Problem Statement and Goals
Software Engineering

Team #22, TeleHealth Insights
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Table 1: Revision History

Date	Vers.	Developer(s)	Change
09/20/2024	1.0	Promish Kandel	Added Initial problem statement
09/22/2024	1.1	Promish Kandel	Modified Problem, Added Goals, Inputs/Outputs, Environment
09/23/2024	1.2	Promish Kandel	Modified Goals, Added Challenge Level and Extras
09/23/2024	1.3	Mitchell Weingust	Proofread and Modified: Problem Statement, Goals, Stretch Goals, Challenge Level and Extras
09/23/2024	1.4	Promish,Mitchell, Parisha, Jasmine	Added Reflection
09/23/2024	1.5	Promish,Mitchell, Parisha, Jasmine	Final Review
03/23/2025	2.1	Parisha Nizam	Implemented TA Feedback: Numbered Goals for Better Tracability Pg 3
03/23/2025	2.2	Parisha Nizam	Implemented TA Feedback: Made Change Coloumn Easier to Read Pg 1
03/23/2025	2.3	Parisha Nizam	Implemented TA Feedback: Ensured Canadian Spelling: Behaviour Pg 2

1 Problem Statement

1.1 Problem

Children with speech difficulties often require regular assessments to track their progress during speech therapy. These assessments are vital in monitoring development, identifying issues, and adjusting treatment plans accordingly. For bilingual children, these assessments can be challenging because of the shortage of bilingual speech language pathologists (SLPs). Parents, who are the key informants with understanding of multiple languages spoken in the home, have the potential to become helpers in bilingual assessments, especially in telehealth settings. However, existing bilingual language assessment tools are often designed and built based on SLPs' in-person practices, and lack designs specifically addressing parents' needs and behaviours when they act as at-home test administrators. The lack of such design considerations could also affect the outcome from these assessments, when SLPs need to assess and understand children's results from remote assessments facilitated by parents. Hence, there are opportunities to build a system that better supports bilingual language assessments at home settings for children and parents, through providing better guidance and instructions for parents, capturing more contextual data to complement the results for SLPs, and engaging children in these assessments.

1.2 Inputs and Outputs

1.2.1 Input

- Video Stream of the individual taking the assessment
- Selecting answers via mouse clicks
- Microphone Audio

1.2.2 Output

- Audio analysis for background noise
- Video analysis for keyboard and face movement
- Analysis of the selected answer for each question
- Summary of results and analysis details for clinicians

1.3 Stakeholders

- Parents with children that have speech difficulties
- Children with speech difficulties (who need to take language assessments)
- Clinicians (SLPs) who work with children that have speech difficulties

- Project Researcher, Dr. Yao Du, Clinician Assistant, Professor at the University of Southern California
- Project Supervisor, Dr. Irene Ye Yuan, Assistant Professor in the Department of Computing and Software at McMaster University

1.4 Environment

1.4.1 Software

Software should be cross-compatible amongst Linux, MacOS, Windows, IOS and Android operating systems.

1.4.2 Hardware

Hardware required includes any personal computer or mobile device with:

- Sound Output (Speaker, Headphones)
- Microphone
- Webcam (Internal/External)

2 Goals

1. **Intuitive Parent Interface:** Intuitive and helpful interface that can guide parents to effectively administer language tests.
    - The application should be easy to navigate with clear and meaningful symbols. It should also provide feedback so that end users are aware of their interactions being processed throughout the assessment.
2. **Engaging Child Interface:** Engaging interface and interaction for children when taking the assessment.
    - The webpage should have a simple but visually appealing design to keep children engaged throughout the assessment.
    - The webpage should have colours and images to attract attention to the assessment's questions and selections.
3. **Reliable SLP Assessment Results:** Provide reliable assessment results for SLPs by capturing additional contextual data and preliminary analysis.
    - The application should provide additional information to SLPs to identify background interference and signs of bias or test complications.
    - The application should filter out noise and be able to identify multiple users to detect additional guidance from others.

4. **Data Security:** Data security to ensure health/sensitive records are stored and accessed securely.
    - The software should use a security protocol to store and retrieve sensitive data from a secure database.
5. **Cross-Platform Integration:** Provide cross-platform integration for different devices and screen sizes.
    - The webpage should be accessible for parents and children, regardless of the chosen device, by rendering correctly on all screen sizes and formats.

3 Stretch Goals

- Provide an interface for clinicians to analyze stored data.
    - The software should provide a web interface for clinicians to upload assessment results, for storing and analyzing data more efficiently.
    - This clinician dashboard should allow ability to view and grade assessment results

4 Challenge Level and Extras

Our challenge level is general as the project scope is limited in terms of how much research is required. The required domain knowledge is basic web-design in a stack of our choice. We are also planning on using open-source large language models for audio and video processing.

The extras for this project includes:

- User Documentation: Providing users with a guide on how to use and better understand the system.
- Usability Testing: Receive user feedback on usability of design of the application, including improvements on how the system looks and functions.

Appendix — Reflection

The purpose of reflection questions is to give you a chance to assess your own learning and that of your group as a whole, and to find ways to improve in the future. Reflection is an important part of the learning process. Reflection is also an essential component of a successful software development process.

Reflections are most interesting and useful when they're honest, even if the stories they tell are imperfect. You will be marked based on your depth of thought and analysis, and not based on the content of the reflections themselves. Thus, for full marks we encourage you to answer openly and honestly and to avoid simply writing "what you think the evaluator wants to hear."

Please answer the following questions. Some questions can be answered on the team level, but where appropriate, each team member should write their own response:

1. What went well while writing this deliverable?

    - Promish Kandel: Setting up meetings was easy during this deliverable, as everyone was online and ready to start. We had questions about our goals, which Chris answered. Our supervisor helped guide the scope of our problem statement and goals, providing us with more insight into our project.
    - Mitchell Weingust: The team was able to effectively split up parts, without relying on other team members to complete their parts. The team also communicated with each other to help one another out by reviewing documents for spelling and grammar. The team effectively collaborated with each other to ensure that the documents got completed to a standard all members were happy with, prior to the deadline, giving enough time for a team review and feedback.
    - Parisha Nizam: For this deliverable, most aspects went well. We defined a great system to seperate tasks, review work and work together. This deliverable helped us define our goals, and process of how we will be tackling this project which made a very clear guideline. All sections were completed as detailed as possible to ensure we are on the same page and have a good understanding of our mission for the project and generally how we will be creating it
    - Jasmine Sun-Hu: The team worked well together throughout this deliverable which led to a fairly smooth completion. Tasks were divided up easily among team members, and each member completed their assigned parts in a timely manner. The team met up several times over the timeline of the deliverable to make sure everyone was up-to-date with each other's work and any changes made, and helped each other through small problems such as setting up LaTeX to pdf in vs code or latex syntax errors. Everyone made the effort to communicate with each other and shared issues and ideas freely.

2. What pain points did you experience during this deliverable, and how did you resolve them?

    - Promish Kandel: I had a fever as the due date approached, which made getting work done more challenging. Some aspects of the problem statement, such as how it should be written, weren't well defined, making it difficult to know how to format or write it. I thought of the problem statement was one to two sentences from previous classes but looking at past examples, it had a different format, which I felt it wasn't covered in depth in class.
    - Mitchell Weingust: A pain point I experienced during this deliverable was accurately describing the goals (and their significance). The team understood the problem we wanted to accomplish, but effectively describing the unique selling points, and phrasing them as goals were more difficult. I resolved this pain point by discussing with the team what excited us most about the project, and we found that the most interesting aspects could be grouped and summarized into 5 main goals. This also helped us figure out the goals' significance, which further motivated the project.
    - Parisha Nizam: A pain point i experienced during this deliverable was pinpointing the most important risk for the proof of concept. When building a new application with unfamiliar tools, technology, and handling sensitive info, there is significant potential for many issues to arise. In order to determine the main risk, my team had a very thorough discussion along with our supervisor to effectively decide what to consider and how we plan on managing the risks.
    - Jasmine Sun-Hu: One of the pain points we faced was defining our goals in a way that clearly separated five distinct objectives. During brainstorming sessions a lot of our ideas seemed to overlap, such as an intuitive interface vs ease of use vs accessibility. To address this issue, we reached out to our supervisor for feedback as we knew they were knowledgeable with the project scope. With their feedback, we were able to refine our goals with more clarity and distinction from each other.

3. How did you and your team adjust the scope of your goals to ensure they are suitable for a Capstone project (not overly ambitious but also of appropriate complexity for a senior design project)?

    - Team answer: The team adjusted the scope of our goals for the project by first discussing the main ideas and requirements we had with our project supervisor. From there, our supervisor helped us narrow down the goals to those that are the most important to the system's success. The final goals we decided upon are of an appropriate complexity for a final Capstone, senior design project, as they are requirements for the system to have the desired, full functionality.

As well, the goals are precise and measurable, and focus on different, integral aspects of the system.