A common problem in intensive care units (ICU) in hospitals is to monitor patients. Usually, doctors and nurses are quite busy to care for all patients in the hospital or they currently are only on call. However, in case of an emergency, the medical staff has to react quickly and to take the necessary actions.

Normally, a lot of patients have to be monitored at the same time in different rooms and maybe on different floors. It’s not possible for the medical staff to monitor all patients at the same time. However, in case the physical conditions of a patient gets worse, it has to be reacted very quickly and with the right treatment.

Often also emergencies happen in parallel and it has to be quickly decided who is taking care of which patient. In case a doctor is on call, she needs to be informed quickly what has happened, what patient is affected and in which room she has to go.

The ICU Monitoring IoT Application will target this problem. The idea is to connect medical monitoring devices, video cameras in the hospital, ERP systems, and IBM Watson Health with each other and with the smartphones of the medical staff:
1. The medical monitoring devices detect something unusual at a patient
2. From the hospital’s ERP system, the current available and on call staff is retrieved and also some general information of the patient.
3. The on edge processing is retrieving additional data in step 4 and 5
4. Monitoring data from the cameras in the intensive care unit is retrieved
5. IBM Watson Health is triggered to assist with the diagnosis and correct treatment (monitoring data has been passed to Watson)
6. The on edge processing is collecting the data and will send to the appropriate medical staff determined in step 2.

Afterwards a nurse or a doctor will receive on their smartphones the following information:

- What has happened?
- Who is the patient?
- Which room/bed is the patient?
- Personal data of the patient (gender, age etc.)
- Monitoring data
- Recommendation from IBM Watson

Based on this information the medical staff can quickly react and provide the best treatment to the patient. With ICU Monitoring IoT Application the treatment of many patients in hospitals could be improved and the medical staff could work in a more efficient way
Persona

Jennifer
Senior Physician in the ICU

“I like to give my patients the best medical treatment although I have to take care about a millions things at the same time “

About

• 42, married, 1 kid, senior physician for 5 years in the ICU
• Working often on shifts and also lots of on call duties
• Need to quickly react in case of an emergency although I have to care of many patients and a lot of paper work
• I closely collaborate with other medical staff in the hospital

Responsibilities

• Senior physician in the ICU
• Monitoring medical state of the patients
• Diagnosis of patients
• Handling emergency situations (often in parallel)

Main Goals

• Giving best treatment to patients
• Finding always the correct diagnosis
• Save patients in emergency situations
• Always having an overview of the medical state of monitored patients

Needs

• Constant monitoring of patients medical data
• Alert in case the physical condition of a patient gets worse
• Handling of emergencies in parallel
• Supportive systems to give a quick and correct diagnosis

Pain Points

• Often too many things at the same time to do
• Need a better way to split work in case of parallel emergencies
• A reliable alert system especially when I am on duty
• A better way to access relevant data to give a quicker and better diagnosis
Point of View

As a doctor in the intense cure unit

I need a way to respond quickly with the correct diagnosis and finally the best treatment to parallel emergencies in collaboration with my colleagues even if I am on call or in any other place

so that I can provide the best medical care to our patients even in very busy situations.
## UX Journey

### On Call – Without ICU Solution

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>Having on call duty, doing paper works or resting</th>
<th>Emergency call comes in</th>
<th>Trying to figure out what happens and where to go</th>
<th>Rushing to the patient</th>
<th>Checking medical monitoring data</th>
<th>Figuring out what treatment to provide</th>
</tr>
</thead>
<tbody>
<tr>
<td>MINDSET</td>
<td>“a lot of paper work to do”&lt;br&gt;“Need some rest, was a long shift”</td>
<td>“Has no one else time to take the call?”&lt;br&gt;“Is it really an emergency”</td>
<td>“What has happened”&lt;br&gt;“Who?”&lt;br&gt;“Where do I find the patient?”</td>
<td>“Have to be fast”&lt;br&gt;“Which room was it again”</td>
<td>“A lot of data to look at”&lt;br&gt;“No time to check all”</td>
<td>“Have to find a quick diagnosis”&lt;br&gt;“Am I sure?”</td>
</tr>
<tr>
<td>FEELING</td>
<td>😊</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>TOUCH POINTS</td>
<td>Hospital office</td>
<td>Smartphone</td>
<td>Smartphone Patient’s file</td>
<td>Hospital rooms</td>
<td>Medical Monitoring Devices</td>
<td>Patient Patient’s file</td>
</tr>
</tbody>
</table>
# On Call – With ICU Application

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>Emergency call comes in on the ICU application</th>
<th>ICU application display: patient, room, reason of emergency</th>
<th>Rushing to the patient</th>
<th>ICU application display monitoring data</th>
<th>ICU application supports the diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Having on call duty, doing paper works or resting</td>
<td>“I see everything on my app: patient, room, what has happened”</td>
<td>“I see what medical data is relevant”</td>
<td>“Have to be fast”</td>
<td>“The application helps me to only consider important data”</td>
<td>“What does the computer say”</td>
</tr>
<tr>
<td>“Need some rest, was a long shift”</td>
<td>“I decline the calls and forward to another colleague”</td>
<td>“I see what I need”</td>
<td>“I can look on my phone to see the room”</td>
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<tr>
<td>“I know where to go”</td>
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<tr>
<td>“I know what the patient needs”</td>
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<tr>
<td>“I agree”</td>
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<td>FEELING</td>
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<tr>
<td>Hospital office</td>
<td>Smartphone: ICU application</td>
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<td>Smartphone: ICU application</td>
<td>Patient ICU application</td>
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**MINDSET**

- “a lot of paper work to do”
- “Need some rest, was a long shift”
- “I see everything on my app: patient, room, what has happened”
- “I decline the calls and forward to another colleague”
- “I see what medical data is relevant”
- “I see what I need”
- “I know where to go”
- “I see what I need”
- “I know what the patient needs”
- “Have to be fast”
- “I can look on my phone to see the room”
- “The application helps me to only consider important data”
- “What does the computer say”
- “I agree”
- “I know what the patient needs”

**FEELING**

- 😊
- 😊

**TOUCH POINTS**

- Hospital office
- Smartphone: ICU application
- Smartphone: ICU application
- Smartphone: ICU application
- Smartphone: ICU application
- Patient ICU application
Submission IoT: ICU Application - Johannes Reichel

Prototype

Link to BUILD

Please make your browser window smaller to get the smartphone feeling (build seems not to scale down when accessed by the external link)
**Process Description:**

1. The doctor receives a request on her phone. She sees the patient’s picture (or video in case of a video camera in the ICU) and also the room.
   The doctor can reject or confirm to take the emergency
2. After confirming, the doctor sees the main medical monitoring data which gave the alert and also a link to the IBM Watson analysis
3. There, the doctor can see what IBM Watson’s analysis has been and what treatment is suggested.