CSE321 Project 2

Assigned:	10/03
Deliverable Demo 1:	During Your Assigned Recitation Section on 10/05 or 10/06, Code due 10/7 at 11:59pm
Midpoint Due Date:	10/15 11:59pm
Midpoint Part 2 Due:	10/21 11:59pm
Project Final Demo:	During Your Assigned Recitation Section on 10/27 or 10/28
Project Due:	11/04, 11:59 pm ET

!*!* READ THIS ENTIRE DOCUMENT BEFORE GETTING STARTED *!*!

Objective

Explore design and implementation in a bare metal system with a combination lock/security system.

Important Notes

- This is an **independent** project
- If you score less than 50% in the project category, based on the weighted averages of the project scores, you will fail the course independent of overall grade.
- Incorrect file types and without your name in it will not be graded.
- Incorrect file names result in a 2 pt taken from the final overall grade for the project.

Overall Evaluation

There are multiple parts to this project that will be submitted and evaluated.

1. Deliverable Demonstration 1 (30 Points)
2. Midpoint (200 Points)
3. Review (30 Points)
4. Final Submission and Demonstration (500 Points)
5. Reflection (30 Points)

Constraints/Specification Requirements:

- 4 digit code = last 4 digits of your person number
- Code entered via matrix keypad
- Everytime a value is entered, an LED lights up
- When 4 values are entered it will lock or unlock
- Lock/unlock mode will display on the LCD
- Must have a response of some kind if the wrong code is entered
- Must run “forever”
- BONUS: Add in a password reset to allow user to restart entering their password at any point
    - 10 Points for inclusion in Documentation
    - 10 Points for Code
    - 10 Points for implementation

Implementation Method Requirements

- All registers need to be controlled bitwise for general control not tied to the output of the LCD or an interrupt
    - LCD API can be used
    - Subset of MBED API are allowed
        - ISR
- Bounce needs to be addressed
- Have at least 1 interrupt and ISR
- Proper commenting

Submission and Evaluation:

There are multiple parts to this project that will be evaluated and require different submission methodologies.

Stage 1: 30 Points

- 15 points for code
- 15 points for demonstration

Stage 2:

- Planning: 60 points
- Readme: 50 points
- Code: 50 points
- Memo: 40 points

Stage 3:

- Review Questions: 20 Points
- Reflection Questions: 10 Points

Stage 4/ Wrapup

1. Documentation (120 Points)
   This will be constructed in a power point presentation format, template to be provided.
    a. Table of Contents for your work in slide deck
        i. Cover Page
        ii. Specifications
        iii. Features
        iv. Applications
        v. Block Diagram
        vi. Functionality Diagram
            1. ASM, FSM State Diagram, or Flow Chart pick 1
        vii. BOM
        viii. Schematic
        ix. Test Plan
2. Code (150 Points)
    a. Code will be evaluated for
        i. Commenting (30 Points)
        ii. Implementation technique requirements (60 Points)
        iii. Functionality (60 Points)
            1. Yes partial credit is a thing
3. Implementation (150 Points)
    a. This will be done with a live demo that you schedule
        i. Note if your code doesn't work, you can't get these points
        ii. A sign up will be done for you to select a time on 10/18 or 10/19
        iii. 15% overall score penalty if demo is not done
    b. Runs (10 Points)
    c. Keypad (30 Points)
        i. Causes a response of some kind (20 Points)
        ii. Bounce addressed (10 Points)
    d. LEDs (30 Points)
    e. LCD (30 Points)
    f. Functionality (50 Points)

Implementation Demo (150)
Note- if code submitted does not run you forfeit these points

(which was always stated above as a rule)

Note- if you do not do this part there is a 15% penalty overall

You should have your implementation constructed before logging in to your demo.

	Not gradable or beginning	Developing	Accomplished
Runs	No (0 Points)	----------	Yes (10 Points)
Keypad	(0 Points)	Some responses but not all (10 Points)	Causes Response (20 Points)
Keypad	Not done (0 Points)	Slightly addressed but not entirely correct (5 Points)	Bounce Addressed (10 Points)
LEDs	No (0 Points)	----------	LEDs work (10 Points)
LEDs	No (0 Points)	Couple small errors (10 Points)	LEDs match project design in connections (20 Points)
LCD	Not able to turn on (0 Points)	Able to power but no behavior (5 Points)	Turns on and initializes (10 Points)
LCD	No updates (0 Points)	Updates at least once but not as needed (10 Points)	Updates as it should (20 Points)
Functionality- Code Digits	Substantial errors or no code entry (0 Points)	Small errors (2.5 Points)	Digit behavior matches requirements (5 Points)

Functionality- Keypad response	No response in program (0 Points)	Incomplete but does something (5 Points)	Appropriately reads in and causes expected response (10 Points)
Functionality- LED response	No response associated with the program (0 Points)	Incomplete but does something (5 Points)	Correct (10 Points)
Functionality- LCD response	No response associated with the program (0 Points)	Incomplete but does something (5 Points)	Correct (10 Points)
Functionality- forever	No (0 Points)	----------	Yes (5 Points)
Functionality- Wrong response	Substantial issues or doesn't work (0 Points)	Slight errors but tries to work (5 Points)	Yes (10 Points)

Materials Needed

- LCD (1602 or 1802)
- Nucleo
- Keypad
- Solderless Breadboard
- Jumper wires
- LEDs

Stage 1: Nucleo Preparation

Deliverable Demo 1: During Your Assigned Recitation Section on 10/05 or 10/06
Code Submission: 10/07 11:59pm

Because this is your first project with the Nucleo, you'll need to demonstrate working knowledge of basic concepts to set yourself up for success. You'll do this in your assigned recitation section during the first week of the project (dates 10/05 or 10/06).

You will demonstrate and submit code during this stage.

Stage 2: Planning and Getting Started (200)

Part 1: Key Planning (60)

Planning is critical to success. Follow the protocols established in the algorithm you made in project 1 to document the key elements needed to address the design and implementation of the combination lock/alarm system.

Part 2: Get Started (120)

Start your implementation by updating your template and create a readme. Use examples you have seen for readme files as a guide. Update your template from project 1 to have the elements to guide through implementation. Then communicate your progress with a memo.

Midpoint Submission

By the midpoint due date of `Oct 15, 2021` you need to complete all the parts of stage 2.

Midpoint Part 2 - Stage 3: Review

You will be assigned to groups and given a set of questions to answer and assigned to a small group.

A reflection will follow.

Stage 4: Completion

This is the time to wrap up all functionality, test, and communicate results. This is the last stage of the project before you demonstrate and submit. Your project must run when we test it during grading or the demo points are forfeited.

Final Submission

Files Uploaded to UBLearns

- **All Code**
- **CSE321_project1_*username*_report.pptx**
- **PDF of updated Index**