Final Project

Ladder Game

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Introduction

For the final project, I decided to implement option 1), the ladder game. The goal was for a player to push the button at the correct time when an LED is lit up. If timed correctly, the player will be allowed to progress to the next level, if timed incorrectly, the player will have to restart all the way from the first level.

Rules

In the game, there are 8 levels that the player must clear. As mentioned earlier, pressing the button at the correct time is how to move up the ladder. The duration that the light is lit will shorten as the user moves to higher levels, making the game progressively harder as the player moves up. The time that the light is lit and not lit will be the same. For example on level 2, the light will alternate between being on for 800 milliseconds and then off for 800 milliseconds.

The timing windows are as follows:

Level 1) : 1000 milliseconds

Level 2): 800 milliseconds

Level 3): 600 milliseconds

Level 4): 400 milliseconds

Level 5): 350 milliseconds

Level 6): 300 milliseconds

Level 7): 260 milliseconds

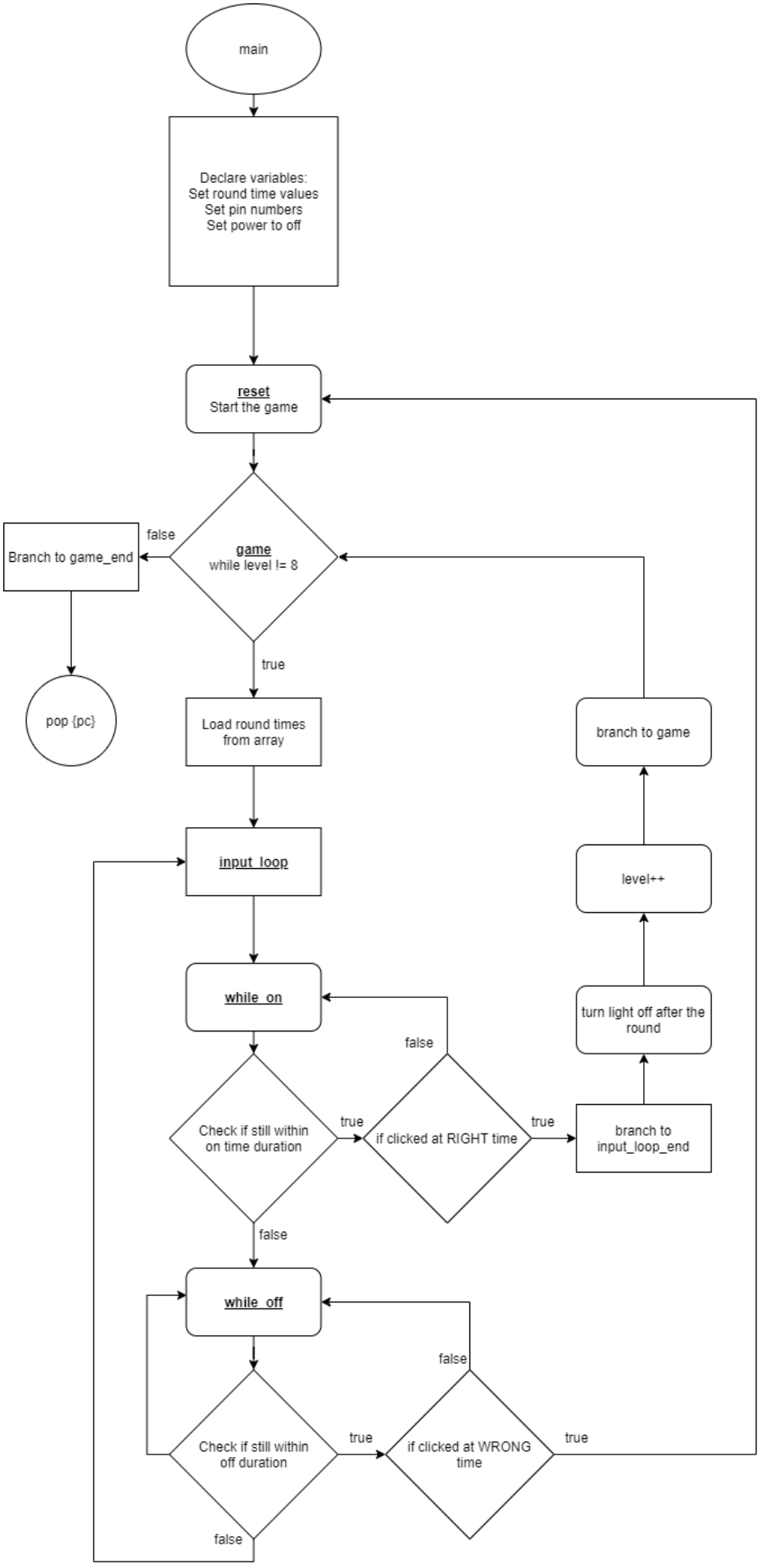
Level 8): 220 milliseconds

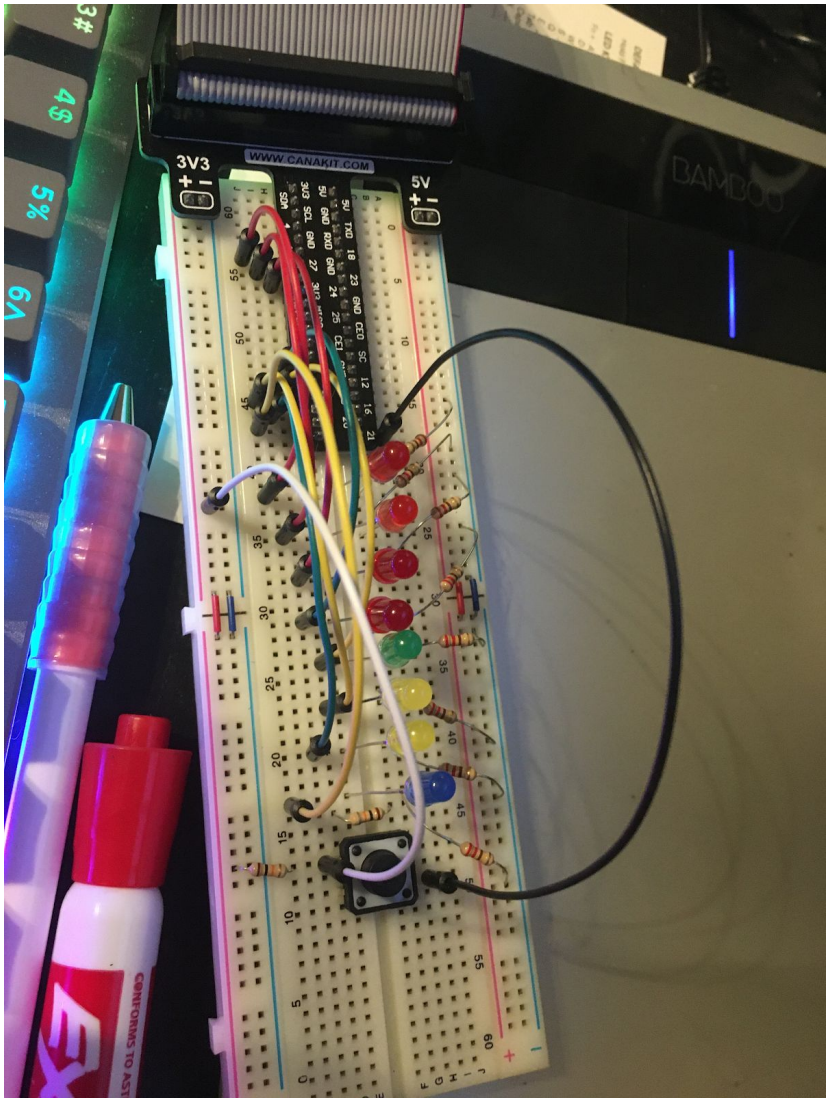
The Code

Since there are two states that the user can press the button on (either LED on, or LED off), there will be a timer based on the level that determines both how long the light is on and then how long it stays off. It will alternate between these times and then the game will continue based on when the button is pressed. If the button is pressed while the LED on timer is running, then we will push the player to the next stage. If the button is pressed while the LED off timer is running, then the player restarts to level 1. The game will end when the player presses correctly on the 8th level.

Flowchart

On the next page is a flowchart showing this process.


main
Declare variables:
Set round time values
Set pin numbers
Set power to off
reset
Start the game
game
while level != 8
false
Branch to game_end
pop {pc}
true
Load round times
from array
input_loop
while_on
Check if still within
on time duration
true
if clicked at RIGHT time
false
true
branch to
input_loop_end
turn light off after the
round
level++
branch to game
false
while_off
Check if still within
off duration
true
if clicked at WRONG
time
false
true
false

Breadboard

Regarding the breadboard, there are simply the 8 LEDs mentioned earlier plugged in along with the button. For each of the lights there are 8 wires, leading them to pin numbers 17, 27, 22, 5, 6, 13, 19 for output. Then for each LED there is also a resistor that links it to ground. The button takes in high voltage and then is plugged into pin 21 for input. Here is an image: