Keyless Door Locking System
System Test Plan
Version 1.1

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Table Of contents

1.0 Introduction

The purpose of the product test plan is to document how the product will be tested to make sure it conforms with all the specifications of the product design specification (PDS) document and to make sure that it functions properly.

1.1 This Document

This document will thoroughly describe the procedure on how to test the system and verify that it's operating properly. It will go over how to ascertain that the operational, functional, performance and interface requirements are met.

2.0 Reference Documents

2.1   Design Documentation

- Product Design Specification (PDS)
- Eagle Circuit Schematic
- Eagle Board Layout
- Top Layer
- Bottom Layer
- Bill of Materials (BOM)

3.0   Overview of Testing approach

3.1   Levels of Testing

In this document three levels of testing are implemented. Each level of testing must be completed before proceeding to the next level. This will help in detecting problems early in the product development cycle and thereby reduce costs and speed up product development. The order of the overall testing approach will be:

- Test individual modules
- Test the interconnectivity of all the modules
    - DC power-up of connected system
    - All modules used at least once
    - All interfaces working properly
- Test how the system interacts as a whole
    - Meets performance specifications
- Test Normal, Corner and Edge Cases

3.1.1   Level 1: Unit Testing

This phase involves testing all the the modules of the system individually. Both the software and hardware components are tested individually and debugged to make sure that they are operational for later use. This will aid debugging in later tests because it shows whether separate units meet their functional specifications.

- Objectives
    - Black box testing.
    - White box testing.
    - Meets all design specifications outlined in PDS.
    - Test all functional requirements.

3.1.2   Level 2: Integrated Testing

In level two, the modules are connected together for a basic functionality test. The first step is a DC power up. Power supply voltage is applied with limited current from a lab power supply, to ensure a mistake doesn't cause unlimited current draw. Once The DC test is verified, communication between the modules is verified. Further verification will occur in level 3, this level simply verifies that communication can occur between the modules.

- Objectives
    - Verify that expected results are obtained as the components are integrated together.
    - Identify and fix problems with the interconnectivity of certain modules before testing the system as a whole.

3.1.3   Level 3: System Testing

In this level of testing, all the modules are connected and the "final" product is tested as a whole. The tests will aim at ascertaining whether the system meets the requirements of the PDS. Tests will be aimed at identifying inputs that produce unexpected results.

- Objectives
    - Ensure that the device works properly and meets all the requirements outlined in the PDS.
    - Verify functional and performance specifications are met.
    - Identify problems with data.

3.3   Operational Description

The system takes an input in the form of a text message sent over the telecommunication network. The message is then interpreted by the onboard chip which will either open or close the door if the appropriate message is sent, or do nothing if the message is not appropriate.

4.0   PRETEST PREPARATION

This section details the test equipment needed to perform validation testing, as well as setup and calibration procedures.

4.1   Test Equipment

-Kedsum CP2102 Cable

The Kedsum CP2102 Cable is a USB to UART bridge that has two testing/debugging roles. The first is to allow a PC Terminal to communicate with the Atmel ATMEGA328P-PU through either the hardware UART pins, or a software UART connection (using other pins.) The second role is to interface with the GSM modem directly (without the microcontroller) to debug the GSM module by itself.

-Oscilloscope\Logic Analyzer

An oscilloscope or Logic Analyzer may be used to view communication on the UART line between the microcontroller and the GSM module.

-Multimeter

A multimeter will be used to verify DC voltages on the system, and to ensure current flow is correct in different areas of the circuit. Also, resistances on surface mount components can be checked.

-Laptop
　　This will be used to communicate through the Kedsum cable, as well as to upload new code to the microcontroller.

-AVR Dragon
　　This programmer will be used to upload code into the Atmel ATMEGA 328P-PU microcontroller.

4.2　　Test Setup and Calibration
　　The lab equipment should be turned on long enough to ensure accurate readings (usually 30 minutes on most test equipment), and oscilloscope probes should be calibrated. The SIM Card should be placed inside the jacket in the GSM module. Additionally, terminal software should be loaded onto a laptop. The same laptop, or another computer is needed to upload code to the Atmel microcontroller through the AVR Dragon programmer. The AVR Dragon functionality should also be verified.

5.0　　SYSTEM TESTS
5.1　　Level I: Unit Testing
- Functional Testing
    - L1-F01-A: Current Consumption Test
    - L1-F02-A: Visual inspection of boards
    - L1-F03-A: Voltage Levels Test
    - L1-F04-A: Door Strike Operation Test
    - L1-F04-A: LED Operation Test
- Reliability Testing
    - L1-R01-A: Message Reception Test
    - L1-R02-A: Message Interpretation Test

5.2　　Level II: Integration Testing
- Functional Testing
    - Basic test to ensure a text message can open or close the door strike.
    - Basic test to ensure a text message can turn on/off the LED when the door is opened / locked.
    - Basic test to ensure text message is interpreted appropriately.
    - Test status of lock upon power off.

5.3　　Level II: System Testing
- Functional Testing
    - Test of all commands.
- Reliability Testing
    - Test one user sending many commands rapidly.
    - Test multiple users sending SMS messages as the same time.
    - Send message with inappropriate data to the system.
    - Send message from an unregistered phone number. (Unlock acceptance test #1)
    - Check if system stays locked when power is lost. (Unlock acceptance test #2).

6.0 Detailed Test Case Descriptions for Two Tests

Test Writer: Tuna Poanessa							
Test Case Name:	Unlock acceptance test #1			**Test ID#:**			
Description:	**Checks the engineering requirement: The system must only permit access to authorized users.**			**Type:**		White box	
Tester Information							
Name of Tester:				**Date:**			
Hardware Ver:	1.0			**Time:**			
Setup:	System should be plugged in and installed in a door with a lock						
Step	**Action**	**Expected Result**		**Pass**	**Fail**	**N/A**	**Comments**
1	Attempt to issue commands from an unauthorized phone number.	Program should be. Should be able to detect incoming text messages but should not toggle the state of the door strike. An "Unauthorized" text should be sent to the unauthorized number.					
2	Authorize number in the system and text the system using the number.	The door strike should now unlock when the system receives the text from the authorized number and send a confirmation text to the number when the door is unlocked/locked.					
3	Disable Authorization for the previously used phone number	Program should be. Should be able to detect incoming text messages but should not toggle the state of the door strike. An "Unauthorized" text should be sent to the unauthorized number.					
Overall test result:							

Test Writer: Tuna Poanessa							
Test Case Name:	Unlock acceptance test #2			**Test ID#:**			
Description:	**Checks the engineering requirement: The system must stay locked if power to the system is lost.**			**Type:**	Black box		
Tester Information							
Name of Tester:				**Date:**			
Hardware Ver:	1.0			**Time:**			
Setup:	System should be plugged in and installed in a door with a lock						
Step	**Action**	**Expected Result**		**Pass**	**Fail**	**N/A**	**Comments**
1	The system should be powered with no pending texts	Door is locked					
2	Authorized number sends text to the system to unlock door	Door strike is unlocked and phone receives confirmation of the unlocked state of the system					
3	Power supply disconnected from system	Door strike should revert back to its locked state					
Overall test result:							