

**Smart Cattle Monitoring using IoT and AI/ML**

Software Test Report

Submitted by

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**Supervisor**

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In partial fulfilment of the requirements for the degree of

Bachelor of Science in Software Engineering

2025

**Faculty of Engineering Sciences and Technology**

Hamdard Institute of Engineering and Technology

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**Software Test Plan and Test Cases**

Project Title: Smart Cattle Health Monitoring System

Date: 3 July 2025

Version: 1.0

**Test Plan**

| **S.No** | **Description** | **Tested By** | **Start Date** | **End Date** |
| --- | --- | --- | --- | --- |
| **1** | **Sensor to ESP32 via Serial** | **Zunair Shahid** | **01-Jul-2025** | **01-Jul-2025** |
| **2** | **ESP32 to Firebase Communication** | **Zunair Shahid** | **01-Jul-2025** | **01-Jul-2025** |
| **3** | **ML Model Sample Test** | **Zunair Shahid** | **02-Jul-2025** | **02-Jul-2025** |
| **4** | **ML Model with Real-Time Data** | **Zunair Shahid** | **02-Jul-2025** | **02-Jul-2025** |
| **5** | **API/Function Deployment** | **Zunair Shahid** | **03-Jul-2025** | **03-Jul-2025** |
| **6** | **App Login & Signup** | **Hina Roshan** | **03-Jul-2025** | **03-Jul-2025** |
| **7** | **Add Cattle Module** | **Hina Roshan** | **03-Jul-2025** | **03-Jul-2025** |
| **8** | **Verify Cattle Entry in Firebase** | **Zunair Shahid** | **03-Jul-2025** | **03-Jul-2025** |
| **9** | **Language Toggle (English ↔ Urdu)** | **Hina Roshan** | **03-Jul-2025** | **03-Jul-2025** |
| **10** | **App Data Sync with Real-Time Cloud** | **Hina Roshan** | **03-Jul-2025** | **03-Jul-2025** |

**Test Case 1**

**Project Name:** Smart Cattle Health Monitoring System  
**Module Name:** Sensor to ESP32 Communication  
**Date:** 01-Jul-2025  
**Test Case ID:** TC\_001  
**Test Engineer:** Zunair Shahid  
**Description:** Verifying sensor data transmission from Arduino to ESP32 via Serial/HC-12.

| **S.No** | **Steps** | **Input Data** | **Expected Result** | **Actual Result** | **Pass/Fail** |
| --- | --- | --- | --- | --- | --- |
| 1 | Power on both devices | N/A | ESP32 starts serial read loop | Loop active | Pass |
| 2 | Send test sensor values | Temperature = 38.5°C | ESP32 receives values correctly | Values received | Pass |
| 3 | Simulate sensor error | Disconnected sensor | ESP32 logs null or error | Logged correctly | Pass |

**Test Case 2**

**Module:** ESP32 to Firebase Communication  
**Date:** 01-Jul-2025  
**ID:** TC\_002

**Test Engineer:** Zunair Shahid

| **S.No** | **Steps** | **Input** | **Expected Result** | **Actual Result** | **Pass/Fail** |
| --- | --- | --- | --- | --- | --- |
| 1 | Connect to Wi-Fi | SSID & Password | ESP32 connected | Connected | Pass |
| 2 | Send JSON payload | HeartRate: 78, Temp:38 etc | Data appears in Firebase in 5–8 seconds | Appeared in time | Pass |
| 3 | Send invalid data | HeartRate: null | Handled gracefully | Logged error | Pass |

**Test Case 3**

**Module:** AI Model Sample Testing  
**Date:** 02-Jul-2025  
**ID:** TC\_003

**Test Engineer:** Zunair Shahid

| **S.No** | **Steps** | **Input** | **Expected Result** | **Actual Result** | **Pass/Fail** |
| --- | --- | --- | --- | --- | --- |
| 1 | Load dataset | Sample CSV with test readings | Data loaded | Loaded successfully | Pass |
| 2 | Run prediction | Valid input row | Healthy or Unhealthy label | Healthy returned | Pass |

**Test Case 4**

**Module:** ML Model Real-Time Prediction  
**Date:** 02–03-Jul-2025  
**ID:** TC\_004

**Test Engineer:** Zunair Shahid

| **S.No** | **Steps** | **Input Source** | **Expected Result** | **Actual Result** | **Pass/Fail** |
| --- | --- | --- | --- | --- | --- |
| 1 | Get real-time data from DB | Firebase | Data retrieved correctly | Data fetched | Pass |
| 2 | Run prediction on live data | Sensor values | Status returned in 2–3 seconds | Slight delay | Pass |

**Test Case 5**

**Module Name:** API / ML Model Integration via Postman  
**Date:** 03-Jul-2025  
**Test Case ID:** TC\_005  
**Test Engineer:** Zunair Shahid  
**Description:** Testing the API that sends cattle health data from Postman to the ML model hosted locally.

| **S.No** | **Steps** | **Input Data (via Postman)** | **Expected Result** | **Actual Result** | **Pass/Fail** |
| --- | --- | --- | --- | --- | --- |
| 1 | Start local ML server | - | Server running at http://localhost:5000 | Server running | Pass |
| 2 | Send POST request | { "temp": 39.5, "hr": 78} | API returns prediction | Response: "Healthy" | Pass |
| 3 | Send malformed request | Missing fields or wrong keys | API returns validation error | Error 400: Bad Request | Pass |
| 4 | Shut down ML server | Send request after shutdown | API fails gracefully with connection error | Error: Connection refused | Pass |

**Test Case 6**

**Module:** App Login & Signup  
**Date:** 04-Jul-2025  
**ID:** TC\_006

**Test Engineer:** Hina Roshan

| **S.No** | **Steps** | **Input Data** | **Expected Result** | **Actual Result** | **Pass/Fail** |
| --- | --- | --- | --- | --- | --- |
| 1 | Open login screen | - | Page loads | Loaded | Pass |
| 2 | Login user | Valid credentials | Dashboard loads | Successful login | Pass |
| 3 | Register new user | New email & password | Account created | Account added | Pass |

**Test Case 7**

**Module:** Add Cattle  
**Date:** 04-Jul-2025  
**ID:** TC\_007

**Test Engineer:** Hina Roshan

| **S.No** | **Steps** | **Input** | **Expected Result** | **Actual Result** | **Pass/Fail** |
| --- | --- | --- | --- | --- | --- |
| 1 | Open add cattle | - | Form loads | Displayed | Pass |
| 2 | Submit details | Breed, weight etc | Record added | Added | Pass |

**Test Case 8**

**Module:** Firebase Record Verification  
**Date:** 04-Jul-2025  
**ID:** TC\_008

**Test Engineer:** Zunair Shahid

| **S.No** | **Steps** | **Input** | **Expected Result** | **Actual Result** | **Pass/Fail** |
| --- | --- | --- | --- | --- | --- |
| 1 | Open Firebase Console | - | Entry appears at /cattle/7/cow1 | Entry visible | Pass |

**Test Case 9**

**Module:** Language Toggle  
**Date:** 04-Jul-2025  
**ID:** TC\_009

**Test Engineer:** Hina Roshan

| **S.No** | **Steps** | **Input Action** | **Expected Result** | **Actual Result** | **Pass/Fail** |
| --- | --- | --- | --- | --- | --- |
| 1 | Switch to Urdu | Tab "Urdu" | All text changes to Urdu | Changed correctly | Pass |

**Test Case 10**

**Module:** App Data Sync  
**Date:** 04-Jul-2025  
**ID:** TC\_010

**Test Engineer:** Hina Roshan

| **S.No** | **Steps** | **Action** | **Expected Result** | **Actual Result** | **Pass/Fail** |
| --- | --- | --- | --- | --- | --- |
| 1 | View cattle data | Open dashboard | Latest data shown | Synced correctly | Pass |