CHAPTER - 5

TESTING

5.1 INTRODUCTION

In the previous chapter the implementation of the proposed system has been discussed. This chapter is about the difficulties we faced during implementation process and also in the functioning of the system. By performing testing on our proposed system, we identified the errors, unexpected outputs from the system, also the risks, its causes and effects. In our project we are performing the unit testing and regression testing. The proposed system contains 4 modules with various functionalities. They are Pilot request to text**,** Text summarization using LSTM**,** Response Generation, and text to audio response. Each and every module undergoes severe testing process. They work one after another, result of first module induces the module 2 i.e., sequential workflow can be observed in the proposed system. Controller bot assists controllers and ensures safety maneuvering of aircraft with certain conditions. If proposed workflow fails somewhere, the objective of our system is entirely lost. So testing every single module in our work is very essential and system failure will effect in paying many lives. Thus testing is done with various possible test cases to assess the system's efficiency and reliability. The modules of our system are tested by unit testing. During the testing phase, we faced lots of difficulties. To overcome this, we modified certain parts of implementation. Again we performed the testing process to ensure the proper and smooth functioning of the proposed system. By performing the testing process, the problems occur at user site can be reduced. Finally the regression testing is performed to ensure that the change made to the system does not affect the entire proposed system.

5.2 TEST CASES

The Table 5.1, 5.2 and 5.3 and 5.4 represents various test cases performed during the testing process. The tabular column contains test case Id (TC ID), scenario, secondary consideration, expected output, status and remarks. Scenario provides the information about the implementation process where testing is performed. Remarks provide a hint or comment about the scenario and also the alternatives that can be used. 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.

5.2.1 MODULE 1 – PILOT REQUEST TO TEXT.

The Table 5.1 represents the test case scenarios for the Module-1. (Pilot request to text)

TC ID	SCENARIO	SECONDARY CONSIDERATIONS	EXPECTED OUTPUT	STATUS	REMARKS
TC01	Direct Audio Input	Device Microphones	Audio gets recorded and accepted.	Pass	The audio input of our system is directly passed through device microphones, without recording it as a separate audio file.

TC ID	SCENARIO	SECONDARY CONSIDERATIONS	EXPECTED OUTPUT	STATUS	REMARKS
TC02	Recorded Audio input file	The input audio must be in .wav format only.	Audio is accepted	Pass	In this case, the device microphone is not accessed. An audio file in specified format is passed as input into our system.
TC03	Input audio is converted to text	Verification of proper conversion	Audio is converted to text	Pass	The system performs speech to text conversion process. Moreover, it is verified that it converts the words to, appropriate text format properly.

TABLE 5.1 TEST CASES FOR MODULE 1

In this module, the pilot’s request is converted to text. The audio request can be passed either directly by accessing the device earphones, else can be passed as a .wav recorded audio file. It is tested whether the system accepts the input in both the cases. Then the recorded/inserted audio request of the pilot must be converted to text format for further process. The testing is done here to check whether the system converts the audio file into text. Then the converted text has to be tested, whether it is converted into proper text or not. We initially faced some problems bringing the proper text out from the audio file. However, after certain modifications we rectified those issues and our test cases got passed. Finally our module 1, which is the conversion of pilot's request, is converted into text successfully without any flaws.

5.2.2 MODULE 2 – TEXT SUMMARIZATION USING LSTM

The Table 5.2 represents the test case scenarios for module-2. (Text Summarization using LSTM)

TC ID	SCENARIO	SECONDARY CONSIDERATIONS	EXPECTED OUTPUT	STATUS	REMARKS
TC04	Converted request text is passed for summarization	The input has to be in proper string format.	Accepted	Pass	The converted request text is accepted by the system after checking its format and passed for summarization process.

TC ID	SCENARIO	SECONDARY CONSIDERATIONS	EXPECTED OUTPUT	STATUS	REMARKS
TC05	Text summarization	The intent of the passed text is checked whether it is properly obtained through summarization.	Summarized text	Pass	The system will perform the checking process whether the text is passed in for summarization and checks whether the intent of our text is obtained and whether the input is converted to proper summarized form.

TABLE 5.2 TEST CASES FOR MODULE 2

The converted request text is accepted by the system after checking its format and passed for summarization process. The system will perform the checking process whether the text is passed in for summarization and checks whether the intent of our text is obtained and whether the input is converted to proper summarized form. Initially the proper summarized form with intent was not obtained. Then after several attempts, the summarized format is obtained with proper intent with accuracy.

5.2.3 MODULE 3 – RESPONSE GENERATION

The Table 5.3 represents the test case scenarios tested for module-3. (Response Generation from CSV).

TC ID	SCENARIO	SECONDARY CONSIDERATIONS	EXPECTED OUTPUT	STATUS	REMARKS
TC06	Summarized text is compared with CSV data.	Availability of data in CSV	Successful comparison	Pass	The summarized text is compared with the data in csv (flight plan). It is tested whether the comparison is correct or not.
TC07	Response Generation after comparison	Verification process	Relevant response for the pilot's request	Pass	After comparing the summarized text with CSV, it is tested whether the appropriate response for the pilot gets generated

TC ID	SCENARIO	SECONDARY CONSIDERATIONS	EXPECTED OUTPUT	STATUS	REMARKS
TC08	Incorrect summarization	No proper intent	No output response gets generated	Pass	Even though the text gets summarized but the expected summarized text is not obtained, it is tested that nothing gets generated from CSV.
TC09	Flight Detail Inclusion	Not Applicable	Flight details gets added to the response	Pass	After the response gets generated, it is tested whether the flight information is appending with the response and found that the final response comes with flight detail included.

TABLE 5.3 TEST CASES FOR MODULE 3

In this module, the summarized text is compared with the data in csv (flight plan). It is tested whether the comparison is correct or not the functionality of email notification is tested. After comparing the summarized text with CSV, it is tested whether the appropriate response for the pilot gets generated. Even though the text gets summarized but the expected summarized text is not obtained, it is tested that nothing gets generated from CSV. After the response gets generated, it is tested whether the flight information is appending with the response and found that the final response comes with flight detail included.

5.2.4 TEXT TO PILOT RESPONSE

The Table 5.4 represents the test case scenarios tested for module-4.

TC ID	SCENARIO	SECONDARY CONSIDERATIONS	EXPECTED OUTPUT	STATUS	REMARKS
TC10	Pilot Response	Does the response flow through a noise-less channel?	Pilot receives a flaw-less audio response for his request	Pass	After getting the final output as text response, it is converted to audio. Testing is applied here to check whether the pilot receives noise-less response or not.

TABLE 5.4 TEST CASES FOR MODULE 4

After getting the response from CSV, the information has to be appended with that response, which is the pre-final output. The pre-final output which the actual text response, is converted to audio. Then it is passed as response to pilot’s request. The most critical thing is, the pilot has to receive response, without noise added with it. So testing is applied here to check whether the pilot receives noise-less response or not.

LEGEND

Module 1 - Pilot request to text

Module 2 - Text summarization using LSTM

Module 3 - Response Generation

Module 4 – Text to audio response

5.3 SUMMARY

The system is tested as single units with the help of unit testing which is just a specialized form of automated testing. The modules that were subjected to testing involve basic Speech to text process, Summarization and pre-processing, text to speech part. Each module is tested separately. In module 1, the pilot’s request is converted to text. The audio request can be passed either directly by accessing the device earphones, else can be passed as a .wav recorded audio file. It is tested whether the system accepts the input in both the cases. Then the recorded/inserted audio request of the pilot must be converted to text format for further process. The testing is done here to check whether the system converts the audio file into text. Then the converted text has to be tested, whether it is converted into proper text or not. All the test cases in module-1 has passed, which is explained in table 5.1. In module-2 the converted request text is accepted by the system after checking its format and passed for summarization process. The system performed the checking process whether the text is passed in for summarization and checks whether the intent of our text is obtained and whether the input is converted to proper summarized form. All the test cases in module-2 has passed, which is explained in table 5.2. In module-3 the summarized text is compared with the data in csv (flight plan). It was tested whether the comparison is correct or not the functionality of email notification is tested. After comparing the summarized text with CSV, it was tested whether the appropriate response for the pilot gets generated. Even though the text gets summarized but the expected summarized text is not obtained, it is tested that nothing gets generated from CSV. After the response gets generated, it was tested whether the flight information is appending with the response and found that the final response comes with flight detail included. All the test cases in module-3 has passed, which is explained in table 5.3.

In module-4 the response from CSV and the information has to be appended, which is the pre-final output. The pre-final output which the actual text response, is converted to audio. Then it is passed as response to pilot's request. The most critical thing is, the pilot has to receive response, without noise added with it. So testing is applied here to check whether the pilot receives noise-less response or not. The test case in module-4 has passed, which is explained in table 5.4. The test cases that were considered also give a brief idea on how the system behaves. If any deviation occurs in the normal behavior, it marks the inefficiency of the system. To the maximum extent, this inefficiency must be avoided.