ECE 353 Introduction to Microprocessor Systems
Project Specification

Due Thursday May 2,@ 11:59PM

Demo Friday May 3—Saturday 4

Overview

Using the ECE353 development platform and TI Launchpad, you will design and implement a game or other type of visual display using the concepts presented in class. Each design will be evaluated based on the following requirements:

- UART0: Used for serial debug. 115,200 baud with interrupts. (2 pts)
- LCD and Capacitive Touch
    - Graphics: Display non-trivial graphic images. Graphics must be something other than graphics provided in class. (5 pts)
    - Animation: Animate a non-trivial motion of an image. Images must be something other than graphics provided in class. (5 pts)
    - Capacitive Touch: Use the capacitive touch abilities of the LCD to support user input. (5 pts)
- Timers
    - Timer1A: Timer1A is configured as a 32-bit timer that generates interrupts once every 1 second to blink any LED on the Launchpad to indicate the system is alive (2 pts)
    - Timer4A: Use Timer4A as a 16-bit count down timer with interrupts. This interrupt is used to check the accelerometer every 8 milliseconds. You will need to use a prescalar to achieve this interrupt rate. (4 pts)
- EEPROM
    - Read: The following information should be read from the EEPROM and printed to UART0 when the MCU is reset. All three fields are terminated with a NULL character. Reserve 80 characters for each field. (5 pts)
        - Student 1: Your name
        - Student 2: Your partner's name
        - Team Number: xx
    - Write: When the SW2 pushbutton is pressed down, the application should write the following information to the EEPROM. (5 pts)
        - Student 1: Your name
        - Student 2: Your partner's name
        - Team Number: xx
    - Game data: Read/Write stateful data such as a high score to the EEPROM (5 pts)
- Push buttons: Use the four directional push buttons connected to the I2C I/O Expander. When a directional push button is pressed, the IO expander should generate an interrupt. DO NOT POLL this device for button changes. (8 pts)
- IO Expander RED LEDs: Use the 8 RED LEDs that are connected to the I2C I/O Expander. (7 pts)
- Accelerometer: Make use of the accelerometer found on the ECE353 Mezzanine card to control the movement of an image. (10 pts)
- Creativity: A subjective evaluation given to the amount of effort required to implement your project. (10 pts)
- Completeness of Design: A subjective evaluation based on how well other requirements were integrated into the overall design of the project. (12 pts)
- Project Demo Q/A: This score will be based on how well your group answers technical questions about your project. You will be expected to articulate design decisions and show a clear understanding of how your software functions. (15 pts)

- Wireless Communication (optional bonus points): Transmit and receive on both devices using the nRF24L01+ on the ECE353 development board. (5 pts)
- Video (optional bonus points): Create a 3 to 5-minute video and upload to YouTube. Submit the link as a comment in the dropbox. The video must include these elements: team introduction, brief introduction of game, description of what peripheral devices are used, and demonstration of running game. The video title must strictly follow this format: "Your Game Title - ECE 353 UW-Madison (Spring 2019)". The video description should include your names and brief description of the game. (3 pts)

Each group will sign up for a demo slot where you will meet with the instructor to demonstrate your project. You will have 5 minutes in which to describe your project and show case your technical achievements. You are expected to address each of the design requirements as part of your 5 minute demo. Following the demo, there will be a 5–10 minutes of Q/A. Sign up sheet will be distributed later. ONLY one person per team is allowed to sign up for a demo slot. (Teams that sign up for more than one demo slot will receive a deduction on their project grade.)

NOTE: If you use a web service for version control, make sure that you use a site that allows private access. If your project is freely open to anyone and someone else uses your source code, it will be treated as academic misconduct for all parties involved.

Team Formation

Make a **team of two** by 11:59pm, Friday April 15, and register using this Google Form. **Unregistered students will be randomly grouped at 12:00am, Saturday April 16. No exception. Register now.**

Expectations

You are allowed to use any of the source code that you and your partner have developed during the semester. You may also use any source code that has been given to you in class. **You may NOT use compiled libraries from previous projects, code that is not your own, or graphic images provided as part of this class.** If you have any questions on what code you can and cannot use, please ask.

What to Turn In

- **All** project files used to generate your project executable in a ZIP file.

Projects That are NOT Allowed

- Paper, Rock, Scissors

- Battleship

- Tick-Tac-Toe

- Etch-e-Sketch

- Snake

- Simon

- Any game that is similar in nature to ICEs or HWs.