

# T03 Project Part 1 Report

ECE 102

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# Introduction

The project consists of designing and constructing a device modeled after the classic *Simon* game. The team has explored the functions of the game, discussed preliminary project specifications, organized responsibilities among team members, created a preliminary project plan, circuit diagram, and physical body designs with a Trinket M0 microcontroller board in mind to power the gadget.

## Research

Simon is an interactive electronic memory game that includes four different colored buttons, each assigned a unique tone. The device plays a sequence of tones, incrementing a random tone with each level. The player advances a level by repeating the same tones by pressing the indicated buttons. Any error in repeating the sequence results in a loss and the game is restarted.

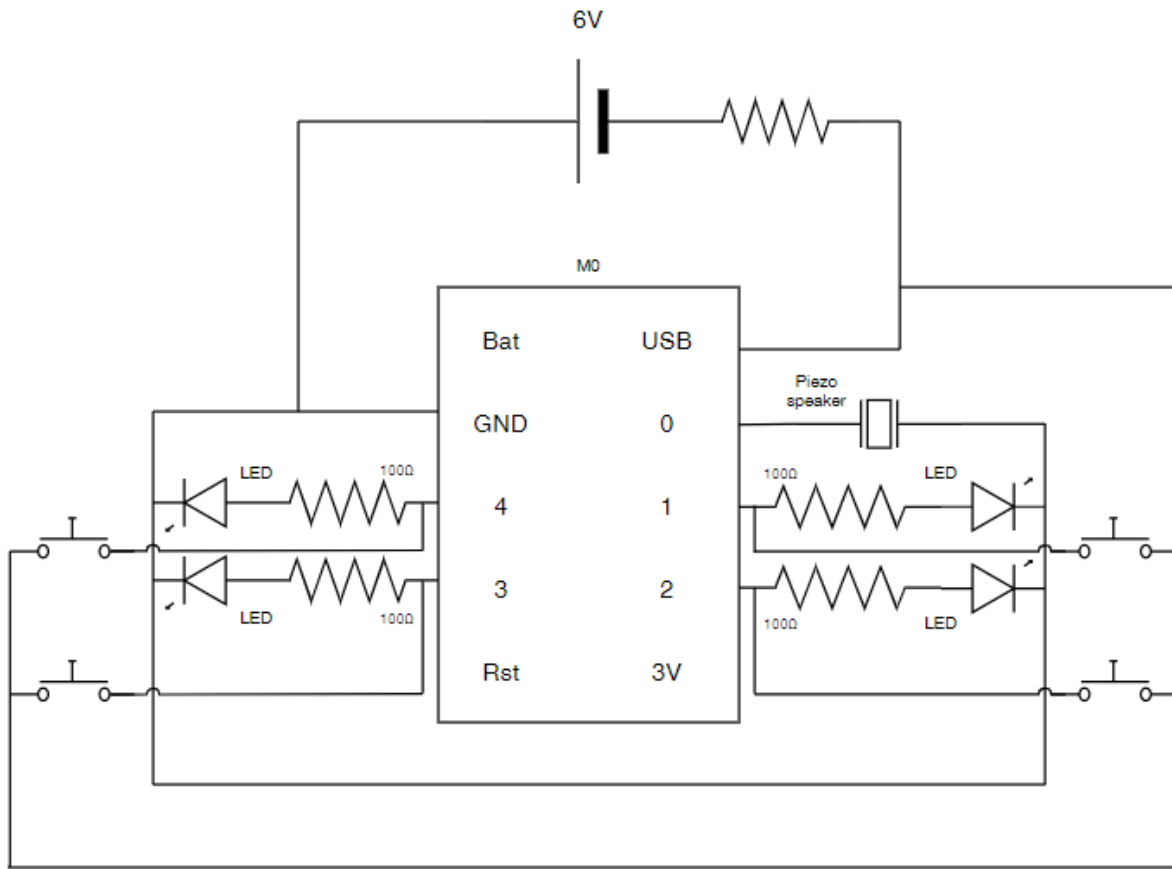
## Design

The projects consist of three major components:

- Circuit with the M0 Trinket, Piezo speaker, four LEDs of different colors, power source, and resistors
- The physical body of the game designed with user safety in mind
- A code written in Python that would include a random number generator, incrementing while loops and tone generator

## Circuit diagram

The team prepared a preliminary diagram design, which is subject to testing and is not considered final. The figure below shows a 6V power source connected to the 5V input of the M0 Trinket, thus supplying power to all digital outputs. Pin 0 is powering the Piezo speaker, which will play the tone based on the random number generator. A corresponding LED (Pins 1 to 4) will light up. The same pins have four buttons connected to them. As the buttons are pressed, the signal would go back into the pins to be processed by the code and checked against the sequence a player was expected to repeat.



*Figure 1.1. Circuit diagram*

## Physical Design

The team researched different designs of the game. The goal of the team is to adjust existing designs for this project using 3D modeling software and 3D print the final design. The designs for consideration are displayed below.



*Figure 1.2. Physical body designs researched.*

## Code Design

The code is to be written in Python and loaded to the M0 Trinket with Mu Editor. Based on the team's research, the background knowledge needed for this project includes random number generation, tone generation, while loops, incrementing, receiving and processing inputs, supplying outputs, and comparing the data obtained from input to expected data. The preliminary logic flowchart is displayed below.

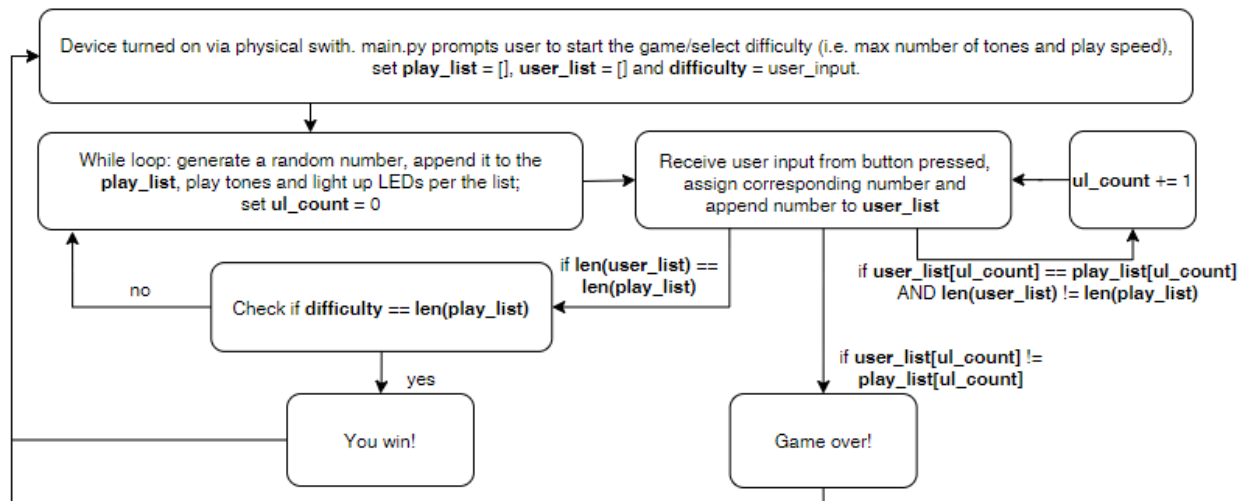


Figure 1.3. Logic code flowchart.

## Discussion

Part 1 of the project allowed the team to execute in-depth research, discuss project specifications, brainstorm possible solutions, determine teammate roles and organize the project into smaller tasks with the help of Trello. Having a better understanding of the steps involved in circuit design, 3D modeling and coding helped prepare a Gantt chart and project timeline to ensure timely completion of individual tasks, and avoid delays due to unaccounted for steps and guarantee successful project completion.

Although Trello is great for keeping track of tasks that are needed to be done, we will continue to have weekly virtual meetings through Zoom to emphasize the importance of team communication and involvement. This will allow us to familiarize ourselves with each member and explore the skills and knowledge that we each can bring to this project.

## Team Task Assignments

The team agreed to split responsibilities per the list below. Each team member will still participate in other aspects of the project, this list just assigns the responsibility of completing specific aspects to a determined teammate to ensure smoother project completion.

Ryan Blackwood - 3D modeling and printing

Dmitrii Fotin - Circuit design

Celina Wong - Code design

## Planning and Schedule

The preliminary list of tasks for the project is listed below along with the Gantt chart.

- Write the code (incrementally):
  - Write the main.py program that calls other functions (below). The main.py would include the request for the user input to start the game, the while loop to increment difficulty and the conditions to win/lose the game.
  - Write a module for random number generation.
  - Write a module for tone generation and lighting up LEDs based on the random function output.
  - Write a module for receiving, processing, and comparing user inputs to the randomly generated sequence.
- Design and test the circuit based on the circuit diagram in *Figure 1.1*.
  - Use a Trinket M0 microcontroller board
  - Integrate LED's, switches, and IC chips
  - Power draw and necessary supply
- Model construction
  - Design prototype
  - 3D-print prototype
  - Assemble hardware components

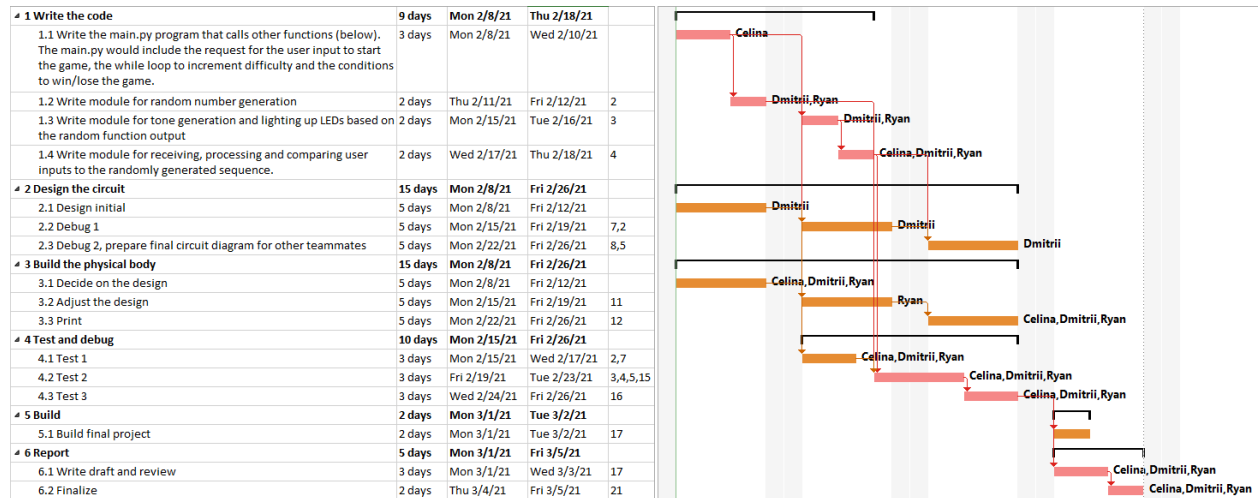


Figure 1.4. Team 3 Gantt Chart.

## Signature

Each team member did their own research and gathered the collected information to form this report. *All of the students listed on this report have read it and agree with its content.*

## References

Ada, L. (2017, August 23). Adafruit Trinket M0. Retrieved February 08, 2021, from <https://learn.adafruit.com/adafruit-trinket-m0-circuitpython-arduino/overview>

Simon (game). (2021, January 24). Retrieved February 08, 2021, from [https://en.wikipedia.org/wiki/Simon\\_\(game\)](https://en.wikipedia.org/wiki/Simon_(game))

The Smithsonian Institution. (Ed.). (2006). Simon electronic Game, 1978. Retrieved February 08, 2021, from [https://americanhistory.si.edu/collections/search/object/nmah\\_1302005](https://americanhistory.si.edu/collections/search/object/nmah_1302005)

Wardynski, D. (2019, October 10). What is a microprocessor and how does it work? Retrieved February 08, 2021, from <https://www.brainspire.com/blog/what-is-a-micro-processor-and-how-does-it-work>