

Boston University
Electrical & Computer Engineering
EC464 Senior Design Project

Final Prototype Testing Plan



Team 20 SwingOn

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Required Materials

Hardware

- A device that can run iOS 15, iPadOS 15, or macOS Catalina (or later) to run and simulate the prototype
- iPhone 6S (or newer for smoother processing)

Software Components

- XCode 13
- Swift
- Tensorflow PoseNet pose estimation pretrained model
- Core ML

Additional material needed

- A tripod to stabilize the iPhone
- A person to carry out swinging motions

Setup

1. Connect the iPhone to the computer.
2. Build the SwingOn project on XCode and download the app on the iPhone by running the code.
3. Set up a tripod for the iPhone to ensure it is in a stable position.

Pre-testing Setup Procedure

1. Find an open area (open enough for full swing and body movement) with nothing too distracting in the background/too much movement.
2. Place the camera (iPhone) on a tripod with the camera facing towards where the user will be situated.
3. Run the SwingOn app on the iPhone.

Testing Procedure

1. Open the SwingOn App on the phone
2. Click for permission to access location when map shown on main screen
3. “Open Camera” and “Upload Video” buttons are shown
4. Click “Open Camera” on the main screen
5. Click for permission to access camera
6. Users will perform multiple swings or other motions
 - a. Motions will be detected in real time and their body joints will be drawn on the screen
 - b. User’s centroid and line of hip rotation will be drawn on the screen
7. Click “Back” to return to the main screen
8. Click “Upload Video” on the main screen
9. Click “Upload from Photos” on the pop-up menu
10. Click for permission to access albums

11. Upload a video of golf swing
 - a. Motions of golfers in video will be detected and their body joints will be drawn on the screen
 - b. User's centroid and line of hip rotation will be drawn on the screen
12. Click "Welcome" to return from main screen
13. Click "Upload video" on the main screen
14. Click "Upload from files" on the pop-up menu
15. Upload a video of golf swing
 - a. Motions of golfers in video will be detected and their body joints will be drawn on the screen
 - b. User's centroid and line of hip rotation will be drawn on the screen

Measurable Criteria

The criteria for successful running is as follows

1. The Application should be able to successfully run on an iOS device, to be more specific, the iPhone that is used to test.
2. Each of the screens of the application should be clearly displayed
 - a. Splash screen should have the SwingOn logo
 - b. Main screen should have a welcome message, a button directing to the camera screen, and a button directing the user to upload a file
 - c. Upload Videos screen should show a pop-up menu prompting the user to choose between "Upload from Photos" and "Upload from Files"

3. The buttons on the device should perform the designated tasks
 - a. “Open camera” button should open the camera screen
 - b. “Upload Video” button should pop-up a menu of “Upload from Photos” and “Upload from Files”
 - c. “Back” Button should return to the previous screen
4. All functions should ask for permission to access
 - a. Map should ask for location access
 - b. Open camera should ask permission to open the camera
 - c. “Upload from Photos” should ask permission to access photo library
 - d. “Upload from Files” should ask permission to access files
5. The camera screen should display a person's body poses in real time ($>30\text{fps}$) as well as allow users to make adjustments
 - a. 17 key-points detected
 - i. Nose
 - ii. Left and right eye
 - iii. Left and right ear
 - iv. Left and right shoulder
 - v. Left and right elbow
 - vi. Left and right wrist
 - vii. Left and right hip
 - viii. Left and right knee
 - ix. Left and right ankle
 - b. User's centroid

- i. Be able to display the user's centroid as a point in the video
 - ii. Be able to display the coordinates of the centroid
6. The Application should be able to run without internet connection

Test Sheet

Object	Performance	Achieved?
APP	Able to build run	
Main Screen	Able to display	
“Open camera” Button	Able to direct to next page when clicked	
Camera Screen	Able to display people’s 17 body points with lines connecting them in real time	
Displays on camera screen	Scores and estimated times are displayed on the screen	
Upload functions	Able to upload videos from photo library and files	
“Back” Button	Able to go back to main Screen	
Privacy access	Able to ask user for permission to access location, camera, photo library, files	

Centroid	Able to display the centroid on the screen for uploaded videos	
Result →		%