University of Moratuwa

Faculty of Engineering

Department of Electrical Engineering

EE4360 - Embedded Systems Design and Programming

Programming Assignment

Objective :	Design and implement a Snake game using the ILI9341 display and a joystick. The game will feature multiple levels, each increasing in complexity. This assignment will test your skills in embedded programming, interfacing with hardware components, and game logic design.
Deadline:	September 30, 2024, at 11:59 PM.

Assignment Description

Game Features

1. **Basic Gameplay**:
    - The snake moves on the display, controlled by the joystick.
    - The snake's direction changes according to joystick input.
    - Food appears randomly on the screen.
    - When the snake eats food, its length increases by 1 unit.
    - If the snake eats its own body, the game is over.
    - There are no walls at the screen's edges; if the snake goes out from one edge, it will reappear on the opposite edge.
    - Each food consumed adds 1 point to the score, displayed in a corner.
    - The game starts at Level 1, with the level increasing by 1 for every 2 points scored.
2. **Level Progression**:
    - **Level 1**: Basic gameplay as described above.
    - **Level 2**:
        - A digit corresponding to the last digit of your group number will appear as a barrier.
        - If the snake hits this digit, the game is over.
        - Food will not appear too close to this digit, ensuring a margin.
        - If the snake is near the center when this digit appears, it should be automatically shifted to a corner.

- **Level 3**:
    - Food starts disappearing 5 seconds after it appears.
    - A countdown timer will be displayed each time food appears.
- **Level 4**:
    - Red food will start appearing; eating it will reduce the score.
- **Level 5 and Onwards**:
    - The snake's speed increases by 20% at each new level.
    - The number of "bad" (red) foods will increase by 1 at each new level.

3. **Additional Features**:
    - Interactive sound effects using a buzzer.
    - A simple menu at the beginning to start a new game or view the past high score.
    - The high score should be saved in EEPROM.
    - The menu navigation will be controlled by the joystick.

Development Tools

- **Platform**: Any development board available on Wokwi and with PlatformIO.
- **Display**: ILI9341.
- **Programming Framework**: Arduino or similar.
- **Libraries**: External libraries may be used.

Submission Requirements

- **Project Files**: Submit all code and related files in a well-organized project folder.
- **Video Demonstration**: Provide a short video showing the game simulation, reaching at least Level 4.
- **Group Size**: Maximum of 2 students per group.
- **File Naming:** The project folder and all files must include the group number in the filename (e.g., Group_XX_SnakeGame.zip).
- **Submission Responsibility:** Only one person from each group is responsible for submitting the project.

Evaluation Criteria

- A viva will be conducted to assess your understanding of the project. The assignment will be graded out of 100 marks. The breakdown is as follows:

Criteria	Marks
Basic Gameplay Mechanics	20
Level Progression & Complexity	25
Display & Joystick Interfacing	15
User Interface	15
Sound Integration	5
Code Quality	20