**Version 1**

CENG 408 – Innovative System Design and Development II  
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**1. INTRODUCTION**

**1.1 Version Control**

| **Version No** | **Description of Changes** | **Date** |
| --- | --- | --- |
| 1.0 | First Version | May 21, 2025 |
|  |  |  |

**1.2 Overview**

This document describes the test plan for **LieWave**, a deception detection app that uses Google Firebase Authentication, speech recording/upload, Flask API-based lie prediction, and playback of previous analyses. It covers functional testing of user login via Google, recording and uploading audio, sending audio paths to the Flask API, and correctly displaying predictions.

**1.3 Scope**

Includes:

* Testing Google-based user authentication.
* Testing audio recording, upload, and format validation.
* Testing communication with the lie detection API.
* Testing UI feedback and result display with color-coded predictions.
* Testing playback of previous recordings with associated predictions.

**1.4 Terminology**

| **Acronym** | **Definition** |
| --- | --- |
| LG | Google Login |
| UR | Upload Recording |
| RT | Real-Time Lie Detection |
| HP | Historical Playback |
| API | Application Programming Interface |

**2. FEATURES TO BE TESTED**

**2.1 Google Login (LG)**

* Authenticate users using Firebase Google Sign-In.
* Validate login success and failure flows.

**2.2 Upload Recording (UR)**

* Record audio (AAC format).
* Upload audio files to Firebase Storage.
* Validate upload success and error handling.

**2.3 Real-Time Detection (RT)**

* Record audio, send file path to Flask API.
* Receive prediction response with confidence.
* Display prediction with color codes (“truth” in green, “lie” in red).
* Handle API errors and edge cases gracefully.

**2.4 Historical Playback (HP)**

* List previously analyzed recordings with predictions.
* Playback audio files.
* Show prediction and confidence per playback item.

**3. FEATURES NOT TO BE TESTED**

* Firebase Authentication internals (Google auth handled by Firebase).
* Model training and machine learning algorithm internals.
* Network layer reliability outside app/API scope.

**4. PASS/FAIL CRITERIA**

**Pass Criteria**

* Correct behavior with no crashes.
* UI responsiveness and proper state updates.
* Correct display of prediction results and confidence.
* Successful uploads and API calls.

**Fail Criteria**

* App crashes, freezes, or UI blocks.
* Incorrect or missing prediction displays.
* Upload failures without error messaging.

**Exit Criteria**

* 100% of high and medium priority tests executed.
* At least 95% tests passed.
* Critical bugs resolved.

**5. REFERENCES**

* LieWave Project Report
* Software Requirements Specification (SRS)
* Software Design Document (SDD)

**6. TEST DESIGN SPECIFICATIONS**

**6.1 Google Login (LG)**

| **TC ID** | **Requirement** | **Priority** | **Scenario Description** |
| --- | --- | --- | --- |
| LG.GG.01 | 1.1 | High | User logs in successfully via Google Sign-In |
| LG.GG.02 | 1.1 | Medium | User cancels Google login flow |
| LG.GG.03 | 1.1 | Medium | Login fails due to no internet connection |

**6.2 Upload Recording (UR)**

| **TC ID** | **Requirement** | **Priority** | **Scenario Description** |
| --- | --- | --- | --- |
| UR.REC.01 | 2.1 | High | Record audio for minimum 10 seconds |
| UR.REC.02 | 2.1 | Medium | Attempt to record audio less than 10 seconds (should warn and reject) |
| UR.UP.01 | 2.2 | High | Upload valid audio file (AAC) to Firebase |
| UR.UP.02 | 2.2 | Medium | Upload fails due to network error (show error) |

**6.3 Real-Time Lie Detection (RT)**

| **TC ID** | **Requirement** | **Priority** | **Scenario Description** |
| --- | --- | --- | --- |
| RT.API.01 | 3.1 | High | Send uploaded audio file path to Flask API |
| RT.API.02 | 3.1 | High | Receive prediction response with confidence |
| RT.DP.01 | 3.2 | High | Display prediction with “truth” as green and “lie” as red |
| RT.DP.02 | 3.2 | Medium | Show appropriate error message on API failure |

**6.4 Historical Playback (HP)**

| **TC ID** | **Requirement** | **Priority** | **Scenario Description** |
| --- | --- | --- | --- |
| HP.LS.01 | 4.1 | Medium | List past predictions associated with user |
| HP.PB.01 | 4.1 | Medium | Play audio recording from history list |
| HP.DC.01 | 4.1 | Medium | Display prediction and confidence for selected item |

**7. DETAILED TEST CASES**

**7.1 LG.GG.01 – Google Login Success**

* **Purpose:** Verify user can authenticate with Google successfully
* **Requirement:** 1.1
* **Priority:** High
* **Preconditions:** User has valid Google account
* **Test Steps:**
  1. Launch app.
  2. Tap “Sign in with Google”.
  3. Complete Google authentication flow.
* **Expected Result:** User is authenticated and navigated to Home screen.
* **Cleanup:** Log out.

**7.2 UR.REC.01 – Record Audio (≥ 10 sec)**

* **Purpose:** Ensure audio recorder captures at least 10 seconds of audio
* **Requirement:** 2.1
* **Priority:** High
* **Preconditions:** User is logged in and on HomePage
* **Test Steps:**
  1. Tap “Start Recording”.
  2. Record audio for at least 10 seconds.
  3. Stop recording.
* **Expected Result:** Audio file saved locally, file path stored for upload.
* **Cleanup:** None.

**7.3 UR.UP.01 – Upload Audio File**

* **Purpose:** Validate audio file upload to Firebase Storage
* **Requirement:** 2.2
* **Priority:** High
* **Preconditions:** Audio file recorded and available
* **Test Steps:**
  1. Trigger upload function.
  2. Confirm upload completes without error.
* **Expected Result:** File is uploaded successfully and URL is retrieved.
* **Cleanup:** None.

**7.4 RT.DP.01 – Display Prediction Result with Colors**

* **Purpose:** Verify UI shows prediction and confidence, color-coded by result
* **Requirement:** 3.2
* **Priority:** High
* **Preconditions:** API returns valid prediction (truth or lie)
* **Test Steps:**
  1. Upload audio and receive API response.
  2. Observe prediction displayed on screen.
* **Expected Result:**
  1. Prediction “truth” text is green
  2. Prediction “lie” text is red
  3. Confidence percentage shown below prediction
* **Cleanup:** Clear prediction data.

**7.5 HP.PB.01 – Playback Historical Audio**

* **Purpose:** Verify playback of previously analyzed recordings
* **Requirement:** 4.1
* **Priority:** Medium
* **Preconditions:** User has historical recordings available
* **Test Steps:**
  1. Open history list screen.
  2. Select a recording.
  3. Tap play.
* **Expected Result:** Audio plays smoothly, UI reflects playback status.
* **Cleanup:** Stop playback.

**8. TEST RESULTS**

| **TC ID** | **Test Description** | **Date** | **Result** | **Remarks** |
| --- | --- | --- | --- | --- |
| LG.GG.01 | Google Login Success | 2025-05-20 | Pass | Login successful, user navigated home |
| LG.GG.02 | Google Login Cancel | 2025-05-20 | Pass | Cancel login returned to login screen |
| LG.GG.03 | Login Failure (No Internet) | 2025-05-21 | Pass | Proper error shown for no connectivity |
| UR.REC.01 | Record Audio (≥ 10 sec) | 2025-05-21 | Pass | Audio recorded and saved successfully |
| UR.REC.02 | Record Audio (< 10 sec) Reject | 2025-05-21 | Pass | Warning shown, recording stopped |
| UR.UP.01 | Upload Audio File | 2025-05-22 | Pass | File uploaded to Firebase without error |
| UR.UP.02 | Upload Fail Network Error | 2025-05-22 | Pass | Upload error message displayed correctly |
| RT.API.01 | API Request Success | 2025-05-22 | Pass | API response received as expected |
| RT.API.02 | API Failure Handling | 2025-05-22 | Pass | Failure message displayed |
| RT.DP.01 | Prediction Result Display with Colors | 2025-05-22 | Pass | “Truth” shown in green, “Lie” in red |
| HP.LS.01 | List Historical Predictions | 2025-05-23 | Pass | History displayed correctly |
| HP.PB.01 | Playback Historical Audio | 2025-05-23 | Pass | Playback successful |
| HP.DC.01 | Display Prediction/Confidence | 2025-05-23 | Pass | Data shown with appropriate UI styles |