Simon Pattern Repetition Game

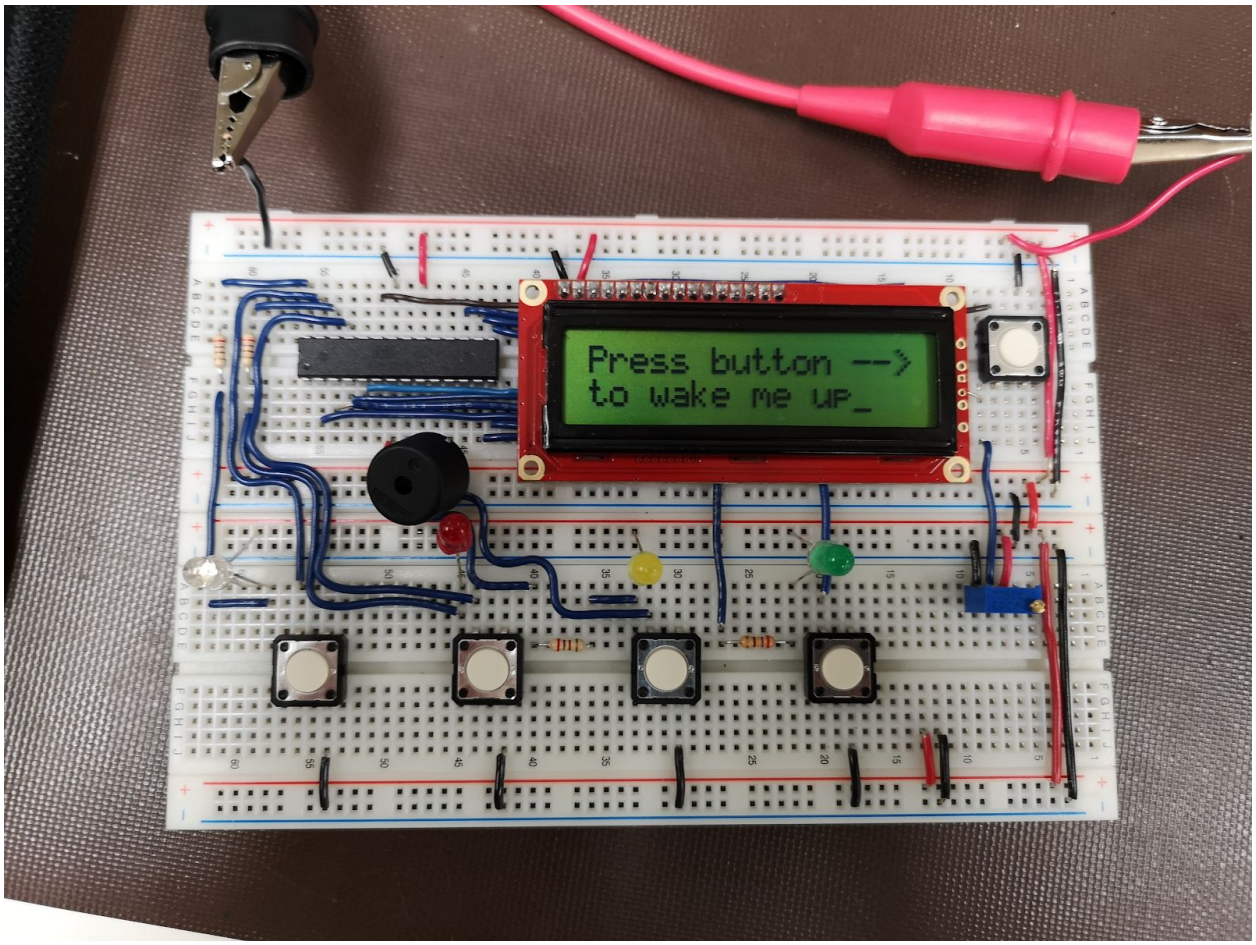
Specification Sheet

By Ian Then and Simon Salami

Introduction:

The Simon Pattern Repetition Game tests the user's memory in a fun and competitive manner. It creates a pseudo-random sequence of lights, with accompanying tones and the user is required to mimic the sequence in succession. The sequence begins with just one element, but with every successful repetition, the sequence increases in length by one. The highest current score (number of successful repetitions) will always be saved permanently. This means that even after switching the game off, the high score will remain the same when it is switched on. After every round, the game will power down to save energy and can be easily turned on with a press of a button.

Figure 1: Hardware of Simon Pattern Repetition Game



Operating Instructions:

Power the product by connecting it to a +5.0V power supply and ensure it is grounded. Note that these are the only connections that you as the user need to manually connect, as every other connection is internal and have been made during the development of this product.

How the device works:

Firstly, the sequence of numbers is displayed through 4 different coloured lights with 4 different accompanying tones. The lights are created by four different coloured LEDs: blue, red, yellow and green. The tones are created by sending different waveforms with different frequencies to a piezo buzzer. There is an LCD which displays instructions and the high score. The user is able to repeat the sequence by pressing one of the four specific buttons that recreate the same lights and tones as the displayed one. There is a “wake up” button that wakes the device up from its sleep.

When the device is powered, it goes into its default sleep mode until the user decides to wake it up from its sleep with a keypress. The device indicates which specific button carries out this function using its LCD. Upon waking up, a “wake up” sequence of lights and tones is carried out and a “welcome” message is displayed. Then, the device prompts the user to press one of the four “colour” buttons to help it generate a pseudo-random seed, to generate a pseudo-random sequence. After that, the game begins!

First, the game displays the first element of the sequence, which the user needs to repeat. The game then checks if the user input matches the sequence displayed. If they match, the game proceeds to the next round where the sequence required to be repeated is increased in length by one. If they do not match, the game displays a “fail sequence” and compares the user’s score (number of previous turns) to the highest score. If the player’s score is higher than the previously set high score, the high score is updated and saved permanently. This high score is accessible even after the device is reset and is displayed at the start of every round.

In the odd case that the user manages to repeat the entire sequence of 150 numbers, the game displays a “victory sequence” and again saves the user’s score as the high score. At the end of every game, the device displays a “power down” sequence and goes back to sleep to save power, awaiting to be woken up for another round.

Table 1: Operating Conditions

Temperature range	-55°C to +125°C
Input Voltage	+2.5V to +5.0V
Maximum Operating Voltage	+6.0V
Output response time	Less than 1ms

Cost Estimate:

Component	Cost Estimate($)
Microcontroller Units (MCUs)	3.00
Piezo Buzzer	0.50
5V Backlit LCD	18.53
4 LEDs	1.00
Omron Pushbuttons	3.25
Wires and resistors	1.00

Total Cost Estimate: $27.28