Smart Patient Monitoring System

An innovative healthcare system designed to enhance patient safety and improve emergency response times, that utilizes pressure, humidity, and temperature sensors to comprehensively monitor sleep activities, handling real-time alerts to notify responsible personnel, ensuring swift response to potential emergencies.

Sends measurements to Helium

Connects to the Azure dashboards

Transmitter Module

- Arduino Pro Mini based
- Processes data
- Sends measurements to Helium

DATACAKE

Handles rule for incoming data to send specific messages to the receiver module if the patient is not in bed.

Receiver Module

- Arduino Pro Mini based
- Processes received data
- Starts an alarm if patient is not in bed for long

LoRa Wan Module

- Long Range Wide Area Network Transmitter
- Sends uplink data

FSR

- Force Sensitive Resistor
- Placed under the mattress
- Used to determine if the bed is occupied

DHD11 Sensor

- Digital Temperature
- Digital Humidity
- Ambient environment

Button

- Used to turn off the alarm
- Accesible

LoRa Wan Module

- Long Range Wide Area Network Receiver
- Receives dowlink flag
- Handles synchronisation with Helium

Buzzer

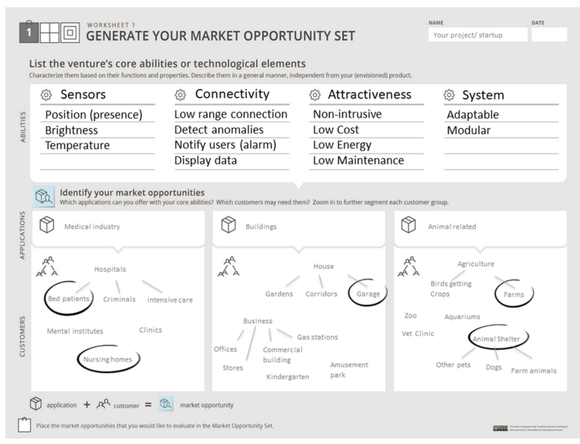
- Used as an alarm
- For the hospital personel
- Loud enough in a noisy environment

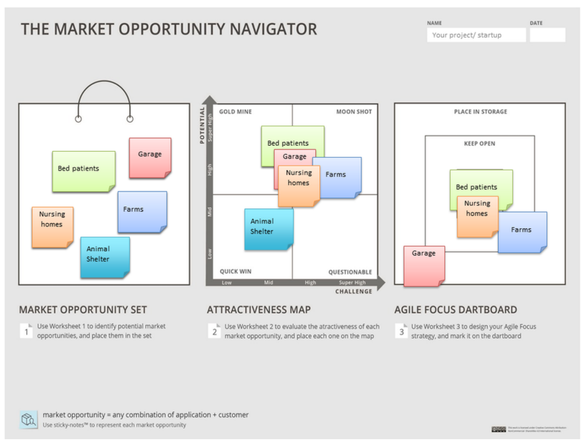
https://www.healthcareradius.in/cloud/2022/09/22/IAQ-1.jpg

User Interface

- In bed/Out of bed status in real-time based on pressure sensor data
- Pressure, humidity and temperature real-time data
- Line charts with data trends and sleep activity up to past 12h
- Big fonts for most relevant data, colour-coded graphs, size and position of the dashboard parts following UX principles

Market





- Total addressable market for IoT: **43.66bn DKK**
- Healthcare IoT market size: **5.83bn DKK**
- IoT CAGR (2023-2028): **12.08%**
- IoT CAGR (2023-2028): **11.18%**
- Growth of **9.9bn DKK** over 5 years

Competitors:

- Teton
- Milestone
- Sensative AB
- No Isolation
- Monsenso

Conclusions

What was accomplished:

- Successful implementation of seamless communication protocols, enabling smooth data transfer and device interaction.
- Plug-and-play system with an intuitive interface, ensuring ease of use for both patients and medical staff.
- Arduino Pro Mini chosen for its low power consumption, optimizing energy efficiency in our IoT Prototyping project for a smart patient application.
- Features a bespoke 3D printed box for durability and customized functionality within the system.

Potential areas of development:

- Integrating more sensors for comprehensive patient monitoring
- Data mining and advanced analysis for more accurate behavioural model
- Designing a smaller, custom PCB for improved efficiency and space optimization in the system.

Scan Me!

Adam Rogowski (232672), Alberto Benito Pontes (223068), Cesare Maio (232435), Dmytro Kirshev (232671), Lukas Malek (212074), Vajk Oliver Vozari (223173) 34365 IoT Prototyping, Technical University of Denmark