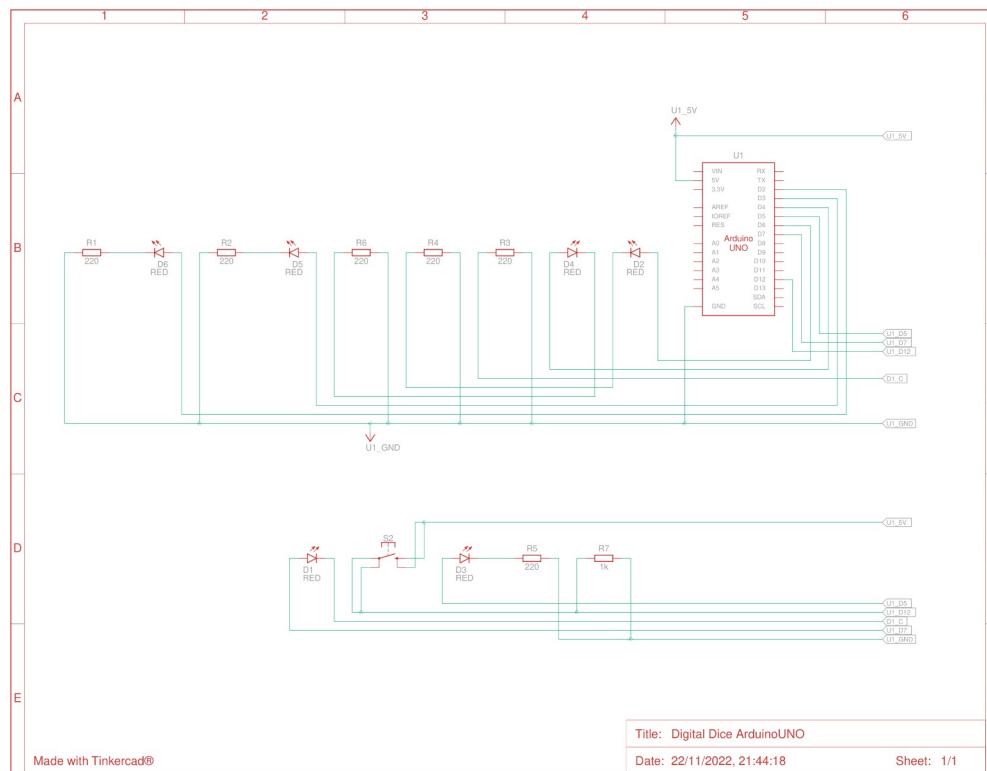
3. Circuit Diagram



Components Required

- 1 X Arduino Uno R3
- 1 X 1k ohm Resistor
- 6 X 220ohm Resistor
- 9v battery / Arduino USB supply
- 6 X 5mm LED
- 1 X Pushbutton
- Breadboard
- Connecting Wires

4. Circuit Design of Digital DICE



5. Working model

- ✓ Make the connections as per the circuit diagram on a bread board and install Arduino and run the program using push button
- .
- ✓ To save the battery, disconnect it from the circuit when it is not being used.

6. Video Drive Link :

7. Applications

- ✓ This simple project can be used in any board game that requires an application of DICE