Summary of Questionnaires

Project Title: Leveraging LLMs and Multi-Modal User Signals to Create Personalized Interactive Experiences for Relaxation

The goal for the questionnaires is to obtain data that will help us understand if there was a significant difference in perceived relaxation (RRS [1]) and reduction of anxiety pre/post intervention (STAI [2]) and compare these with a control group without the intervention. In both conditions, participants might fall asleep, thus, we also added sleep-related questionnaires (RCSQ [3], ESS [4]). We believe that the efficacy of the intervention might also vary based on their imagery abilities, thus we added Psi-Q [5] questionnaire. We will also evaluate the usability of the prototype and users' perception of using AI systems to unwind.

Baseline measurements - In addition to basic demographic information (Section 1. age and gender), the following measures will be administered <u>**at the beginning**</u> of the study session:

- Section 2. Mood

    o   How are you currently feeling?

    o   Any particular reason why you are feeling like this?

    o   [1] Relaxation Rating Scale (RRS)

    o   [2] State Trait Anxiety Inventory (STAI): Form Y-1 (state anxiety)

- Section 3. Sleep

    o   [3] Richards-Campbell Sleep Questionnaire (RCSQ): 5-item survey that assesses perception of the users' quality of sleep the previous night.

    o   [4] Epworth Sleepiness Scale (ESS): rate on a scale of 0 to 3 how likely they are to fall asleep in different situations. A rating of 0 means they would never fall asleep, and a 3 reflects a high likelihood of dozing off.

- Section 4. Imagery

    o   [5] Psi-Q: The Plymouth Sensory Imagery Questionnaire

<u>After</u> the intervention the following measures will be administered:

- Section 1. Mood

    o   [1] Relaxation Rating Scale (RRS)

    o   [2] State Trait Anxiety Inventory (STAI): Form Y-1 (state anxiety)

- Section 2. User Experience and Preferences

Detailed Questions

Project Title: Leveraging LLMs and Multi-Modal User Signals to Create Personalized Interactive Experiences for Relaxation

[Setting up physiological sensors]

<u>Pre-Intervention Questionnaire</u>

Participant ID:

Section 1. Demographics

- Age

    - 18-24
    - 25-34
    - 35-44
    - 45-54
    - 55 or older
    - Prefer not to answer

- Gender

    - Female
    - Male
    - Transgender Female
    - Transgender Male
    - Gender Variant/Non-Conforming
    - Not listed (please specify)
    - Prefer Not to Answer

Section 2. Mood

- How are you currently feeling? [if you prefer not answering to this question, write "NA"] [open answer text input]

- Any particular reason why you are feeling like this that you would like to share? [if you prefer not answering to this question, write "NA"] [text input]

- Rate your current level of relaxation on a scale from 1 to 7, with 1 being "Not relaxed at all" and 7 being "totally relaxed".

- On a scale from 1 to 4, with 1 being "Not at all", 2 "Somewhat", 3 "Moderately So" and 4 "Very much so"; rate <u>how you feel right now, that is, at this moment</u>.

    1. I feel calm
    2. I feel secure
    3. I am tense
    4. I feel strained
    5. I feel at ease
    6. I feel upset
    7. I am presently worrying over possible misfortunes
    8. I feel satisfied
    9. I feel frightened
    10. I feel comfortable

11. I feel self-confident
12. I feel nervous
13. I am jittery
14. I feel indecisive
15. I am relaxed
16. I feel content
17. I am worried
18. I feel confused
19. I feel steady
20. I feel pleasant

Section 3. Sleep

- Sleep depth
  My sleep last night was: Deep sleep (100) -------------------------------------- Light sleep (0)

- Sleep latency
  Last night, the first time I got to sleep, I:
  Fell asleep almost immediately (100} -------------------------------------- Just never could fall asleep (0)

- Awakenings from sleep Last night I was:
  Awake very little (100) -------------------------------------- Awake all night long (0)

- Ability to return to sleep Last night, when I woke up or was awakened, I:
  Got back to sleep immediately (100) -------------------------------------- Couldn't get back to sleep (0)

- Sleep quality I would describe my sleep last night as
  A good night's sleep (100) -------------------------------------- A bad night's sleep (0)

- Optional: Noise Item I would describe the noise level last night as:
  Very quiet (100) -------------------------------------- Very noisy (0)

- On the following scale: 0 = would never doze, 1 = slight chance of dozing, 2= moderate chance of dozing, 3 = high chance of dozing.

  1. Sitting and reading
  2. Watching TV
  3. Sitting, inactive in a public space
  4. As a passenger in a car for an hour without a break
  5. Lying down to rest in the afternoon when circumstances permit
  6. Sitting and talking to someone
  7. Sitting quietly after a lunch without alcohol
  8. In a car, while stopped for a few minutes in the traffic

Section 4. Imagery

Please try to form the images described below and rate each mental image on the following scale: 0 (no image at all) to 10 (image as clear and vivid as real life).

Imagine the appearance of:
- a friend you know well
- a cat climbing a tree
- a sunset

- the front door of your house
- a bonfire

Imagine the sound of:
- an ambulance siren
- hands clapping in applause
- the mewing of a cat
- the sound of a car horn
- the sound of children playing

Imagine the smell of:
- a stuffy room
- a rose
- fresh paint
- newly cut grass
- burning wood

Imagine the taste of:
- mustard
- toothpaste
- lemon
- sea water
- black pepper

Imagine touching
- a warm sand
- a soft towel
- the point of a pin
- icy water
- fur

Imagine the bodily sensation of:
- relaxing in a warm bath
- having a sore throat
- threading a needle
- jumping into a swimming pool
- walking briskly in the cold

Imagine feeling:
- excited
- relieved
- furious
- in love
- scared

- If you could teleport to another location or a memory from your past that could help you relax and unwind, what would you pick?
- What sounds are in this scenery?
- What odors?
- Can you describe any other sensations?

[Questionnaire is over, 5 minutes of baseline physiological measurement]

[After 5 minutes are over:]

10 minutes rest (control group) or AI-based (intervention).]

Group A: Continues sitting in chair. What instruction, if any, would you give this group?

[Script that the investigator will read]: Thank you for your help, we just finished the 5 minutes of baseline measurements. Now we will proceed with the second part of the study. You can simply close your eyes or rest as you wish. We will do this for 10 minutes and then we will proceed with the final round of questionnaires. If you fall asleep, don't worry I will wake you up. Let me know if you have any questions.

Group B: What instruction would you give this group before they put on headphones, eye mask? Continues sitting in chair] Script that the investigator will read]: Thank you for your help, we just finished the 5 minutes of baseline measurements., now we will proceed with the AI guided imagery. Guided imagery is a type of focused relaxation or meditation. It is a therapeutic approach that has been used in the past to help lower stress and anxiety levels. To do guided imagery, you need to focus on something that makes you feel calm and happy. You might close your eyes and imagine a beautiful place or a positive situation. This might help you to be more aware and relaxed. Your thoughts affect how your body feels. For instance, when you worry about something, you might feel nervous and tense. Your heart might beat faster, and you might have trouble concentrating. But when you think about something nice, you tend to feel more relaxed and peaceful. Your muscles might loosen up, and your mind might clear up. This can help you deal with different kinds of stress better. Today, we will practice guided imagery driven by an AI. You can simply close your eyes and rest. A voice will guide you through the relaxing scenery of your choice, you just need to relax and enjoy the sounds and scent, which might help you relax and fall asleep. You will also hear the sound of a heart beating, that is your real-time heartrate. *We will do this for 10 minutes and then we will proceed with the final round of questionnaires. If you fall asleep, don't worry I will wake you up. You are also welcome to stay for longer if you like. Let me know if you have any questions.*

Before we get started, it would be helpful if you want to share how you are currently feeling and your preferred scenery that might help you relax and fall asleep. This information will be used by the AI to customize the experience and come up with a story based on how you are feeling, your current heart rate and your preferences. For example, I am currently feeling anxious about a deadline, and my preferred scenery would be a beach in the mexican caribbean with my family, friends and my dog.You can be as specific as you want, if you don't feel comfortable sharing how you are currently feeling you don't need to do so. <u>Post-Intervention Questionnaire</u>

Section 1. Mood

- Rate your current level of relaxation on a scale from 1 to 7, with 1 being "Not relaxed at all" and 7 being "totally relaxed".

- On a scale from 1 to 4, with 1 being "Not at all", 2 "Somewhat", 3 "Moderately So" and 4 "Very much so"; rate <u>how you feel right now, that is, at this moment</u>.

  - I feel calm
  - I feel secure
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  - I feel strained
  - I feel at ease
  - I feel upset
  - I am presently worrying over possible misfortunes
  - I feel satisfied
  - I feel frightened

- I feel comfortable
- I feel self-confident
- I feel nervous
- I am jittery
- I feel indecisive
- I am relaxed
- I feel content
- I am worried
- I feel confused
- I feel steady
- I feel pleasant

Section 2.b User Experience [skip if you did not try AI-based guided imagery]

Please answer each question on a scale of 1 to 5, with 1 means strongly disagree and 5 means strongly agree.

- I felt comfortable using AI as a guided imagery tool.
- I felt it was important that the AI personalized the story based on my preferred scenery.
- I felt it was important that the AI personalized the story based on my current mood.
- I felt it was important that the AI personalized the story based on my current heart rate.
- I felt it was important to hear my heart rate.
- I found the voice pleasant.
- I found the sound of my heart beating pleasant.
- I found the rest of the sounds pleasant.
- I found the scent pleasant.
- I found that the system perceived/recognized how I was feeling.
- I found that the system adjusted/responded to how I was feeling.
- I found that the system was empathic (ability to sense your emotions and share your feelings).
- I found that the system was compassionate (ability to feel for and not feeling with the other).

- I found that the way the system adjusted/responded based on my preferred scenery was important for me to:
  - Enjoy the experience
  - Feel immersed
  - Relax
  - Unwind/Disconnect
  - Sleep
  - Other
  - None of the above

- I found that the way the system adjusted/responded based on my heart rate was important for me to:
  - Enjoy the experience
  - Feel immersed
  - Relax
  - Unwind/Disconnect
  - Sleep

- Other
- None of the above

- I found that the way the system adjusted/responded based on my current mood was important for me to:
  - Enjoy the experience
  - Feel immersed
  - Relax
  - Unwind/Disconnect
  - Sleep
  - Other
  - None of the above

- I found that the system responses were: (select all that apply):

  - Empathic
  - Compassionate
  - Designed/Developed to be empathic
  - Designed/Developed to be compassionate
  - Don't know
  - None of the above (please specify)

How can the AI experience be improved to better suit your needs and expectations? [text input]

Section 2. Overall User Experience & AI Preferences

- In your own words, describe the experience you just had. [text input]
- Did you use any particular technique that helped you relax? [text input]
- Please answer each question on a scale of 1 to 5, with 1 means strongly disagree and 5 means strongly agree.
  - I enjoyed the experience.
  - I felt immersed.
  - I felt more relaxed after the experience than before.
  - I felt more calm after the experience than before.
  - I felt more refreshed after the experience than before.
  - I felt more sleepy after the experience than before.
  - I felt my mood was better after the experience than before.
  - I felt more rested after the experience than before.
  - I feel positive after using the experience.
    I would use this at home.
  - I would prefer it if the guided imagery*** was narrated by someone/something (see description below if you don't know what guided imagery is).
  - I would prefer it if an AI narrated the guided imagery.
  - I would prefer it if a pre-recording of a human narrated the guided imagery.
  - I would prefer it if a human narrated the guided imagery in real-time.

I don't mind if an AI or a human narrates the story.

If the voice of the AI could be customized based on your preferences, what type of voice would you prefer? (select all that apply):
- A voice that I do not know (unknown voice)

- The voice of a partner (intimate voice)
- The voice of a good friend or family (personal voice)
- The voice of an acquaintance (e.g, someone from work)
- The voice of a therapist/doctor
- Your own voice
- Other (please describe)

- ***Guided imagery is a type of focused relaxation or meditation. It is a therapeutic approach that has been used in the past to help lower stress and anxiety levels. To do guided imagery, you need to focus on something that makes you feel calm and happy. You might close your eyes and imagine a beautiful place or a positive situation. This might help you to be more aware and relaxed. Your thoughts affect how your body feels. For instance, when you worry about something, you might feel nervous and tense. Your heart might beat faster, and you might have trouble concentrating. But when you think about something nice, you tend to feel more relaxed and peaceful. Your muscles might loosen up, and your mind might clear up. This can help you deal with different kinds of stress better.

- What are the main advantages or disadvantages that you can envision of using AI to drive guided imagery experiences (e.g., audio-based narrations with preferred scenery) compared to other methods or sources that do not use AI? [text input]

- What are the main reasons or goals that you would be using AI-driven experiences for?

  - Relaxation
  - Sleep
  - Focus
  - Retrieve past experiences
  - Stress management
  - Pain relief
  - Emotional regulation
  - Self-care
  - Creativity
  - Learning
  - Memory enhancement
  - Other (please specify)
  -
- From 1 to 5, with 1 means "Never", and 5 "Very often". How often would you use an AI to help improve your well-being and self-care (e.g, increase relaxation, help you sleep, etc.)
- Any other comments or suggestions? [Please write your answer here.]

Thank you very much for your time, participation and feedback!