Acceptance Tests

Test for US-D1	**Display thermal imaging in real-time**
Objective	Verify that the system displays the FLIR camera's thermal imaging in real-time on the Raspberry Pi operating system and can stream to the web application for remote monitoring.
Test Steps	1. Set up the FLIR camera and connect it to the Raspberry Pi. 2. Start the system and open the thermal imaging application on the Raspberry Pi. 3. Verify that the thermal imaging is displayed in real-time with high clarity and a consistent refresh rate. 4. Access the FarmBot web application and confirm that the real-time thermal imaging is being streamed correctly.
Expected Result	• The thermal imaging is displayed in real-time on the Raspberry Pi with high clarity. • The thermal imaging is successfully streamed to the web application for remote monitoring.

Test for US-D2	**Understand FLIR camera's data interface**
Objective	Verify that the system identifies and documents the data interface type of the FLIR camera and assesses compatibility with FarmBot's mainboard.
Test Steps	1. Connect the FLIR camera to the Raspberry Pi using both Ethernet and USB interfaces. 2. Identify and document the data interface type used by the FLIR camera. 3. Check the compatibility of the identified interface with FarmBot's mainboard. 4. Develop and document a communication strategy that ensures seamless data exchange between the FLIR camera and FarmBot's mainboard.
Expected Result	• The data interface type (Ethernet or USB) of the FLIR camera is identified and documented. • Compatibility with FarmBot's mainboard is assessed and documented. • A communication strategy is developed and documented.

Test for US-D3	**Know sensor's dimensions and mounting details**
Objective	Verify that the sensor's dimensions and mounting details are documented and that a stable, easily installable mounting solution is designed.
Test Steps	1. Measure and document the sensor's dimensions and mounting details. 2. Design a mounting solution for the sensor that fits within FarmBot's operational environment. 3. Create an installation guide with step-by-step instructions and safety precautions. 4. Test the installation process using the guide to ensure ease of use and stability.

Expected Result	• The sensor's dimensions and mounting details are documented. • A stable and easily installable mounting solution is designed. • The installation guide is comprehensive and easy to follow. • The sensor is installed successfully and operates stably.

Test for US-D4	**Adjust hardware integration for adaptability**
Objective	Ensure that the FLIR camera and integration components support hardware adjustments for adaptability and are user-friendly.
Test Steps	1. Test the FLIR camera and integration components for hardware adjustments. 2. Verify that the camera supports plug-and-play functionality without the need for additional drivers or complex configuration steps. 3. Evaluate the user experience during the integration process, focusing on ease of use and minimizing technical barriers.
Expected Result	• The FLIR camera and integration components support hardware adjustments for adaptability. • The camera is easily connectable to FarmBot without additional drivers or complex configurations. • The integration process is user-friendly, with minimal technical barriers

Test for US-D5	**Ensure camera's power cable compatibility**
Objective	Verify that the camera's power cable is compatible with the movement range of FarmBot's robotic arm.
Test Steps	1. Design a power cable for the camera that is flexible and long enough for FarmBot's full range of motion. 2. Install the power cable and connect it to the camera and FarmBot. 3. Move the robotic arm through its full range of motion while capturing thermal images. 4. Assess the efficiency and reliability of the thermal imaging capture process. 5. Verify that the power cable design adheres to safety standards and is durable under operational conditions.
Expected Result	• The power cable is designed and installed successfully, accommodating the full range of motion. • The thermal imaging capture process is efficient and reliable. • The power cable meets safety standards and is durable.

Test for US-D6	**Specify new sensor's power specifications**
Objective	Verify that the new sensor's power specifications are documented and compatible with FarmBot's electrical system.
Test Steps	1. Document the required voltage and current specifications for the new sensor. 2. Verify the compatibility of the sensor's power specifications with FarmBot's electrical system.

	3. Implement and document safety protocols to prevent equipment damage due to power incompatibility.
Expected Result	• The power specifications for the new sensor are documented. • The sensor's power specifications are compatible with FarmBot's electrical system. • Safety protocols are in place to prevent equipment damage.

Test for US-D7	**Design efficient server architecture**
Objective	Verify that an efficient server architecture is designed to handle data requests and responses for thermal imaging data.
Test Steps	1. Design a server architecture that can efficiently handle thermal imaging data. 2. Establish performance metrics, including response times and data handling capacity. 3. Test the server architecture against these metrics. 4. Assess the scalability of the server architecture to accommodate future data volume increases.
Expected Result	• An efficient server architecture is designed. • Performance metrics are established and met. • The server architecture is scalable to handle future data volume increases.

Test for US-D8	**Design a database for thermal imaging data**
Objective	Verify that a database is designed to store and manage thermal imaging data efficiently and securely.
Test Steps	1. Develop a database schema for storing thermal imaging data. 2. Implement security measures to protect the data from unauthorized access. 3. Establish routines for regular data integrity checks. 4. Test the database for efficient data retrieval and storage.
Expected Result	• A database schema is developed. • Security measures are in place to protect the data. • Regular data integrity checks ensure accuracy and consistency. • The database efficiently retrieves and stores thermal imaging data.

Test for US-D9	**Integrate thermal imaging in the web application**
Objective	Ensure the thermal imaging functionality is seamlessly integrated into the FarmBot web application, including real-time viewing.
Test Steps	1. Access the FarmBot web application. 2. Navigate to the new thermal imaging page. 3. Verify that real-time thermal imaging is displayed on the page. 4. Interact with the interface, such as zooming in on images or switching views, to confirm responsiveness and functionality. 5. Collect user feedback on the thermal imaging functionality.

Expected Result	• The thermal imaging page displays real-time images correctly. • The interface is responsive and user-friendly, with all features functioning as intended.

Test for US-D10	**Provide ability to download thermal imaging data as temperature matrices**
Objective	Verify that users can download thermal imaging data as temperature matrices for further analysis.
Test Steps	1. Access the FarmBot web application and navigate to the thermal imaging page. 2. Capture a thermal image and download it as a temperature matrix. 3. Verify that the downloaded matrix accurately represents the thermal imaging data. 4. Follow the user guide to use the temperature matrix for data analysis.
Expected Result	• The thermal image is successfully downloaded as a temperature matrix. • The temperature matrix accurately represents the captured thermal imaging data. • The user guide provides clear instructions for analyzing the matrix data.

Test for US-D11	**Display camera's relative coordinates on FarmBot**
Objective	Ensure the web app displays the camera's relative coordinates on the FarmBot, allowing users to identify, record, and analyze thermal images captured at different positions.
Test Steps	1. Access the FarmBot web application and navigate to the thermal imaging page. 2. Move the FarmBot's robotic arm to various positions. 3. Verify that the web app displays the camera's relative coordinates in real-time. 4. Capture thermal images at different positions and record the coordinates. 5. Analyze the captured images to ensure the coordinates are accurate.
Expected Result	• The camera's relative coordinates are displayed accurately and updated in real-time. • Users can record and analyze thermal images with correct positional data.

Test for US-U1	**Simple and easy-to-use web application interface**
Objective	Verify that the web application interface for viewing thermal imaging is simple and easy to use.
Test Steps	1. Access the FarmBot web application. 2. Navigate to the thermal imaging page. 3. Interact with the interface, checking for ease of navigation and usability. 4. Verify that instructional content or tooltips are available and helpful.
Expected Result	• The interface is straightforward and easy to navigate. • Real-time thermal imaging is accessible with minimal latency. • Instructional content is clear and assists users in understanding the features.

Test for US-U2	**View and download historical data**

Objective	Verify that users can access and download historical thermal imaging data from the web application.
Test Steps	1. Access the FarmBot web application and navigate to the historical data section. 2. View historical thermal imaging data within the web application. 3. Download historical data for offline analysis. 4. Verify the accuracy and completeness of the downloaded data.
Expected Result	• Users can access and view historical thermal imaging data. • Historical data can be downloaded for offline analysis. • The downloaded data is accurate and complete.