CHAPTER-5

TESTING

5.1 INTRODUCTION

Testing is one of the main phases in the product development cycle. The main objective of testing is, to validate and verify the efficiency, performance reliability and other features of the proposed system. By performing testing on the proposed system, we can easily identify the errors, unexpected outputs from the system and risk and cause and effect for that risk is been identified. In this chapter we discussed about the testing process which is performed for the proposed system. The proposed system contains 3 modules with various functionalities. These functionalities are integrated or linked with the other modules. They work one after another, result of first module induces the module 2, it produces sequential workflow can be observed in the proposed system. Testing each and every module is very important in this case, when testing each and every module separately, the errors are efficiently identified and it reduces the affect on the further modules.

5.2 TEST CASES

The Table 5.1 represents various test cases with scenario, expected output, status, secondary considerations and the remarks. TCID is the test case ID. Remarks provide a hint or comment about the scenario and also the alternatives that can be used are mentioned here. Secondary considerations include the parameter which also needs to be considered for the given test case. Status marks the success or the failure of the scenario. These test cases helps to test the proposed system functionalities and performance measures based on the type of input is been given to the system.

5.2.1 Module 1 - Bluetooth connectivity between Mobile Phone and Vegetable Cutter

The following Table 5.1 tabulates the test cases with the results for the module1 Bluetooth connectivity between mobile phone and Vegetable Cutter.

TC ID	SCENARIO	SECONDARY CONSIDERATIONS	EXPECTED OUTPUT	STATUS	REMARKS
TC01	Without Power Supply	Not Applicable	No process instantiated	Pass	Without the power supply the system is not instantiated.
TC02	With Power Supply	Machine Started	Machine is instantiated	Pass	With the power supply the system is not instantiated.
TC03	Bluetooth Pairing	Available devices connectivity	HC-05 must be paired with the mobile	Pass	Mobile phone and Arduino are connected via a medium called Bluetooth which has a shorter range of connectivity.

Table 5.1 Test Cases for Module-1

For the module Bluetooth connectivity between mobile phone and Vegetable Cutter three test cases are tested and passed. These are the four scenarios for the first module. The secondary considerations and the expected output and status and the remarks for the respective first module scenarios are for checking the machine without any power supply. And in the expected output no process

instantiated and the status is passed now. And next is with power supply, in the expected output the machine is started, then the test case is passed.

5.2.2 Module 2 – Choosing the type of blade from the mobile application

The following Table 5.2 tabulates the test cases with the results for the module2 Choosing the type of blade from the mobile application.

TC ID	SCENARIO	SECONDARY CONSIDERATIONS	EXPECTED OUTPUT	STATUS	REMARKS
TC04	Mobile App	Available devices connectivity	Connection between App and HC-05	Pass	Mobile app and Arduino are connected via a medium called Bluetooth which has a shorter range of connectivity.
TC05	Mobile App	Small type Blade is chosen in the mobile app	Stepper motor rotates the small type blade to 180^{o} in the slicer platform	Pass	Small blade is used to chop the vegetable in small size.
TC06	Mobile App	Large type Blade is chosen in the mobile app	Stepper motor rotates the Large type	Pass	Large blade is used to chop the vegetable in large size.

			blade to 180^{o}		
TC07	Mobile App	Pneumatic Cylinder activation	Pneumatic cylinder activates and chop the vegetables	Pass	When “Start” button is clicked, the pneumatic compressor activates and chops the loaded vegetables

Table 5.2 Test Cases for Module-2

For the module 2 choosing the type of blade from the mobile application, four test cases are tested and passed, here the mobile application which provided was paired with the vegetable cutter through the Bluetooth device. These are the four scenarios for the second module. The secondary considerations and the expected output and status and the remarks for the respective second module scenarios is mobile application, the secondary consideration is find out the availability of the Bluetooth devices And in the expected output the needed Bluetooth device (HC-05) availability is found and paired and the status is passed now. And next is the choosing small type blade through the mobile app, where the stepper motor functionality is checked, in the expected output the stepper should change the correct blade in the slicer platform, then the test case is passed. And next is the choosing large type of blade through the mobile app, where the stepper motor functionality is checked, in the expected output the stepper should change the correct blade in the slicer platform, then the test case is passed. And last test case is activating the pneumatic cylinder through the mobile app, after loading the vegetable the “START” button is pressed in the mobile application, in the expected output the Pneumatic cylinder is activated to chop the vegetables, then the test case is passed.

5.2.3 Module 3 – Chop the vegetables using Pneumatic Cylinder

The following Table 5.3 tabulates the test cases with the results for the module2 Chop the vegetables using Pneumatic Cylinder.

TC ID	SCENARIO	SECONDARY CONSIDERATIONS	EXPECTED OUTPUT	STATUS	REMARKS
TC08	Onion	Normal Size	It should be chopped into the desired shape of blade	Pass	Tomato is sliced into shapes based on the type of blade chosen.
TC09	Tomato	Normal Size	It should be chopped into the desired shape of blade chosen	Pass	Tomato is sliced into shapes based on the type of blade chosen.
TC10	Potato	Normal Size	It should be chopped into the desired shape of blade chosen	Pass	Potato is sliced into shapes based on the type of blade chosen.

TC ID	SCENARIO	SECONDARY CONSIDERATIONS	EXPECTED OUTPUT	STATUS	REMARKS
TC11	Carrot	Any Size	It should be chopped into the desired shape of blade chosen	Pass	Carrot is sliced into shapes based on the type of blade chosen.
TC12	Radish	Any Size	It should be chopped into the desired shape of blade chosen	Pass	Radish is sliced into shapes based on the type of blade chosen.
TC13	Ladies finger	Any Size	It should be chopped into the desired shape of blade chosen	Fail	Ladies finger is can’t able to sliced into shapes based on the type of blade chosen.

TC ID	SCENARIO	SECONDARY CONSIDERATIONS	EXPECTED OUTPUT	STATUS	REMARKS
TC14	Ginger	Normal Size	It should be chopped into the desired shape of blade chosen	Pass	Ginger is sliced into shapes based on the type of blade chosen.
TC15	Beet root	Normal Size	It should be chopped into the desired shape of blade chosen	Pass	Beetroot is sliced into shapes based on the type of blade chosen.
TC16	Cabbage	Normal Size	It should be chopped into the desired shape of blade chosen	Fail	Cabbage is can’t able to sliced into shapes based on the type of blade chosen.

TC ID	SCENARIO	SECONDARY CONSIDERATIONS	EXPECTED OUTPUT	STATUS	REMARKS
TC17	Edible tuber	Small Size	It should be chopped into the desired shape of blade chosen	Pass	Edible tuber is sliced into shapes based on the type of blade chosen.
TC18	Ivy gourd	Normal size	It should be chopped into the desired shape of blade chosen	Pass	Ivy gourd is sliced into shapes based on the type of blade chosen.
TC19	Squash gourd	Normal Size	It should be chopped into the desired shape of blade chosen	Fail	Squash gourd is can’t able to sliced into shapes based on the type of blade chosen.

TC ID	SCENARIO	SECONDARY CONSIDERATIONS	EXPECTED OUTPUT	STATUS	REMARKS
TC20	Brinjal	Normal Size	It should be chopped into the desired shape of blade chosen	Fail	Sabre bean is can't able to sliced into shapes based on the type of blade chosen.
TC21	Drumstick	Should be cut into half	It should be chopped into the desired shape of blade chosen	Fail	Drumstick is can't able to sliced into shapes based on the type of blade chosen. Since, the nature of vegetable is hard.
TC22	Snake Gourd	Should be cut into many halves	It should be chopped into the desired shape of blade chosen	Fail	Drumstick is can't able to sliced into shapes based on the type of blade chosen. Since, the length of vegetable is too long.
TC23	Sabre bean	Normal Size	Chopped into the desired shape	Pass	Sabre bean is sliced into shapes based on the type of blade chosen.

TC ID	SCENARIO	SECONDARY CONSIDERATIONS	EXPECTED OUTPUT	STATUS	REMARKS
TC24	Air Compressor	Without Air compressor	No action Pneumatic Cylinder	Pass	Without the usage of air compressor, we cannot operate the DVC and Pneumatic cylinder.

Table 5.3 Test Cases for Module-3

LEGEND

Module 1 - Bluetooth connectivity between mobile phone and Vegetable Cutter

Module 2 – Choosing the type of blade from the mobile application

Module 3 – Chop the vegetables using Pneumatic Cylinder

The system is implemented by modularizing it into 3 parts depending on its working. The factors considered for making these three modules were the entities involved in chopping the vegetables. The entities are vegetable cutter, Mobile Phone and the android application to operate it. Module 1 is a "Bluetooth devices Pairing" where the android application in the mobile phone is paired with vegetable cutting machine's Bluetooth module (HC-05). Module 2 is a "Choosing the type of blade" where the user will choose the type of blade using the android application in the mobile phone i.e. click the button which type of blade is needed to chop the vegetables. Module 3 is "Cutting the vegetable" which involves the activation of pneumatic cylinder to cut the vegetables into the user's desired shapes by applying required pressure on the vegetable. From testing the system by applying the all possible test cases with the secondary scenarios, expected outputs, actual outputs, status of the test case and the remarks for test case performed. Each test case is performed separately

by considering the secondary considerations. In this project, the test cases were designed in such a way that it tests all the modules of the system.

5.3 SUMMARY

The modules that were subjected to testing involve the basic Bluetooth devices pairing, mobile app connectivity and the instant response from the system for user request. The development process in this context refers to the workflow framing, modules connection, coding and integrating the code into the modules considered. The proposed system is tested with various test cases. The considered scenario reflects the checkpoints that co exist along with the possibilities. In the Table 5.1, the TC03 and TC04 test the scenario of Bluetooth pairing. Total number of test cases for testing the entire proposed system is 24. Out of these, the number of failed scenario is 6. These failed test cases are due to the nature of the vegetable that are been loaded. Remaining 18 test cases pass which marks the success of the digital vegetable cutter. The test cases that were considered also give a brief idea on how the system behaves. If any deviation occurs in the normal behaviour, it marks the inefficiency of the system.