SafePressure Alert

Mastering Embedded System Online Diploma
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Use Case Document

First Term (Final Project 1)

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Use Cases for Pressure Control System (PCS)

Version 1.0 approved

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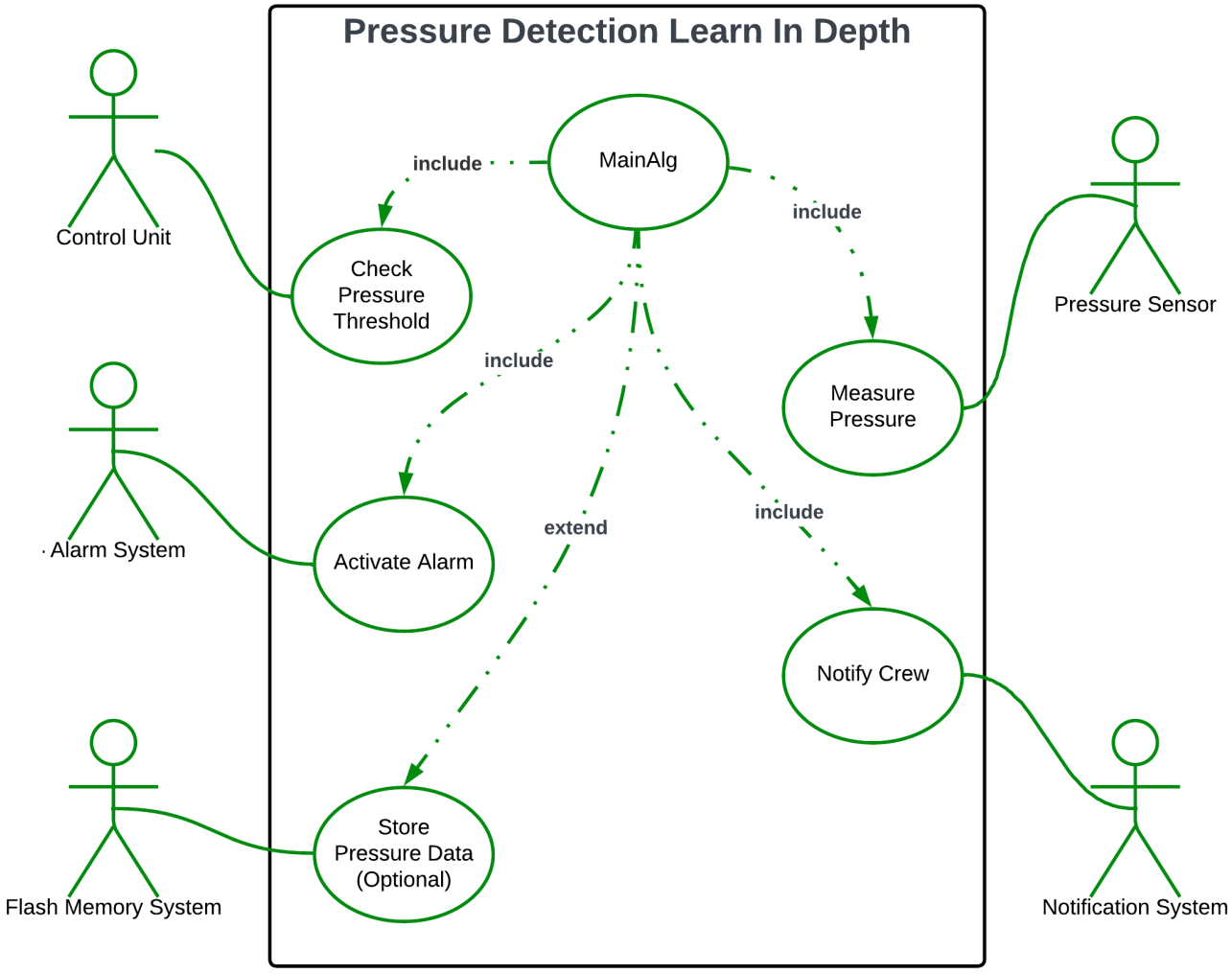
Revision History

Name	Date	Reason For Changes	Version
Abdallah Shabaan Ghazy	8/11/2024	Initial Document	1.0

Use Case Diagram



Use Case ID	Actor Action	System Response
UC1	1. Pressure Sensor measures pressure. 2. Sends pressure data to Control Unit.	1. Receives pressure data. 2. Stores data for further processing.
UC2	1. Control Unit receives pressure data. 2. Compares pressure to the predefined threshold (20 bars).	1. Compares pressure data to threshold. 2. Determines if pressure exceeds threshold.
UC3	1. Control Unit detects that pressure exceeds 20 bars. 2. Activates Alarm System.	1. Activates alarm. 2. Turns on LED for 60 seconds.
UC4	1. Control Unit detects high pressure. 2. Sends notification signal to Notification System.	1. Sends notification to crew. 2. Displays alert to crew.
UC5	1. Control Unit receives pressure data. 2. Stores pressure values in Flash Memory (if enabled).	1. Saves pressure data in Flash Memory. 2. Updates memory with new data.

Field	UC1: Measure Pressure	UC2: Check Threshold	UC3: Activate Alarm	UC4: Notify Crew	UC5: Store Data (Optional)
Use Case ID:	UC1	UC2	UC3	UC4	UC5
Use Case Name:	Measure Pressure	Check Pressure Threshold	Activate Alarm	Notify Crew	Store Pressure Data (Optional)
Created By:	Abdallah Shabaan Ghazy	Abdallah Shabaan Ghazy	Abdallah Shabaan Ghazy	Abdallah Shabaan Ghazy	Abdallah Shabaan Ghazy
Last Updated By:	Abdallah Shabaan Ghazy	Abdallah Shabaan Ghazy	Abdallah Shabaan Ghazy	Abdallah Shabaan Ghazy	Abdallah Shabaan Ghazy
Date Created:	8/11/2024	8/11/2024	8/11/2024	8/11/2024	8/11/2024
Date Last Updated:	[Date]	[Date]	[Date]	[Date]	[Date]
Actor:	Pressure Sensor	Control Unit	Alarm System	Notification System	Flash Memory System

Use Case ID: UC1

- **Use Case Name:** Measure Pressure
- **Created By:** Abdallah Shabaan Ghazy
- **Last Updated By:** Abdallah Shabaan Ghazy
- **Date Created:** 8/11/2024

- **Actor:** Pressure Sensor
- **Description:** The Pressure Sensor measures the pressure in the cabin and sends this data to the Control Unit.
- **Preconditions:**
  1. The Pressure Sensor is operational.
  2. The Pressure Sensor is properly connected to the Control Unit.
- **Postconditions:**
  1. The Control Unit receives the pressure data.
- **Priority:** High
- **Frequency of Use:** Continuous (as long as the system is active)
- **Normal Course of Events:**
  1. The Pressure Sensor measures the cabin pressure.
  2. The Pressure Sensor sends the pressure data to the Control Unit.
  3. The Control Unit receives and acknowledges the data.

- **Alternative Courses:**

  UC1.AC1: If the Pressure Sensor fails to measure pressure, an error message is sent to the Control Unit.

- **Exceptions:**

  UC1.EX1: If sensor data transmission fails, an error is logged, and the system attempts a retry.

Use Case ID: UC2

- **Use Case Name:** Check Pressure Threshold
- **Created By:** Abdallah Shabaan Ghazy
- **Last Updated By:** Abdallah Shabaan Ghazy
- **Date Created:** 8/11/2024

- **Actor:** Control Unit
- **Description:** The Control Unit compares the received pressure data against a predefined threshold of 20 bars.

- **Preconditions:**
  1. Pressure data has been received from the Pressure Sensor.
- **Postconditions:**
  1. The Control Unit determines if the pressure exceeds the threshold.
- **Priority:** High
- **Frequency of Use:** Continuous (as long as the system is active)

- **Normal Course of Events:**
  1. The Control Unit receives pressure data from the Pressure Sensor.
  2. The Control Unit compares the data to the predefined threshold of 20 bars.
  3. If the pressure exceeds 20 bars, the system proceeds to activate the alarm.

- **Alternative Courses:**

  UC2.AC1: If the threshold value needs adjustment, the Control Unit re-calibrates the threshold
- **Exceptions:**

  UC2.EX1: If there is an error in threshold comparison, the system logs the error and attempts to correct it.
- **Includes:** None
- **Special Requirements:** The threshold value must be configurable.
- **Assumptions:** The Control Unit has access to the correct threshold value.
- **Notes and Issues:** None

Use Case ID: UC3

- **Use Case Name:** Activate Alarm
- **Created By:** Abdallah Shabaan Ghazy
- **Last Updated By:** Abdallah Shabaan Ghazy
- **Date Created:** 8/11/2024

- **Actor:** Alarm System
- **Description:** If the pressure exceeds 20 bars, the Alarm System activates and the LED indicator turns on for 60 seconds.
- **Preconditions:**
  1. The pressure threshold has been exceeded.
- **Postconditions:**
  1. The alarm is active and the LED indicator is turned on.
- **Priority:** High
- **Frequency of Use:** As needed (when pressure exceeds 20 bars)
- **Normal Course of Events:**
  1. The Control Unit sends a signal to the Alarm System.
  2. The Alarm System activates the alarm and turns on the LED indicator.
  3. The LED remains on for 60 seconds.

- **Alternative Courses:**
  - **UC3.AC1:** If the LED indicator fails, the alarm will still sound, and the issue is logged.
  - **Exceptions:**
  - **UC3.EX1:** If the alarm system fails to activate, an error is logged, and the system attempts to retry.

  - **Includes:** None
  - **Special Requirements:** The LED must be visible and clearly indicate the alarm state.
  - **Assumptions:** The Alarm System and LED are in good working condition.
  - **Notes and Issues:** None

Use Case ID: UC4

- **Use Case Name:** Notify Crew
- **Created By:** Abdallah Shabaan Ghazy
- **Last Updated By:** Abdallah Shabaan Ghazy
- **Date Created:** 8/11/2024

- **Actor:** Notification System
- **Description:** The system notifies the crew of high pressure conditions in the cabin.

- **Preconditions:**
  1. The alarm has been activated.
- **Postconditions:**
  1. The crew receives a notification.
- **Priority:** High
- **Frequency of Use:** As needed (when pressure exceeds 20 bars)

- **Normal Course of Events:**
  1. The Control Unit sends a notification signal to the Notification System.
  2. The Notification System delivers the notification to the crew.

- **Alternative Courses:**

  UC4.AC1: If the primary notification system fails, a secondary notification method is used.

- **Exceptions:**
- **UC4.EX1:** If notification delivery fails, the system retries and logs the failure.
- **Includes:** None
- **Special Requirements:** Notifications must be clear and timely.
- **Assumptions:** The Notification System is operational and accessible to the crew.
- **Notes and Issues:** None

Use Case ID: UC5

- **Use Case Name:** Store Pressure Data (Optional)
- **Created By:** Abdallah Shabaan Ghazy
- **Last Updated By:** Abdallah Shabaan Ghazy
- **Date Created:** 8/11/2024

- **Actor:** Flash Memory System
- **Description:** The system stores pressure values in Flash Memory for historical record-keeping.

- **Preconditions:**
  1. Pressure data is available and needs to be stored.
- **Postconditions:**
  1. Pressure values are stored in Flash Memory.
- **Priority:** Medium
- **Frequency of Use:** As needed (for historical data recording)

- **Normal Course of Events:**
  1. The Control Unit sends pressure data to the Flash Memory System.
  2. The Flash Memory System stores the data in the designated section.

- **Alternative Courses:**

  UC5.AC1: If Flash Memory is full, older data is overwritten or archived.
- **Exceptions:**

  UC5.EX1: If data storage fails, an error is logged, and the system attempts a retry.

- **Includes:** None
- **Special Requirements:** Flash Memory must be sufficient in size and reliability.
- **Assumptions:** Flash Memory is operational and has adequate capacity.
- **Notes and Issues:** None