American International University-Bangladesh (AIUB)

Department of Computer Science

Faculty of Science & Technology (FST)

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Section: A

Software Quality Assurance and Testing

Smart Home Automation and Security System

A Report Submitted
By

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Software Test Plan
for

< Smart Home Automation and Security System >

Version 1.0 approved

Prepared by

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American International University -Bangladesh (AIUB)

25 Dec 2023

Checked By Industry Personnel

Name:

Designation:

Company:

Sign:

Date:

Table of Contents

Revision History

Revision	Date	Updated by	Update Comments
0.1	2023.12.01	Talukder Md Apon Riaz	First Draft
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0.3	2023.12.06	Siam Md Tafimul Islam	Third Draft
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0.8	2023.12.21	Wasif Hassan Joarder	Eight Draft
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1. TEST PLAN IDENTIFIER:

2. REFERENCES

- Home Automat

  https://www.homeautomat.in/

3. INTRODUCTION

The following document aims to outline the development of Smart Home Automation and Security System. This system is designed to control home device management by integrating technology to enhance security measures, streamline daily tasks, and provide homeowners with an efficient, convenient, and secure living environment. The main purpose of this automation system is to ensure user satisfaction and provide them Automation home device control, Security and maintenance. This document targets users of the system, potential developers, and the testing team.

Background to the Problem

Modern households face challenges concerning security, energy efficiency, and the management of various home appliances and systems. As homes become smarter and more interconnected, the need for a centralized, intelligent system to monitor and control these elements efficiently has become increasingly evident. Homeowners often grapple with security concerns, such as unauthorized access, burglary, or property damage. Furthermore, the complexity of managing diverse appliances, such as HVAC systems, lighting, entertainment devices, and more, demands a more unified and user-friendly approach.

Solution to the Problem

- Existing Solution

  Currently, homeowners rely on disparate systems and manual controls for home security and automation. Typical security measures might include basic alarm systems or CCTV cameras, while automation might involve standalone smart devices controlled by individual apps.

However, these fragmented solutions often lack integration, leading to inefficiencies, higher maintenance efforts, and limited overall security coverage.

- Proposed Solution
  The proposed Smart Home Automation and Security System aims to integrate all aspects of home management into a centralized, intelligent platform. Key features include:

  Unified Control Interface: A centralized dashboard accessible via mobile devices or computers, allowing homeowners to monitor and control security cameras, door locks, lighting, temperature, and other connected devices.

  Advanced Security Measures: Implementation of robust security protocols, including motion sensors, smart locks, facial recognition, and real-time alerts, ensuring comprehensive protection against intrusions or emergencies.

  Energy Efficiency Optimization: Automated scheduling and optimization of energy consumption for heating, cooling, and lighting to reduce wastage and lower utility bills.

  Task Automation: Integration of smart algorithms to automate routine tasks, such as watering plants, adjusting room temperature based on occupancy, and managing entertainment systems.

  Customization and Expandability: It is flexible for homeowners to customize settings and easily expand the system by adding compatible devices or functionalities.

  This proposed solution aims to provide homeowners with a seamless, intuitive, and secure smart home experience that increases convenience, safety, and energy efficiency.

4. REQUEIREMNT SPECIFICATION

4.1 System Features

- **User Authentication:**

  Functional Requirements:

  Allow users to log in using their designated username and password.

  Implement security measures like generating verification codes after consecutive login failures.

  Set limits for failed login attempts to ensure account security.

  Priority Level: High

- **User Registration:**

  Functional Requirements:

  Enable any potential user to register within the system at their convenience.

  Collect minimal necessary information during the registration process.

  Permit registration solely through a valid email and password.

  Priority Level: High

- **Payment Processing:**

  Functional Requirements:

  Validate user payment cards for authenticity.

  Verify that the user's address falls within the designated service area.

  Ensure accurate username and password entry for payment authorization.

  Priority Level: Medium

- **Home Device Management:**

  Functional Requirements:

  Enable control and management of various home devices such as lights, thermostats, and entertainment systems.

  Provide scheduling options for automated tasks within the home environment.

  Priority Level: High

4.2 System Quality Attributes

Functionality:
Ensure seamless management of home devices, allowing users to control and automate various functions.

Reliability:
Ensure consistent system performance without crashes or errors, even under high user load.

Usability:
Design an intuitive and user-friendly interface for easy navigation and control of home devices.

Performance:
Prioritize quick response times and efficient task automation for enhanced user experience.

Security:
Implement robust security measures such as encryption, authentication, and access controls to protect user data and the home environment.

Maintainability:
Design the system to be easily modifiable and adaptable to accommodate future changes or updates.

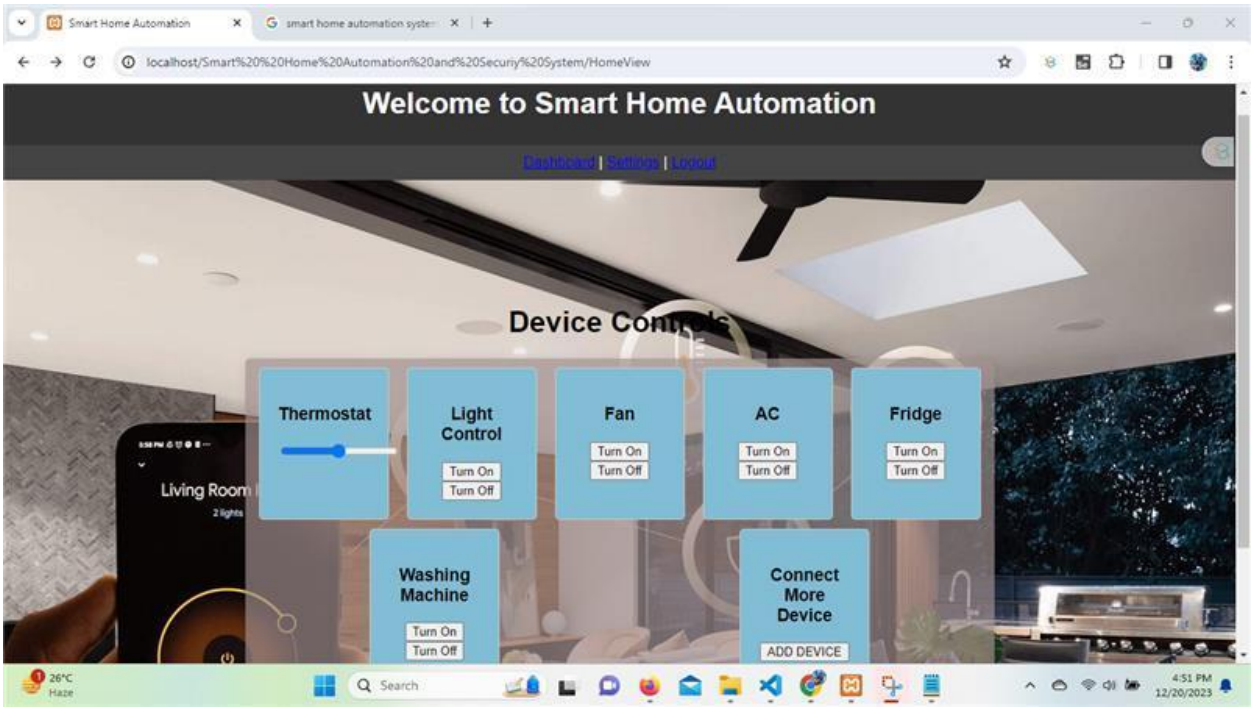
Portability:
Ensure the system operates seamlessly across different platforms and devices commonly used in smart home setups.

Compatibility:
Enable integration with other home automation systems or devices for a cohesive user experience.

Testability:
Design the system with testing in mind to ensure a thorough evaluation of functionality, security, and performance.

Scalability:
Ensure the system can accommodate a growing user base and additional devices without compromising performance.

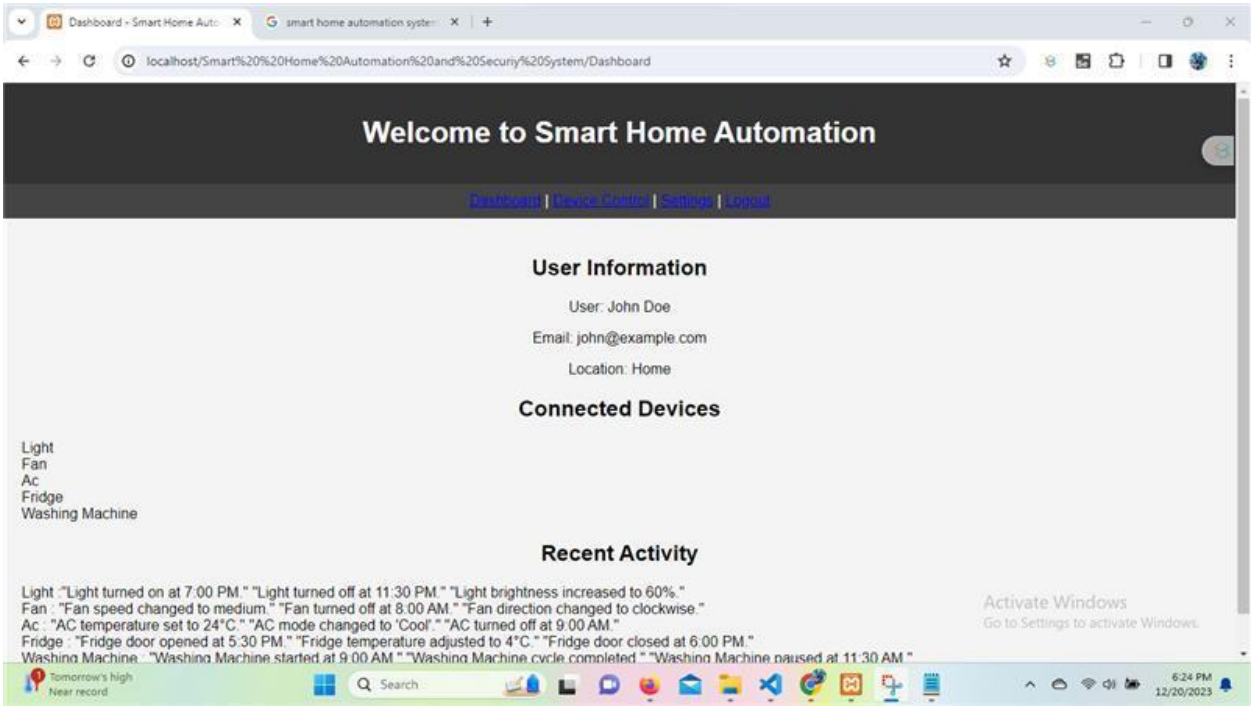
4.3 System Interface



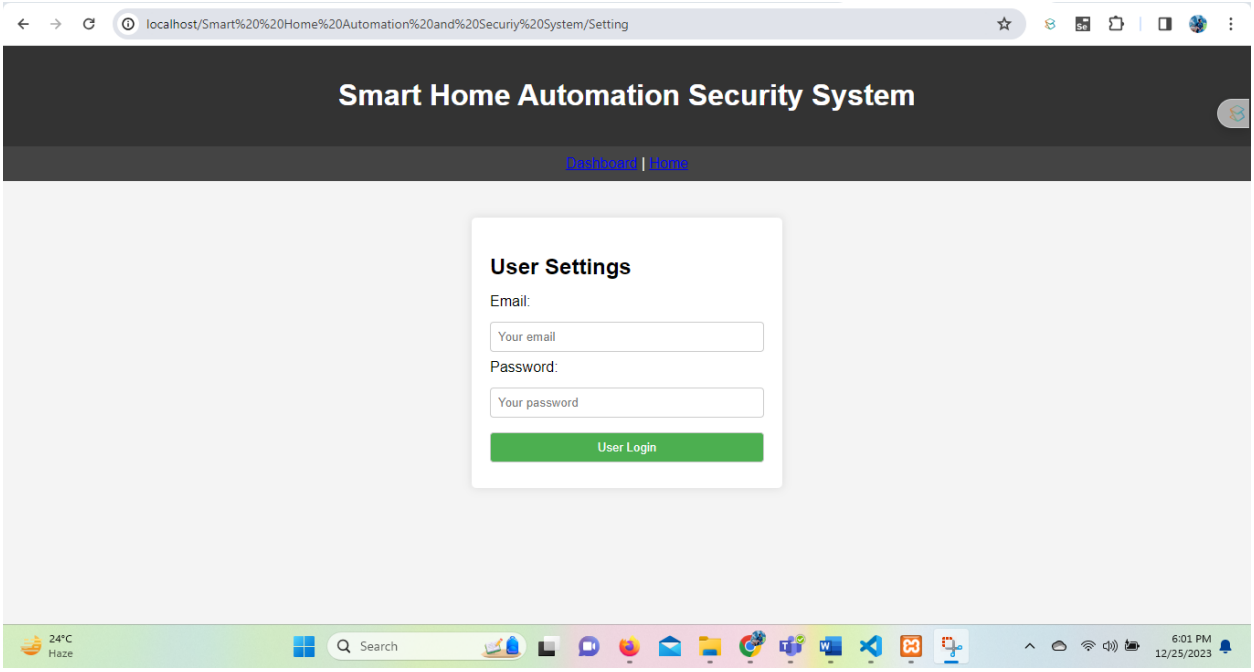
Home Page: User after login/ Registration successfully they can use it for control their device from outside.

Login Page: If user has valid account, they can login for access device from website.

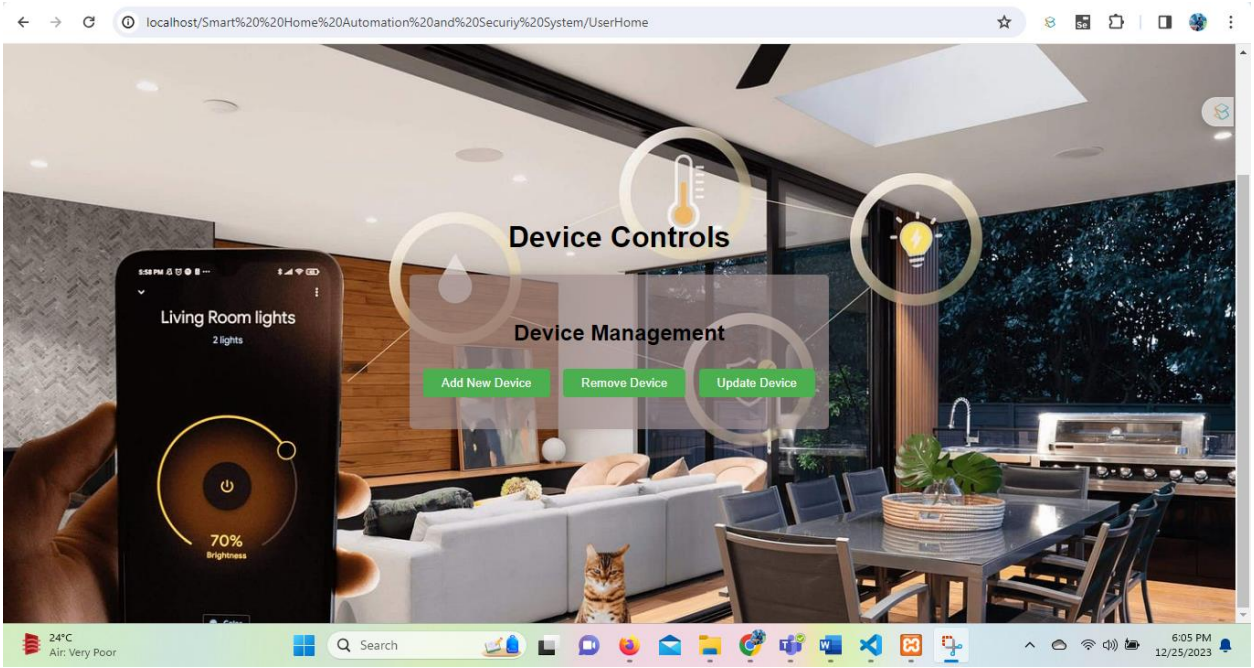
Signup Page: For access or use home page user need to login if new user than first need to signup(registration) than they can login and go to home page for connect home device.



Dashboard: Dashboard keep tracking user activity



User Setting: If user needs make any change, they came here then need to give valid username/password to make changes.



In this page user can add/remove/control device anytime (after they successfully log in user setting) for security purpose we keep this page that if anyone can access home page, they also must need to login again.

4.4 Project Requirements

- Time: To complete this web-based Smart Home Automation and Security System application around 3 months (90days) can be needed.
  Budget: 7,00,000 BDT
- Size: The final size of this web-based application will not be more than 200-500 MB.
  Globally there are lots of services in the web. But we mainly focused on Bangladeshi city/town area. So, this system is only for Bangladeshi people.
- Language: Php, HTML, CSS, JavaScript will be used to build this web-based Smart Home Automation and Security System application.
  COCOMO (Constructive Cost Model) is a software cost estimation model that uses the size of the project,
  the team size, and other factors to estimate the effort required to develop software. There are three
- versions of COCOMO: Organic, Semi-detached, Embedded. Here, I will use the Organic version as it is
  the most commonly used one.
  Effort = PM = Coefficient<Effort Factor>*(SLOC/1000) ^P
  Development time = DM = 2.50*(PM)^T
  Required number of people = ST = PM/DM
- PM: person-months needed for project.
- SLOC: source lines of code
- P: project complexity (1.04-1.24)
  DM - duration time in months for project
- T: SLOC-dependent coefficient (0.32-0.38)
- ST: average staffing necessary
  Effort = PM = Coefficient<effort factor>*(SLOC/1000) ^P
  = 3.6*(10000/1000) ^1.20
  = 57.05 person-months
  Development time = DM = 2.50*(PM)^T
  =2.50*(57.05) ^0.34
  = 7.71
  Required number of people = ST = PM/DM
  = (57.05/7.71)
  = 7.40
  = 8
  Budget:
  8 developers working of 3 months:
  Duration in weeks = 15 weeks
  Office days = 5 days
  Working hours = 8 Hours
  So, per week working hours is = (5*8) hours = 40 hours
  Hence, Total Working hours is = (40*15) hours
  = 600 hours.
  All Developer salary is = 800 BDT Per Hour

Total developers Salary = (800*600) BDT = 4,80,000 BDT
Utility cost: 35,000 BDT
Salary cost: 4,80,000 BDT
Components cost: 25,000 BDT.
Revenue: 1,60,000 BDT
Total cost = 7,00,000 BDT

5. FEATURES NOT TO BE TESTED

In our project "Smart Home Automation and Security System", here are some areas that might not we test:

o Is the NID copy of the customer valid or not.

o Is the Shop Trade License number valid or not.

o Physical location of the workshop.

o Payment system because of the system API integration.

o Internal Security Checks.

o Experience and Degree of Mechanic's.

o Is the customer providing authentic information about him/her

6. TESTING APPROACH

6.1 Testing Levels

- **Unit Testing**:
  Verify individual components or functionalities of the system, such as specific device controls (e.g., lights, thermostats, alarms).

- **Integration Testing:**
  Test how different modules or devices within the home automation system interact and function together.

- **System Testing:**
  Evaluate the system as a whole to ensure it meets functional and non-functional requirements, including device synchronization, user interfaces, and system responses.

- **Acceptance Testing:**
  Conduct tests based on user scenarios to ensure the system meets the expectations of end-users in terms of ease of use, functionality, and meeting specified requirements.

- **Regression Testing:**
  Ensure that existing functionalities are not affected after updates or modifications, especially concerning device controls or system interfaces.

- **Performance Testing:**
  Assess the system's performance under various load conditions, checking response times, device synchronization under heavy usage, and system stability.

6.2 Test Tools

For the project required testing tools are described below –

- **Selenium IDE:**
  For our project, Selenium IDE would be beneficial for creating quick and simple automated test cases to validate basic functionalities of our web-based smart home automation system.
  It allows creating automated test cases for web applications without writing code manually. It records user interactions with the browser and generates scripts based on these actions. So, we open our project and start a new project then give just the URL of our project and start record functionality. After recording our project functionality stop recording and execute a test case FOR get the result.

- **Microsoft Project**
  For construct our project planning schedule we used MS Project tool for Making Gant Chart.

- **Visual Studio**
  Making System Interface used this tool. In this visual studio code so many language are used [PHP, CSS, HTML]

6.3 Meetings

The purpose of our project meeting is to establish a comprehensive testing approach that aligns with the project's objectives, ensuring the quality and reliability of the Smart Home Automation and Security System.

Meeting Activities:
Reviewing Project Requirements: Ensuring a thorough understanding of the system's functionalities and features to be covered in the testing plan.

Defining Testing Objectives: Identifying specific testing goals and outlining the scope of testing required for the system.

Testing Types and Scope: Determining various testing types needed, such as unit testing, integration testing, system testing, user acceptance testing (UAT), and regression testing, tailored for the smart home system.

Testing Environment and Tools: Identifying suitable testing environments and tools necessary for comprehensive testing of home automation devices, security protocols, and system interfaces.
Resource Requirements: Outlining the hardware, software, and personnel needed for testing activities, ensuring a well-equipped testing environment.

Defining Testing Schedule: Establishing a timeline with key milestones, deliverables, and deadlines for different phases of testing.

Risk Management: Identifying potential risks or challenges in the testing process and developing strategies to mitigate them, ensuring a smooth testing phase.

Success Criteria: Determining how testing success will be measured, evaluated, and aligned with project objectives and requirements.

Testing Plan Documentation: Compiling a detailed testing plan document that outlines the approach, timeline, resources, responsibilities, and methodologies for testing the Smart Home Automation and Security System.

7. TEST CASES/TEST ITEMS

7.1.1 Test Case 1: Login Functionality

Project Name: Smart Home Automation & Security System		Test Designed by: Apon		
Test Case ID: SMASS_TC_01		Test Designed date: 01/12/23		
Test Priority (Low/Medium/High): High		Test Executed by: Riaz		
Module Name: Login		Test Execution date: 02/12/23		
Test Title: Verify User Login				
Description: To verify that a user with valid credentials can successfully login to the system				
Precondition (If any): Functional login page available with valid user credentials				
Test Step	Test Data	Expected Result	Actual Result	Status (Pass/Fail)
1.Go to the log in page 2.Enter valid credentials (username/password) 3.Click on the login button	Username: valid_username Password: valid_Password	Login must be successful. User should be logged in	-	Pass
Post Condition: Successful user login redirects to the dashboard or designated landing page.				

7.1.2 Test Case 2: Signup Functionality

Project Name: Smart Home Automation & Security System		Test Designed by: Wasif		
Test Case ID: SMASS_TC_02		Test Designed date: 03/12/23		
Test Priority (Low/Medium/High): High		Test Executed by: Jorder		
Module Name: Signup		Test Execution date: 04/12/23		
Test Title: Verify User Signup				
Description: To verify that a new user can successfully register for the system				
Precondition (If any): No existing account with the provided user credentials (user_name,….,user_password) should exist in the system.				
Test Step	Test Data	Expected Result	Actual Result	Status (Pass/Fail)
1. Go to the signup page 2. Enter valid signup data 3. Click on the 'Signup' button	Name user_name, Email: user@gmail.com Password :User_password	Signup page loads User should be registered successfully	-	Pass
Post condition: Successful registration redirect the user to login page, enabling login with the newly created account credentials.				

7.1.3 Test Case 3: Dashboard Navigation

Project Name: Smart Home Automation & Security System		Test Designed by: Siam		
Test Case ID: SMASS_TC_03		Test Designed date:05/12/23		
Test Priority (Low/Medium/High): Medium		Test Executed by: Tafimul		
Module Name: Dashboard		Test Execution date:06/12/23		
Test Title: Verify Navigation from Dashboard				
Description: To verify that navigation links from the dashboard lead to the respective pages.				
Precondition (If any): User is logged into the system and is on the dashboard page.				
Test Step	Test Data	Expected Result	Actual Result	Status (Pass/Fail)
1. Click on the 'Device Control' link 2. Click on the 'Settings' link	- - -	Device Control page loads Settings page loads	- -	pass

Post condition: Successfully navigation top the Device control and setting pages from the dashboard.

7.1.4 Test Case 4: Device Control Functionality

Project Name: Smart Home Automation & Security System		Test Designed by: Apon		
Test Case ID: SMASS_TC_04		Test Designed date: 07/12/23		
Test Priority (Low/Medium/High): High		Test Executed by: Riaz		
Module Name: Device Control		Test Execution date: 08/12/23		
Test Title: Verify Device control Functionality				
Description: To verify the functionality of individual device controls.				
Precondition (If any): Device are connected and accessible within the Smart Home Automation System.				
Test Step	Test Data	Expected Result	Actual Result	Status (Pass/Fail)
1. Turn on a Device 2. Turn off the same Device	- - - -	D Device turn on Device turn off	-	Pass
Post Condition: Device control functionalities are successfully tested and verified for accurate operation within the system.				

7.1.5 Test Case 5: Setting Modification

Project Name: Smart Home Automation & Security System		Test Designed by: Wasif		
Test Case ID: SMASS_TC_05		Test Designed date: 09/12/23		
Test Priority (Low/Medium/High): Medium		Test Executed by: Jorder		
Module Name: User Setting		Test Execution date: 10/12/23		
Test Title: Verify user setting modification				
Description: To verify the modification of user preferences setting.				
Precondition (If any): User access the setting page successfully				
Test Step	Test Data	Expected Result	Actual Result	Status (Pass/Fail)
1. Go to the Settings page 2. Modify user preferences	Change Time zone, Notification, Setting, Add Device, Update, Remove	Settings page loads. Changes should be saved	-	Pass

		successfully		

Post condition: User's modified preferences/setting to make changes.

7.1.6 Test Case 6: Device Management

Project Name: Smart Home Automation & Security System		Test Designed by: Apon		
Test Case ID: SMASS_TC_06		Test Designed date: 11/12/23		
Test Priority (Low/Medium/High): High		Test Executed by: Riaz		
Module Name: Device Management		Test Execution date: 12/12/23		
Test Title: Verify addition of a new device				
Description: To confirm the successful addition of a new device to the system.				
Precondition (If any): User is logged in navigation to the device management page.				
Test Step	Test Data	Expected Result	Actual Result	Status (Pass/Fail)
1. Click on the "Add Device" button. 2. Save the device information	New device details (name/type etc.)	Device is successfully added. Newly added device is display in dashboard list.	-	Pass

Post Condition: The new device is successfully added and reflected in the dashboard list .

8. ITEM PASS/FAIL CRITERIA

This section's primary goal is to outline the PASS/FAIL standards for the tests included in this project. A component, unit, system, or integrated test item will be deemed to meet the pass criterion if it scores between 80% and 95%, and the failure criteria will be applied to any system or unit scoring below 80%. This measurement is what we used in our project to determine how dependable and user-satisfying it is. The test process will be completed once the initial set of distributors have successfully sent in reassigned sales data for a period of one month and the new EDI data balances with the old ZIP/FAX data received in parallel. When the sales administration staff is satisfied that the data is correct the initial set of distributors will be set to active and all parallel stopped for those accounts.

9. TEST DELIVERABLES

- Software Requirements Specification (SRS): This document outlines the functional and non-functional. Requirements for the software used in a Home Automation system.
- Design Specification: This document describes the software design for the Home Automation Security including the architecture and interfaces.
- User Manual: This document provides instructions for end-users on how to use the software that controls the automation or the software system.
- Maintenance Manual: This document provides instructions for maintaining and troubleshooting the software and any related components or hardware.
- Test Plan: This document outlines the test strategy, test cases, and expected results for the software used in an Automation system and maintained security.
- Release Notes: This document provides an overview of the new features, bug fixes, and known issues with a particular release of the software.
- Technical Support Guide: This document provides information on how to obtain technical support for any issues related to the software used in an Automation system.

10. STAFFING AND TRAINING NEEDS

When implementing software for "Smart Home Automation Security System", it is essential to have a team with the necessary skills and knowledge to complete the work effectively and efficiently. Staffing and training are crucial components of any project, and in this article, we will discuss the staffing and training needs for a project that involves the implementation of software for automation security systems.

STAFFING NEEDS: The first staffing need for this project is a team of developers with experience in developing software for automation security systems. The team should be composed of at least one software architect, one lead developer, and several junior developers. The software architect will be responsible for the overall design of the software, while the lead developer will oversee the implementation and ensure that it meets the necessary standards. The junior developers will assist in the implementation and testing phases of the project. It is also recommended to have at least one full-time tester assigned to the project for the system/integration and acceptance testing phases of the project. This will require assignment of a person part- time at the beginning of the project to participate in reviews, etc., and approximately four months into the project, they will be assigned full-time. If a separate test person is not available, the project manager or test manager should assume this role.

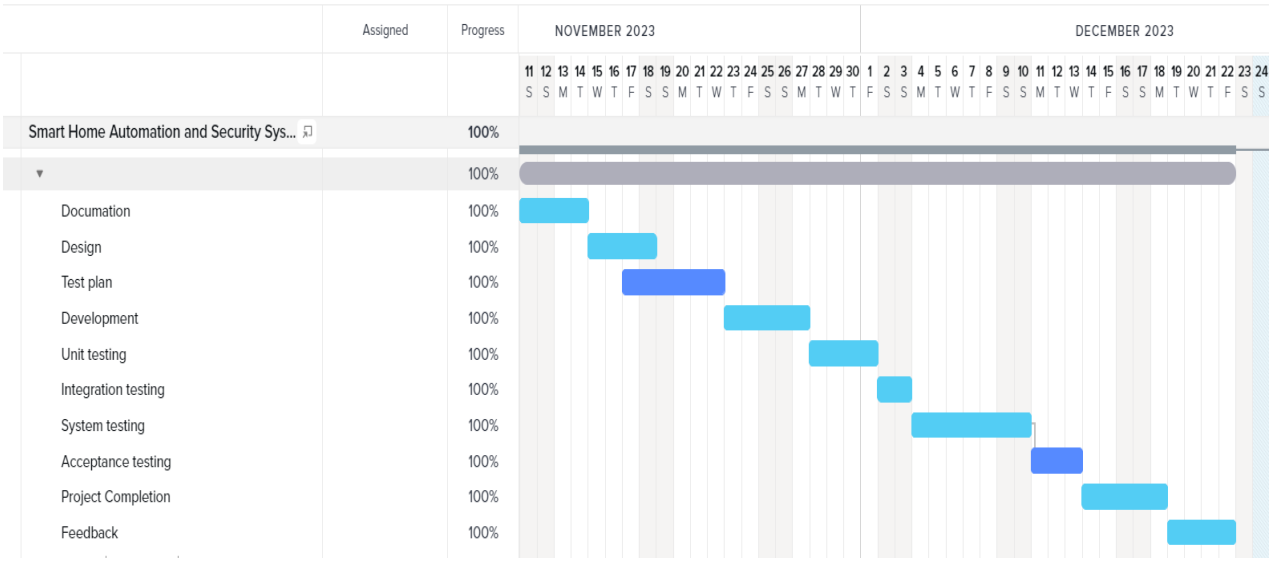
TRAINING NEEDS: The developers and testers will need to be trained in the specific technologies used in the software, such as programming languages, frameworks, and tools. They should also be trained in the specific requirements of the project, including the specific functionalities required for automation security system. In addition, the sales and administration staff will require training on the new screens and reports.

11. RESPONSIBILITIES

Name	Role	Responsibilities
Talukder Md Apon Riaz	Project Manager	1. Requirement analysis, make plans for designing of the project. 3. Prepare Development schedule and Test plan. 4. Check all the designed test case. 5. After execute test case check the reports. 6. Resource management. 7. Risk management.
Wasif Hassan Joarder	Quality Analyst	1. Analysis quality attributes based of requirements. 2. Prepare quality charts. 3. Check system quality during development and testing phase.
Talukder Md Apon Riaz	Developer	1. Research, designing, implement the software. 2. Writing and implementing efficient code. 3. Module integration.
Siam Md Tafimul Islam	Test Engineer	1. Check the characteristics of the testing activities. 2. Execute test case and report to the project manager. 3. Find system bugs and report it.

12. TESTING SCHEDULE

Task Name	Duration (Days)
Documentation	4
Design	4
Test Plan	6
Development	5
Unit Test	4
Integration Test	2
System Test	7
Acceptance Test	3
Project Completion	5
Feedback	4



13. PLANNING RISKS AND CONTINGENCIES

- Planning for risks and contingencies is an important aspect of any software development project, including those related to Smart Home Automation Security System. Here's a description of how this planning might be done:
- **Identify potential risks:** The first step is to identify the potential risks that could affect the project, such as budget overruns, technical challenges, scope creep, and changes in regulatory requirements. This can be done through brainstorming sessions, expert opinions, historical data, and other sources.
- **Assess the likelihood and impact of each risk:** Once the risks have been identified, we need to be assessed in terms of their likelihood of occurring and their potential impact on the project. This can be done using qualitative or quantitative methods, such as risk probability and impact assessment or Monte Carlo simulations.
- **Develop a risk management plan:** Based on the risk assessment, a risk management plan we should develop that outlines the specific actions that will be taken to mitigate, avoid, transfer, or accept each risk. The plan should also include contingency measures for dealing with unexpected events or failures.
- **Assign responsibilities and resources:** The risk management plan should clearly assign responsibilities and allocate resources for risk mitigation and contingency planning. This includes identifying the individuals or teams responsible for specific tasks and ensuring that they have the necessary skills, tools, and support to carry out those tasks.
- **Monitor and update the plan:** Risks and contingencies should be monitored throughout the project lifecycle, and the risk management plan should be updated as needed. This may involve reassessing risks, adjusting mitigation strategies, or developing new contingency plans.

  Overall, effective planning for risks and contingencies is critical to the success of a software development project related to vehicle parts and services. By identifying potential risks early and developing appropriate mitigation and contingency measures, project teams can minimize the likelihood and impact of negative events and ensure that the project stays on track.

14. APROVALS

Project Sponsor	American International University-Bangladesh
Development Management	Talukder Md Apon Riaz
EDI Project Manager	Wasif Hassan Joarder
RS Test Manager	Talukder Md Apon Riaz
RS Development Team Manager	Talukder Md Apon Riaz
Reassigned Sales	Siam Md Tafimul Islam
Order Entry EDI Team Manager	Wasif Hassan Joarder