Specification Document For Painkiller Injection System

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1 Contents

2 System Architecture

Below is the architecture of the Painkiller Injection System:

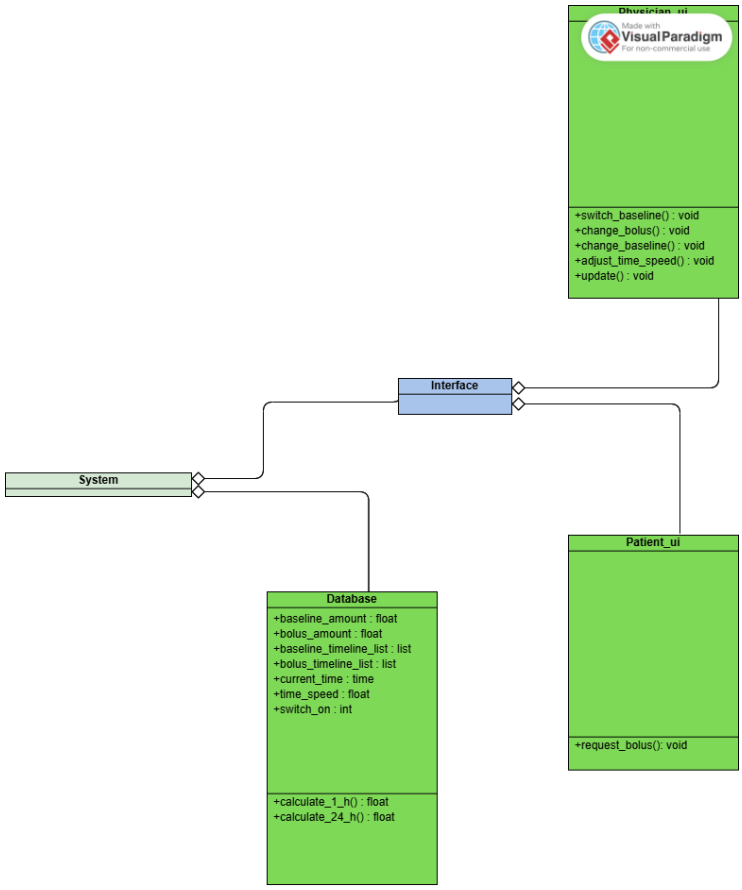

图 1: System Architecture

3 Specification

S1: Physician Operations

S1.1: Adjust Baseline Amount

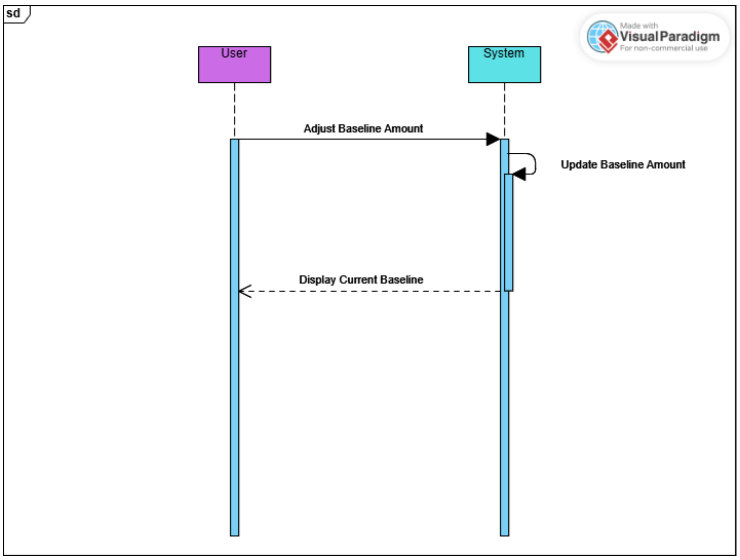

图 2: S1.1

Frontend: The user uses the scrollbar to adjust the baseline amount, which ranges from 0.01ml/min to 0.1ml/min.

Backend: database.baseline_amount changes to the adjusted value.

System Response: The current baseline will be displayed on screen.

S1.2: Set Bolus Amount

Frontend: The user uses the scrollbar to adjust the bolus amount, which ranges from 0.2ml/shot to 0.5ml/shot.

Backend: database.bolus_amount changes to the adjusted value.

System Response: The current bolus will be displayed on screen.

S1.3: Baseline Switch

Frontend: The user click on the "Switch" button.

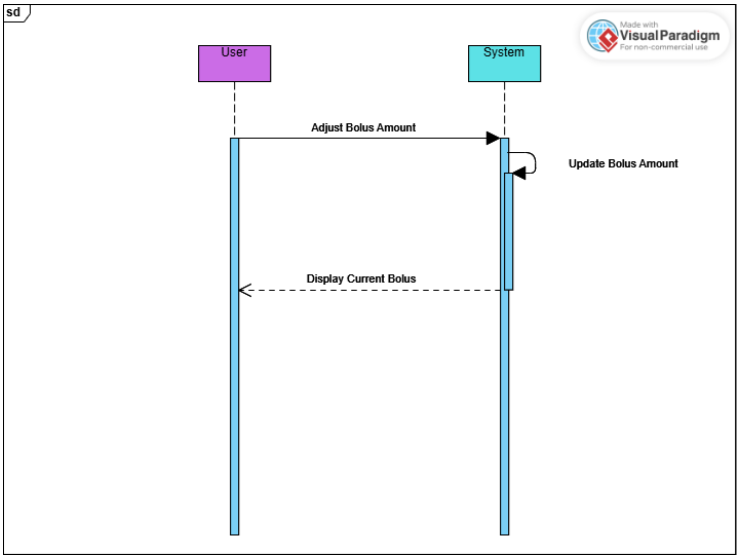
sd
User
System
Adjust Bolus Amount
Update Bolus Amount
Display Current Bolus

图 3: S1.2

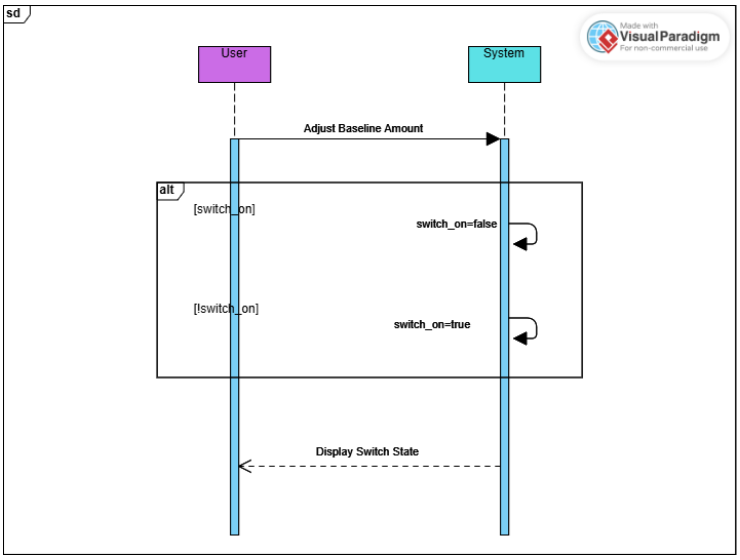
sd
User
System
Adjust Baseline Amount
alt
[switch_on]
switch_on=false
[!switch_on]
switch_on=true
Display Switch State

图 4: S1.3

Backend: database.switch_on changes to 1 if originally 0, changes to 0 if originally 1.

System Response: One line displays the switch state.

S1.4: Amount Calculation

Backend:

1. database. baseline_timeline_list and database. bolus_timeline_list are initialized to empty.

2. database.calculate_1h() and database.calculate_24h() have the same procedures of calculation, take database.calculate_1h() for example.

3. Initialized sum_=0.

4. We know that database. baseline_timeline_list and database. bolus_timeline_list are in time order.

5. Find all records of bolus injection in database. bolus_timeline_list in the last 60 minutes, and add their amounts to sum_.

6. For baseline, first consider the corner case that len(database. baseline_timeline_list)<=1.

7. Locate the last element whose time is earlier than an hour ago in database. baseline_timeline_list . If there is no, locate the first element.

8. Iterate from the location.

If it's the last element:

If it's earlier than an hour ago, add 1 hour multiplies the corresponding amount. Else if it's not earlier than an hour ago, add the time interval between this element and now multiplies the corresponding amount.

Else if it's not the last element:

If it's earlier than an hour ago, add add the time interval between 1 hour ago and next element multiplies the corresponding amount. Else, for common cases, add the time interval between this and next element multiplies the corresponding amount.

System Response: Update the two progress bars.

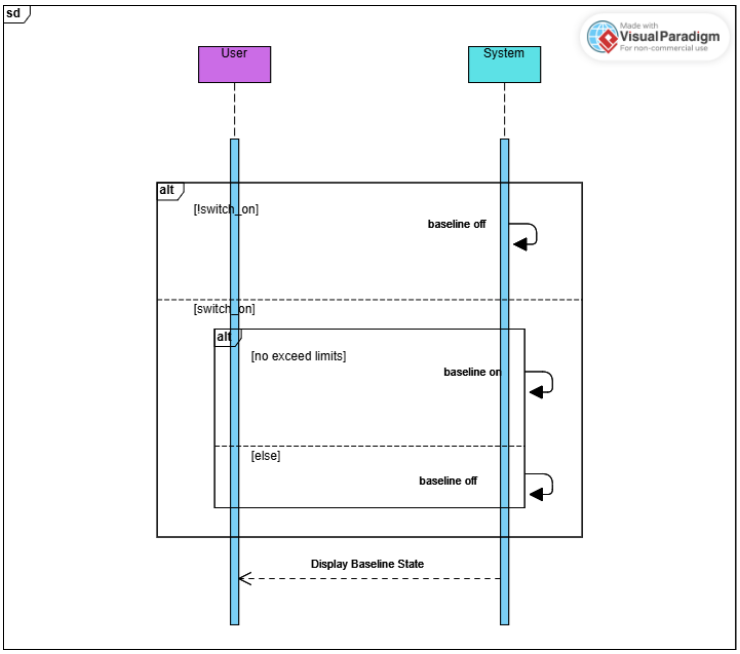

图 5: S1.5

S1.5: Decide Baseline State

Backend: If database.calculate_1h() plus the next drop amount will exceed 1 or database.calculate_24h() plus the next drop amount will exceed 3, don't inject. If the switch is off, don't inject. Else inject.

System Response: One line displays the state.

S1.6: Reset Injection Records

Frontend: The user click on the "Reset" button.

Backend: database. baseline_timeline_list and database. bolus_timeline_list are set to empty.

System Response: The two progress bars will be empty.

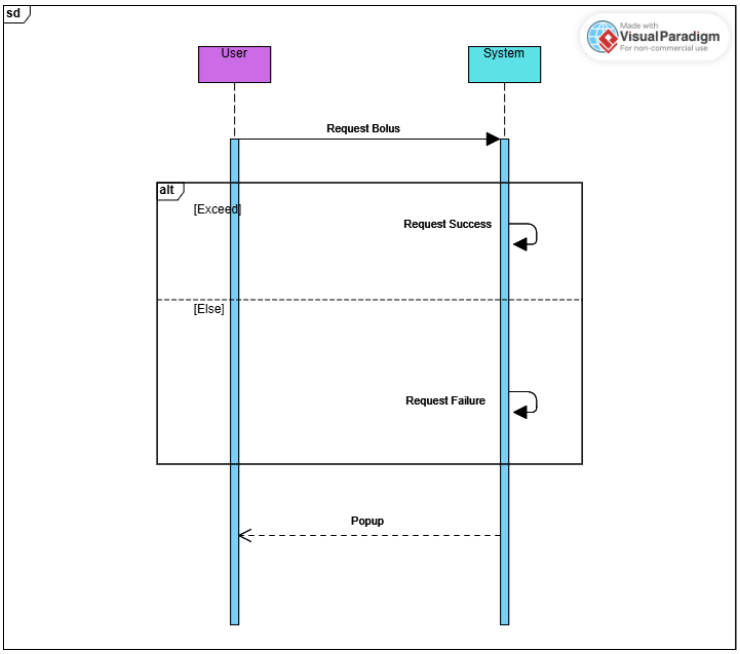

图 6: S2.1

S2: Patient Operations

S2.1: Request Bolus

Frontend: The user clicks on the "RequestBolus" button.

Backend: If database.calculate_1h() plus the bolus amount will exceed 1 or database.calculate_24h() plus the next bolus amount will exceed 3, don't inject. Else inject. A record [time,database.bolus_amount] will be added into database. bolus_timeline_list .

System Response: Failed or succeeded, a message box will pop up to inform you the detailed information.

S3: Update

S3.1: Update

Backend: First judge baseline state. If it's being injected, current_injected_amount =database.baseline_amount, else it's 0. If database. baseline_timeline_list is empty,

append[time,current_injected_amount]. Else if append[time,current_injected_amount] is different from the last element in the list, append[time,current_injected_amount], else pass.

System Response: Update the two progress bars.