LED DICE USING ARDUINO

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ABSTRACT

This project demonstrates the usage of random function with LED dice using an Arduino. In this project LEDs are used to represent the face of a Dice. To create all the six faces of a dice, we need 7 LEDs. A push button is connected to the ground with a resistor. All the cathodes of the LEDs are connected to the ground with resistors. LEDS are then connected to the Arduino to facilitate the requirement.

 The Arduino is connected to the ground. Finally, the button is connected the 5v of Arduino, the pin 6 of Arduino is connected to the button. A code is given to the Arduino IDE to give the output as per the requirement. When the code is executed, the output will be random outputs which are given to the LEDs, so that they glow randomly resembling a Dice.

1. INTRODUCTION

The main objective of this project is to demonstrate the usage of Random function using an Arduino. The random function is displayed in the project through an LED dice. Dice are small, throwable objects with marked sides that can be positioned in a variety of ways. They are widely used in tabletop games such as dice games, board games, role-playing games, and games of chance to generate random numbers.

A typical die is a cube with a different number of dots (pips) on each of its six sides, ranging from one to six. When tossed or rolled, the die comes to a stop on its upper surface, displaying a random integer from one to six, with each value being equally probable. Dice may also have polyhedral or irregular shapes, as well as numerals or symbols on their faces instead of pips.

Arduino is a software development platform that enables you to build computers that can feel and monitor more of the physical world than a traditional desktop computer. Arduino boards can read inputs such as light on a sensor or a finger on a button and convert them to outputs such as turning on an LED or triggering a motor.

A dice is a small throwable object with multiple resting positions, used for generating random number. This makes dice suitable as gambling devices for games like craps, or for use in non-gambling tabletop games.A traditional die is an often rounded cube, with each of its six faces showing a different number. The design as a whole is aimed at the die providing a randomly determined integer from one to six, each of those values being actually likely.

A variety of similar devices are also described as dice; such specialized dice may have polyhedral or irregular shapes and may have faces marked with symbols instead of numbers. They may be used to produce results other than one through six. Loaded and crooked dice are designed to favor some results over others for purposes of cheating or amusement

Figure 1:General dice

An LED dice that can be made to generate a random number. It can be used like a normal dice in games. The dice works by switching Light Emitting Diodes (LEDs) on and off in the pattern of dots found on a traditional dice. The microcontroller is the 'brain' of the dice.
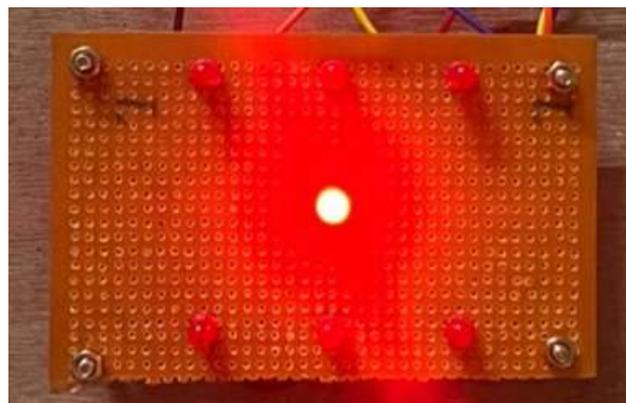

Figure.2: Led Dice

1.1 BLOCK DIAGRAM
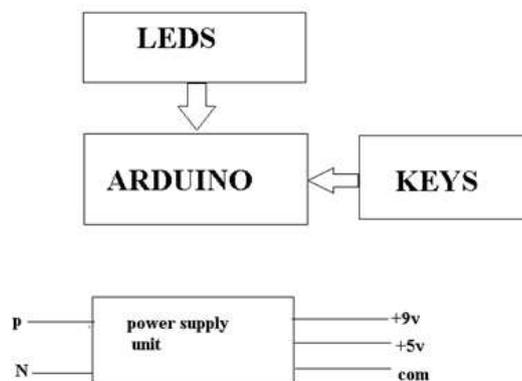
Figure.3:Block Diagram of Led Dice

1.1.1 ARDUINO UNO:

Figure.4: Arduino Uno

The Arduino UNO is an open-source microcontroller board based on the Microchip ATmega328P microcontroller. The board is equipped with sets of digital and Analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable. It can be powered by a USB cable or by an external 9 Volt battery, though it accepts voltages between 7 and 20 volts.

"Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Arduino Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno also differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it uses the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

1.1.2 LIGHT EMITTING DIODE(LED):

As current flows through a light-emitting diode (LED), it emits light. Photons are generated when electrons in a semiconductor recombine with electron holes, releasing energy. The energy needed for electrons to cross the semiconductor's band gap determines the colour of light (corresponding to photon energy). Multiple semiconductors or a light-emitting phosphor layer on the semiconductor chip are used to generate white light.

 The first LEDs were practical electronic components that emitted low- intensity infrared (IR) light. They were introduced in 1962. Remote-control circuits, such as those used in a wide range of consumer electronics, use infrared LEDs. The first visible- light LEDs had a low strength and were only available in colour. With high light intensity, modern LEDs are available in visible, ultraviolet (UV), and infrared wavelengths**.**

Figure.5: Led

The recombination of electrons and electron holes in a semiconductor induces light (infrared, visible, or UV) in a light emitting diode, a phenomenon known as "electroluminescence." The energy band gap of the semiconductors used determines the wavelength of the light. Since these materials have a high index of refraction, special optical coatings and die shapes are needed in the system design to efficiently emit light.

1.1.3 KEY(PUSH BUTTON SWITCH):

Figure.6: Key(Push Button Switch)

A push-button is a simple switch that is used to operate a computer or a procedure. Buttons are normally made of a hard material like plastic or metal. The surface is normally flat or shaped to match the human finger or hand, allowing it to be depressed or pushed easily. Although many un-biased buttons (due to their physical nature) also require a spring to return to their un-pushed state, buttons are most often biased switches. Calculators, push-button telephones, kitchen appliances, and a variety of other mechanical and electronic devices, both home and industrial, have all used the "push-button.

2. FLOWCHART
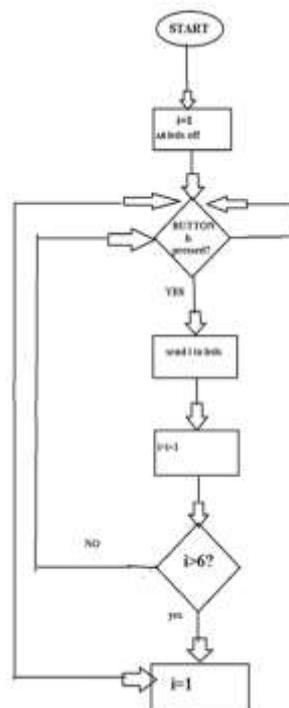
Fig.7 flow chart

Schematic Diagram:

Fig.8 Circuit Diagram.

3. RESULTS

The project hardware kit is as show in below figure 9, without power supply.
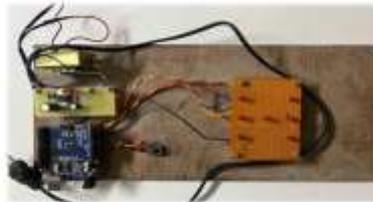
Figure 9: Without Power Supply.

When the power supply is given to the kit the led placed for indication of power supply glows and then uno board led glows which conforms that there is a power supply as shown in fig 10.
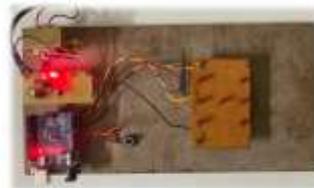
Figure 10 With Power Supply

When push button is pressed Repeatedly than a random numbers are displayed with Led's as shown in figures 11,12,13,14,15,16.

Figure 11: For the number 6 of the dice: lights up the groups 1, 2, 3, 5, 6, 7
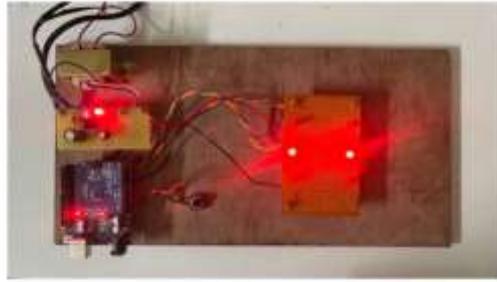
Figure 12: For the number 2 of the dice: lights up the groups 3, 5
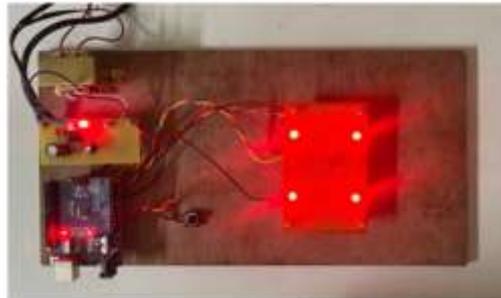
Figure 13: For the number 4 of the dice: lights up the groups 1, 2, 6, 7
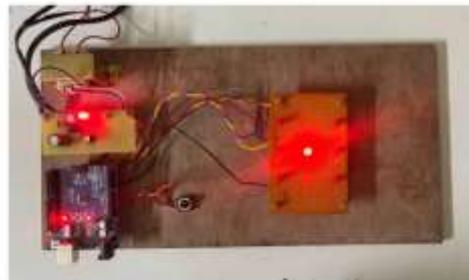
Figure 14: For the number 1 of the dice: lights up the groups 4
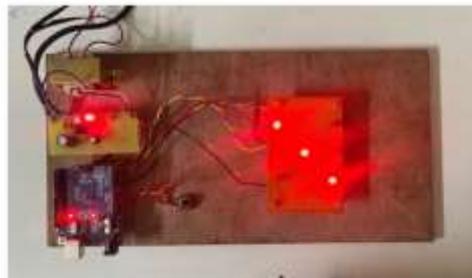
Figure 15: For the number 3 of the dice: lights up the groups 1 ,4, 7

Figure 16: For the number 5 of the dice: lights up the groups 1, 2, 4, 6, 7

3.1 Advantages:
• Hand tricks during the dice rolling can be avoided.
• Normal small dice can be lost easily but with the electronic dice there is no such problem.

3.2 Disadvantages:
• The battery can die anytime which can stop the game.
• The player can change the algorithms of the electronic dice to get necessary points.
• The electronic dice is not very popular and easily available in the local stores.

3.3 Applications:
1. For Game Applications like Snakes and Ladders,Chutes and Ladders, Monopoly, Business
2. Designing and implementing a digital instruction-assisted system.
3. It can be used as a normal dice in any board game.
4. It can give any random value from 1 to 6.

4. CONCLUSION AND FUTURE SCOPE

4.1 Conclusion
The Random function is an essential component of this project. Randomness is important for computer security because it enables secure encryption, which allows people to communicate anonymously even though an attacker has access to all coded messages. Surprisingly, even though the adversary knows the key used to encrypt the messages, confidentiality can be preserved. Random numbers are often used to speed up algorithms. Choosing random numbers, for example, is the quickest way we know of to determine whether a number is prime. This is useful in a variety of fields, including math, computer science, and cryptography. Random numbers are also essential for simulating extremely complicated systems. When it comes to the environment or the economy. In this project, the use of the random function is clearly demonstrated.

4.2 Future Scope
In future the battery life can be increased or alternate power supply can be given. The player cannot change the algorithms of the electronic dice to get necessary points. Led dice will come into use every were.
Figure 5.9: For the number 5 of the dice: lights up the groups 1, 2, 4, 6, 7

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• The battery can die anytime which can stop the game.
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• The electronic dice is not very popular and easily available in the local stores.

4.5 Applications:

1.   For Game Applications like Snakes and Ladders,Chutes and Ladders,Monopoly,Business
2.   Designing and implementing a digital instruction-assisted system.
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5.   REFERENCES

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