CHAPTER 10

LIMITATION AND FUTURE ENHANCEMENTS

- **Limitations**
- **Future Enhancements**

10.1 LIMITATIONS

While the SignSpeak project aims to provide an effective sign language to text conversion solution, several limitations can affect its overall performance and user experience:

1. **Variability in Sign Language:** Sign languages are not universally standardized; different regions may have distinct dialects and variations. This diversity can create challenges for the system, as it may struggle to accurately interpret signs that differ from those present in its training data. Additionally, individual signing styles and fluency levels can vary widely, leading to potential inaccuracies in translation.

2. **Environmental Factors:** The effectiveness of real-time sign language recognition can be impacted by environmental conditions such as lighting, background noise, and cluttered settings. Poor lighting may hinder the camera's ability to capture clear images of the signs, while distractions in the background can lead to misinterpretations. Moreover, factors like camera quality and resolution play a crucial role in the accuracy of gesture recognition.

3. **Limited Vocabulary:** The vocabulary that the system can recognize may be limited, especially for specialized or less commonly used signs. While the module can be trained on a broad dataset, it may still struggle with context-specific vocabulary or new signs that emerge over time. This limitation could restrict users, especially in professional or academic settings where specialized terminology is often required.

4. **User Interface Challenges:** For users who may not be familiar with technology, navigating the application or adjusting settings can be challenging. The user interface must be designed to be intuitive and accessible for all users, including those with varying levels of technological proficiency. If not, it may hinder the overall effectiveness and adoption of the application.

10.2 FUTURE ENHANCEMENTS

1. **Expanded Sign Language Support**

   Example: A future enhancement could include support for additional languages like Australian Sign Language (Auslan) , American Sign Language (ASL) and British Sign Language (BSL) or sign languages from different regions. This expansion could involve collaborations with native sign language users to build a diverse dataset, allowing the app to recognize and translate a broader range of signs.

2. **Contextual Understanding and Semantic Recognition**

   Example: In its current form, SignSpeak might struggle with signs that have multiple meanings, such as "bank" (financial institution vs. riverbank). An enhancement could involve integrating natural language processing (NLP) to analyze the context in which a sign is used. For instance, if a user signs "bank" while pointing to a river, the system could correctly interpret it as a riverbank, providing a more accurate translation.

3. **User Feedback Loop for Continuous Learning**

   Example: Implementing a feedback feature where users can rate the accuracy of translations could lead to significant improvements. If a user finds that the system incorrectly translates a sign, they could submit feedback that allows the developers to adjust the model. For instance, if a user indicates that the sign for "thank you" is not accurately represented, this input could help refine the system's understanding of the sign.

4. **Advanced Personalization Options**

   Example: SignSpeak could introduce user profiles that learn individual signing styles over time. For instance, if a user consistently signs "hello" with a particular gesture, the system could adapt and prioritize that specific sign in future translations, improving accuracy and personalization.

By implementing these enhancements, the SignSpeak project can evolve into a more comprehensive and versatile tool, significantly improving the communication experience for both deaf and hard-of-hearing individuals and their hearing counterparts.