



SMART LOCK



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Introduction

The project has important characteristics for a home today that are security and limitations for an environment where the user can feel safe when he is not in his home since it consists of an automation of a house where the user arrives at his home by entering A code to your security plate and if an error is achieved 5 times the sheet will activate security by blocking all the accesses that can be made to the house in this way if the user does not own the house cannot access without knowing the password, For this project everything consists of assembly programming in the Kinetis card for the development of this project.

Scope of work

This project is developed for people who need to have a touch of security in their own home in this way reaching agreements with users to install the system in their home, the interesting thing about this project is that when you reach the user who needs this service operation is going to be something simple so that the user has the ability to understand it easily and cannot have problems with it.

Project objectives

Our goal is to be able to develop this project to somehow be able to take it to the outside public and be able to obtain resources through this project since apart from obtaining resources we also create a state where the user who required this service feels more secure to live in their home since it will keep you more safe and secure of being and not being in your home since through our system we will be able to take care of your home without your being in your home.

Functional description

To use this project, we need to first have the SmartLock application installed in our smartphone. Then, open it and connect to the bluetooth module. After it has, now all you must do is type the correct four-digit pin and send it. If it is, the door will unlock, and the lights will be turned on.

Else, you can try again. But, if the pin is wrong three times, the windows will lock, and the house enter in lockdown mode and be a one-minute delay to be able to try again. Only when the correct pin is introduced, the windows will unlock, the door will open and exit the lockdown mode.

Schedule

We plan on accomplishing on 8 weeks the final project. Here we will define what we have planned to do each week.

On week one we will make the physical connections between the number pad, solenoid, dc motor and microcontroller.

On week two, we will make the external enclosure and mock-up to have a visual representation of a real-life application of our project.

On week three we will define how the microcontroller will communicate or interact with each component. It could be via an IC, or through transistors and other electronic components.

On week four we will create and solder any PCB we might use, to assure that later we will not have problems with protoboard prototypes getting disconnected or tangled up.

On week five we will make test programs for every single component independently, with the mere purpose to test the functionality of each part.

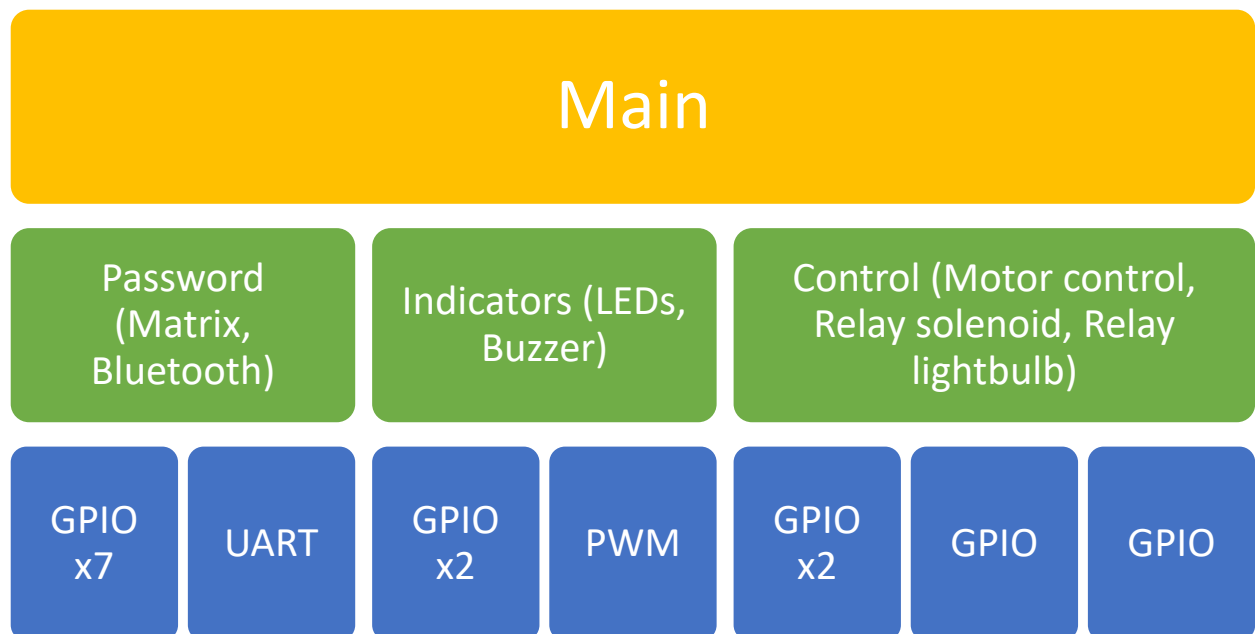
On week six and seven we will integrate all the main ideas of the test programs made the week before. These two weeks will be crucial for the sake of the project, because it is here where we will make sure everything works as it should when all is connected properly.

Finally, week eight will be dedicated to debugging any issues that might have arisen from the programming.

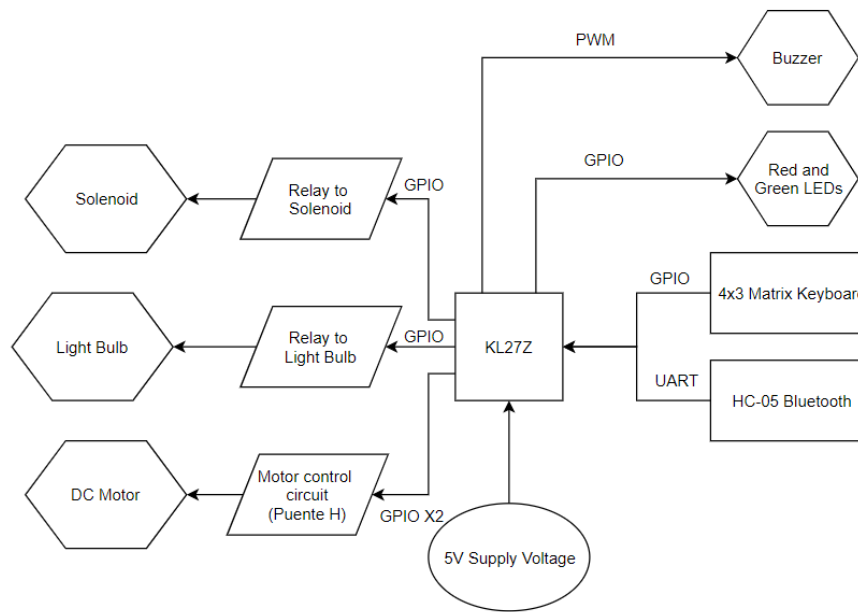
Modules

1. APP layer
 - a. Smartlock.c
2. HIL
 - a. Control.c/.h
 - b. Indicators.c/.h
 - c. Password.c/.h
3. HAL
 - a. GPIO.c/.h
 - b. PWM.c/.h
 - c. UART.c/.h
4. SL
 - a. serviceLayer.c/.h

Architecture



Flow chart



Expected outcomes

We want to make this product work because if the goal is perfectly achieved we can create a safer environment in the homes of our home since today the place where we live that is Mexico is not very safe for everyone and with our project we can create a option for people to feel safe inside their own home.

Acceptance criteria

For this project to be considered finished in an appropriate way, it should cover the next points. First, it should be able to withstand any external forces that try to open it. Another important point is that the door only must open if the correct code is inserted; if not, it should warn the user that the code introduced is incorrect, blink the red LED and play a low-pitch tone. When the code is correct, the green LED should blink, the solenoid should retract and open the door, play a high-pitched tone from a buzzer; at the same time, it should open the curtains and turn on the lights of the room.

Materials

- ❖ KL27z
- ❖ DC engine
- ❖ Gears
- ❖ Closing
- ❖ Diode 4004
- ❖ 7 330 Ω resistors
- ❖ HC-05 Bluetooth module
- ❖ 1 relay
- ❖ 1 solenoid
- ❖ Protoboard
- ❖ 9v voltage source
- ❖ Red LED
- ❖ Green LED
- ❖ H bridge L293D
- ❖ 5 wooden boards 30x30
- ❖ 6 screws
- ❖ 2 hinges
- ❖ 1 buzzer
- ❖ 1 USB to micro USB cable
- ❖ Silicon
- ❖ Adhesive belt

Problems found

The problems we had at the beginning were that the motor could not work since it did not continue with the cycle of the state machine, the solenoid did not receive enough voltage to

remain open, a transistor failed to increase the signal connected to the buzzer and for the bluetooth module, when we connected with a generic application and we sent the pin, the module failed to read them properly and data was lost or corrupted.

For the motor, the solution was to connect ground pins of the two voltage sources that we used, for the solenoid we increased the voltage, for the transistor, we decided not to use it and connect the buzzer through a pair of resistors and for the bluetooth module, we created our own app and configured it to send the digits one by one, receiving a confirmation bit between digits.

Lessons learned

From this project, I got a lot of insight from the main functioning of the KL27z board, the ARM Cortex M0+ architecture and its communication with other modules like the HC-05 bluetooth. Apart from that, a lot of other stuff was needed to make this project functional. One of those things, was to be able to make an Android app to meet our specific needs. Another one, was simply designing the architecture for the project. We had to know beforehand what and how everything had to work together, and then start coding. We tried to do it the other way around at first, and it simply was no way of doing it in a timely manner.

I intend to keep improving this project and keep applying all the knowledge I gained from this activity. This caught my attention and interest above other past projects and will keep on doing so.