

Ask:

- What is the purpose
 - Design an all-in-one count-down alarm system that users can program, utilizing the bare metal methodology of embedded operating system interaction.
- What are the inputs?
 - 4x4 Matrix Keypad
 - ◆ Press A to start the timer
 - ◆ Press B to stop/turn off
 - ◆ Press D to input the time
 - ◆ Press number keys to enter the time
- What are the outputs?
 - LCD displays time
- Are there any constraints?
 - Time is entered as m:ss
 - Valid time can go up to 9 min and 59 sec

Research/Imagine:

- Matrix Keypad configuration
 - There are 8 connections, 1-8.
 - ◆ Pin 5 to 8 are row lines
 - ◆ Pin 4 to 1 are column lines.
 - How to tell which button is pressed?
 - ◆ Poll
 - Loop going through checking each condition
 - Recommend using the same GPIO for all inputs so that needs to be changed is the value
- 1602 LCD
 - Its full name is 1602 character-type liquid crystal display
 - There are CSE321 LCD library files for this project.

Planning:

- How to connect the matrix to Nucleo?
 - What GPIO to connect?
 - ◆ Connect 8 pin connectors to GPIOD, from pin D0 to pin D7.
 - Pin 8 on keypad to PD_7
 - Pin 7 on keypad to PD_6
 - Pin 6 on keypad to PD_5
 - Pin 5 on keypad to PD_4

- Pin 4 on keypad to PD_3
 - Pin 3 on keypad to PD_2
 - Pin 2 on keypad to PD_1
 - Pin 1 on keypad to PD_0
- How to connect the 1602 LCD to Nucleo
 - 1602 LCD have four pins, GND, VCC, SDA and SLA
 - ◆ Connect GND on LCD to GND on board.
 - ◆ Connect VCC on LCD to +5V on board.
 - ◆ Connect SDA on LCD to PB_9 on board.
 - ◆ Connect SLA on LCD to PB_8 on board.
 - lcd1602.cpp and lcd1602.h are provided