Egg Steamer
ECE 153B Final Project Proposal
Jimmy Kraemer

Overview:
      For this project, I will create a device that will steam an egg for a desired amount of time. First, a user will place an egg in the steaming area and fill the lower container with water. Then, the user can turn a potentiometer to select the steaming time, which will appear on a LED matrix display. Finally, the user will press a start button to begin the steaming process. The water will be heated using a heating element, using a temperature sensor to identify when the water reaches its boiling point. The water temperature will be monitored during the steaming process and the heating element will be toggled to maintain the boiling temperature, and the remaining time will be shown on the display. Once the timer finishes, the egg will be moved out of the steaming area using a stepper motor. An indicator LED will stay on as long as the water is still hot and turn off once the water is a safe temperature.

Peripherals:
- Button
- LED
- Potentiometer
- Stepper Motor
- Temperature Sensor
- Heating Element
- 2 8x8 LED Matrix Displays

Protocols:
- SPI (Display)
- I2C (Temperature Sensor)

Software Structure:
      The STM32 board will use an ADC to convert the potentiometer position (voltage) to a digital value that can be read to adjust the steaming time. The display will show the steaming time as the user adjusts it, "heat" when the water is heating up to temperature, the steaming time left once the water reaches its boiling point, and "done" when the steaming time has finished, controlled using SPI. The start button will use interrupts to determine when it is pressed. When the start button is pressed, the temperature sensor will be periodically read using I2C to monitor the water temperature. The heating element will be turned ON using a relay board if the temperature is below the water's boiling point, OFF otherwise. The indicator LED will be set to ON if the water is above a certain temperature, OFF otherwise. The motor will move a door to let the egg roll out of the steaming area when the timer finishes, and will be controlled using PWM.

Website: https://sites.google.com/view/ece153b-egg-steamer/home?authuser=2
(block diagram is on the website)