ECE 353 Introduction to Microprocessor Systems

Project Specification

Due Sunday ~~April 26th~~ May 3rd,@ 11:59PM

Demo ~~April 27th & 29th~~ TBD

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:

Functionality requirements (50 pts)

- UART0: Used for serial debug. 115,200 baud via interrupt. Pause and resume when space bar is hit. When game is running, print "Running…". When paused, print "Paused. Hit space bar to resume…". (The messages are not a strict requirement. You just need to show the game status when pause/ resume.) (5 pts).
- ADC and joystick: Must use the PS2 Joystick for input for a portion of the game. ADC inputs must be sampled via timer interrupt, not polling. (4 pts)
- Push buttons: Use at least on directional push button connected to the I2C I/O Expander. When a directional push button is pressed, the IO expander should generate an interrupt. Must be debounced. (8 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)
    - (Bonus 2 pts) Make the LED "breath" (see https://www.youtube.com/watch?v=TjzFo63svmM)
    - Timer4A: Use Timer4A as a 16-bit count down timer with interrupts. This interrupt is used to check the ADC every 10ms. You will need to use a prescalar to achieve this interrupt rate. (4 pts)
- EEPROM
    - Game data: Store a high score of the game to EEPROM and display on the LCD on power up (5 pts)
- IO Expander RED LEDs: Use the 8 RED LEDs that are connected to the I2C I/O Expander. (7 pts)

Fun/appeal of the game (15 pts)

- Creativity: A subjective evaluation given to new/creative features of your game. (5 pts)
- Completeness of Design: A subjective evaluation based on how well other requirements were integrated into the overall design of the project. (10 pts)

Understanding of project (25 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. (10 pts)
- Coding Style/Readability/Commenting (15 pts)

Use of github (5 pts)

- Since you are collaborating remotely, online source management is important. Use github actively. Proof of active use will be required. (e.g., screen capture of commit history)
- **NOTE:** Make sure that you use 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.

Quality/Completeness of video (5 pts)

- Create a 3 to 5-minute video and upload to YouTube. Submit the link in the Project contribution survey (will be distributed later). 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 2020)". The video description should include your names and brief description of the game.
    - Video examples: https://www.youtube.com/watch?v=qBCS6U2KiUA&list=PLQfrIYHpy6Airwbj-ZnG74kQCqpM-ttxe

Demo

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.)

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.
- Project contribution survey. Include YouTube video link.

Projects That are NOT Allowed

- Rock, Paper, Scissors
- Tick-Tac-Toe
- Etch-e-Sketch
- Snake
- Any game that is similar in nature to ICEs or HWs.