Assignment

Cognitive Behavioral Therapy for Insomnia (CBTI)

Course: IoT

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Design a digital CBT-I system

- The goal of the team assignment is to plan a complete technology-supported digital CBT-I system.
- The complete system would consist of:
  - The patients' app
  - Wearables / IoT devices
  - The server/cloud
  - The doctor's/therapists app (optional, only necessary if designing a support)

Recommended way to proceed

1. Brainstorm for requirements and functionality
2. Design an overview of your system (e.g. UML component diagrams)
3. Select hardware and communication protocols
4. Prototype the patients' app
5. Design the server/cloud component
6. Prototype the therapists' app
7. Fine-tune your system design (e.g. UML activity, sequence and deployment diagrams)

Requirements and functionality

- Brainstorm in your group to decide the requirements and functionality of the system that you want to plan
  - The course is on IoMT, so pay special attention to how wearables or other kinds of IoT devices could help to get information or to interact with the patient
- Possible methodologies for this part:
  - Design thinking
  - User-centered design techniques. For example, design two different personas to think about what they would need from the system, their limitations and preferences, how you can engage them to adhere to the therapy, etc.

Overview of the system

- Think of the different components of your system. some examples:
  - Sensors and maybe actuators, wearables, etc
  - Smartphone
  - Do you want to use a local gateway (like a Raspberry Pi) or is it enough with the smartphone as gateway?
  - Do you want to store information in the cloud or only on premises?
  - If using a cloud service, can you include some artificial intelligence functionality?
- Draw a diagram showing the different components and their relations.
  - Please use some formalized representation, like a UML component diagram. If you know SysML, you can also use that.
  - Remember: you do not need to know yet at this point which wearables or devices you will select or how they will communicate.

Hardware and protocols

- For the external components of your system (wearables, IoT):
  - Select possible devices (if available)
  - Or describe which sensors/actuators you would need and how they would communicate
    - WiFi
    - BLE
    - ZigBee, etc

Prototype the patients' app

- The basic functionality of the CBT-I app is guided by the CBT-I protocol. It is recommended that you think about:
  - Which information can you extract directly from the wearables (sleep metrics, sleeping environment, stress level, etc.)?
    - Do you still need to ask the user for their subjective answers (i.e., regarding sleep quality, duration, stress, etc.)?
    - Can you use the information to determine the adherence of the patient to the different steps of the therapy?
  - Digitalization of information input.
    - The anamnesis interview (initial session) and the sleep diaries still include information you cannot control by wearables. How would you improve the user experience for this part?
  - (Optional) How would you increase the adherence to the treatment/engagement to use the app? (Think of some gamification techniques)

Prototype the patients' app

- You will probably not have enough time to create a wireframe/mockup of all the app's functionality. Please describe all that you consider relevant to the app.
- Create a wireframe/mockup for some selected aspects of your app. You can choose how many and which ones.
- Recommended mockup/wireframe tools:
  - You can do it on paper
  - Use Figma (www.figma.com)
  - etc

Questions