

Door Lock
Team 05

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Reference Documentation:

<https://github.com/camdeno/ECE-411-Team-5/blob/main/Product%20Design%20Specification.pdf>

<https://github.com/camdeno/ECE-411-Team-5>

Hierarchical Test Plan:**Unit/Model Test:****Equipments:**

ATMega328PU

16MHz quartz crystal oscillator

Relay (SRD-05VDC-SL-C)

Push button

Stepper Motor

Stepper Motor Driver (A4988)

4x4 Keypad

16x2 LCD Display Module

5A DC-DC Buck Convertor

12V Power Supply

Arduino IDE

Arduino Door Lock Source Code

(<https://github.com/camdeno/ECE-411-Team-5/blob/main/securitySystemCode.ino>)

Main Program:

- Initialize pins to stepper motor, keypad, LCD, relay, and push button.
- Test Keypress function.
- Test lockStatus function.
- Test ButtonStatus function.
- Test screenWrite function.
- Test writeCode function.
- Test StepperTurn function.
- Test relayPosition Function.

*NOTE: Each of the tests mentioned above (under Unit/Model Test) can verify and test for each individual unit/component. I.e. The 'Keypress' function can test for and verify that the Keypad is recognized by the ATMega328PU and that input(s) from Keypad are being recognized as well.

Integration Test:

Equipment:

ATMega328PU

16MHz quartz crystal oscillator

Relay (SRD-05VDC-SL-C)

Push button

Stepper Motor

Stepper Motor Driver (A4988)

4x4 Keypad

16x2 LCD Display Module

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- Test ATMega328PU to LCD display (shows correct UI, asks for password, change password, etc.)
- Test Keypad functionality and LCD display response in terms of input from keypad.
- Test stepper motor response to input(s) from Keypad.
- Test push button functionality and stepper motor response if button pressed.

*NOTE: Each of the tests above (under Integration Test) can verify that the Microcontroller (ATMega328P) is communicating, correctly, with the neighboring components (keypad, LCD display, stepper motor driver, etc.) via the Arduino Door Lock Source Code.

Parametric Test:Equipments:

ATMega328PU
16MHz quartz crystal oscillator
Relay (SRD-05VDC-SL-C)
Push button
Stepper Motor
Stepper Motor Driver (A4988)
4x4 Keypad
16x2 LCD Display Module
5A DC-DC Buck Convertor
12V Power Supply
Arduino IDE
Arduino Door Lock Source Code
(<https://github.com/camdeno/ECE-411-Team-5/blob/main/securitySystemCode.ino>)
Multi-meter (or Oscilloscope if available)
Protractor
Stopwatch

- Test the rotation degrees of the stepper motor.
- Test the voltage outputted from the Buck Convertor.
- Test for push button debounce and response time.
- Test stepper motor strength (or torque) against opening/closing a door.

Function Test:Equipments:

ATMega328PU

16MHz quartz crystal oscillator

Relay (SRD-05VDC-SL-C)

Push button

Stepper Motor

Stepper Motor Driver (A4988)

4x4 Keypad

16x2 LCD Display Module

5A DC-DC Buck Convertor

12V Power Supply

Arduino IDE

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(<https://github.com/camdeno/ECE-411-Team-5/blob/main/securitySystemCode.ino>)

Multi-meter (or Oscilloscope if available)

-Verify microcontroller operation

-Verify LCD Display outputs

-Verify keypad inputs

-Verify button input

-Verify stepper motor response

Test Description:

Test Writer: Team 5						
Test Case Name:	Stepper Motor Parametric Test #1				Test ID#:	SMR-01
Description:	Simulate locking and unlocking the door. Verifying Step Motor Rotates 117 degrees in the CCW (Lock) and CW (Unlock) direction.				Type:	
Tester Information						
	Name of Tester:		Date:			
Hardware Ver:	1.0				Time:	
	Materials: Protractor Software: securitySystemCode https://github.com/camdeno/ECE-411-Team-5/blob/main/securitySystemCode.ino Hardware: ATmega328PU, Stepper Motor, Keypad, LCD Screen					
Setup:	Make sure system is in Locked state and keypad is cleared.					
Step	Action	Expected Result	Pass	Fail	N/A	Comments
1	Enter Incorrect Code	Screen Clear				
2	Enter "AB123"	Screen Displays Unlock Message				
3	Wait	Stepper Motor Turns 117 degrees CW to Unlock Position				
4	Press Pushbutton	Stepper Motor Turns 117 degrees CCW to Lock Position				
Overall Test Result:						

Test Writer: Team 5						
Test Case Name:	Keypad & LCD Display Integration Test #1				Test ID#:	SMR-01
Description:	Simulate the inputted code by the user. Test if code displays correctly on the LCD screen.				Type:	
Tester Information						
	Name of Tester:				Date:	
Hardware Ver:	1.0				Time:	
Setup:	Materials: Software: securitySystemCode https://github.com/camdeno/ECE-411-Team-5/blob/main/securitySystemCode.ino Hardware: ATmega328PU, Keypad, LCD Screen Make sure all components are connected, code is displaying correctly, code is cleared after each input, code is cleared if "C" is pressed, correct/incorrect code is detected by microcontroller.					
Step	Action	Expected Result	Pass	Fail	N/A	Comments
1	Enter Random Code	Code displays on the LCD screen correctly, without overwrite, overlap or any other issues				
2	Enter Incorrect Code	Print Incorrect code message and clear the code				
3	Enter Correct Code	Print correct code message and clear the code				
4	Enter "12" then "C"	Print clear code message and clear the code				
Overall Test Result:						