Katherine Stock Project 2: Key Planning

10/15/21

Ask:

- 1. Purpose/Goal
 - a. To create a count-down and alarm system that takes a user-input time (up to 9m 59s).
 - b. Extra credit
 - Design a count-up toggled option that displays time passed, otherwise the same
- 2. What are the inputs?
 - a. Keypad
 - i. use to read time value from the user
 - ii. Sets state of the timer start/stop/input
- 3. What are the outputs?
 - a. LED(s)
 - i. Lights up when a value is entered
 - ii. Many turn on when time is up
 - b. LCD
 - i. Displays time remaining
 - ii. Displays Times Up
- 4. Are there any constraints or relationships between the inputs and outputs?
 - a. When a value is entered, an LED must light up
 - b. When the input time has passed, the LCD must display a message and have many LEDs turn on

Research/Imagine:

- How will I control keypad input and checking row/column?
 - Lecture 9
 - 9/29/21 lecture
 - Polling?
- Accounting for bounce?
 - Work this into the polling to find specific value as seen in class
- Possible Solution
 - Read key values off of keypad as seen in class
 - Use interrupts and have an isr for each row
 - Create conditions to read different keys
 - A, B, D, potentially C, have different behavior than 0-9
 - LED light-up each time a value is pressed

- Maximum time of 3 values long
 - Keep track of logic for X min and 60 seconds
 - Reject 9 min 60 seconds
- Build time as values are input
- Begin clock -- we haven't really learned this time piece fully yet so I will add it to the plan when we do
 - Time Remaining on LCD
 - Read the documentation for specifics on LCD commands
- When time reaches 0:00
 - Change LCD to display times up
 - Turn on many LEDs
- Extra Credit?
 - Add isr that will take input from key C and toggle into count-up mode?
 - Begin clock
 - Time Passed on LCD
 - When time reaches the value input by user
 - Change LCD to display time reached
 - Turn on many LEDs

Plan:

- Variables: interrupts for each column, isr for each possible key value, accumulator (init to 0), row counter, something to track LCD, variables necessary for the clock
- We need the 1 Nucleo-L4R5ZI, ~10-15 jumpers, 1 breadboard, 4 LEDs, 1 LCD, 1 Keypad
- Test plan
 - Do intended LEDs light up when a value from the corresponding column is pressed
 - Print accumulator after each key press, is it reading the right value? Is the accumulator correctly building the total time?
 - Does correct time display at start of clock cycle?
 - Does it count down 1 second at a time until 0:00 is displayed?
 - When 0:00 is reached, does the display change to times up? Do all 4 LEDs light up?
- Logic diagram for possible solution from imagine (excluding extra credit) is on the next page

