Portable pulse oxymeter

Connected to a cloud server

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I. Introduction

In a hospital, almost every patient gets a pulse oxymeter to control constantly their pulse and oxygen content in their body. This is particularly important because it can prevent strokes, unconsciousness and much more. Today's pulse oxymeter are every time wired which makes them only useful when the patient is in his room and not moving, this makes them extremely laborious. Portable pulse oxymeter are also available, but these are only viewed by the patient who can already be unconscious or not familiar with the data. Hospitals do not have a lot of money and mostly do not have enough personal, not every patient can be monitored at the same time which is a big problem in today´s hospital. It should be easy and painless to see if a patient is not feeling well at various locations.
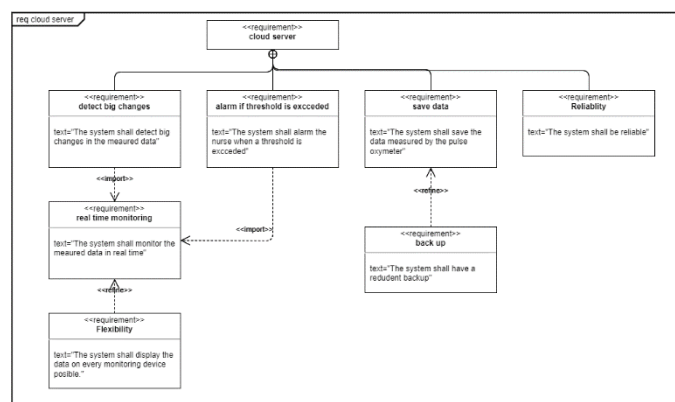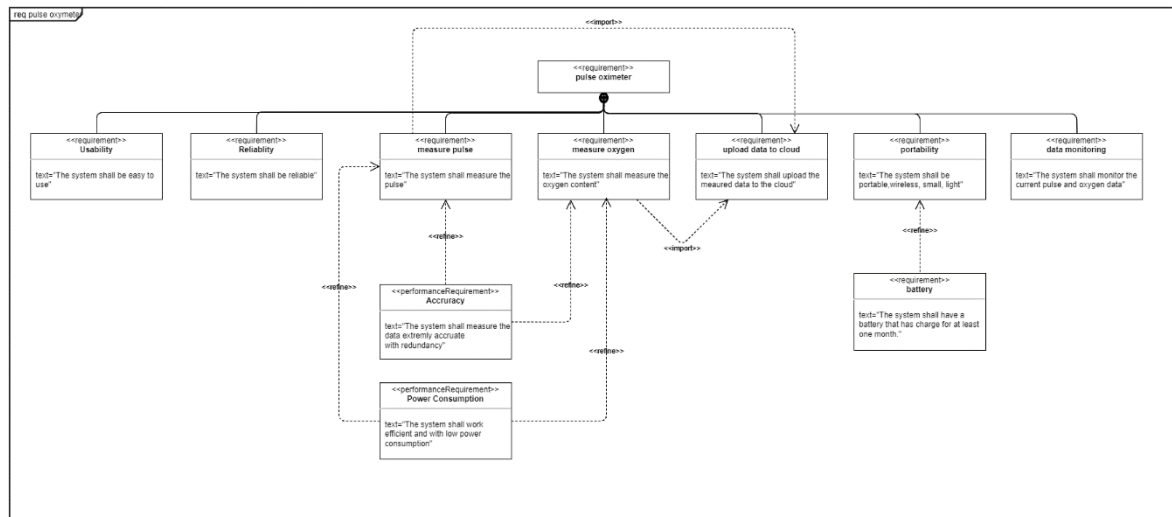
II. Concept

The solution to this problem is a portable pulse oxymeter that is connected to a cloud server, updated and monitored in real time. It detects substantial changes, if a threshold is exceeded and alarms, if necessary, the nurse and doctor by any monitoring device.

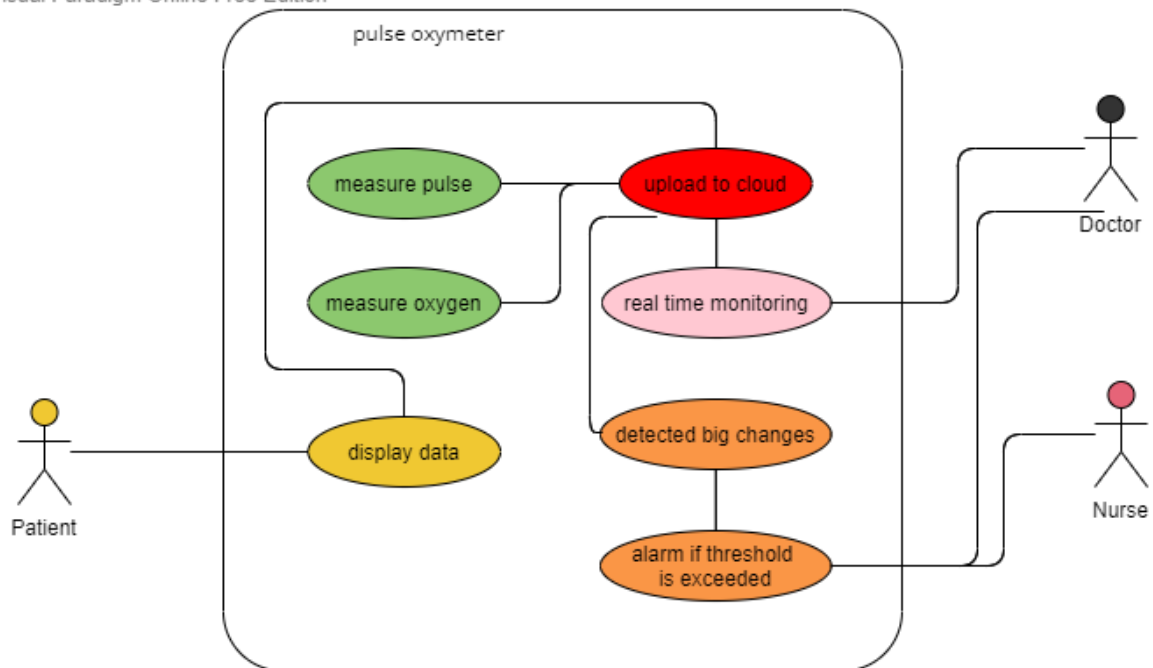## III. Design of the Concept

1. Requirements

The main requirement is that the pulse oxymeter is portable, with that it comes that it requires a low power consumption and a powerful battery. It also needs a Wi-Fi connection and should be packed in a small form factor, not bigger than a today´s pulse oxymeter. The current data should be monitored directly on the pulse oxymeter. For the system to work every room and every park in a hospital should be equipped with a Wi-Fi access point which is directly connected to the hospital's own server. The data which the pulse oxymeter sends to the server, needs to be saved and compared with old data in order to see if the current data exceeds any thresholds or any substantial changes occurred. The data from the server should be monitored by any device by the doctor or nurse. If the current data exceeds any thresholds or any substantial changes occurred, an alarm should be sent out to every monitoring device that is responsible for the specific patient. Also, the current and past data should be monitored in real time at any monitoring device that the nurse or doctor uses, that includes for example hospital PCs or smartphones.
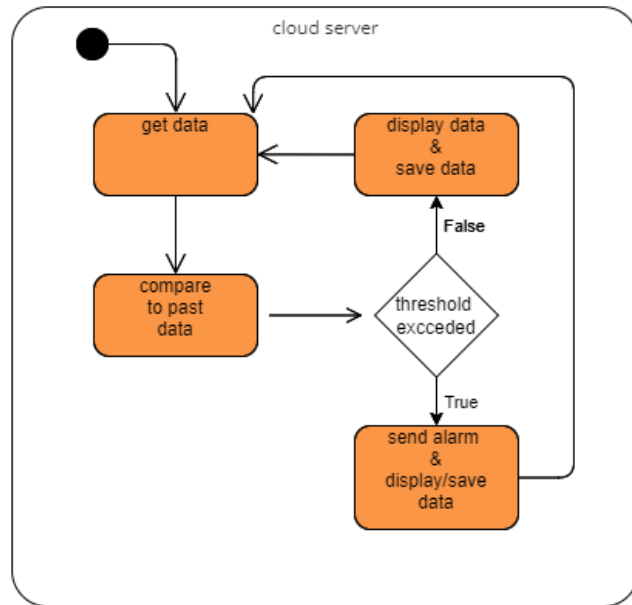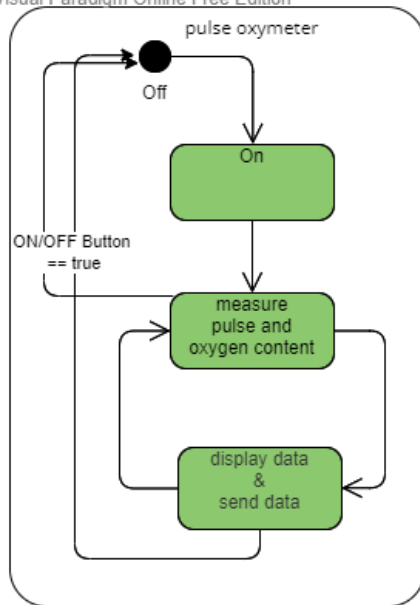
req pulse oximeter

<<requirement>>
pulse oximeter

<<requirement>>
Usability

text="The system shall be easy to use"

<<requirement>>
Reliablity

text="The system shall be reliable"

<<requirement>>
measure pulse

text="The system shall measure the pulse"

<<requirement>>
measure oxygen

text="The system shall measure the oxygen content"

<<import>>

<<requirement>>
upload data to cloud

text="The system shall upload the meaured data to the cloud"

<<requirement>>
portability

text="The system shall be portable,wireless, small, light"

<<requirement>>
data monitoring

text="The system shall monitor the current pulse and oxygen data"

<<refine>>

<<performanceRequirement>>
Accruracy

text="The system shall measure the data extremly accruate with redundancy"

<<performanceRequirement>>
Power Consumption

text="The system shall work efficient and with low power consumption"

<<import>>

<<requirement>>
battery

text="The system shall have a battery that has charge for at least one month."

req cloud server

<<requirement>>
cloud server

<<requirement>>
detect big changes

text="The system shall detect big changes in the meaured data"

<<requirement>>
alarm if threshold is excceded

text="The system shall alarm the nurse when a threshold is excceded"

<<requirement>>
save data

text="The system shall save the data measured by the pulse oxymeter"

<<requirement>>
Reliablity

text="The system shall be reliable"

<<requirement>>
real time monitoring

text="The system shall monitor the meaured data in real time"

<<requirement>>
back up

text="The system shall have a redudent backup"

<<requirement>>
Flexibility

text="The system shall display the data on every monitoring device posible."

<<import>> <<refine>>

2. Models

A. Use case

pulse oxymeter

- measure pulse
- upload to cloud
- measure oxygen
- real time monitoring
- display data
- detected big changes
- alarm if threshold is exceeded

Patient

Doctor

Nurse

B. State machine

pulse oxymeter

Off

On

ON/OFF Button
== true

measure
pulse and
oxygen content

display data
&
send data

cloud server

get data

display data
&
save data

compare
to past
data

threshold
excceded

False

True

send alarm
&
display/save
data

3. Hardware

4. Critical-based parts of the system

5. User interface