Department of Computer Science and Engineering
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System Test Plan

Team: AudioTEK

Project: dRadio

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1 Introduction

1.1 Document Overview
The System Test Plan (STP) will detail testing procedures and plans for proper testing of the dRadio. The System Test Plan document is structured as follow:
1. Introduction
2. References
3. Test Items
4. Risk
5. Testable Features
6. Non Testable Features
7. Testing Strategy
8. Item Pass or Fail Criteria
9. Test Deliverables
10. Test Schedules
11. Approvals

1.2 Purpose
The purpose of this document is to provide a testing framework for the dRadio. It will also detail the testing procedures and plans for proper testing of the dRadio. Testing will be carried out in each phase of the software development life cycle and will be done by testing each unit, component, layer and requirements as specified in the System Requirements Specification (SRS), Architectural Design Specification and (ADS) and the Detailed Design Specification (DDS). This document will also outline the features that are not to be tested with the rationale behind not testing those items.

1.3 Project Scope
The dRadio is a recording device for the car audio system (car stereo and speakers) that enables the user to use the playback functionalities, such as rewind, play, pause, and fast-forward, live radio. This is what we call “Radio Mode.”
In addition, when using our system, the user will also have the ability to record live radio. If the user decides to record the content that the car radio is playing, then this recording will be stored in the dRadio’s memory system. The user will be able to interact with recordings and use the playback options previously mentioned to manipulate the recordings. This is what we call “Time Capsule Mode.” Furthermore, the user will also have the ability to stop listening to a recording and switch back to live radio at the touch of a button.

Figure 1-1 provides a graphical overview of how the dRadio system is integrated into the car audio system.

1.4 Definitions and Acronyms

SRS: System Requirements Specification
ADS: Architectural Design Specification
DDS: Detail Design Specification
STP: System Test Plan
OS: Operating System
2 References

2.1 Overview
In order for the dRadio System to be properly verified and tested, the STP needs to be referred to the previous documents like SRS, ADS and the DDS. The SRS describes the system requirements which are needed for the proper functioning of dRadio System, the ADS describes the outer layer Architectural Design of the system and the DDS describes the Architecture in more detail by decomposing the subsystem into smaller modules System Requirements Specifications.

2.1.1 Customer Requirements
Listed below are the customer requirements that are described in more detail in section 3 of the SRS:

- GUI
- Speaker Output
- Input from Radio
- Saved Recordings
- Playing the Audio Recordings
- Live Radio Playback
- Basic Playback Controls
- Clear Playback
- Wireless Connectivity
- Smart Phone Interface
- Automated Recordings
- Verbal Commands
- Auxiliary Input
- Delete Recordings
- Browse Recordings
- Display Recordings List
2.1.2 Packaging Requirements

Listed below are the packaging requirements that are described in more detail in section 4 of the SRS:

- Enclosed Components
- Maximum Dimensions
- Power Source
- User Manual
- Safety Guide
- Product Packaging
- Monitor Packaging
- Software Pre-Loading
- Hardware Preassembled
- Software CD
- Monitor Dimensions

2.1.3 Performance Requirements

Listed below are the performance requirements that are described in more detail in section 5 of the SRS:

- Initialization
- Recording Rate
- Display
- Storage
- Audio Recordings
- Capacity
- Rewind Speed
- Fast-Forward Speed

2.1.4 Safety Requirements

Listed below are the safety requirements that are described in more detail in section 6 of the SRS:

- No Sharp Edges
• No Exposed Wires
• Adequate Cooling
• System Placement
• User Interface Buttons Protected Display

2.1.5 Maintenance and Support Requirements
Listed below are the maintenance and support requirements that are described in more detail in section 7 of the SRS:
• User Manual
• Field Maintenance
• Design Documents
• Source Code Standards

2.1.6 Other Requirements
Listed below are the other requirements that are described in more detail in section 8 of the SRS:
• American English Written Standard
• United States Standard Units of Measurements
• Operating System

2.2 Architectural Design Specifications

2.2.1 Layer Overview
The dRadio System consists of the three main Architectural Layer:
• User Interface Layer: The UI Layer is the main means of interaction between the user and the system. The UI Layer will handle receiving user input and displaying relevant information to the user.
• Processing Layer: The Processing Layer handles the input from the car radio, and interacts with both the UI and the Data Layer.
• Data Layer: The Data Layer is where all audio files will be stored and played
2.2.2 Requirements Mapping

The following is the requirements mapping table from section 8 of the ADS. It shows how the layers of the architecture maps to some key requirements listed in the System Requirements Specification based on the acceptance criteria.
### Table 2-1 Requirement Mapping

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Layers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>User Interface</td>
</tr>
<tr>
<td>3.1 Graphical User Interface</td>
<td>X</td>
</tr>
<tr>
<td>3.2 Speaker Output</td>
<td></td>
</tr>
<tr>
<td>3.3 Input from Radio</td>
<td>X</td>
</tr>
<tr>
<td>3.4 Saved Recording</td>
<td></td>
</tr>
<tr>
<td>3.5 Playing Audio</td>
<td></td>
</tr>
<tr>
<td>3.6 Live Radio Playback</td>
<td></td>
</tr>
<tr>
<td>3.7 Playback Controls</td>
<td></td>
</tr>
<tr>
<td>3.14 Delete Recording</td>
<td></td>
</tr>
<tr>
<td>5.3 Display</td>
<td></td>
</tr>
<tr>
<td>5.4 Storage</td>
<td></td>
</tr>
</tbody>
</table>
2.3 Detailed Design Specifications

2.3.1 Module Decomposition Chart

The module decomposition chart breaks the architecture down into modules with data flows.

![Module Decomposition Chart]

Figure 2-2 Module Decomposition

2.3.2 Requirements Traceability Matrix

Requirements mapping shows that the architecture fulfills the requirements listed in the SRS. The requirements listed are based on the acceptance criteria detailed in the SRS.
### Table 1-2 Requirement Mapping

<table>
<thead>
<tr>
<th>Modules</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3.1 Graphical User Interface</td>
</tr>
<tr>
<td></td>
<td>3.2 Speaker Output</td>
</tr>
<tr>
<td></td>
<td>3.3 Input from Radio</td>
</tr>
<tr>
<td></td>
<td>3.4 Saved Recording</td>
</tr>
<tr>
<td></td>
<td>3.5 Playing Audio</td>
</tr>
<tr>
<td></td>
<td>3.6 Live Radio Playback</td>
</tr>
<tr>
<td></td>
<td>3.7 Playback Controls</td>
</tr>
<tr>
<td></td>
<td>3.14 Delete Recording</td>
</tr>
<tr>
<td></td>
<td>5.3 Display</td>
</tr>
<tr>
<td></td>
<td>5.4 Storage</td>
</tr>
<tr>
<td>Event Handler</td>
<td>X</td>
</tr>
<tr>
<td>Graphics</td>
<td>X</td>
</tr>
<tr>
<td>Record</td>
<td>X X X X X</td>
</tr>
<tr>
<td>Logic</td>
<td></td>
</tr>
<tr>
<td>Files</td>
<td>X X X X X</td>
</tr>
<tr>
<td>Player Controller</td>
<td>X</td>
</tr>
<tr>
<td>Player</td>
<td>X X X</td>
</tr>
</tbody>
</table>
3 Test Items

3.1 Overview

The System Test Plan (STP) details the different testing items necessary to ensure the quality of the product. The tests are broken into stages – Hardware Unit, Software Unit, Component, Integration, and System.

3.2 Relational Diagram

Figure 3 Relational Diagram, in the next section graphically shows the relationships between the modules from the hardware components to the system building completion.
3.3 Unit Tests

3.3.1 Hardware Unit Tests

<table>
<thead>
<tr>
<th>Test ID</th>
<th>Module</th>
<th>Inputs</th>
<th>Expected Outputs</th>
<th>Risk Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>HU1</td>
<td>Touchscreen</td>
<td>USB signal from motherboard</td>
<td>Standard video output (except blue screen)</td>
<td>Low</td>
</tr>
<tr>
<td>HU2</td>
<td>Touchscreen</td>
<td>Screen touch by tester</td>
<td>Mouse click event</td>
<td>Low</td>
</tr>
</tbody>
</table>

3.3.2 Software Unit Tests

3.3.2.1 Software Unit Tests - User Interface Layer

<table>
<thead>
<tr>
<th>Test ID</th>
<th>Module</th>
<th>Inputs</th>
<th>Expected Output</th>
<th>Risk Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>SU1</td>
<td>Event Handler</td>
<td>User Input</td>
<td>Appropriate action event</td>
<td>Low</td>
</tr>
<tr>
<td>SU2</td>
<td>Graphics</td>
<td>Commands generated from its method calls</td>
<td>Appropriate actions being displayed to the screen</td>
<td>Low</td>
</tr>
</tbody>
</table>

3.3.2.2 Software Unit Tests - Processing Layer

<table>
<thead>
<tr>
<th>Test ID</th>
<th>Module</th>
<th>Inputs</th>
<th>Expected Output</th>
<th>Risk Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>SU3</td>
<td>Rewind</td>
<td>Integer representing the number of sound files to rewind</td>
<td>An integer representing the location of the current file to be played from</td>
<td>High</td>
</tr>
<tr>
<td>SU4</td>
<td>Play</td>
<td>String representing the sound file to be played</td>
<td>String representing the sound file to be played</td>
<td>Medium</td>
</tr>
<tr>
<td>SU5</td>
<td>Pause</td>
<td>None</td>
<td>A string that represents system state and path from where the from</td>
<td>Low</td>
</tr>
</tbody>
</table>
### 3.3.2.3 Software Unit Tests - Data Layer

<table>
<thead>
<tr>
<th>Test ID</th>
<th>Module</th>
<th>Inputs</th>
<th>Expected Outputs</th>
<th>Risk Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>SU6</td>
<td>Fast Forward</td>
<td>Integer representing the number of sound files to skip</td>
<td>An integer representing the location of the current file to be played from</td>
<td>High</td>
</tr>
<tr>
<td>SU7</td>
<td>Record</td>
<td>A string that represents the location to save sound files</td>
<td>Creates .wav files in the specified directory</td>
<td>Low</td>
</tr>
<tr>
<td>SU8</td>
<td>Live</td>
<td>None</td>
<td>Switches system modes</td>
<td>Medium</td>
</tr>
<tr>
<td>SU9</td>
<td>Browse</td>
<td>None</td>
<td>A string array that contains the names of all recordings on the hard drive</td>
<td>Low</td>
</tr>
<tr>
<td>SU10</td>
<td>Volume</td>
<td>Integer representing the new volume of the system</td>
<td>Integer representing the new desired volume</td>
<td>Low</td>
</tr>
<tr>
<td>SU11</td>
<td>Makedir</td>
<td>None</td>
<td>A string representing the path to the newly created directory</td>
<td>Low</td>
</tr>
<tr>
<td>SU12</td>
<td>Delete</td>
<td>A string representing the name of the directory to remove from the system</td>
<td>None</td>
<td>Low</td>
</tr>
<tr>
<td>SU13</td>
<td>Logic</td>
<td>A string representing the appropriate command to invoke</td>
<td>A string array representing the appropriate response from the command that was invoked</td>
<td>High</td>
</tr>
</tbody>
</table>
### 3.4 Component Tests

#### 3.4.1 Software Component Tests - User Interface Layer

<table>
<thead>
<tr>
<th>Test ID</th>
<th>Feature</th>
<th>Integrated Components</th>
<th>Inputs</th>
<th>Expected Output</th>
<th>Risk Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>User Interface Controller</td>
<td>Event Handler</td>
<td>User Input</td>
<td>Appropriate graphics command</td>
<td>Low</td>
</tr>
<tr>
<td>C2</td>
<td>Graphics</td>
<td>Graphics</td>
<td>Appropriate graphics command</td>
<td>Tester sees appropriate GUI elements</td>
<td>Low</td>
</tr>
</tbody>
</table>

#### 3.4.2 Software Component Tests - Processing Layer

<table>
<thead>
<tr>
<th>Test ID</th>
<th>Feature</th>
<th>Integrated Components</th>
<th>Inputs</th>
<th>Expected Output</th>
<th>Risk Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>C3</td>
<td>Radio Input Handler</td>
<td>Record</td>
<td>A string representing the path where to save sound files</td>
<td>Creates .wav files in the specified directory</td>
<td>Low</td>
</tr>
<tr>
<td>C4</td>
<td>System Logic Controller</td>
<td>Logic, Rewind, Play, Pause, fast forward, Live, Volume</td>
<td>A string representing which command to</td>
<td>A string representing the appropriate</td>
<td>High</td>
</tr>
</tbody>
</table>
### System Logic

<table>
<thead>
<tr>
<th>Test ID</th>
<th>Feature</th>
<th>Integrated Components</th>
<th>Inputs</th>
<th>Expected Outputs</th>
<th>Risk Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>C5</td>
<td>System Logic Controller</td>
<td>Logic, Makedir</td>
<td>A string representing which command to execute</td>
<td>A string representing the path of the newly created directory</td>
<td>Low</td>
</tr>
<tr>
<td>C6</td>
<td>System Logic Controller</td>
<td>Logic, Browse</td>
<td>A string representing which command to execute</td>
<td>A string array containing a list of recording names</td>
<td>Low</td>
</tr>
<tr>
<td>C7</td>
<td>System Logic Controller</td>
<td>Logic, Delete</td>
<td>A string representing which command to execute</td>
<td>None</td>
<td>Low</td>
</tr>
</tbody>
</table>

### 3.4.3 Software Component Tests- Data Layer

<table>
<thead>
<tr>
<th>Test ID</th>
<th>Feature</th>
<th>Integrated Components</th>
<th>Inputs</th>
<th>Expected Outputs</th>
<th>Risk Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>C8</td>
<td>Data Controller</td>
<td>Player Controller</td>
<td>A string representing a command</td>
<td>A string representing the path to the sound files to be played</td>
<td>Medium</td>
</tr>
<tr>
<td>C9</td>
<td>Data Controller</td>
<td>Wait</td>
<td>None</td>
<td>No output</td>
<td>Low</td>
</tr>
<tr>
<td>C10</td>
<td>Audio Player</td>
<td>Player</td>
<td>A string representing the path to the sound files to be played</td>
<td>A command to invoke the playing of the desired sound file</td>
<td>Low</td>
</tr>
</tbody>
</table>
### 3.5 Integration Tests

<table>
<thead>
<tr>
<th>Test ID</th>
<th>Feature</th>
<th>Integrated Components</th>
<th>Inputs</th>
<th>Expected Outputs</th>
<th>Risk Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>I1</td>
<td>User Interface Layer</td>
<td>User Interface Controller, Graphics</td>
<td>User input</td>
<td>Appropriate strings and graphics</td>
<td>Medium</td>
</tr>
<tr>
<td>I2</td>
<td>Processing Layer</td>
<td>Radio Input Handler, System Logic Controller</td>
<td>Radio Input and command strings</td>
<td>Sound Files to the hard drive and the correct commands</td>
<td>High</td>
</tr>
<tr>
<td>I3</td>
<td>Data Layer</td>
<td>Data Controller, Audio Player</td>
<td>Command strings and sound files</td>
<td>The presence or absence of sound from the audio output</td>
<td>Medium</td>
</tr>
</tbody>
</table>

### 3.6 System Verification Tests

<table>
<thead>
<tr>
<th>Test ID</th>
<th>System Test</th>
<th>Inputs</th>
<th>Expected Outputs</th>
<th>Risk Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>SV1</td>
<td>Radio Mode</td>
<td>Initialization or User Input</td>
<td>Live radio should be heard and the appropriate GUI elements</td>
<td>High</td>
</tr>
<tr>
<td>SV2</td>
<td>Time Capsule Mode</td>
<td>User Input</td>
<td>Hear recorded audio and appropriate GUI elements for Time Capsule Mode</td>
<td>High</td>
</tr>
</tbody>
</table>
# 3.7 Non-Functional Tests

<table>
<thead>
<tr>
<th>Test ID</th>
<th>Features</th>
<th>Required Action/ Resources</th>
<th>Risk Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>NF1</td>
<td>Maximum Dimensions</td>
<td>19” long by 8” wide by 18” high</td>
<td>Low</td>
</tr>
<tr>
<td>NF2</td>
<td>No sharp edges</td>
<td>Use soft edge enclosure</td>
<td>Low</td>
</tr>
<tr>
<td>NF3</td>
<td>American English</td>
<td>Team members will review all documents to ensure that they are written in American English</td>
<td>Low</td>
</tr>
<tr>
<td>NF4</td>
<td>United States Standard Units</td>
<td>Team members will review all documents to ensure that units used are in United States Standard Units</td>
<td>Medium</td>
</tr>
</tbody>
</table>
4 Risks

4.1 Overview

The following table represents the various risk associated with testing that may take place during the testing process of the dRadio. Each risk is associated with a risk ID for tracking purposes or reference. The risk column is where the risk is explicitly recorded. If the risk happens, the risk impact is documented in the impact column. In the management plan column, the team identifies the scheme to mitigate the risk. Severity is basically a category that attempts to quantify the magnitude of the risk’s impact. The affected component is the particular component of the relational diagram that is affected by this risk.

4.2 Risk Table

<table>
<thead>
<tr>
<th>Risk ID</th>
<th>Risk</th>
<th>Impact</th>
<th>Management Plan</th>
<th>Severity</th>
<th>Affected Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>Damage to hardware components</td>
<td>System will not work</td>
<td>Reorder components</td>
<td>High</td>
<td>Hardware</td>
</tr>
<tr>
<td>R2</td>
<td>Reorder components</td>
<td>User input inaccurate</td>
<td>Periodical recalibration</td>
<td>Low</td>
<td>Touchscreen</td>
</tr>
<tr>
<td>R3</td>
<td>Touchscreen drivers incompatible with development hardware</td>
<td>Cannot test touchscreen</td>
<td>Have a spare touchscreen</td>
<td>Low</td>
<td>Touchscreen</td>
</tr>
<tr>
<td>R4</td>
<td>Test misses bug in code in module</td>
<td>Erratic behavior</td>
<td>Conduct tests under the “it works” mentality</td>
<td>High</td>
<td>Software component</td>
</tr>
<tr>
<td>R5</td>
<td>Gold Plating while fixing bug</td>
<td>Cannot finish tests</td>
<td>New Feature will not be added unless is it required to fix bug</td>
<td>Low</td>
<td>Software component</td>
</tr>
</tbody>
</table>
5 Testable Features

5.1 Overview

Testable features represent the separate stages of the dRadio. First we list the features then we assign a risk value to it. Next we describe the feature and how it will be tested, followed by an explanation of why the corresponding risk value was assigned.

5.2 Features

5.2.1 Rewind

Risk: High

This feature has three different cases that must work in Radio Mode and Time Capsule Mode. The first case is when the tester presses the rewind button once; the current recording will go back five seconds from the current time. The second case is when the tester holds down the rewind button for less than three (3) seconds but greater than 0 seconds; the current recording will go back 10 seconds from the current time. In the third case, the tester holds down the rewind button for longer than three seconds; for each second after that, the current recording will go back 30 seconds from the current time. For each case, if the rewind time is greater than the recording length, the current recording will be played from the beginning. The tester should be able to hear the current audio being played from its corresponding new location. The risk is high due to all three cases must be tested and must work in Radio Mode and Time Capsule Mode.

5.2.2 Play

Risk: Medium

Play has two functions. The first deals with the resuming of playing audio after being paused. The second function deals with playing a selected recording when using the browse function. The first feature will be tested by the tester pressing the pause button waiting five seconds, and then pressing the play button. The second feature will be tested by the tester, by first selecting then browse function, then selecting a recording, then pressing the play button. The risk is medium due to the dual functionality placed with in a single button.

5.2.3 Pause
Pause deals with stopping dRadio from sending audio output. This feature will be tested by the tester pressing the pause button. The risk is low due to it involves saving state information.

### 5.2.4 Fast Forward

Risk: High

This feature has three different cases that must work in Radio Mode and Time Capsule Mode. The first case is when the tester presses the fast forward button once; the current recording will go forward five seconds from the current time. The second case is when the tester holds down the fast forward button for less than three (3) seconds but greater than 0 seconds; the current recording will go forward 10 seconds from the current time. In the third case, the tester holds down the fast forward button for longer than three seconds; for each second after that, the current recording will go forward 30 seconds from the current time. For each case, if the fast forward time is greater than the recording length while in Radio Mode, the current recording will be played from the most recently recorded audio file. For each case, if the fast forward time is greater than the recording length while in Time Capsule Mode, the current recording will stop playing. The tester should be able to hear the current audio being played from its corresponding new location or the absence in the case of time capsule Mode if the fast forward time is greater than the recording length. The risk is high due to all three cases must be tested and must work in Radio Mode and Time Capsule Mode.

### 5.2.5 Record

Risk: Low

The Record feature deals with obtaining sounds information from the operating system and encoding it to .wav files. This feature will be tested by the tester pressing the record button, waiting 10 seconds, then pressing the record button again. A visual inspection will then be done to verify that the audio file(s) have been created. The risk is low due to the acquired experience working with SoX through experimentation.

### 5.2.6 Live

Risk: Medium

The feature Live deals with resuming of playing the live radio. This feature will be tested by the tester entering Time Capsule Mode then pressing the Live button. The risk is medium due to the Live feature has to switch the system state to Radio Mode as well as stopping and creating threads and the team has limited experience with multithreading.

### 5.2.7 Browse

Risk: Low
Browse deals with retrieving a list of recording from the dRadio hard drive. This feature will be tested by the tester pressing the browse button. The risk is low due to our teams experience with file management, string manipulation, and GUI programming in Java.

5.2.8 Delete

Risk: Low

Delete deals with removing directories of audio files (recordings). This feature will be tested by the tester first browsing the list of recordings, selecting a recording, then pressing the delete button. The risk on deleting is low due to our team’s experience with file manipulation Java.

5.2.9 Volume Control

Risk: Low

Volume Control deals with raising and lowering the amplitude of the dRadio audio output. This feature will be tested by the tester pressing the volume up button to raise the volume and the volume down button to lower the volume. The risk on the volume control is low due to our team’s experience with Java.

5.2.10 Display Appropriate GUI

Risk: Low

Displaying the appropriate GUI is showing certain GUI components depending on the mode of the dRadio – Radio Mode or Time Capsule Mode. These modes will be tested by starting the system and switching between modes. The risk is low due to our team’s experience with GUI programming in Java.

5.2.11 Save Recordings

Risk: Low

Saving recordings is the process of creating a new directory to store permanent audio files. It will be tested by the tester pressing the record button wait 10 seconds and then press the record button again. A visual inspection will then be done to verify that the audio file(s) are in place. The risk is low because the team has experience in creating directories in Java.
6 Non-testable Features

6.1 Overview

Non-testable features represent requirements that will not or cannot be tested due to certain circumstances. These features are assumed to be working properly or are low priority.

6.2 Non-testable Requirements

Requirements listed in the System Requirement Specification with Priority 5 will not be tested; this is due to the fact that these requirements were not complete at this time for this prototype.

6.2.1 SRS Section 4: Packaging Requirements

None of the requirements listed in this section will be tested because they imply a physical state of the system, components associated with, or materials used to package the product.

6.2.2 SRS Section 6: Safety Requirements

None of the requirements listed in this section will be tested because they imply physical components, system state, or location of the system that are defined by our requirements. These dictate safety precaution we took in order to make our system safe.

6.2.3 SRS Section 7: Support Requirements

None of the requirements listed in this section will be tested because they are documentation that will accompany our product however does not affect the functionality of our project and product.
7 Test Strategy

7.1 Overview

This section will describe in detail the strategy that team AudioTEK will execute in order to test the dRadio prototype. Testing will be conducted to ensure that all the requirements specified in the SRS have been met. A description will be given for the methods used to test each of the individual components and then the system as a whole. The results obtained during the testing phase will also be recorded.

7.2 Configurations

Different hardware and software configurations will be tested by the team to make sure that our system is satisfactory. The requirements, which are set as high priority, will be implemented and tested first. The team will also try to implement all the medium and low priority requirements if everything goes the right way at the right time. Future requirements will not be implemented and hence will not be tested by the team.

7.3 Strategy

The order of the testing that the team will follow is Unit, Component, Integration and System Verification testing. All the testing will be done during the team meetings as teamwork. All units must pass their specific tests before we can jump into the Component testing. In other words, the team will not jump onto the second level of testing until all the units have passed their Unit testing. Similarly, all components must pass the Components testing before they are integrated. After integration is complete, Integration testing will begin. Finally, the System Verification Test will begin after our integrated prototype had passed the integration test.

The information that will be collected during each test is listed below:
- Test Name and ID
- Test Date
- Input(s)
- Expected Output(s)
- Actual Output(s)
- Test Result (Pass/Fail)
- Problems encountered if any
7.4 Metrics

The metrics the team will use to determine the priority of the test cases will be based on the priorities of the requirements that they test. In other words, the high priority test case will be carried out for high priority requirements, a medium priority test case for the medium priority requirements and low priority test case for the low priority requirements. As stated earlier, the future requirements will not be implemented and hence will not to be tested.

If a component of the high priority test fails, it will hamper the system as a whole. In that case, a replacement of the component must be required to make the system stable again. Similarly, a component of the medium priority test may partially hamper the system. In this case, a replacement of the component may or may not be required to make the system stable again. Finally, a component of low priority test will not hamper the system at all.

7.5 Regression

Each time a bug or an error is found and fixed on any unit or component, a regression test is performed to make sure that those components are bug free and are working as required. Regression testing will also be performed when a new component is added to the system during Integration testing. This testing will also make sure that the bug or error has not affected the functionalities of any other component in the system.
8 Acceptance Criteria

8.1 Overview
This section will be used by the team AudioTEK to ensure that the dRadio is of the highest quality by keeping the number of defects to a minimum. Tests will be conducted to determine whether a particular unit or component has either passed or failed the given criteria. The unit or component will be accepted only if has passed the particular test and behaves according to expected results.

8.2 Hardware Unit Tests
Pass: The unit returns the correct output when given a correct input. The unit gives an error when given an invalid input.
Fail: The unit returns incorrect output when given a correct input.

8.3 Software Unit Tests
Pass: The unit returns a valid output when given a valid input. The unit gives an error or exception when given an invalid input.
Fail: The unit returns an incorrect response when given a valid input and the unit does not give an error or exception when it is supposed to.

8.4 Component Tests
Pass: The system returns an expected output when given a valid input.
Fail: The system does not behave as supposed to when given a valid input.

8.5 Integration Tests
Pass: All the layers, subsystems and modules work accordingly as described in the ADS and the DDS.
Fail: The layers, subsystems and modules do not behave as described in the ADS and the DDS.
8.6 System Verification Tests

Pass: The system works and meets all the requirements as described in the SRS.

Fail: The systems do not work and do not meet all the requirements as described in the SRS.
9 Test Deliverables

9.1 Overview
Beside the various test conducted, it is also important to record the test report, bugs and errors found during each testing phase so that similar mistakes could be avoided in the future.

9.2 Deliverables

9.2.1 Test Cases
The test cases will describe what exactly will be tested including all inputs, expected outputs, and tested outputs. The following will be recorded:

- Tester’s Name
- Test ID
- Input(s)
- Expected Output(s)
- Actual Output(s)
- Test Result
- Notes

9.2.2 Test Results
The results of each test will be either pass or fail. All of the test report will be combined together and will be delivered as a single report at the end of the semester.

9.2.3 Bugs and Defects
All the bugs and defects found during each of the testing phases will be noted down so that similar bugs could be easily solved or avoided. Some of the records that will be noted are:

- Test Name
- Test ID
- Reason/Condition
- Severity (High, Medium, Low)
- Status (Fixed/Ignored)
- Notes
9.2.4 Test Code

Any code written to conduct a test will be delivered at the end of the semester along with the system prototype.
10 Test Schedule

10.1 Overview

Test Schedule shows the work breakdown per team member as represented in the MS Project plan.

10.2 Test Schedule

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Start</th>
<th>Finish</th>
<th>Time</th>
<th>% Complete</th>
<th>Resource Names</th>
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<tbody>
<tr>
<td>2.3.1.1 Hardware Testing</td>
<td>7/06/12</td>
<td>7/18/12</td>
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<td>0%</td>
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<td>2.3.1.2 Software Unit Testing</td>
<td>7/06/12</td>
<td>7/13/12</td>
<td>15 hrs</td>
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<td>Cater H, Jose F</td>
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<td>2.3.1.3 Component Unit Testing</td>
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<td>7/24/12</td>
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<td>0%</td>
<td>Carter H, Jose F, David L</td>
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<td>2.3.1.4 Integration</td>
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<td>7/28/12</td>
<td>25 hrs</td>
<td>0%</td>
<td>Binkal T, Carter H, Jose F, David L, Jose O</td>
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<tr>
<td>2.3.1.5 System</td>
<td>7/29/12</td>
<td>8/03/12</td>
<td>48 hrs</td>
<td>0%</td>
<td>Binkal T, Carter H, Jose F, David L, Jose O</td>
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</table>
# 11 Approvals

The following signatures approve this document and the testing procedure:

<table>
<thead>
<tr>
<th>Position and Name</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team Leader:</td>
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<tr>
<td>Jose Ortiz</td>
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<td>Test Plan Manager:</td>
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<tr>
<td>Jose Fleites</td>
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<tr>
<td>Project Sponsor:</td>
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<tr>
<td>Mr. Umair Sadiq</td>
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<tr>
<td>Department Head:</td>
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<td>Mike Odell</td>
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