User Incorporation Plan

1. End-User Identification Report

a. End-User Group(s) for the Project

The primary end-users of SenseAI are individuals who are blind or have low vision. According to the World Health Organization (WHO), over 2.2 billion people worldwide experience some form of blindness, with many facing moderate to severe limitations in visual function [11]. These individuals frequently rely on access technologies to enhance their sensory engagement with the world and facilitate navigation in daily activities [1].

A study published in the *Journal on Multimodal User Interfaces* underscores the importance of developing user-centered access technologies specifically tailored to address the needs of blind users [2]. SenseAI attempts to address this requirement by focusing on immersive audio descriptions and creating an experience that extends beyond simple navigation aids to enrich sensory engagement. Moreover, research highlights the value of intuitive, accessible technology, which is essential for improving the quality of life of people with disabilities [1].

b. Importance of These Users to Project Success

These users are critical to the project because their input ensures that the system's immersive audio descriptions are effective, user-friendly, and aligned with real-world needs. According to what we have learned in HCI for AI class indicates that involving end-users in developing AI technologies significantly enhances the usability, satisfaction, and long-term adoption of these tools.

A study in the *Journal of Environmental Research and Public Health* demonstrates that access technologies developed with continuous feedback from target users yield more practical and impactful solutions, ultimately leading to improved user experience and accessibility outcomes [4]. Additionally, research in the *International Journal of Human-Computer Studies* underscores the effectiveness of user-centered design methodologies in access technology, noting that early and ongoing user involvement allows developers to address specific user experiences, resulting in more accessible and empowering technologies [5]. Collaborating with blind users and organizations like Envisioning Access provides SenseAI with essential insights that guide the system’s functionality and adaptability, enhancing its relevance and success in the blind community.

c. Demographic, Psychographic, and Behavioristic Characteristics

To ensure SenseAI meets the needs of its end-users, we must understand the demographic, psychographic, and behavioristic characteristics of blind individuals.

- **Demographics**: The population of blind individuals spans a wide age range, with a significant portion comprising older adults. According to the World Health Organization, the prevalence of need for assistive products excluding spectacles, is approximately 31.2% at and above age 60 and 8.2% between age 18 and 59 [6]. Only 43% of blind youths regularly use the Internet, compared to 95% of their sighted peers, and just 40% have access to the assistive technology they need [3] highlighting a critical gap in access and training.
- **Psychographics**: Many blind individuals are motivated to seek out technologies that enhance their experiences, emotional well-being, and quality of life. It is important that we as developers value access technologies that provide an enriching experience beyond basic functionality for the users.
- **Behavioral Characteristics**: The adoption and use of access technologies among blind users vary widely, influenced by factors such as ease of use, perceived benefits, and the availability of training. Research indicates that while many people with disabilities are receptive to access devices, barriers such as lack of training and awareness can hinder effective use [8]. Addressing these barriers through comprehensive user education and access is essential for the successful implementation of technologies like SenseAI.

2. Recruitment Strategy Plan

a. Outline of Recruitment Methods

To recruit blind participants for SenseAI, we'll employ targeted methods designed to reach relevant individuals and encourage engagement. By partnering with community organizations, using online platforms, and leveraging networks focused on accessibility we will try to ensure a diverse and representative sample of participants.

We have connected with Diane S. Nahabedian, the Executive Director of Envisioning Access, Inc., who has expressed willingness to connect us with relevant groups and end-users for feedback and testing. Collaborating with an organization like Envisioning Access significantly enhances recruitment, as their established networks build trust within the blind community. Studies in the *Journal of Clinical and Translational Science* highlight the effectiveness of such partnerships in fostering meaningful participation and ensuring community-based engagement [9].

By implementing this strategy, and with access from Envisioning Access, SenseAI can build a well-rounded participant pool that provides insights across various demographic and technological backgrounds, enhancing the applicability and inclusiveness of the research.

b. Criteria for Selecting Participants, Outreach Methods, and Incentives

To ensure that SenseAI effectively serves blind users, we have established criteria for participant selection and detailed outreach methods.

- **Participant Selection Criteria**:

    - Selection will focus on individuals who are legally blind or have low vision, encompassing a variety of age groups and levels of technological familiarity to ensure diverse feedback. Research in the *Journal of Assistive Technologies* highlights the importance of considering factors like familiarity with technology in selecting participants for studies involving access tools [13].
    - To accurately gauge SenseAI's effectiveness, participants will be screened for device usage comfort, targeting individuals who are accustomed to using access technologies, such as screen readers or audio-based devices.
- **Outreach Methods**:
    - **Community Partnerships and Online Platforms**: Collaborating with community-based organizations like Envisioning Access and leveraging online platforms frequented by blind individuals can maximize recruitment reach. A study in the *Journal of Clinical and Translational Science* underscores that engagement through established networks fosters trust and enhances participation, particularly in accessibility-focused research [9].
- **Incentives**:
    - To encourage participation, appropriate incentives will be offered while adhering to ethical standards depending on funding. Research in *JAMA Internal Medicine* indicates that incentives, when carefully designed, can effectively motivate participation without undue influence, ensuring voluntary and meaningful engagement [15].

By implementing these strategies, SenseAI's recruitment plan effectively supports the engagement of a diverse participant base, enhancing the research's relevance and impact.

3. Questionnaire Design Document

a. Objectives of the Questionnaire

This questionnaire is designed to explore the needs, preferences, and experiences of blind users with current access technology. By understanding their frustrations and desired features, we can align SenseAI with real user requirements.

b. Questionnaire

Section 1: Background Information

1. What is your age?
2. What is the extent of your blindness? (e.g., legally blind, low vision, etc.)
3. How comfortable are you with using access technology on a scale of 1 to 5? (1 = not comfortable, 5 = very comfortable)

Justification: Collecting demographic and blindness-related data provides essential context for interpreting user feedback. Understanding the extent of blindness and familiarity with technology allows for tailored design solutions that meet specific user needs [16].

Section 2: Current Technology Usage

1. Which access technologies do you currently use? (e.g., screen readers, voice partners, audio description devices)
2. How frequently do you use access technology in your daily life? (e.g., daily, weekly, occasionally)
3. How satisfied are you with the current access technologies you use? (1 = not satisfied, 5 = very satisfied)

Justification: Understanding current technology use helps identify gaps and areas for improvement in existing solutions. This information provides a foundation for developing a more effective access tool that builds on existing user habits [16].

Section 3: Needs and Preferences

1. What aspects of your current access technology do you find most helpful?
2. Are there any features you wish were available in your current access technology?
3. When using audio-based access tools, what type of information do you find most helpful? (e.g., detailed object descriptions, emotional tone, contextual information)

Justification: Exploring needs and preferences supports a user-centered design approach, ensuring that SenseAI offers functionalities that directly address user requirements. Understanding user needs enables a more personalized and effective technology solution [17].

Section 4: Challenges and Frustrations

1. What frustrations, if any, do you experience with your current access technology?
2. Do you encounter any difficulties in understanding or using audio descriptions from your devices?
3. How could your experience with access technology be improved?

Justification: Identifying user issues helps developers address pain points, thereby improving usability and satisfaction. Acknowledging challenges leads to more refined and accepted technologies [18].

Section 5: Preferences for SenseAI

1. Would you find it useful if an access tool could provide emotionally enriching and immersive audio descriptions?

2. How customizable do you prefer your access technology to be in terms of description style and detail level? (1 = no customization, 5 = highly customizable)
3. What concerns, if any, do you have about a new AI-driven access technology?

Justification: Gathering input on potential features and customization preferences ensures SenseAI aligns with user expectations. Research shows that customizable access technologies significantly improve user satisfaction and engagement [19].

Section 6: Feedback and Suggestions

1. What additional features or improvements would you like to see in access technologies like SenseAI?
2. Would you be interested in participating in future tests or feedback sessions for SenseAI?
3. Do you have any other comments or suggestions?

Justification: Open-ended feedback encourages user involvement, fostering a sense of ownership and providing valuable insights for future iterations. User-centered design approaches emphasize the importance of iteration for enhancing technologies [17].

4. Observation and Activity Plan

A. Activities and Behaviors to Observe

We will observe the following during the interaction with SenseAI:

- **Types of Questions:** The range and specificity of questions users ask regarding visual elements like colors, textures, and animals. Every question that is asked will be documented. As an extension of this activity, we can categorize the questions based on topics and the specificity expected. This can later be included in our system as feedback.
- **User Reactions:** Immediate verbal and non-verbal responses (e.g., surprise, confusion, satisfaction) to the descriptions provided by SenseAI.
- **Engagement:** How actively users follow up after receiving a description, such as asking for further details or clarification.

  Justification:

  - Observing users in their natural environments provides context for how they engage with access technology, offering insights into environmental and situational influences.
  - The SETT (Student, Environment, Tasks, and Tools) Framework, widely used in access technology assessments, highlights the importance of environmental and contextual observations to create tailored and effective solutions [20].

B. Conducting Observations:

- **Platform**: Zoom meetings will be used for real-time interaction.
- Task: Each user will be asked to ask five questions to SenseAI, selected based on their curiosity about visual elements (e.g., "What does a lion look like?" or "What color is a ripe banana?").
- Real-time Monitoring: We will observe participants' reactions through the Zoom video and audio, including facial expressions, verbal comments, and gestures (if applicable).

Justification:
This approach aligns with the SETT Framework[20] by focusing on the dynamic interaction between the user's abilities, their environment, and the tasks they need to complete, ensuring SenseAI provides effective support. While the Zoom setting may not fully replicate a natural environment, it serves as a valuable step toward real-world application.

C. Documentation and Analysis:

- **Recording**: Each session will be recorded (with participant consent) to ensure an accurate capture of user interactions, reactions, and feedback.
- **Transcription**: The verbal exchanges (including questions and user reactions) will be transcribed. Key phrases indicating user satisfaction, confusion, or curiosity will be highlighted for further analysis.
- **Behavior Coding**: User reactions will be categorized based on emotional responses (positive, neutral, negative) and engagement level (e.g., asking follow-up questions or showing interest).

Justification: Observer notes are a valuable qualitative method for capturing context in user experience studies, offering flexibility to record nuanced observations and unexpected contextual factors that may be missed by automated techniques alone, as evidenced by the paper's inclusion of using comprehensive data gathering techniques including researcher observations alongside other methods.[23]
Video recording is presented as a valuable method for capturing complex interactions in primary care settings [24] which can be parallelized in our context.

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