Description of Access Control System

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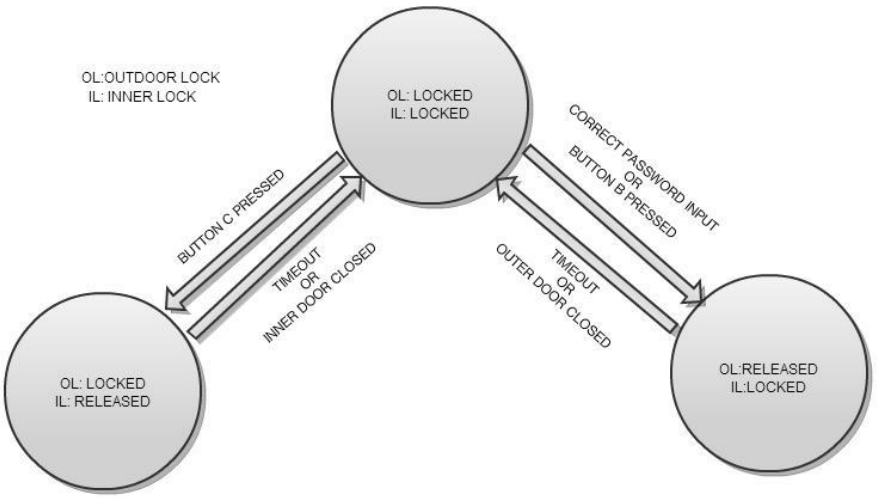
Program features

The program is driven by touching the LCD screen and operating the buttons. The features of the program are as follows:

1. The system is initialized with both LED1 and LED3 lighted which indicates the both lock of inner door and outer door is locked. There are four different states for a single door:

1). Door lock locked.
2). Door lock released.
3). Door opened.
4). Door closed.

The state machine of controlling the doors and locks as follows:



Race condition details:
1). Only one lock could be released at same time.
2). Only one door could be opened at same time.
3). Door A could be opened only when
    (1). Lock A is released.
    (2). Lock B is locked.
    (3). Door B is closed.
5). Both locks are locked at beginning.

2. There are two ways to **release** the outer door lock and one way to **release** the inner door lock.

Outer door:
1). Entering the right code. 9527 is the correct code for the system.
2). Pressing the button 1 which corresponds to the button B in the scenario.

Inner door:
1). Pressing the button 3 which corresponds to the button C in the scenario.

3. To simulate the door sensors, button 2 and button 4 are used and different operation on these two buttons represent different states:

1). Button released: It indicates the door is **closed**.
2). Button pressed: It indicates the door is **opened**.

Only the door whose lock is released could be open and the two door locks could not be released at the same time.

4. There are two situation that the door lock will be locked:

1). Once the door is closed by users(button 2 or button 4 released).
2). 5s after the door lock is released no matter the door is opening or has never been opened after lock is released.

5. The electromagnet works when the lock is locked. When the 5s timeout occurs and the lock is locked, electromagnet begin to work and once the door is closed, it could not be opened.

6. The state indicators of doors and locks could only be modified in the control task. The control operations are all atomic like:

Procedure of locking the lock once door is closed:
1). Closing the door. (DOOR = DOOR_CLOSE)
2). Locking the lock. (LOCK = LOCKED)
3).Turning the led off (ledOperate (LED,OFF))

Testing Routine

1. Start the program. Both Led1 and Led3 is on.
2. Input the incorrect key (9527 is the right key set in the program), outer lock would not be released and led1 is still on.
3. Input the correct key 9527. Outer lock is released and led1 is off.
4. If do nothing, led1 will turn on after 5s.
5. If press and release the button 2 in 5s and led1 will turn on immediately.
6. If Press the button 2 as the door is opened, led1 will turn on after 5s. When you release the button and press button 2 again, led1 will not turn off since the lock is locked.
7. If not do the step3 but press the button1, led1 would turn off. Button 1 is used for controlling the outer lock inside the security room.
8. The routine to test inner door and inner lock is similar to testing outer door and outer lock except the inputting code procedure.