Project 2 Report  
ECE-218: Embedded Microcontroller Projects

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**Objectives**

The objective of this project is to add functionality to the existing smart home system by adding an gated entryway that can be opened or closed with an entered passcode. The system should allow a user to operate a servo, which will rototate 90 degrees to simulate a raisable barrier, and maintain the raised position for long enough for a car to pass through. Ultimately, the user will get three attempts at the code before being locked out of the system and an LCD will provide this information, and the required updates to the user. The uart terminal output will allow the user to view the current set password in case it is forgotten and the alarm deactivation function will also be shifted to terminal as the keypad is repurposed. The other functions of the system (entryway light, gas detection, temperature detection, and the alarm function) will all remain fully operational.

**Design and Hardware**

The project will be designed and implemented using a NUCLEO-F429ZI (henceforth referenced as NUCLEO) board using the STM32 architecture required by the onboard CORTEX-M processor. We will use an LM35 temperature sensor, an [insert gas sensor name] gas sensor and a 3.3V buzzer to implement the smoke and temperature detection which is carried over from the previous iteration of our smart home. We also use an LDR sensor to drive the entryway light functionality and the onboard LEDs for this and other functions. The main hardware required for the new functionality is the 4x4 membrane keypad which will now be used to input the gate code, the [insert size] LCD display which will be used to display information to the user - including the current entered code on the keypad, and the servo which will drive the gate service.

Here is hardware diagram: