Use Case 1: Power On/Off the Pump

- Primary Actor: USER
- Stakeholders: USER
- Pre-condition: Simulation successfully running. Pump has enough power.
- Success Guarantee: Pump starts up and shows home screen or pump turns off
- Main Success Scenario:
    - The user presses and holds the power button.
    - The home screen appears with updated indicators (battery, insulin level, IOB)
    - For shutdown, the user selects “power off” in the options menu, and the pump turns off.
- Extensions:
    - If the battery is too low, the system displays a warning to charge it

Use Case 2: Display Home Screen

- Primary Actor(s): USER
- Stakeholders: USER
- Pre-condition(s): Pump is turned on, sufficiently charged
- Success Guarantee: Home screen appears with battery level, insulin fill gauge, IOB (insulin on board), and graph of CGM data (mmol/L blood sugar level)
- Main Success Scenario:
    - Upon successful power on, the system loads the home screen.
    - Battery, insulin quantity, IOB, and blood sugar levels are displayed.
    - Options and Bolus buttons are displayed
    - User can press “Home Button” to return to home screen at any time
- Extensions:
    - If any data is missing, show error message, use default values

Use Case 3: Personal Profiles

- Primary Actor: USER
- Stakeholder: USER
- Pre-condition: The pump is powered on and the user has unlocked the device (if there’s a pin)
- Success Guarantee: A new profile is created, or an existing profile is updated or deleted
- Main Success Scenario:
    - User navigates to “Personal Profiles” section from the home screen.
    - For a new profile, the user selects “New Profile” and inputs basal rates, carb ratios, correction factors, target glucose levels
    - For update, user selects an existing profile, changes the values

    - User clicks confirm and the system saves the profile
- Extensions:
    - Invalid data prompts an error message

Use Case 4: Manual Bolus Administration

- Primary Actor(s): USER
- Stakeholders: USER
- Pre-condition: The pump is powered on and the user is on the home screen
- Success Guarantee: A bolus is delivered according to the user's input or retrieved CGM data
- Main Success Scenario:
    - The user taps the bolus button to access the bolus calculator.
    - The user enters current blood glucose levels and carbohydrate intake manually or opts to retrieve these from the CGM.
    - The system computes a recommended bolus dose based on configured sensitivity and target values.
    - The user confirms the recommended dose or manually enters and accepts
    - The bolus is administered, and the event is logged.
- Extensions:
    - If the user cancels mid-process, the system aborts without delivering insulin.
    - If the user enters a dose too high or low an error message is shown

Use Case 5: Extended Bolus Administration

- Primary Actor: USER
- Stakeholders: USER
- Pre-condition: The pump is in manual bolus mode and the user opts for an extended delivery mode
- Success Guarantee: Insulin is delivered gradually over a predetermined period
- Main Success Scenario:
    - After launching the bolus calculator, the user selects "Extended Bolus" as the delivery option.
    - The system computes the dosing schedule for extended delivery.
    - Insulin is delivered incrementally over the specified period while continuously monitoring glucose levels.
    - The system logs each increment as part of the overall bolus event.
- Extensions:
    - If an interruption occurs (e.g., low glucose detected), the extended bolus may be paused or adjusted accordingly.

Use Case 6: Start, Stop, and Resume Basal Insulin Delivery

- Primary Actor: USER
- Stakeholders: USER
- Pre-condition: The pump is powered on and an active personal profile is loaded
- Success Guarantee: Basal insulin delivery commences, is suspended when necessary, and can be resumed as conditions change
- Main Success Scenario:
    - The user selects a basal rate from the active profile or inputs a custom rate via the options menu.
    - Insulin delivery starts and continues at the set rate.
    - The system automatically suspends delivery if CGM readings drop below 3.9 mmol/L
    - Once conditions normalize, the user or system resumes the basal delivery using the prior settings.
- Extensions:
    - User manually overrides automatic suspensions
    - An error might prevent resuming and prompt troubleshooting

Use Case 7: Log and View Insulin Delivery History

- Primary Actor: USER
- Stakeholders: USER
- Pre-condition: The pump has been successfully operating and logging events
- Success Guarantee: All insulin delivery events (basal, bolus, errors) are stored and viewable in chronological order
- Main Success Scenario:
    - Every insulin delivery event is logged automatically by the system.
    - The user selects a “History” option from the options menu.
    - The system displays dosages and event details with time stamps.
- Extensions:
    - If no events have been logged, the log page is blank

Use Case 8: View Graphed Data

- Primary Actor: USER
- Stakeholders: USER
- Pre-condition: Pump is on, there’s enough data to visualize
- Success Guarantee: User can see and understand their blood sugar levels over time
- Main Success Scenario:
    - The user is on the home screen.

    - The system continuously graphs the users blood sugar (mmol/L) in real time
    - The user reviews these graphs for insights into glucose control
- Extensions:
    - If data is insufficient, nothing is displayed

Use Case 9: Handle Pump Errors and Alerts

- Primary Actor(s): USER
- Stakeholders: USER, DEVELOPERS
- Pre-condition(s): The pump is active and monitoring its own status
- Success Guarantee: low battery, CGM disconnection are detected, alerts are displayed, and insulin delivery is safely suspended if required
- Main Success Scenario:
    - The system continuously monitors for conditions such as low battery, low insulin, or sensor disconnections.
    - On detecting an error, an alert message appears on the screen.
    - If the error is critical (sensor disconnect), the system suspends insulin delivery immediately.
    - The user acknowledges the alert and follows on-screen instructions to resolve the issue.
- Extensions:
    - Persistent errors trigger repeated alerts or suggestions to contact support.
    - Non-critical warnings may allow the user to override after confirmation.

Use Case 10: Simulate Control IQ Technology Adjustments

- Primary Actor: SYSTEM
- Stakeholders: USER
- Pre-condition: CGM data is available and being monitored in real time
- Success Guarantee: Insulin delivery is automatically adjusted based on the patient's glucose readings
- Main Success Scenario:
    - The system receives continuous glucose data from the CGM.
    - It computes necessary adjustments to the basal or bolus rates based on preset algorithms.
    - Insulin delivery is modified dynamically while logging the adjustments.
- Extensions:
    - If CGM data is missing, the system pauses and alerts the user

Use Case 11: Screen Navigation and Interaction

- Primary Actor(s): USER

- Stakeholders: USER, DEVELOPERS
- Pre-condition(s): The pump is on and displaying a functional screen
- Success Guarantee: The user can smoothly transition between screens (e.g., home, bolus, profiles, settings)
- Main Success Scenario:
    - The user taps on navigation buttons (such as the bolus button or the options).
    - The system processes the input and transitions to the selected screen with updated information.
- Extensions:
    - In the event of an error, the system reverts to the home screen

Use Case 12: Simulate Pump Charging

- Name: Charging Process Simulation
- Primary Actor(s): User
- Stakeholders: Patient; system developers
- Pre-condition(s): The pump is off or in a low-battery state
- Success Guarantee: The charging process is accurately simulated with an updating battery indicator
- Main Success Scenario:
    - The user connects the pump to a charger (or selects “Charge” in the simulation).
    - The system displays a charging animation and updates the battery level over time.
    - Once fully charged, the battery indicator reflects a full charge and the user can power on the pump.
- Extensions:
    - If charging is interrupted, an error is displayed and the battery level stops updating.