IM3080 Design and Innovation Project (AY2022/23 Semester 2)
Individual Report

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Group No: 4

Project Title: Project Tetris (Interactive)

Contributions to the Project (1 page)

- Software
  1. Discuss with teammates to collect features and design game rules
  2. Develop the algorithm
     Using 2D-array lightArray[][] to record the light/dark condition of each pixel
     Using variables centerx and centery to track the position of current shape
     Predefining the rotation state of each shape and using variable currentState to track the rotation state of current shape
  3. Develop 5 Shape functions. Shape function is the main function of each shape, which controls all shape activities
  4. Develop Light and Turnoff functions through setpixelcolor()
  5. Develop the endgame and restart function
  6. Realize the automatically drop and stack feature
  7. Realize the button related features including
     changing speed
     moving left/right/down
     instant dropping
     rotating
  8. Realize the score related features including
     line clearing
     line blinking before being cleared
     score system
     difficulty level modification
  9. Realize the next shape preview feature
- Hardware
  LED strip soldering
- Test
  1. Using Tinkercad Arduino simulator to test simple functions and single shape
  2. Using actual hardware to test entire code
- Debug

Reflection on Learning Outcome Attainment

Point 1: Modern Tool Usage

- Hardware
  Wire Soldering: our project needs lots of soldered LED strips to connect to the Arduino board. Since it is something new to me, initially it needs around 10 minutes and at least 2 people to solder one strip that one stabilizes the strip and one does the soldering and the defect rate was very high. After many practices, we mastered that one person spend only 3 minutes to solder one strip successfully. The key is should put the glue on the strip first and before it solidifies, put the wire on it to stick it together.
- Software
  1. Arduino Simulator Debug: Use the console together with Serial.println() statement to implement basic debugging. By setting the start point and end point, stepping over when running the code to track the progress of the program
  2. Trello: We use Trello as our project management tool. It helps us to set “to do”, “doing” and “done” and arrange the task to individuals.

Point 2: Individual and Teamwork

- Our team leader divided us into three subgroups (Software, Hardware and Design) and set tasks in Trello. Although for most time, each subgroup worked separately, when making important decisions, we usually had meetings like brainstorming to collect features and deciding the design styles. This method allows us to work efficiently while also know the progress of the whole project. And at the late stage of the project, three subgroups gathered frequently to combine our work, test and find out the problems together. Then, we solved the respective issues and gathered again until there are no more problems.

Point 3: Engineering Knowledge

- By attending the emodules on NTUlearn, visiting the website of Prof Chua and studying the documentation syntax on Arduino’s official website, I got to know and manage how to code using Arduino language together with the hardware knowledge like Arduino board, common sensors and LED strip
- At the beginning, we developed algorithms feature by feature. But later we found that when developing new features, the algorithm for it conflicts with the existing algorithms so we have to rethink the new algorithm to satisfy all the features, which lowers the efficiency. Hence, we restarted by listing down all features and thought of the general algorithm for the whole program. And for each feature, we develop the respective algorithm based on the general algorithm
- To save time, we used the simplest shape-shape O, which only has one rotation state, to test the algorithm. If the algorithm works, we complete the function