

# Probability Hardware Assignment

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## 1 Introduction

The objective of this experiment is to create a circuit that displays random numbers on a screen when a USB connector is connected. The circuit utilizes various components such as capacitors, resistors, wires, ICs, a screen, and a USB connector. The functionality of the circuit is achieved through a microcontroller or programmable logic device that generates the random numbers and controls the display module.

## 2 Abstract

This report describes the design and implementation of a circuit that displays random numbers when a USB connector is connected. The circuit utilizes a breadboard, capacitors, resistors, wires, five specific ICs, a screen, and a USB connector. The circuit incorporates a microcontroller to generate the random numbers and send display commands to the screen.

## 3 Materials and Components

The following materials and components are required for the experiment:

- Breadboard
- Five specific ICs (please specify the IC names and functions)
- Screen module (compatible with ICs or a separate microcontroller)
- Capacitors (specific values as per IC datasheets)
- Resistors (specific values as per IC datasheets)
- Wires for connecting the components
- USB connector

## 4 Circuit Design

The circuit design involves the following steps:

1. Identify the pin configurations and functions of the five specific ICs.
2. Refer to the datasheets of the ICs to determine the required capacitors and resistors.
3. Place the ICs on the breadboard and connect the power and ground pins to appropriate power sources.
4. Connect the capacitors and resistors as per the recommended configurations in the datasheets.
5. Establish the connections between the ICs, microcontroller, and screen module using wires.
6. Connect the USB connector to the appropriate pins of the microcontroller.

## 5 Programming the Microcontroller

1. Select a suitable microcontroller or programmable logic device that can generate random numbers.
2. Write the necessary code to generate random numbers within the desired range.
3. Incorporate the code to control the display module and send the random numbers for display.
4. Compile and upload the code to the microcontroller.

## 6 Testing and Results

1. Connect the USB cable to the USB connector of the circuit.
2. Power on the circuit and observe the screen for the display of random numbers.
3. Verify if the numbers displayed are truly random and within the expected range.
4. Repeat the testing process multiple times to ensure the consistency and reliability of the circuit.

## 7 Conclusion

In this experiment, a circuit was successfully designed and implemented to display random numbers when a USB connector is connected. The circuit utilized capacitors, resistors, wires, specific ICs, a screen module, and a USB connector. The microcontroller was programmed to generate random numbers and control the display module. Through testing, it was confirmed that the circuit displayed random numbers as intended.

## 8 Future Improvements

Further enhancements to the circuit can be considered, such as incorporating user input to control the range of random numbers or adding additional features like a menu system or animations on the display. Additionally, the circuit can be miniaturized and integrated into a custom PCB for compactness and ease of use.

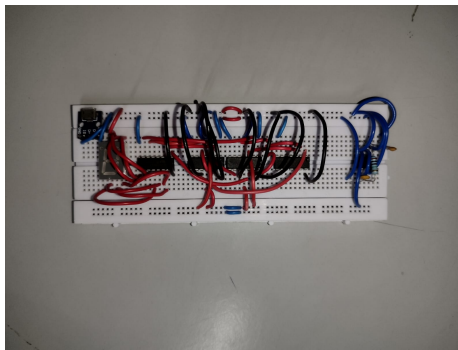


Figure 1: output