



SOFTWARE REQUIREMENTS

Painkiller Injection System

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System Objective

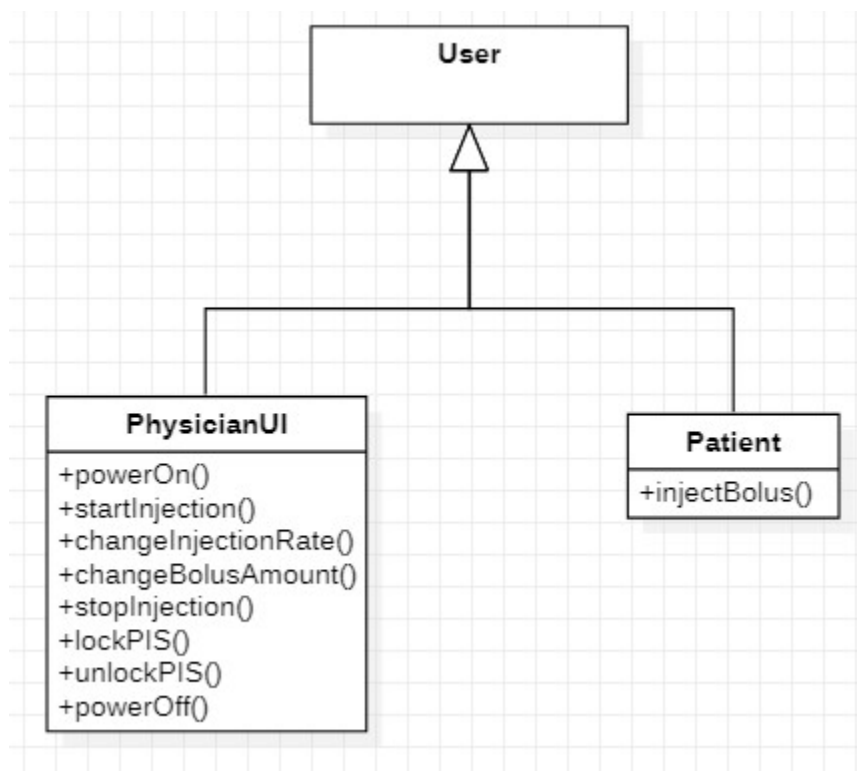
Patients need painkiller after surgery, however, the dosage and the rate the painkiller injected should be controlled precisely. In this Painkiller Injection System(PIS), an automatic machine of painkiller injection is designed to assist physician to spend less time on checking the dosage and rate once and once again. Besides, the PIS also give patient a bonus to give them a bolus when they are bad hurt.

Limitation

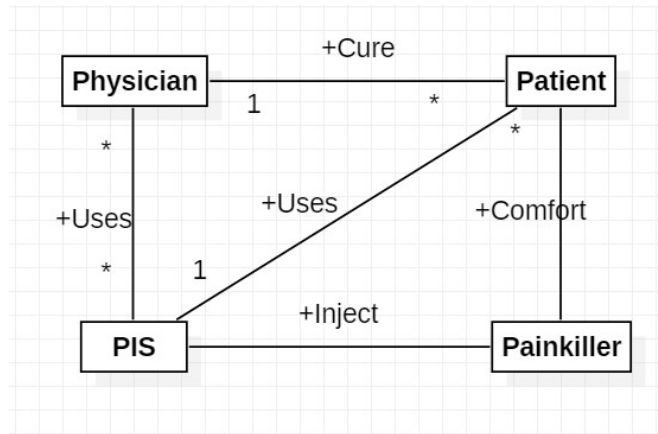
1. The total amount per day is less than 3.000ml.
2. Amount in an hour should be less than 1.000ml.
3. Baseline: 0.01-0.1ml/min.
4. Bolus: 0.2-0.5ml/shot.
5. Interface: for physician and patient button.

Domain Analysis

The participants of activities related to PIS can be categorized into Physician and Patient.

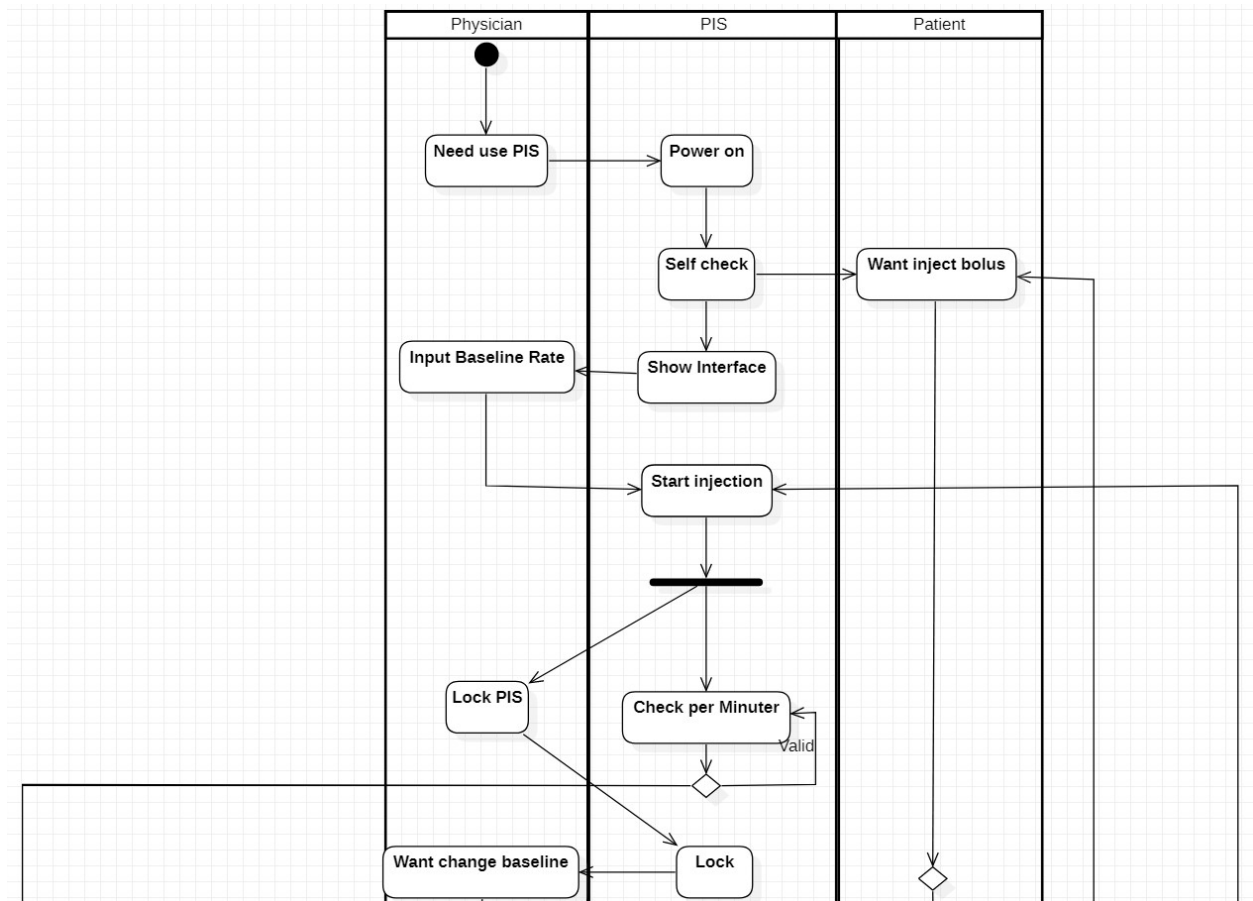


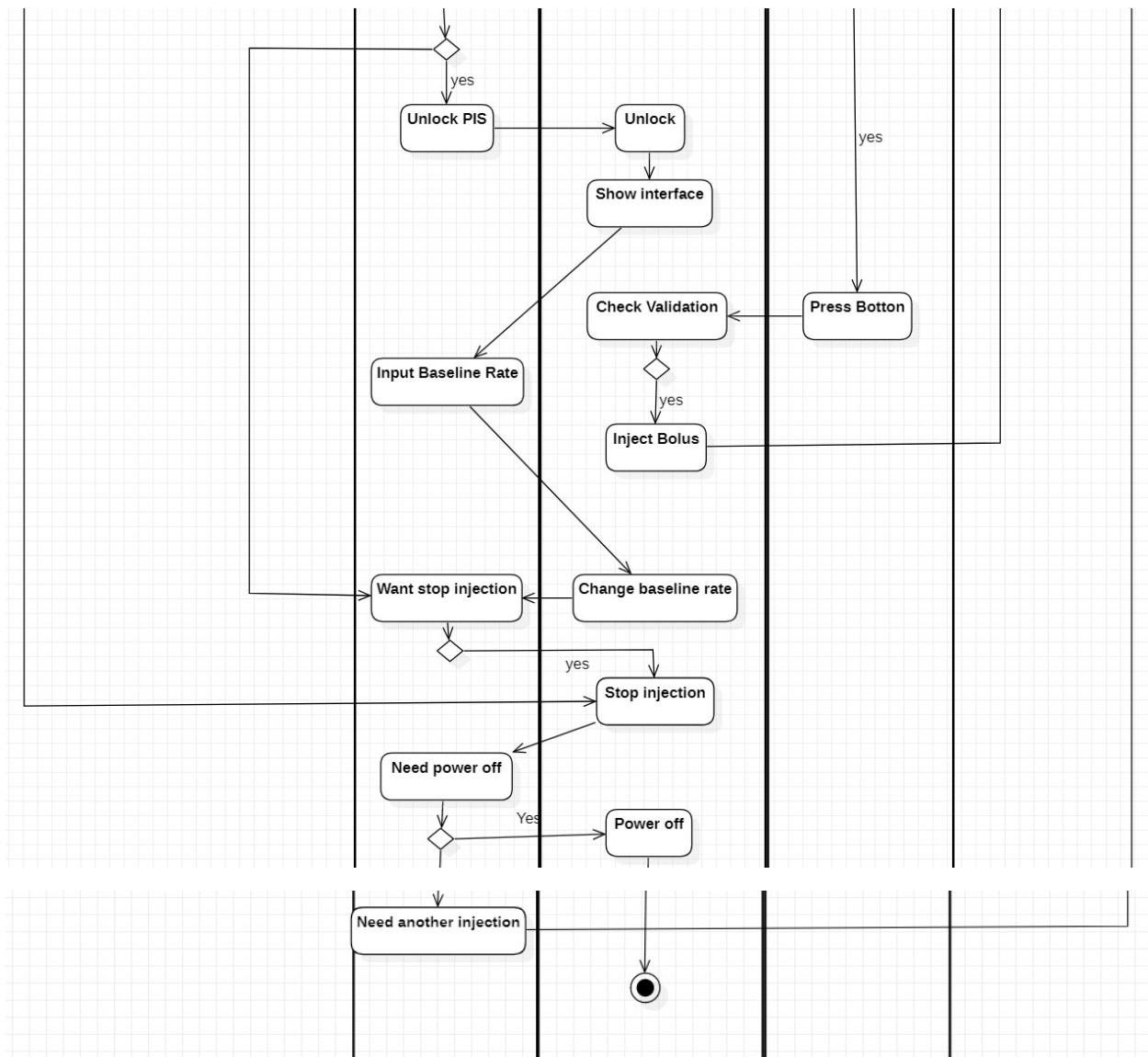
The relationships among different participants and PIS are shown as follows:



Activity Diagram:

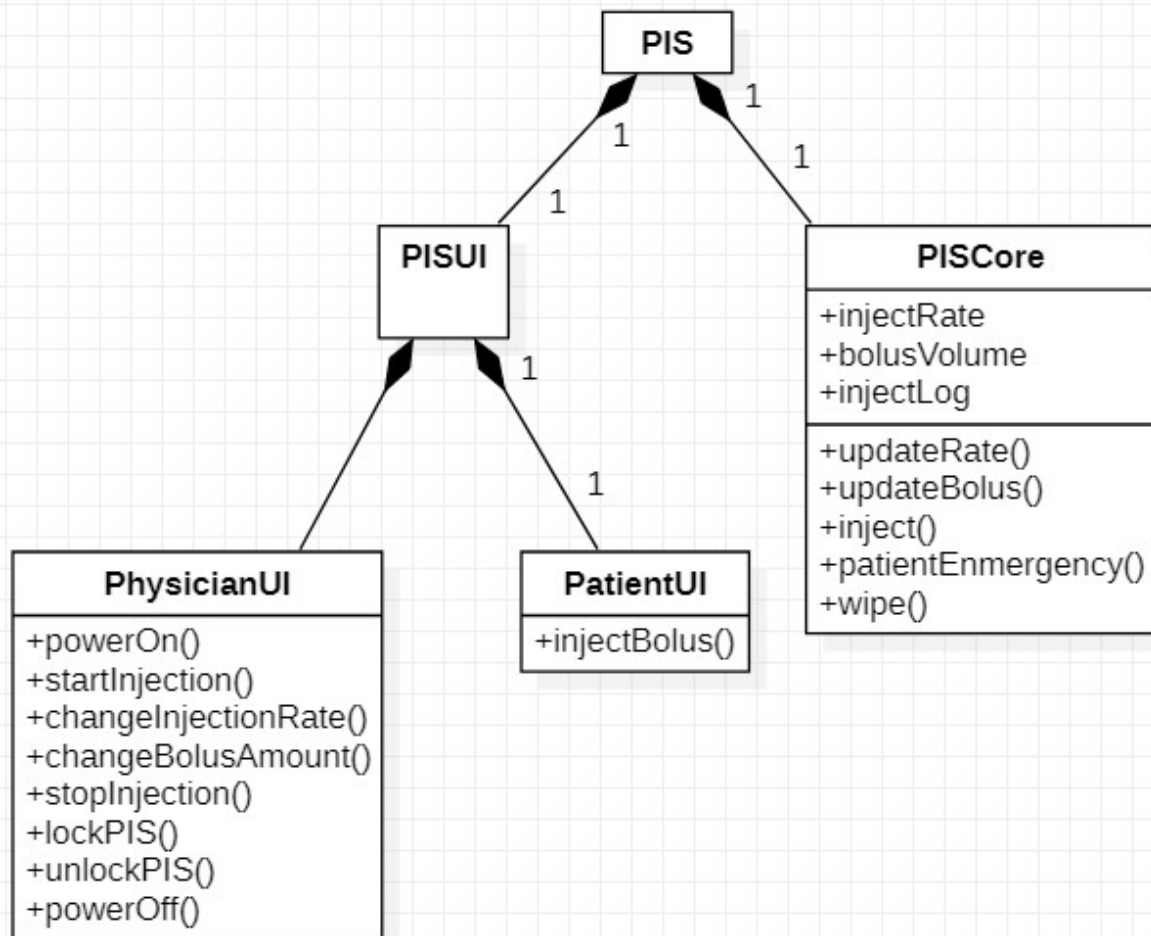
Here is the sequence of events for using a PIS:





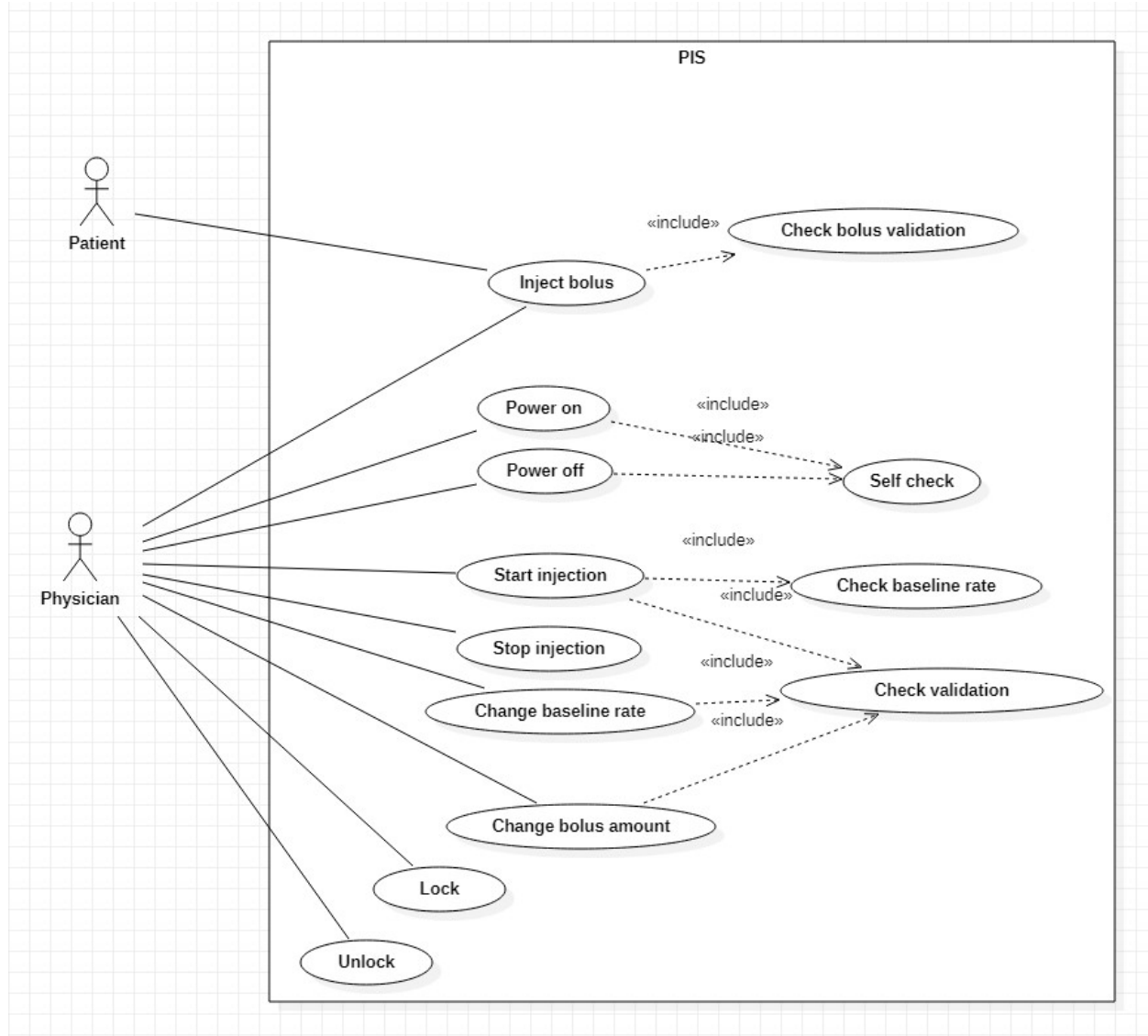
System Architecture

From the information above, we will design a software system that assist physician to inject painkiller and patient to inject bolus when they are really hurt. Besides the system should guarantee the safety for the first. The simplified system architecture is shown below, and a detailed one is given in the appendix:

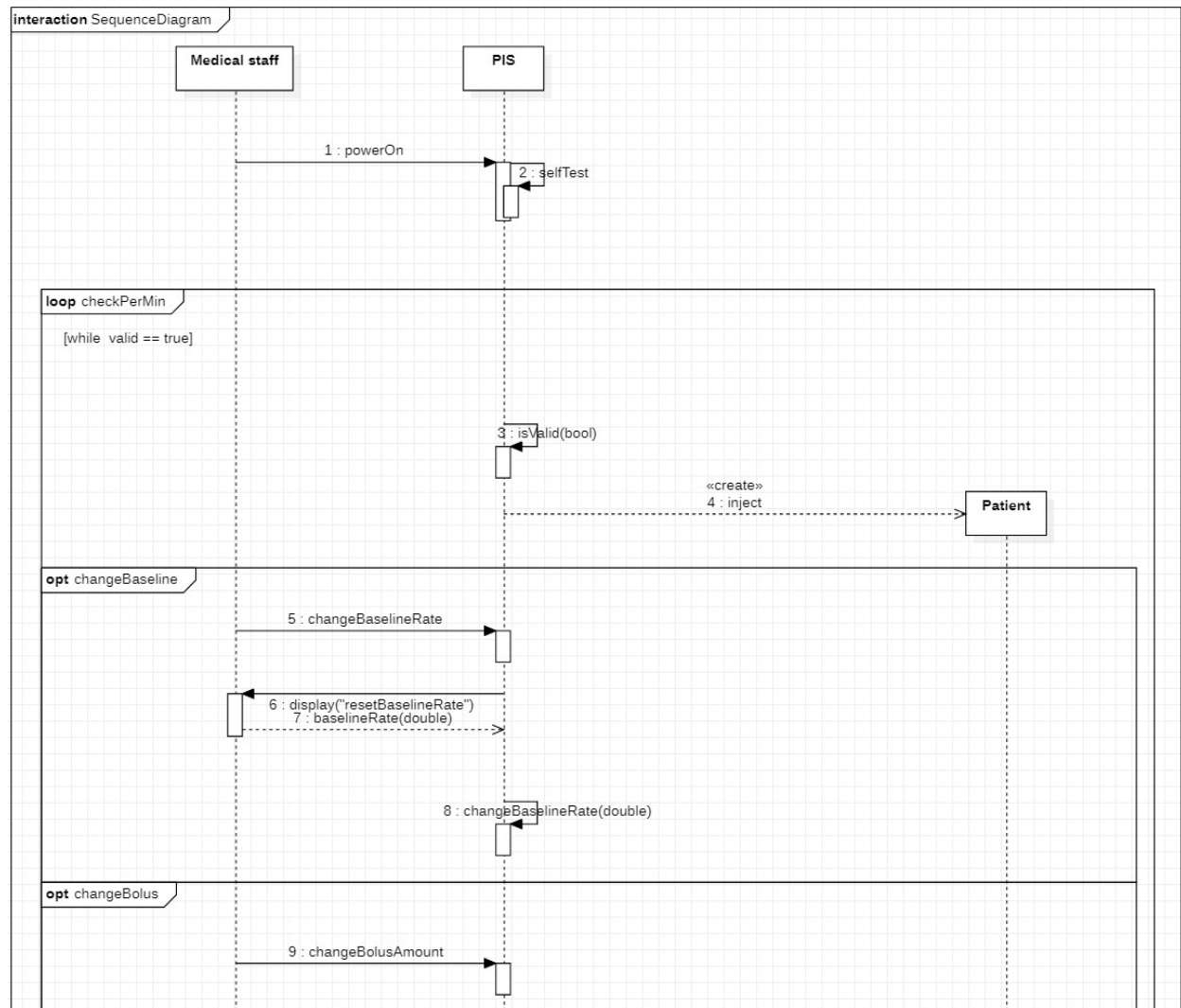


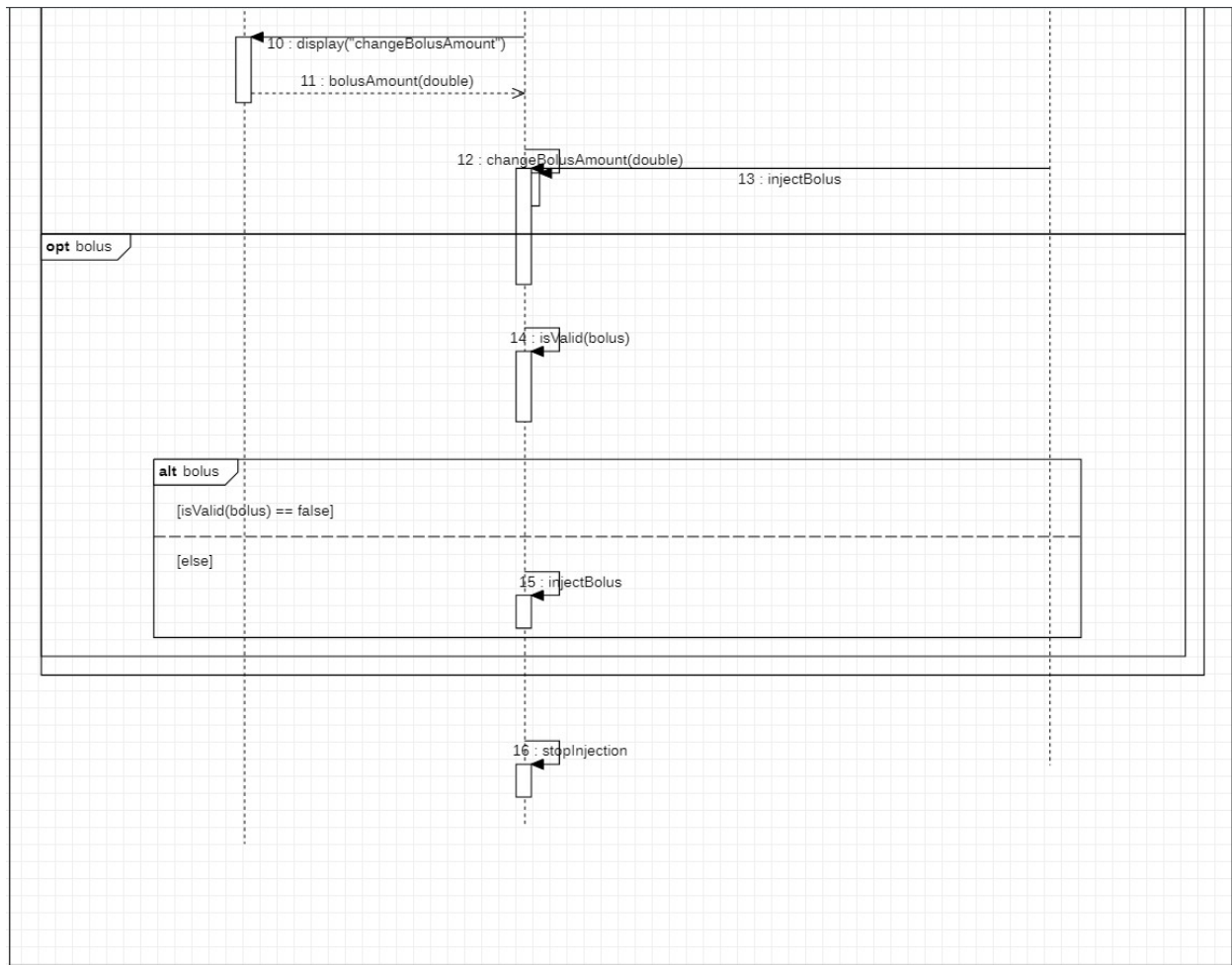
Use Cases

The system can achieve the following use cases from the physician's and the patient's perspectives:



Sequence Diagram





Software Requirements

R1: PISUI

- R1.1: The user interface should be able to support basic functions.
 - R1.1.1: The PIS should be able to power on when it is off by user interface.
 - R1.1.2: The PIS should be able to power off when the UI is not locked.
- R1.2: The user interface should be able to support security interface.
 - R1.2.1: The user interface should be able to lock, when it is locked any other functions can't be activated besides the unlock module and bolus button.
- R1.3: The user interface should be able to support injection interface.
 - R1.3.1: The injection user interface should be able to start injection when given a valid baseline rate.
 - R1.3.2: The injection user interface should be able to change baseline rate when given a valid baseline rate.

- R1.3.3: The injection user interface should be able to change bolus amount when given a valid bolus amount by doctor.

R2: PISCore

- R2.1: The PISCore should self-test the PIS after power on and before display the PISUI.
- R2.2: The PISCore should be able to call check module.
 - R2.2.1: The PISCore should be able to call check module to check whether the set rate is valid.
 - R2.2.2: The PISCore should be able to call check module to check whether the injection state is valid after start injection continuously.
 - R2.2.3: The PISCore should be able to call check module to check whether the bolus is valid.
- R2.3: The PISCore should be able to control painkiller injection module.
 - R2.3.1: The PISCore should be able to control painkiller injection module to inject in baseline mode in a set rate.
 - R2.3.2: The PISCore should be able to control painkiller injection module to inject in bolus mode
- R2.4: The PISCore should be able to record injection rate every minute and store it.
- R2.5: The PISCore should tell PISUI what to display.

R3: CheckModule

- R3.1: The check module should be able to check whether the injection is valid.
 - R3.1.1: The check module should be able to check the total amount per day is at most 3ml
 - R3.1.2: The check module should be able to check the amount in an hour should be less than 1ml.
 - R3.1.3: The check module should be able to check baseline rate should be between 0.01ml/min and 0.1ml/min.
 - R3.1.4: The check module should be able to check the bolus is between 0.2ml/slot and 0.5ml/slot.
 - R3.1.5: The check module should be able to acquire injection rate every minute stored in the PISCore.

R4: PainkillerInjector

- R4.1: The painkiller injector should be able to inject baseline in set rate.
- R4.2: The painkiller injector should be able to inject bolus in set slot.
- R4.3: The painkiller injector should be able to stop injection.

Appendix

