

Research Article

Synvo Headphone

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Abstract: *The explosive growth of the internet gaming community around the world has converged players from various linguistic communities in the same space, whereas communication between them is hindered, which consequently has an impact on team coordination and also the gaming experience itself. This paper describes Synvo Headphones, a new technology incorporating real-time language translation to enable multiplayer game playing interaction. Using speech-to-text, natural language processing (NLP) and adaptive (noisy) reduction, these headphones offer an all-in-one cross-language communication solution for immersive, collaborative, global-driven gameplay among globally diverse gamers. Through a wide study, based on interviews with game play and industry view, the study discovers a number of critical pain points such as incompleteness, discomfort and requester of controllability properties. The proposed solution emphasizes effective in-game communication, ergonomic usability to facilitate long-term use, and modular design for usability. This study advances the state-of-the-art in gaming peripherals by overcoming multilingual collaboration problems, towards the future of AI-powered interactive systems in the game industry and elsewhere.*

Keywords: *Gaming headphones; real-time translation; communication barriers; speech recognition; natural language processing (NLP); ergonomic design; adaptive noise reduction; multiplayer gaming; AI-driven technology.*



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1. Introduction

Innovation about headphones or earbuds that can translate into any language by keywords for gamers. The issues that we detect when teenagers nowadays play the online game with random people from other country but do not how to speak in English. Therefore, they cannot understand what they are trying to talk about. So, we would like to innovate headphones that can auto translate language to communicate while playing online games. The importance of the innovation that we can understand the instruction from other gamers from other country.

According to the research based on the article, the quick development of technology has greatly given impact influenced to the business. One of the electronics in industry that has high competition is headphones. Headphones are not important not only for those who love music but also for the rising gaming. A few individuals might not believe headphones are not important for daily life but for gamers

it is very essential. Headphones are very important for gamers to improve their performance in gaming and can provide high-quality sound to identify the movements of the enemy in the game.

The global online gaming community has expanded significantly, uniting players from all cultures and languages. This global engagement has enhanced the gaming experience but has also created an important communication barrier, especially for youngsters who may lack fluency in English or other widely spoken languages. During gameplay, language problems can cause misunderstandings, dissatisfactions between each other and the ability to understand the instructions and strategies is decreasing.

Among gamers worldwide, it is very important to develop headphones to overcome the communication barrier and make it easy for players to participate with other foreign gamers. By improving the language problems to cooperate can help to create an accessible gaming environment. Our auto-translation headphones enable gamers to enhance their gaming experience by learning instructions from colleagues globally, therefore eliminating the competitive environment for all participants.

2. Method & Material

High performance is crucial in the gaming industry, but the insights show that there is an urgent need for user-centric innovation in gaming headphones. The surprising choice for portability shown by Afeef highlights the changing needs of modern players who want flexibility without sacrificing performance. The traditional design approach of gaming headphones, which frequently only accommodate fixed settings, is being challenged by this change. Manufacturers have the chance to reconsider mobility in high-performance audio equipment by meeting this desire.

The focus on a volume switch as a key component points to a more thorough understanding of situational control in gaming settings. Despite being commonplace, its prioritisation indicates that to improve gameplay, even regular elements must satisfy specific requirements. Similarly, a growing understanding of the long-term physical toll that gaming might have is reflected in the unexpected emphasis on health-conscious design elements like ergonomic considerations and break reminders. This issue differs from typical gaming culture, which frequently puts performance ahead of health.

Gaming headphones with language translation features highlight an interesting connection between technology and international communication. The necessity for smooth multilingual communication has grown as gaming increasingly crosses national borders. This divide might be closed with translator headphones, which would encourage cooperation and diversity in global gaming groups. This innovation shows a desire for deeper involvement with different coworkers in addition to addressing actual communication difficulties.

Gamers' expectations are shifting towards ease, modernism, and sustainability, as seen by the need for wireless charging and durable design. Players who wear glasses experience physical discomfort, which draws attention to a commonly disregarded design fault and identifies a major area for innovation. Similar to this, the annoyance of headphones breaking after a year of usage highlights the need for durability in addition to price and highlights dissatisfaction with current manufacturing standards.

2.1 Project Challenges

CHALLENGE	STRATEGY
No accurate translating for orders and phrases used in gaming, since standard translators frequently have trouble with specialized vocabulary.	Create a language database that can be customized to incorporate gaming phrases. This way, users can add or change terms according to the game they're playing.
Users may have doubts about the new headphone's translation efficacy and accuracy.	Use a varied sample of gamer for beta testing in order to get their opinions, demonstrate on updates, and provide early access rewards to encourage customers to use the software.
High-consumed battery life for a wearable gadget that needs to do audio processing, translation, and voice recognition.	To guarantee a long battery life during continuous gaming sessions, use low-power technologies and enhance the headphone's power management system.

2.2 Project Success Indicators

Indicator 1: Real-time speech translation during gameplay should have a delay of less than 100 milliseconds to maintain smooth communication and prevent game interruptions.

Indicator 2: At least 80% of beta testers gave positive feedback, confirming that the translation tool increases communication without creating noticeable distractions.

Indicator 3: At least 70% of the first users of the translator headphones continued to use them often for online gaming sessions following the product's launch, indicating a good user retention rate.

Indicator 4: High demand for the product after launch, as evidenced by enquiries or pre-orders from communities and gaming influencers that appreciate its special features.

Indicator 5: Forming partnerships with streaming services or game developers for integrating the headphone translator into the gaming environment, guaranteeing a wider audience and greater adoption rates.

3. FINDINGS

3.1 Project Brief

The project's goal is to help players from different language backgrounds communicate more effectively in fast-paced online games. Because of their high latency or incapacity to provide accurate real-time translations, current translation systems disrupt gameplay. Moreover, coordination problems, poor team performance, and a disappointing player experience might result from this issue. To overcome language barriers, increase in-game teamwork, and improve the overall gaming experience, the project emphasizes the possibility of creating a low-latency, high-accuracy translation headset designed especially for the gaming community. The project's goal is to make gaming more enjoyable for players by focusing on the design solution.

3.2 Idea Expansion

Due to its wide applicability, technological feasibility, and ability to address critical, user needs in gaming headphones are noise reduction. An interview was conducted with the hardcore player. They also tell the pros and cons of using headphones based on their experience.

3.3 Improve the Idea

A next-generation noise-cancellation system specifically designed for gamers. The system incorporates adaptive noise cancellation with volume adjuster while in the game to strike a balance between immersion and external situational awareness.

3.3.1 Core Features:

i. Flexible:

The headphones automatically detect in-game audio patterns and adjust cancellation levels to enhance critical sounds like footsteps or gunfire while suppressing irrelevant background noise. The headphones also have an adjuster to ensure that critical sounds are not too loud, preventing them from disturbing hearing and the voices of team members.

ii. Ambient Mode for Alerts:

The headphones are equipped with external microphones to capture sounds from the surroundings, such as someone calling your name or emergency alarms. Users can toggle the "Ambient Alert Mode" and "Noise Adaptation" to amplify specific external sounds based on frequency recognition.

3.3.2 Enhanced User Experience:

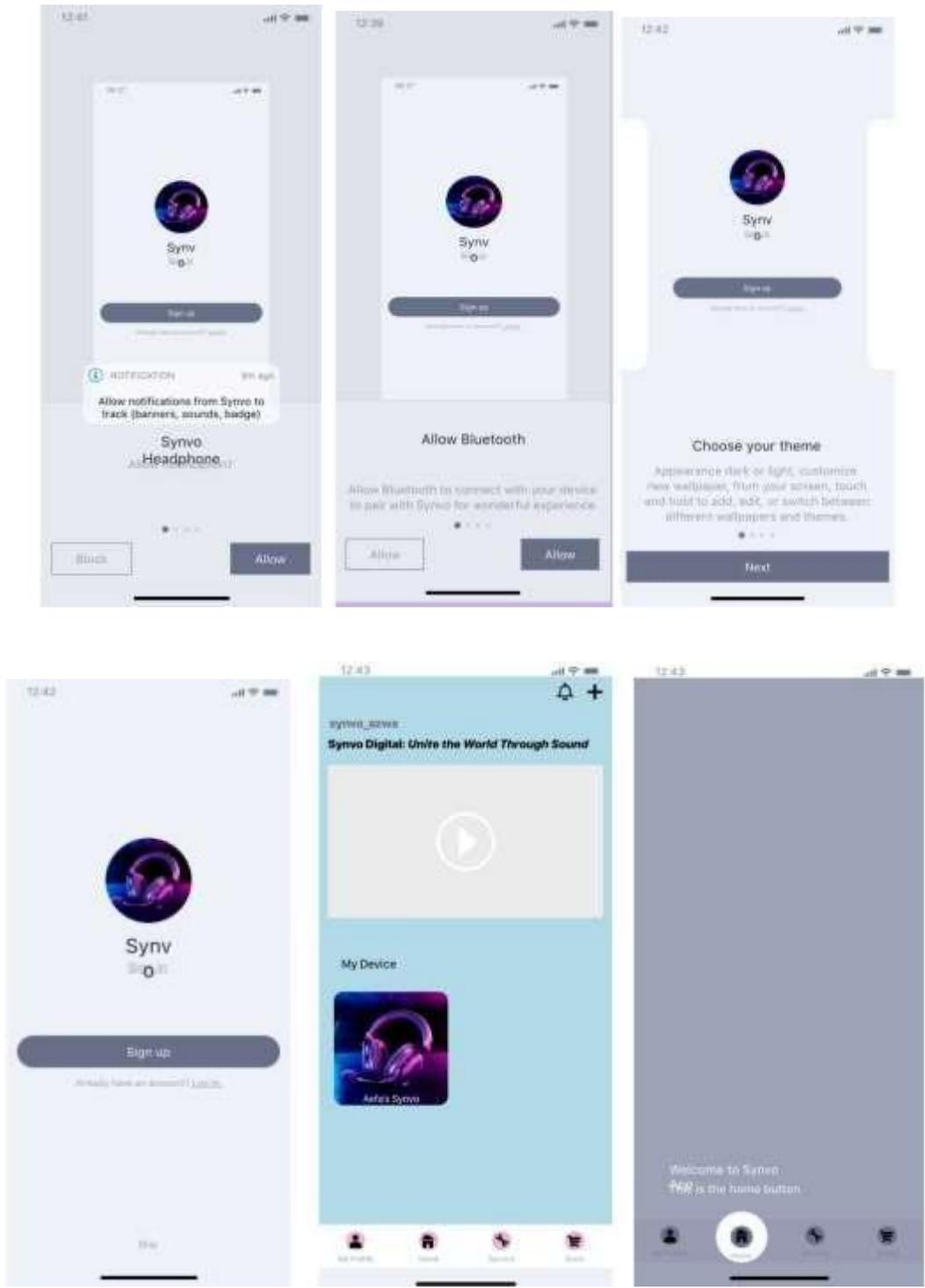
- i.** Gamers are able to focus entirely on the game without losing sight of outside indications.
- ii.** Improves team communication clarity by separating team members' voices and minimizing extraneous noises. With adaptive noise cancellation built into the headphones, they can discern external noises and players' speech.

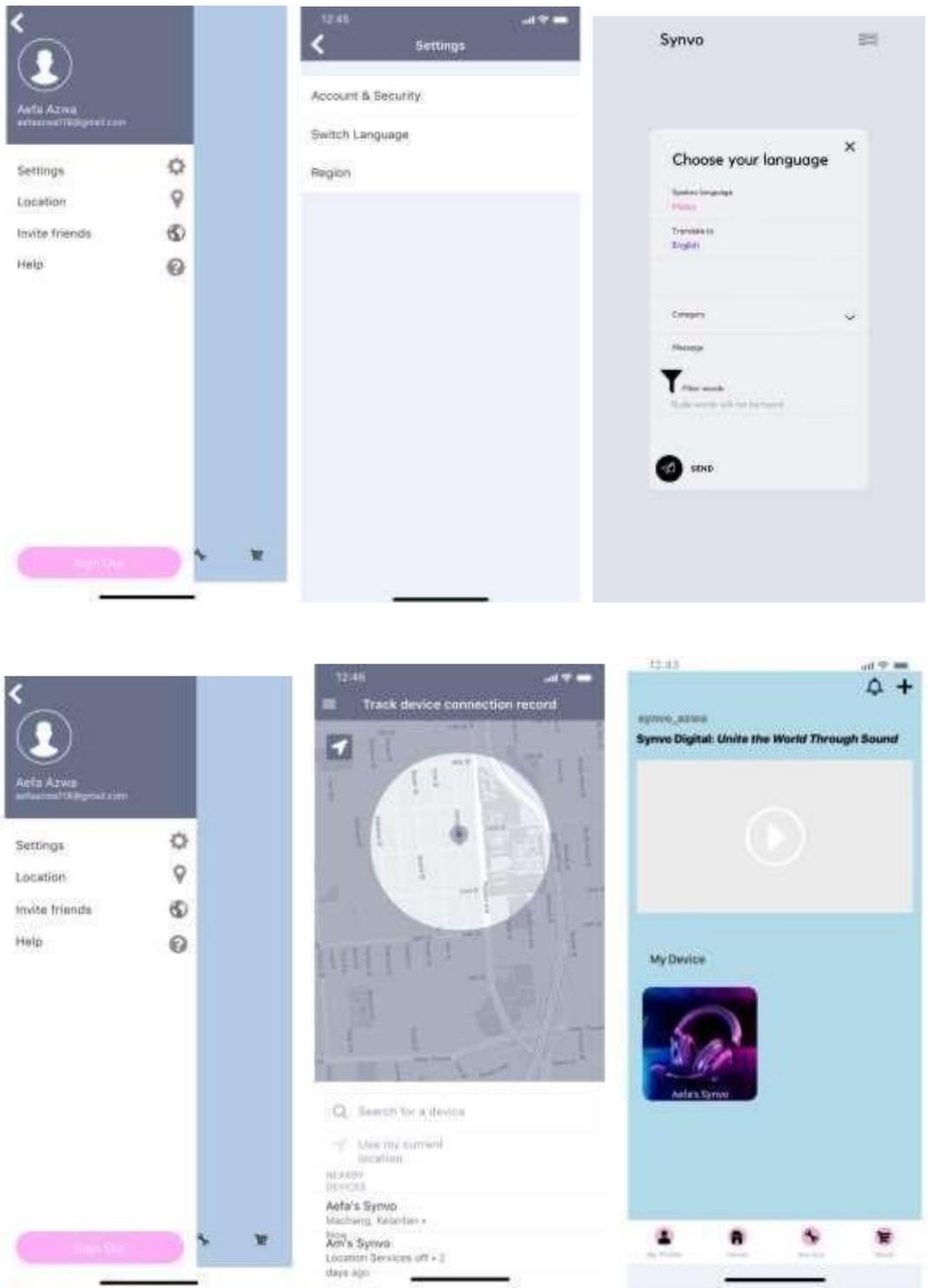
3.4 New Insights from Interviews and Personas:

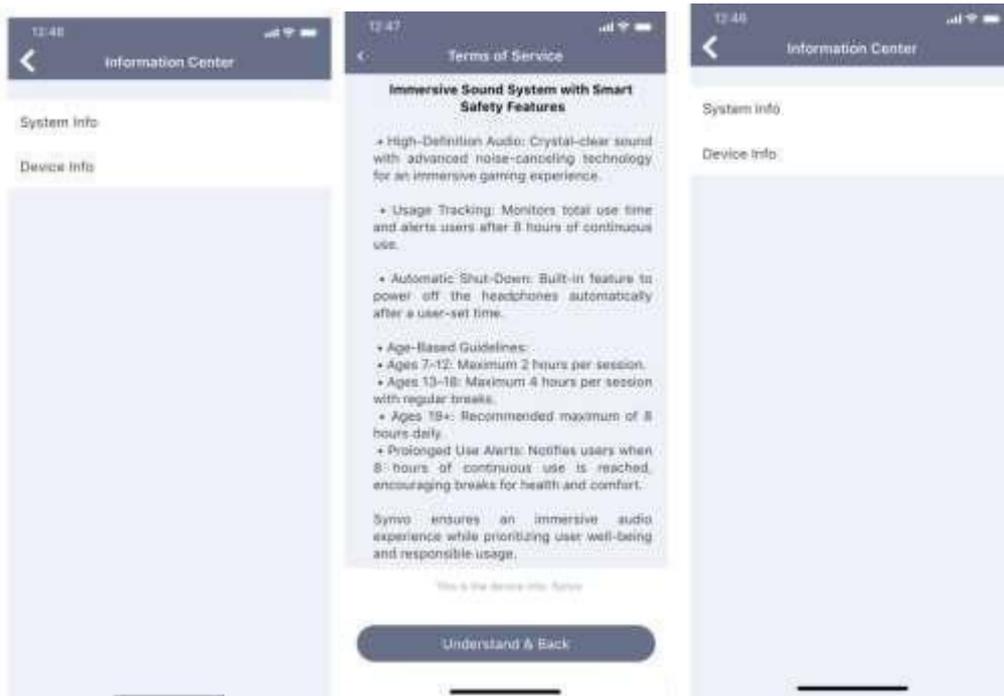
- i.** Missing information and sound in real-world while gaming.
- ii.** Not convenient because of the size and it becomes uncomfortable if used for too long.

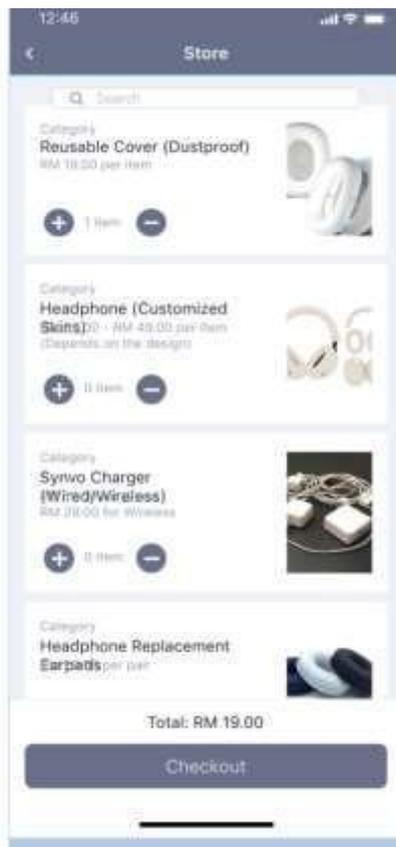
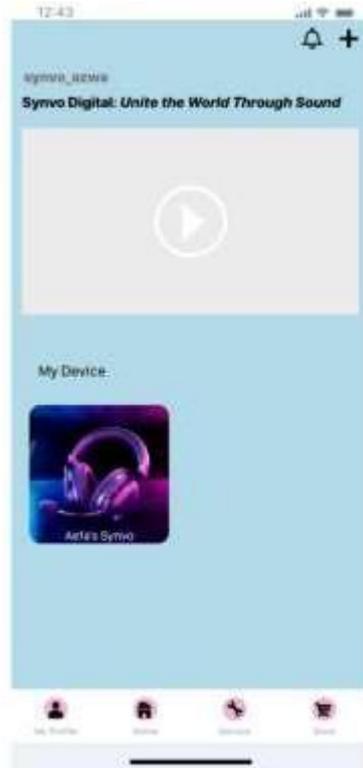
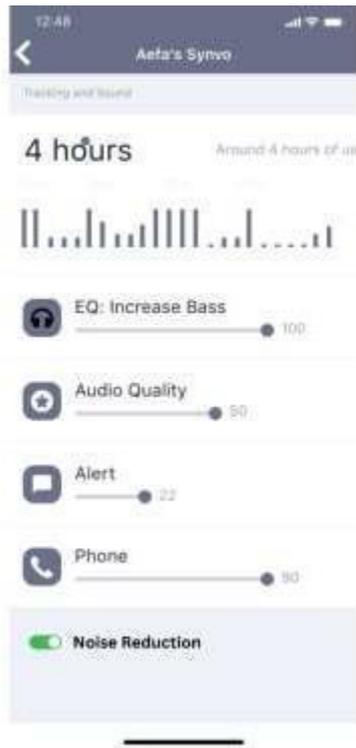
4. DISCUSSION

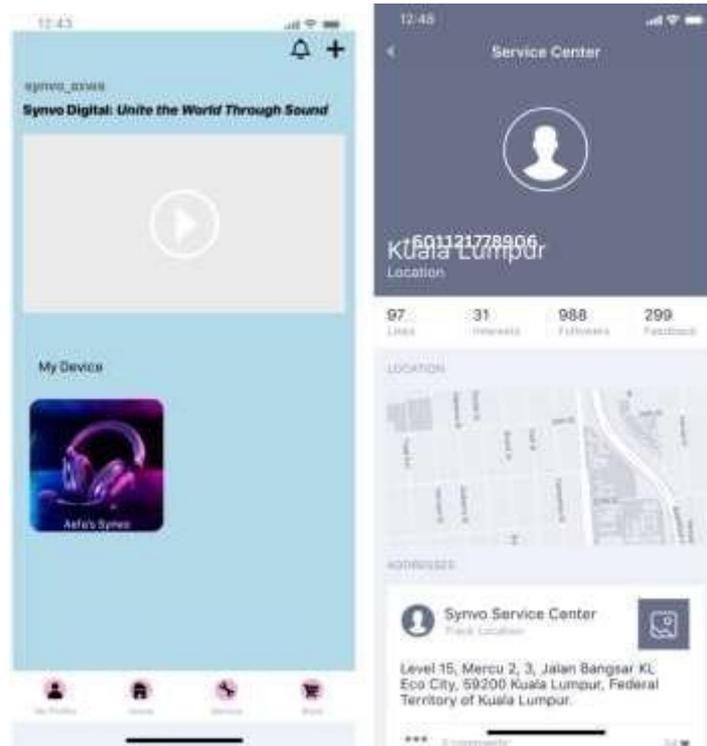
Concept visualization is a process of thinking and visualizing a fresh concept and new ideas. We created a prototype to illustrate and demonstrate how to use the synvo app properly. Prototyping is the process of developing an early, simplified version of a product or system to test ideas, check functionality, and identify potential improvements prior to full-scale production. This prototype is a visual depiction of the app's features and user interface, giving a clear picture of how users interact with its functionalities. By demonstrating the process via a prototype, we hope to gain feedback, enhance the concept, and verify that the app satisfies user expectations and requirements.











1. User scenario

User scenario is a story of the ideas that will generate more information on how the solution will work. It is a platform for communicating ideas about how the users actions within the solution. Provide an illustration of the user scenario.



In daily conversation

- Two individuals are engaged in a conversation, one speaking in Malay (uttering the phrase “*bagaimana keadaan anda?*”) And the other responding in English (“how are you?”).

Language translator headphones:

- Both participants are using advanced language translation headphones, featuring a modern design with led indicators signaling that the device is active.
- The headphones are equipped with integrated speech recognition technology, enabling the capture of spoken input and real-time translation.

Translation process:

- The headphones’ built-in microphones capture the spoken Malay sentence, which is processed and translated into English through natural language processing (nlp) algorithms.
- Similarly, the response in English is translated back into Malay, easing seamless communication between the speakers.

Accompanying mobile application:

- A smartphone application is visible in the background, displaying both the Malay and English translations of the conversation, providing a textual representation of the exchange for user reference and confirmation.

Environment:

- The interaction occurs in a casual outdoor café setting, characterized by a relaxed atmosphere with greenery, reflecting a natural, real-world context for the use of the translation technology.

Impact on communication:

- The participants appear to communicate effortlessly, as showed by their positive demeanor and mutual understanding, proving the effectiveness of the language translation headphones in overcoming language barriers in everyday situations.

In gaming

- Two gamers are in the middle of a fast-paced multiplayer game. One speaks malay, shouting “*serang mereka sekarang!*” (attack them now!), while the other, responding in english, says, “attack them now!” Both are clearly in sync, despite the language difference, thanks to their translation headsets.

Language translation headphone:

- They are wearing advanced gaming headsets that not only pick up their voices but instantly translate what they’re saying into each other’s language. The headsets ensure that their commands are heard and understood immediately, without interrupting the game’s flow.

How it works:

- As the malay-speaking gamer gives a command, the headset’s real-time translation software kicks in, converting the words into english and feeding them directly to the other player. The same happens in reverse when the english-speaking gamer responds. The whole process happens in the background so they can stay focused on the action.

Setting:

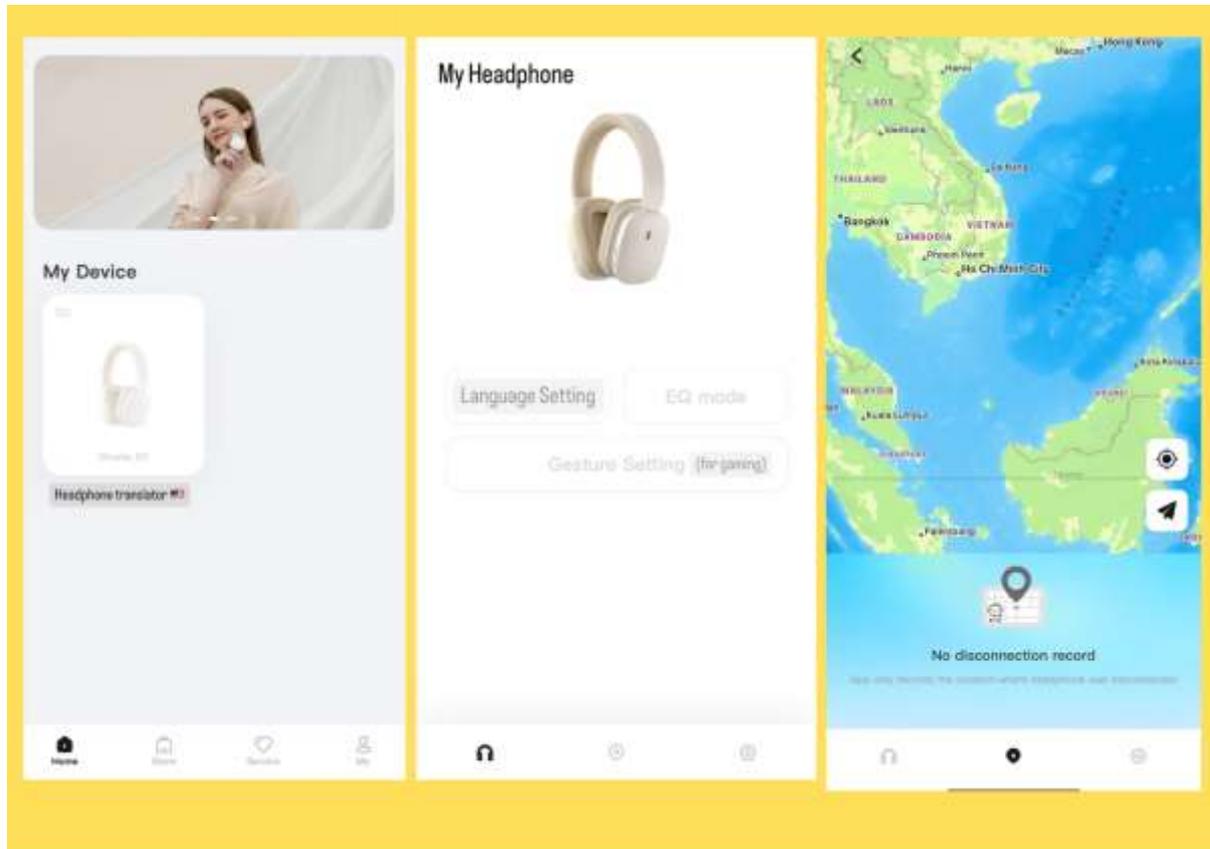
- They’re gaming in a classic setup: a dark, cozy room lit by the glow of their monitors and colorful led lights. Gaming gear like controllers and keyboards are scattered around them, creating a fully immersive gaming environment.

Effect on communication:

- Even though they speak different languages, the translation headphones allow them to coordinate effortlessly, as if they were speaking the same language. Their focus, intensity, and the smooth flow of communication highlight how this technology helps overcome language barriers, especially in competitive, fast-paced situations like gaming.

Rapid prototyping

Prototyping is transforming your ideas into a tangible presentation. It can be presented in a form of a model, role play, storyboard, mock-up, and diagram. Provide an illustration of the prototype. Explain how it will work and achieve the user's goals.



1. Device management:

- The first figure shows the “my device” page, where users can store and manage their connected devices within the app.
- In this example, a headphone translator is paired with the app. This feature allows easy access to the paired device and offers an organized interface to view the connected device.

2. Customizable settings for the headphones:

- The second figure highlights the detailed settings for the headphone, showing multiple customization options:
- Language setting: the headphone translator allows for multiple language options, enabling users to translate languages in real time through their device.
- Eq mode: this feature enables users to adjust sound equalization according to their preferences (e.g., bass-heavy, vocal-focused, etc.).

- Gesture setting (for gaming): specialized gesture controls can be activated, which is particularly useful in gaming scenarios for a more intuitive experience.

3. Tracking device location:

- The third figure showcases the ability to track the location of the headphones using a map-based interface.
- The app records where the headphones were last disconnected or left, helping users to easily locate them if they are misplaced.
- This feature is particularly helpful for users who frequently travel or misplace their devices, adding a layer of convenience and security.

Key features of rapid prototyping based on the figure:

- User interaction: the app provides a clear interface for storing devices and interacting with settings (e.g., language, gesture, eq mode), enhancing user customization.
- Iterative testing: prototyping allows designers to test each feature individually, such as the translation and tracking capabilities, and adjust them based on user feedback.
- Visualization of features: the map-tracking function is an example of a key feature that is easily visualized and tested using rapid prototyping, providing immediate feedback on the feature's usefulness.

5. CONCLUSION

In conclusion, headphones contain an individual and underexploited design potential. They are a popular and socially acknowledged consumer product. Nonetheless, their application is currently primarily bound to auditory controls and physical experiences that do not need visual engagement. This article proposes an extended design space for interaction modalities facilitated by headphones, including concepts that leverage the positioning of headphones on the head and their usage across various activities and contexts. Our designs examine the advantages of integrating various gesture types (tangible, mid-air, and head orientation) with headphone control. This also enables us to incorporate motions not usually linked to the direct control of headphones (such as elevating an earcup) to establish contextually pertinent application behavior. The utilization of a semantically rich location, such as the head, offers the opportunity to gain insights into user behavior and to adapt application behavior to align more effectively with the context. Headphones can be perceived as utilizing established habits to facilitate digital encounters across various contexts (Panda, P. et al., 2023).

The headphones that we want to innovate are useful for all gamers. In the worldwide online gaming community, solutions are needed to solve the problem of language barriers where the gamers are from different countries that always struggle to communicate and cooperate. The main aim of our innovation is to make unique gaming headphones with real-time language translation capabilities, that personalized design to enhance communication and build an excellent teamwork in gaming. We found solutions through many ways such as make a research, interviews with experienced gamers, and repeated development processes. For the final design, we included a few advanced features such as

vocabulary translation, noise reduction, and settings to set up our customized personal headphones. These developments can give better improvement and enhance to gamers in their gaming experience.

In future, we should focus more on enhancement of refining translation algorithms to handle a wide range of languages and latest vocabulary, design a comfort and portability hardware, included AI elements for more understanding in gaming while playing. To increase the utility and influence of these headphones, we should expand the use of this technology more than gaming sectors such as education, employment and many more.

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