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Test Plan, Test Design Specifications and Test Cases

CENG 408

Innovative System Design and Development II

Mine Detection Drone

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1. INTRODUCTION

1.1 Overview

This document is prepared to test the user interface, drone movement and sensors, and user management system components of the Mine Detection Drone project.

1.2 Scope

This document encapsulates the test plan, test design specifications, and the cases.

1.3 Terminology

Acronym	Definition
UI	User Interface (UI)
DB	Database
MS	Metal Sensor
DS	Distance Sensor

2. FEATURES TO BE TESTED

2.1 User Interface (UI)

Test the functionality of user interface components such as user login, data display, and system messages.

2.2 Drone Movement and Sensors

Test the drone's movement (right, left, up, forward) and the functionality of metal and distance sensors.

2.3 User and Password Management

Tests the user registration, login, and access to sensor data from the MySQL database.

3. ITEM PASS/FAIL CRITERIA

3.1 Exit Criteria

- 100% of the test cases are executed
- 99.9% of the test cases passed
- All High and Medium Priority test cases passed

4. REFERENCES

[1] Group10_SRS_100, April 12, 2017
[2] Group10_SDD_100, April 12,2017

5. TEST DESIGN SPECIFICATIONS

5.1 User Interface (UI)

5.1.1 Subfeatures to be tested

5.1.1.1 UI.LOGIN

Test the user login functionality with both valid and invalid credentials.

- UI.LOGIN.01: Login with valid username and password.
- UI.LOGIN.02: Login with invalid username and password.
- UI.LOGIN.BTN: Verify the login button functionality.

5.1.1.2 UI.DISPLAY_DATA

Ensure sensor data is displayed correctly in the user interface.

- UI.DISPLAY_DATA.01: Display sensor data.

5.1.1.3 UI.DATA_MSG

Validate that error messages are displayed correctly and are user-friendly.

- UI.ERROR_MSG.01: Display error messages correctly.

5.1.1.4 UI.DATA_SAVE

Verify that user data is correctly saved to the MySQL database.

- UI.DATA_SAVE.01: Save user data to the MySQL database correctly.

5.1.2 Test Cases

TC ID	Requirements	Priority	Scenario Description
UI.LOGIN.01	3.2.1	High	Login with valid username and password.
UI.LOGIN.02	3.2.1	High	Login with invalid username and password.
UI.LOGIN_BTN	3.2.1	High	Verify the login button functionality.

TC ID	Requirements	Priority	Scenario Description
UI.DISPLAY_DATA.01	3.2.2	Medium	Display sensor data.

TC ID	Requirements	Priority	Scenario Description
UI.ERROR_MSG.01	3.2.3	Low	Display error message correctly.

TC ID	Requirements	Priority	Scenario Description
UI.DATA_SAVE.01	3.2.4	High	Save user data to the database.

5.2 Drone Movement and Sensors

5.2.1 Subfeatures to be tested

5.2.1.1 DRONE.MOVEMENT

Test the drone's ability to move in different directions.

- DRONE.MOVEMENT.01: Drone moves to the right.
- DRONE.MOVEMENT.02: Drone moves to the left.
- DRONE.MOVEMENT.03: Drone moves up.
- DRONE.MOVEMENT.04: Drone moves forward.

5.2.1.2 DRONE.MS

Validate the metal sensor's ability to detect metal objects.

- DRONE.MS.01: Metal sensor detects metal.

5.2.1.3 DRONE.DS

Ensure the distance sensor correctly detects obstacles.

- DRONE.DS.01: Distance sensor detects an obstacle.

5.2.2 Test Cases

TC ID	Requirements	Priority	Scenario Description
DRONE.MOVEMENT.01	3.3.1	High	Drone moves to the right.
DRONE.MOVEMENT.02	3.3.1	High	Drone moves to the left.
DRONE.MOVEMENT.03	3.3.1	High	Drone moves up.
DRONE.MOVEMENT.04	3.3.1	High	Drone moves forward.

TC ID	Requirements	Priority	Scenario Description
DRONE.MS.01	3.3.2	High	Metal sensor detects metal.

TC ID	Requirements	Priority	Scenario Description
DRONE.DS.01	3.3.3	Medium	Distance sensor detects an obstacle.

5.3 User and Password Management

5.3.1 Subfeatures to be tested

5.3.1.1 USER.REG

Test the user registration functionality.

- USER.REG.01: User registration.

5.3.1.2 USER.LOGIN

Test the user login functionality.

- USER.LOGIN.01: User login.

5.3.1.3 USER.DATA_ACCESS

Ensure users can access sensor data after logging in.

- USER.DATA_ACCESS.01: Access sensor data.

5.3.2 Test Cases

TC ID	Requirements	Priority	Scenario Description
USER.REG.01	3.4.1	High	User registration.
USER.LOGIN.01	3.4.2	High	User login.
USER.DATA_ACCESS.01	3.4.2	Medium	Access sensor data.

6. Detailed Test Cases

6.1 UI.LOGIN.01

TC_ID	UI.LOGIN.01
Purpose	Verify successful login with valid credentials
Requirements	3.2.1
Priority	High
Estimated Time Needed	2 Minutes
Dependency	None
Setup	Ensure a valid user is registered in the MySQL database
Procedure	[A01] Navigate to the login page.
	[A02] Enter a valid username and password.
	[A03] Click the "Login" button.
	[V01] Verify that the login is successful and the main page is displayed.
Cleanup	Logout.

6.2 UI.LOGIN.02

TC_ID	UI.LOGIN.02
Purpose	Verify login failure with invalid credentials
Requirements	3.2.1
Priority	High
Estimated Time Needed	2 Minutes
Dependency	None
Setup	Ensure no user is registered with the provided credentials
Procedure	[A01] Navigate to the login page.
	[A02] Enter an invalid username and password.
	[A03] Click the "Login" button.
	[V01] Verify that an "Invalid username or password" error message is displayed.
Cleanup	Close the login page.

6.3 UI.LOGIN.03

TC_ID	UI.LOGIN.03
Purpose	Verify the login button functionality
Requirements	3.2.1
Priority	High
Estimated Time Needed	2 Minutes
Dependency	None
Setup	Ensure the login button is visible and clickable
Procedure	[A01] Navigate to the login page.
	[A02] Verify the login button is visible.
	[A03] Click the login button without entering any credentials.
	[V01] Verify that an error message prompts the user to enter credentials.
Cleanup	Close the login page.

6.4 UI.DISPLAY_DATA.01

TC_ID	UI.DISPLAY_DATA.01
Purpose	Ensure that sensor data is displayed correctly
Requirements	3.2.2
Priority	Medium
Estimated Time Needed	3 Minutes
Dependency	User must be logged in
Setup	Ensure sensor data is available in the system
Procedure	[A01] Login to the user interface.
	[A02] Navigate to the sensor data display page.
	[V01] Verify that data from metal and distance sensors is correctly displayed.
Cleanup	Logout.

6.5 UI.ERROR_MSG.01

TC_ID	UI.ERROR_MSG.01
Purpose	Validate the display of error messages.
Requirements	3.2.3
Priority	Low
Estimated Time Needed	2 Minutes
Dependency	None
Setup	System must be configured to generate error messages.
Procedure	[A01] Perform an invalid action (e.g., enter an incorrect password).
	[V01] Verify that the error message is correctly and user-friendly displayed.
Cleanup	Close the login page.

6.6 UI.DATA_SAVE.01

TC_ID	UI.DATA_SAVE.01
Purpose	Verify that user data is correctly saved to the database.
Requirements	3.2.4
Priority	High
Estimated Time Needed	3 Minutes
Dependency	MySQL database must be operational.
Setup	Ensure the database connection is established and functional.
Procedure	[A01] Navigate to the user registration page.
	[A02] Enter new user information and click "Register".
	[V01] Verify that the user data is correctly saved in the database by checking the database records.
Cleanup	Return to the login page.

6.7 DRONE.MOVEMENT.01

TC_ID	DRONE.MOVEMENT.01
Purpose	Verify the drone's ability to move to the right
Requirements	3.3.1
Priority	High
Estimated Time Needed	3 Minutes
Dependency	Drone must be operational.
Setup	Drone and controller must be ready
Procedure	[A01] Start the drone.
	[A02] Press the right movement button on the controller.
	[V01] Verify that the drone moves to the right.
Cleanup	Safely stop and power off the drone.

6.8 DRONE.MOVEMENT.02

TC_ID	DRONE.MOVEMENT.02
Purpose	Verify the drone's ability to move to the left.
Requirements	3.3.1
Priority	High
Estimated Time Needed	3 Minutes
Dependency	Drone must be operational.
Setup	Drone and controller must be ready.
Procedure	[A01] Start the drone.
	[A02] Press the left movement button on the controller.
	[V01] Verify that the drone moves to the left.
Cleanup	Safely stop and power off the drone.

6.9 DRONE.MOVEMENT.03

TC_ID	DRONE.MOVEMENT.03
Purpose	Verify the drone's ability to move up.
Requirements	3.3.1
Priority	High
Estimated Time Needed	3 Minutes
Dependency	Drone must be operational.
Setup	Drone and controller must be ready.
Procedure	[A01] Start the drone.
	[A02] Press the up movement button on the controller.
	[V01] Verify that the drone moves up.
Cleanup	Safely stop and power off the drone.

6.10 DRONE.MOVEMENT.04

TC_ID	DRONE.MOVEMENT.04
Purpose	Verify the drone's ability to move forward.
Requirements	3.3.1
Priority	High
Estimated Time Needed	3 Minutes
Dependency	Drone must be operational.
Setup	Drone and controller must be ready.
Procedure	[A01] Start the drone.
	[A02] Press the forward movement button on the controller.
	[V01] Verify that the drone moves forward.
Cleanup	Safely stop and power off the drone.

6.11 DRONE.MS.01

TC_ID	DRONE.MS.01
Purpose	Validate that the metal sensor detects metal objects.
Requirements	3.3.2
Priority	High
Estimated Time Needed	12-15 Minutes
Dependency	Drone must be operational and metal sensor must be active.
Setup	Prepare a metal object.
Procedure	[A01] Start the drone and fly it near the metal object.
	[V01] Verify that the metal sensor detects the metal and sends the data to the user interface.
Cleanup	Safely stop and power off the drone.

6.12 DRONE.DS.01

TC_ID	DRONE.DS.01
Purpose	Ensure the distance sensor detects obstacles.
Requirements	3.3.3
Priority	Medium
Estimated Time Needed	12-15 Minutes
Dependency	Drone must be operational and distance sensor must be active.
Setup	Prepare an obstacle.
Procedure	[A01] Start the drone and fly it near the obstacle.
	[V01] Verify that the distance sensor detects the obstacle and stops the drone.
Cleanup	Safely stop and power off the drone.

6.13 USER.REG.01

TC_ID	USER.REG.01
Purpose	Verify that a new user can register successfully.
Requirements	3.4.1
Priority	High
Estimated Time Needed	3 Minutes
Dependency	MySQL database must be operational.
Setup	MySQL database must be ready.
Procedure	[A01] Navigate to the user registration page.
	[A02] Enter new user information and click "Register".
	[V01] Verify that the user is successfully registered.
Cleanup	Return to the login page.

6.14 USER.LOGIN.01

TC_ID	USER.LOGIN.01
Purpose	Verify that a registered user can log in successfully.
Requirements	3.4.2
Priority	High
Estimated Time Needed	2 Minutes
Dependency	User must be registered.
Setup	MySQL database must have a registered user.
Procedure	[A01] Navigate to the login page.
	[A02] Enter the username and password.
	[A03] Click the "Login" button.
	[V01] Verify that the user is successfully logged in.
Cleanup	Close the login page.

6.15 USER.DATA_ACCESS.01

TC_ID	USER.DATA_ACCESS.01
Purpose	Ensure users can access sensor data after logging in.
Requirements	3.4.3
Priority	Medium
Estimated Time Needed	3 Minutes
Dependency	User must be logged in.
Setup	Sensor data must be available.
Procedure	[A01] Login to the user interface.
	[A02] Navigate to the sensor data page.
	[V01] Verify that the data from the metal and distance sensors is displayed correctly.
Cleanup	Logout.

6.16 DRONE.KILLSWITCH.01

TC_ID	DRONE.KILLSWITCH.01
Purpose	Verify that the kill switch stops the drone.
Requirements	3.3.4
Priority	High
Estimated Time Needed	2 Minutes
Dependency	Drone must be operational.
Setup	Kill switch must be active.
Procedure	[A01] Start the drone.
	[A02] Press the kill switch.
	[V01] Verify that the drone stops immediately.
Cleanup	Safely stop and power off the drone.

6.17 UI.MAIN_MENU

TC_ID	UI.MAIN_MENU.01
Purpose	Verify navigation from the main menu to different pages.
Requirements	3.2.1
Priority	Medium
Estimated Time Needed	1 Minutes
Dependency	User must be logged in.
Setup	System must be ready.
Procedure	[A01] Navigate to the main menu.
	[A02] Click on different menu options (e.g., "Sensor Data", "Settings").
	[V01] Verify that the respective page opens.
Cleanup	Return to the main menu.

6.18 UI.SETTINGS.01

TC_ID	UI.SETTINGS.01
Purpose	Verify changes made in the settings page
Requirements	3.2.4
Priority	Low
Estimated Time Needed	3 Minutes
Dependency	User must be logged in.
Setup	System settings must be available.
Procedure	[A01] Navigate to the settings page.
	[A02] Change a setting (e.g., adjust the volume level).
	[V02] Verify that the change is saved and applied.
Cleanup	Close the settings page.

6.19 DRONE.DATA.LOGGING.01

TC_ID	DRONE.DATA_LOGGING.01
Purpose	Verify logging of sensor data.
Requirements	3.3.5
Priority	Medium
Estimated Time Needed	12-15 Minutes
Dependency	Drone must be operational and sensors must be active.
Setup	Data logging system must be active.
Procedure	[A01] Start the drone and use the metal/distance sensors.
	[A02] Verify that the sensor data is logged.
	[V02] Verify that the data is accurately logged and accessible through the user interface.
Cleanup	Safely stop and power off the drone and review the logged data.

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