COMSATS University Islamabad,
Park Road, Chak Shahzad, Islamabad Pakistan

SOFTWARE TEST PLAN

(STP DOCUMENT)

for

ATOM

Version 1.0

By

Kinza Arshad **CIIT/FA16-BCS-108/ISB**

Muhammad Faizan Badar **CIIT/FA16-BCS-054/ISB**

Supervisor

Dr Yasir Faheem

Bachelor of Science in Computer Science (2016-2020)

STP DOCUMENT REVSION HISTORY

No.	Comment	Action

Supervisor Signature

Date:

Table of Contents

Software Test Plan for ATOM

Revision History

Name	**Date**	**Reason for changes**	**Version**

Application EvaluationHistory

Comments (by committee) ***include the ones given at scope time both in doc and presentation**	**Action Taken**

Supervised by

Dr Yasir Faheem

Signature_____

1. Introduction

Our project deals with the domain of Brain-Computer interface and Cognitive Electrophysiology. As the name suggests it uses brain to give input and reads its input by tapping into the electric mode pf communication that our neuron use to communicate all the thoughts and functionalities, we are able to perform. The field is growing, and the possibilities are endless. The fundamental idea is to use this EEG incorporated BCI to target issues relating to human activities, specifically enhancing the attention span to improve focus in daily activities such as reading and others with similar brain involvement. The methodology we've chosen to achieve said claim can be divided into two streams; entertainment incentivized training and specialized controlled training, achieved by mini-games and a book reader respectively, where-in both these utilities are taken use of by the BCI to be built

This document will specify the hardware and the software aspects while also discussing the compatibility of different platforms and the integration of different modules that come together to make the whole project.

1.1 Purpose

This document is being made available so that everyone can get an idea what we are trying to achieve and the benefits of this product. To dive into the technical problems and how we are solving some of the hurdles to deliver this project. The main goal really is to improve the mental health of the general public and making them more productive and focused.

Making the world a better place one problem at a time. The issue we have chosen to raise is millennialism and the increasing patients of ADHD in the future generations. For single human being scrolling through their virtual-self on social networks and getting entertained, in the background, the sense of pride and happier mood is because of the drug dopamine which for many complex anatomical reasons and signs implies happiness, comfort and pleasure in general. To keep a dopamine cycle going, the "scrolling" or the "scrubbing" takes up most of the social networking quota allocated per hour for every individual. On the other hand, whilst reading to a book or focusing on a task which in effect releases this sweet pleasured drug, the user desserts the activity entirely. This in nutshell deductively follows to the conclusion that it'll lead to a population whose daily completion of any set of tasks relies on self-appraisal and dopamine cycles.

To remove this plague, it is necessary to take action and improve our health and keep our mind from wandering to focus more on productive things. Our application equips u with just what u need to beat this problem. Social media apps have engulfed our generation keeping us hooked on them so much that we can't survive without them. As the world grew the need to become fast-paced and constantly connected felt important but it is also important sometimes to sit back, take a breath and see life in a new perspective to yield better results and to make new discoveries. The notification bell from our mobile apps keeps us on our toes depriving us of the pleasure to really enjoy a book. Our intention with this project is to tap into your brain and slowly divert u away from the toxic habits that rule your brain.

1.2 Scope

So, in nutshell, our system is a BCI that detects the mental state of the user while he or she is using the provided utilities e.g. the reading exercise and the mini-games ,` from the detected mental state makes the prediction with some confidence that whether the user is paying attention or has lost focus. The BCI will achieve this using the hardware provisions of an EEG system, a headset, to gather brain wave readings and judge the state by using pre-programmed experience and a learnt model from previous examples. EEG defines its readings to be of five types of waves; namely the following:

- Alpha: graphing the occipital lobe's specifics regarding the visual stimuli,
- Beta: graphing the fontal lobe's specifics regarding the conscious thought and movement,
- Theta: graphing sleep pertinent specifics and apparent in children,
- Delta: partially sleep relevant specifics, while apparent in infants,
- and Gamma: highest frequency waves ending spectral range,

and if a specific part or cortex of the human brain is targeted, depending on the requirement and the nature of the part of brain, then while performing the activity any change in the mental state can be detected by different fluctuations in all these different types of waves. The command center is located in the frontal lobe which is also responsible for the conscious thought and voluntary movement. Although targeting one cortex limits us from the other aspects of the mental state detection such as emotion recognition, social involvement, the human vision. This also limits the overall accuracy due to lower spatial averaging, upon which the entire system is based.

2. Executive Summary

To achieve self-awareness, the above proposed BCI can be used to make any user of the complementary application aware of the fact that he or she has lost focus during the indulgence of this certain task. Technically, this will be achieved by identification of a pattern difference in the Electroencephalograph of the user, which our system will learn by gathering experience and learning from previous examples to build and develop. A state in which the user has lost the focus, reinforcement of attention can be achieved in a multitude of ways.

- We lose our focus doing certain tasks, so if there's monitor and check on this, we can bring forth a targeted solution
- Amongst all the victims of this mind wandering dilemma, the task of book reading is the most popular one. Almost all readers face this problem, and we can design our system to monitor our users and train them to pay more attention to this task at hand
- For the other population, which did not even get into reading, a more suitable way is to use entertainment in form games.

2.1 Test Items

In this plan we aim to test the various components of this system (ATOM) in order to detect as many defects as possible which will be later removed to increase efficiency of ATOM.

- **Unit Testing:** Each unit of ATOM will be tested to its core in order to ensure efficient working of each and every unit, make sure there are no hurdles or hiccups in the units
- **Functional Testing:** Each and every single requirement will be tested against that specified in the Requirement document, end to end delivery will be ensured.
- **Interface Testing:** The interface of ATOM will be tested in order to ensure that it is speedy and it doesn't produce any hiccups so that the users can see the application and user it effectively.

2.2 Features to be tested

Features
Sign up
Sign in
Sign out
Edit profile
View personal information
Already exists check
Contact validation
Sign in(admin)
Sign out(admin)
Choose a game
View games-list
Start game
Quit game
Exit games-screen
View scores

Pause game
Resume game
Run model
Fetch command
Save model
Load model
Send data
View data(admin)
Edit data(admin)
Delete data(admin)
Fetch data(admin)
View report
Graph of one report
Graph progress
View best report
View worst report
Average of reports
Start recording
Save csv
Display one channel
Display all channels
Display wavelet transform
Display table
End recording

Upload pdf
View pdf
Start monitor
Connect headset
Generate quiz
Solve quiz

.

2.3 Features not to be tested

2.4 Item Pass/Fail criteria

Unit Level:

- If 70% of the cases are completed with less than 5% of defects, then declare test pass
- If 70% of the cases are completed but the defects composed are greater than 5% or the critical level to be specified, then test is declared failed.

Application Level

- The application will receive a pass status if it successfully receives the data form the headset and sends the data to the cortex, receives the commands from the cortex and sends that to the unity games.
- The application will receive a fail status if it fails to either receive the data properly or fails to sends the commands properly to the games.

3. Testing

3.1 Verification:

All the functionalities that have been described or tested in this document will be cross referenced and checked with those mentioned or required in the Software requirement document.

3.2 Validation:

All the defects that will be detected during the tests will be evaluated and further removed/mitigated in the debugging phase.

3.3 Usability Testing:

ATOM will be tested to ensure that it is usable by the audience that it has been made for and that it runs properly and effectively.

3.4 Module / Unit Testing:

Each unit of each function/module of ATOM will undergo vigorous testing to identify as many defects as possible which will be removed in the debugging phase.

3.5 Integration Testing:

All the modules/functions of ATOM will be inter-tested meaning that inter-compatibility of the modules will be tested in order to ensure that each modules works with the other modules effectively and that there arise no clashes between the inter working of the modules of ATOM.

3.6 System Testing:

After the successful completion of the integration testing the overall system of ATOM will be tested, meaning overall system which includes all the modules, the interface and the server.

3.7 Acceptance Testing:

We will go into the environment of the client and test out the system keeping in mind how the client would use it and what the client would do with the system and what kind of errors might be generated from the end of the client.

4. Test Cases

Write the test cases of your project as per module wise. A sample test cases with format is mentioned:

4.1 Unit Testing

4.1.1 Sign up

Testing Objective: To ensure the Sign up form is working properly.

Test Case Id: TC_01

Test Case Description: Test the Sign up functionality.

Test Scenario:

Table 1: Test Cases for Sign up form

No.	Test Case/Test Script	Test Data	Expected Result	Actual Result	Pass/Fail/Not Executed/ Suspended
1.	Verify user Sign up after click on the 'Sign up' button on Sign up form with correct input data	Username: 03321576652 Password: Stark506	Successfully Account is created into the android application	Account is created successfully	Pass
2.	Verify user Sign up after click on the 'Sign up' button on Sign up form with correct input data	Username: 0332157665245 Password: 123456	Account not created in ATOM	Contact must be valid.	Fail

4.1.2 Sign in

Testing Objective: To ensure the Sign In form is working properly.

Test Case Id: TC_02

Test Case Description: Test the Sign in functionality.

Test Scenario:

Table 2: Test Cases for Sign In form

No.	Test Case/Test Script	Test Data	Expected Result	Actual Result	Pass/Fail/Not Executed/ Suspended
1.	Verify user Sign in after click on the 'Sign in' button on Sign in form with correct input data	Contact : 03321576652 Password: Stark506	Successfully Account is signed-in into the ARTINK website.	Sign in into the website successfully	Pass
2.	Verify user Sign in after click on the 'Sign in' button on Sign in form with correct input data	Contact : 03321576652 Password: 1234	Account is not signed-in.	Password incorrect	Fail
3.	Verify user Sign in after click on the 'Sign in' button on Sign in form with correct input data	Contact: 03235065035 Password: Ansa	Account not signed-in .	Contact not registered.	Fail

4.1.3 Sign out

Testing Objective: To ensure the Sign out is working properly.

Test Case Id: TC_03

Test Case Description: Test the Sign out functionality.

Test Scenario:

Table 3: Test Cases for Sign out

No.	Test Case/Test Script	Test Data	Expected Result	Actual Result	Pass/Fail/Not Executed/ Suspended
1.	Verify user Sign out after click on the 'Sign out' button	User clicks on the Sign out button	Successfully Signed out .	Signed out successfully	Pass

4.1.4 Edit profile

Testing Objective: To ensure the Edit profile form is working properly.

Test Case Id: TC_04

Test Case Description: Test the Edit profile functionality.

Test Scenario:

Table 4: Test Cases for Edit profile form

No.	Test Case/Test Script	Test Data	Expected Result	Actual Result	Pass/Fail/Not Executed/ Suspended
1.	Verify user Edit profile after click on the 'Edit profile' button on Edit profile form with correct input data	Contact : 03321576652 Username: kinza Password: Stark506	Successfully Profile is Edited .	Account is Edited successfully	Pass

		Gender: Female Age : 21			
2.	Verify user Edit profile after click on the 'Edit profile' button on Edit profile form with correct input data	Contact : Username: kinza Password: Stark506 Gender: Female Age : 21	Profile is not Edited	Contact is empty.	Fail
4.	Verify user Edit profile after click on the 'Edit profile' button.	Contact : 03321576652 Username: Password: Stark506 Gender: Female Age : 21	Profile is not Edited	Invalid username	Fail

4.1.5 View Personal Information

Testing Objective: To ensure the personal information Dashboard is working properly.

Test Case Id: TC_05

Test Case Description: Test the personal information Dashboard functionality.

Test Scenario:

Table 5: Test Cases for Customer Dashboard

No.	Test Case/Test Script	Test Data	Expected Result	Actual Result	Pass/Fail/Not Executed/ Suspended
1.	Verify personal information Dashboard is getting all the user information .	User slides the dashboard out .	Successfully personal information is retrieved from the cloud real-time.	Information is correct.	Pass

4.1.6 Already exists check

Testing Objective: To ensure if the contact is already present.

Test Case Id: TC_06

Test Case Description: Test the contact already exists check works.

Test Scenario:

Table 6: Test Cases for Customer Dashboard

No.	Test Case/Test Script	Test Data	Expected Result	Actual Result	Pass/Fail/Not Executed/ Suspended
1.	Verify that profile is not created if the contact already exists.	Username: 03321576652	Account not created.	Contact already exists.	Pass

4.1.7 Contact Validation

Testing Objective: check if the contact validation from firebase works.

Test Case Id: TC_07

Test Case Description: check if the code is generated to the contact number and checked properly.

Test Scenario:

Table 7: Test Cases for Customer Dashboard

No.	Test Case/Test Script	Test Data	Expected Result	Actual Result	Pass/Fail/Not Executed/ Suspended
1.	Verify contact number with code generated	Code received on the message.	Successfully code verified and contact validated	Information is correct.	Pass

4.1.8 Sign In (Admin)

Testing Objective: To ensure the Sign In form is working properly.

Test Case Id: TC_08

Test Case Description: Test the Sign in functionality.

Test Scenario:

Table 8: Test Cases for Sign In form

No.	Test Case/Test Script	Test Data	Expected Result	Actual Result	Pass/Fail/Not Executed/ Suspended
1.	Verify user Sign in after click on the 'Sign in' button on Sign in form with correct input data	Contact : 03321576652 Password: Stark506	Successfully Account is signed-in into the ARTINK website.	Sign in into the website successfully	Pass
2.	Verify user Sign in after click on the 'Sign in'	Contact : 03321576652	Account is not signed-in.	Password incorrect	Fail

	button on Sign in form with correct input data	Password: 1234			
3.	Verify user Sign in after click on the 'Sign in' button on Sign in form with correct input data	Contact: 03235065035 Password: Ansa	Account not signed-in .	Contact not registered.	Fail

4.1.9 Sign out (Admin)

Testing Objective: To ensure the Sign out is working properly.

Test Case Id: TC_9

Test Case Description: Test the Sign out functionality.

Test Scenario:

Table 9: Test Cases for Sign out

No.	Test Case/Test Script	Test Data	Expected Result	Actual Result	Pass/Fail/Not Executed/ Suspended
1.	Verify user Sign out after click on the 'Sign out' button	User clicks on the Sign out button	Successfully Signed out .	Signed out successfully	Pass

4.1.10 Choose a Game

Testing Objective: To ensure that all the games are in the list.

Test Case Id: TC_10

Test Case Description: Test the buttons functionality in the list.

Test Scenario:

Table 10: Test Cases for Sign out

No.	Test Case/Test Script	Test Data	Expected Result	Actual Result	Pass/Fail/Not Executed/ Suspended
1.	Verify all the buttons take to the corresponding games .	User clicks on the start buttons against different games.	Successfully opened the game and phone locked in landscape mode.	Game opens and phone locks in landscape mode	Pass

4.1.11 View Game List

Testing Objective: To ensure that all the games are in the list.

Test Case Id: TC_11

Test Case Description: Test the scrollable functionality in the list.

Test Scenario:

Table 11: Test Cases for Sign out

No.	Test Case/Test Script	Test Data	Expected Result	Actual Result	Pass/Fail/Not Executed/ Suspended
1.	Verify the scrollable functionality in the list	User drags his/her finger on the screen to scroll through the list.	Successfully scrolled through the list	Scroll works and all the games are accessible.	Pass

4.1.12 Start a game

Testing Objective: To ensure that the game starts properly

Test Case Id: TC_12

Test Case Description: game starts and scores are updated periodically

Test Scenario:

Table 12: Test Cases for Sign out

No.	Test Case/Test Script	Test Data	Expected Result	Actual Result	Pass/Fail/Not Executed/ Suspended
1.	Verify that the game starts properly	User clicks on the start buttons against different games.	Successfully opened the game and phone locked in landscape mode.	Game opens and phone locks in landscape mode	Pass

4.1.13 Quit Game

Testing Objective: To ensure that the game quits properly

Test Case Id: TC_13

Test Case Description: game quits and takes the user back to the games-list

Test Scenario:

Table 13: Test Cases for Sign out

No.	**Test Case/Test Script**	**Test Data**	**Expected Result**	**Actual Result**	**Pass/Fail/Not Executed/ Suspended**
1.	Verify that the game quits properly	User clicks on the back button.	Successfully quits the game and takes the user back to the games-list.	Game quits and games-list is opened.	Pass

4.1.14 Exit Game Screen

Testing Objective: To ensure that the games/unity screen quits and takes us back to home page.

Test Case Id: TC_14

Test Case Description: game-screen/unity quits and takes us to the home screen.

Test Scenario:

Table 14: Test Cases for Sign out

No.	Test Case/Test Script	Test Data	Expected Result	Actual Result	Pass/Fail/Not Executed/ Suspended
1.	Verify that the game-screen quits properly	User clicks on the back button.	Successfully quits the game and takes the user back to the home screen	Game quits and home-screen is opened.	Pass

4.1.15 View Scores

Testing Objective: To ensure that the game-score updates periodically.

Test Case Id: TC_15

Test Case Description: score is visible and updates periodically.

Test Scenario:

Table 15: Test Cases for Sign out

No.	Test Case/Test Script	Test Data	Expected Result	Actual Result	Pass/Fail/Not Executed/ Suspended
1.	Verify that the score updates properly.	User stays on the game and score is updated periodically.	Successfully updates the game score.	Updates the score periodically.	Pass

4.1.16 Pause Game

Testing Objective: To ensure that the game pauses properly.

Test Case Id: TC_16

Test Case Description: game screen pauses and a smaller menu is opened.

Test Scenario:

Table 16: Test Cases for Sign out

No.	Test Case/Test Script	Test Data	Expected Result	Actual Result	Pass/Fail/Not Executed/ Suspended
1.	Verify that the game pauses properly.	User clicks on the pause button.	Successfully pauses the game and a smaller menu is opened.	Game pauses and a smaller menu is opened.	Pass

4.1.17 Resume Game

Testing Objective: To ensure that the game resumes properly.

Test Case Id: TC_17

Test Case Description: game screen resumes.

Test Scenario:

Table 17: Test Cases for Sign out

No.	**Test Case/Test Script**	**Test Data**	**Expected Result**	**Actual Result**	**Pass/Fail/Not Executed/ Suspended**
1.	Verify that the game resumes properly.	User clicks on the resume button from the smaller menu.	Successfully resumes the game.	Game resumes.	Pass

4.1.18 Run Model

Testing Objective: To ensure EEG classification works properly.

Test Case Id: TC_18

Test Case Description: EEG classification works and sends the commands to server.

Test Scenario:

Table 18: Test Cases for Sign out

No.	Test Case/Test Script	Test Data	Expected Result	Actual Result	Pass/Fail/Not Executed/ Suspended
1.	Verify that the EEG classification properly.	server calls the model periodically.	Successfully returns the commands.	Commands are returned to server.	Pass

4.1.19 Fetch Command

Testing Objective: To ensure unity gets the command.

Test Case Id: TC_19

Test Case Description: unity fetches the commands from the server 50 times per second.

Test Scenario:

Table 19: Test Cases for Sign out

No.	Test Case/Test Script	Test Data	Expected Result	Actual Result	Pass/Fail/Not Executed/ Suspended
1.	Verify that the unity fetches commands periodically.	Unity calls the model 50 times per second.	Successfully fetches the commands from the server.	Commands are fetched from the server.	Pass

4.1.20 Save Model

Testing Objective: To ensure model is updated periodically.

Test Case Id: TC_20

Test Case Description: EEG classification model is updated periodically.

Test Scenario:

Table 20: Test Cases for Sign out

No.	Test Case/Test Script	Test Data	Expected Result	Actual Result	Pass/Fail/Not Executed/ Suspended
1.	Verify that the EEG classification model works properly.	Unity updates the model.	Successfully updates the model.	model is updated to cortex profile	Pass

4.1.21 Load Model

Testing Objective: To ensure that the model is loaded from the cortex.

Test Case Id: TC_21

Test Case Description: model loads , takes the EEG data from the headset and sends the classified command back to the server.

Test Scenario:

Table 21: Test Cases for Sign out

No.	Test Case/Test Script	Test Data	Expected Result	Actual Result	Pass/Fail/Not Executed/ Suspended
1.	Verify that the model loads properly.	Server loads the model periodically.	Successfully loads the model on cortex.	Model is loaded successfully.	Pass

4.1.22 Send Data

Testing Objective: To ensure the data from the headset is sent to cortex properly.

Test Case Id: TC_22

Test Case Description: EEG data is sent from the headset to the cortex.

Test Scenario:

Table 22: Test Cases for Sign out

No.	Test Case/Test Script	Test Data	Expected Result	Actual Result	Pass/Fail/Not Executed/ Suspended
1.	Verify that the EEG data from the headset is sent properly.	Server send the data to the cortex from the headset.	Successfully sends the data to the cortex.	Data is sent to the cortex from the headset.	Pass

5. Task Deliverables

5.1 Test Tasks

- Test plan
  Tasks to be done are as following:
  - Compile information regarding testing criteria and methodology
  - Create test cases
  - Tabularize test cases
  - Organize a plan in which tests can be conducted

- Test case specifications
  - Use functional and non-functional requirements to create criteria on which test case output can be judged
  - Use a sprint sheet to coordinate use cases and appropriate test cases

- Test Incident reports
  - Create reports based on results of test cases

5.2 Environmental Needs

- A working emotive headset.
- A working internet connection.
- 4GB or above RAM to run the app smoothly.

5.3 Responsibilities

Both team members are responsible for performing test cases.

6. Conclusion

The testing of this System has to be conducted in order to ensure the correct working of the system and optimize the system as much as possible, testing also ensure the identification of as much defects as possible (depending on how much testing has been conducted). Testing ensures maximization of efficiency and effectiveness of any system. So vigorous testing of every good system has to be conducted and that too in a proper manner which is mentioned and described in the test document.