Real-time communication between normal and deaf people using machine learning and 3D animation

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Abstract

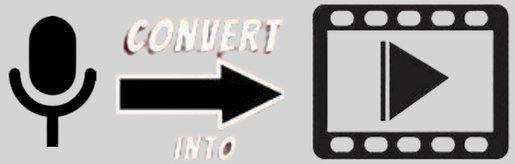
"Hands to Talk" is a mobile app that enhances communication for the deaf community. Built with React Native and advanced technologies like Random Forest classifiers, it achieves 100% accuracy in recognizing American Sign Language (ASL). The app transforms voice and text messages into 3D hand gesture animations, converts video messages into readable text or voice, and translates sign language images into text and voice. It's available on both iPhones and Androids, offering a secure and inclusive communication experience. Tools like Visual Studio Code and Blender were used to ensure a smooth and visually appealing user experience.

Problem Statement

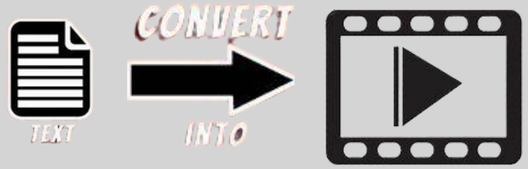
- Real-Time Communication Gap
  - Existing apps focus on teaching sign language, not real-time communication.
  - This gap hinders quick and easy conversations, affecting social and work interactions.
- 3D Animation Data
  - Lack of 3D animation datasets limits the creation of visually dynamic content.
- Voice Expression to Animation Translation
  - Missing mechanism for translating voice expressions into animations, reducing engagement.

Objectives

- incorporate 3D Animation for Gestures
  - Utilize advanced 3D animation technology to visualize sign language gestures effectively.
- Voice-to-3D Animation with Hand Gestures

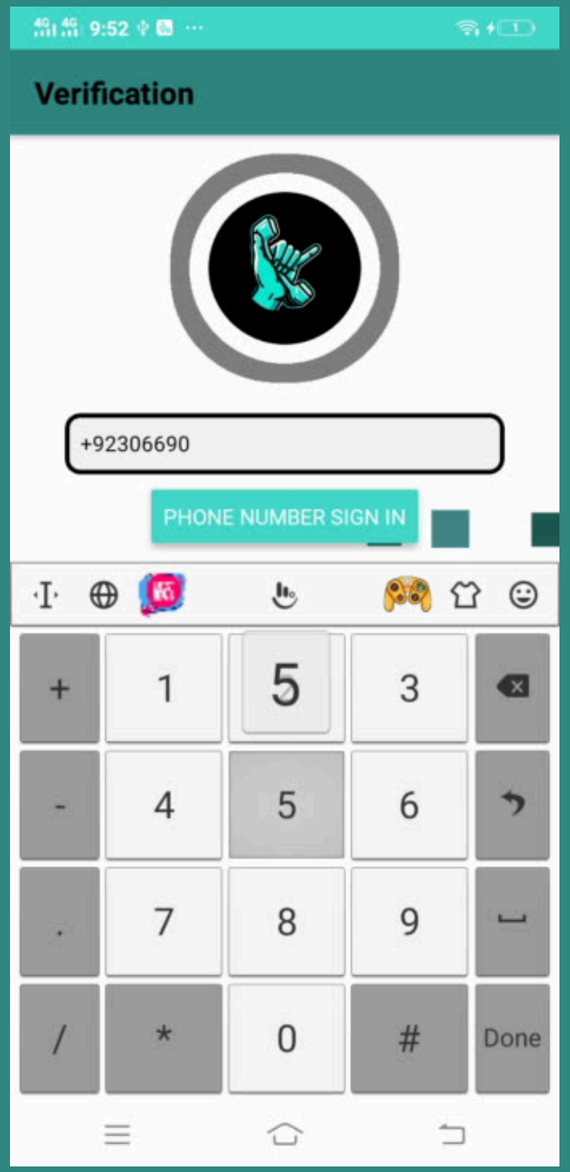


- Text-to-3D Animation with Hand Gestures

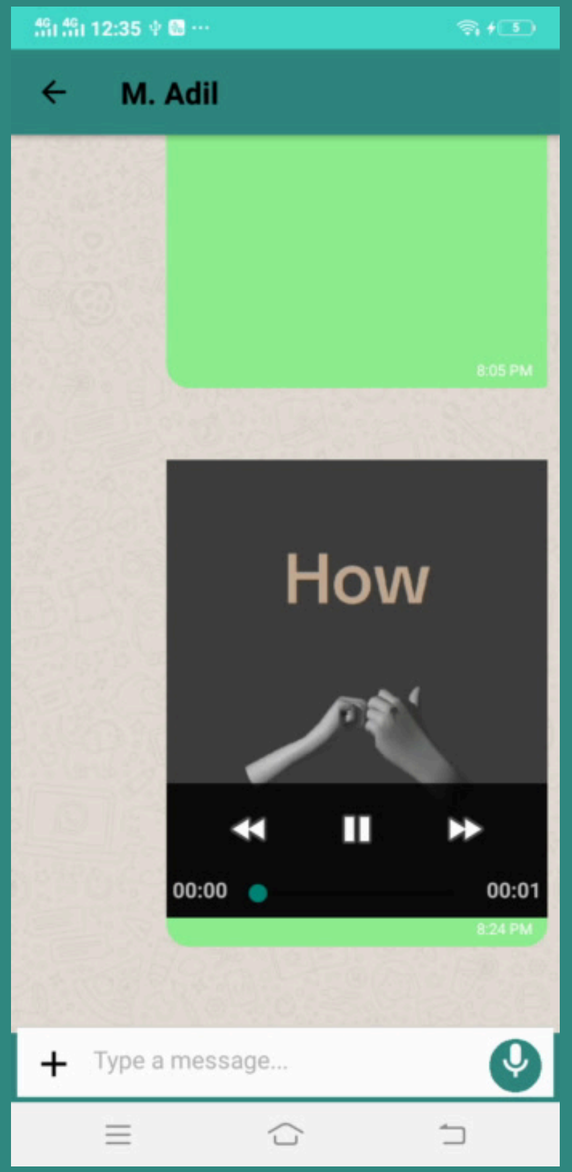


- Sign Image to Text and Voice

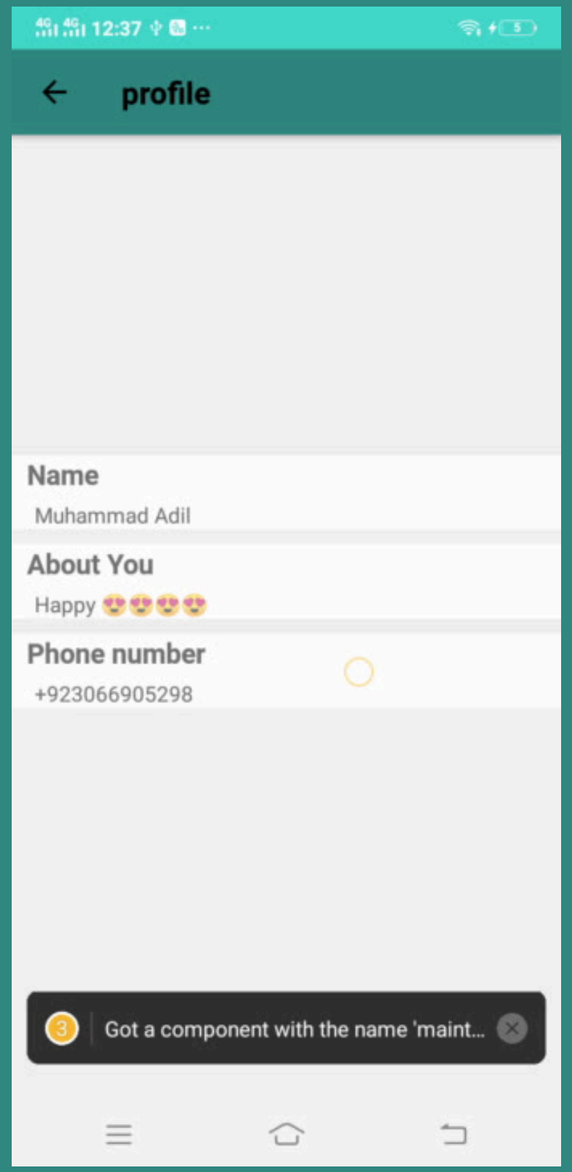
Working of project



Verfication

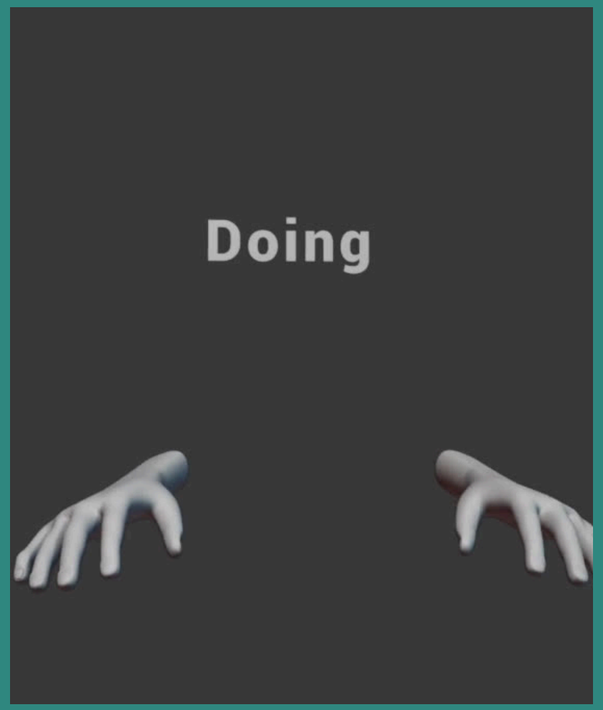


one to one chat

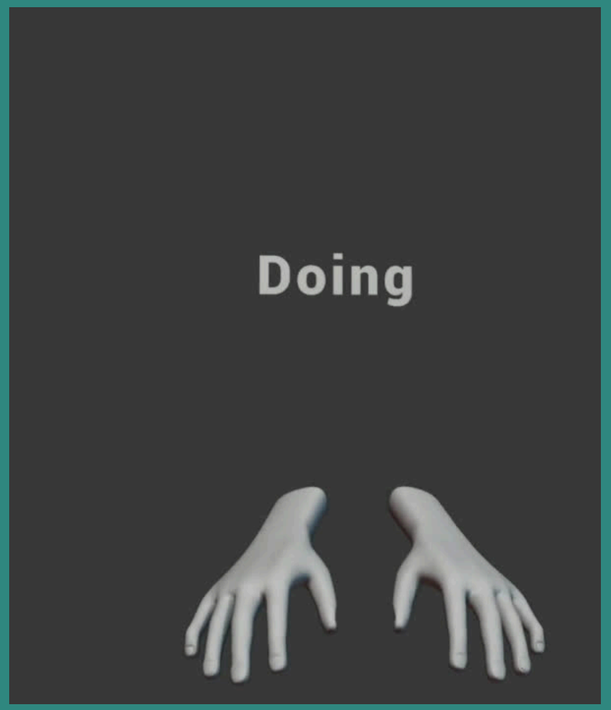


setting

Data set



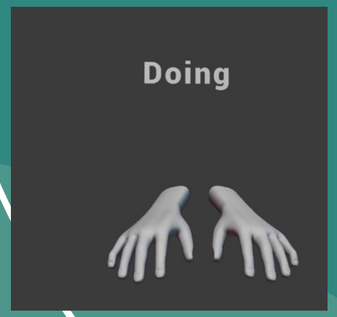
Doing

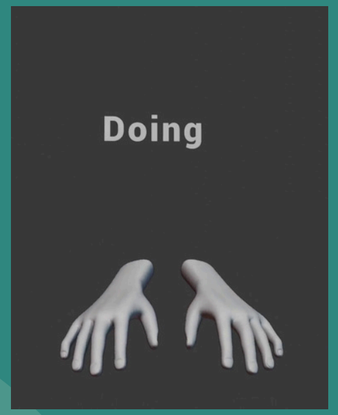


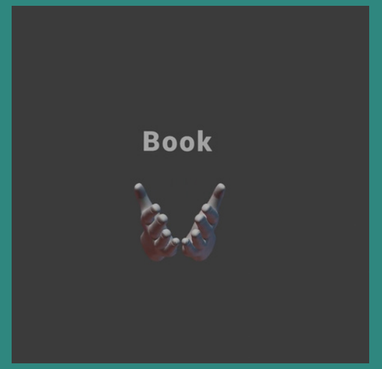
What are you doing

i am reading book

Data set Frame







Doing sign frame

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what are you doing sign frame

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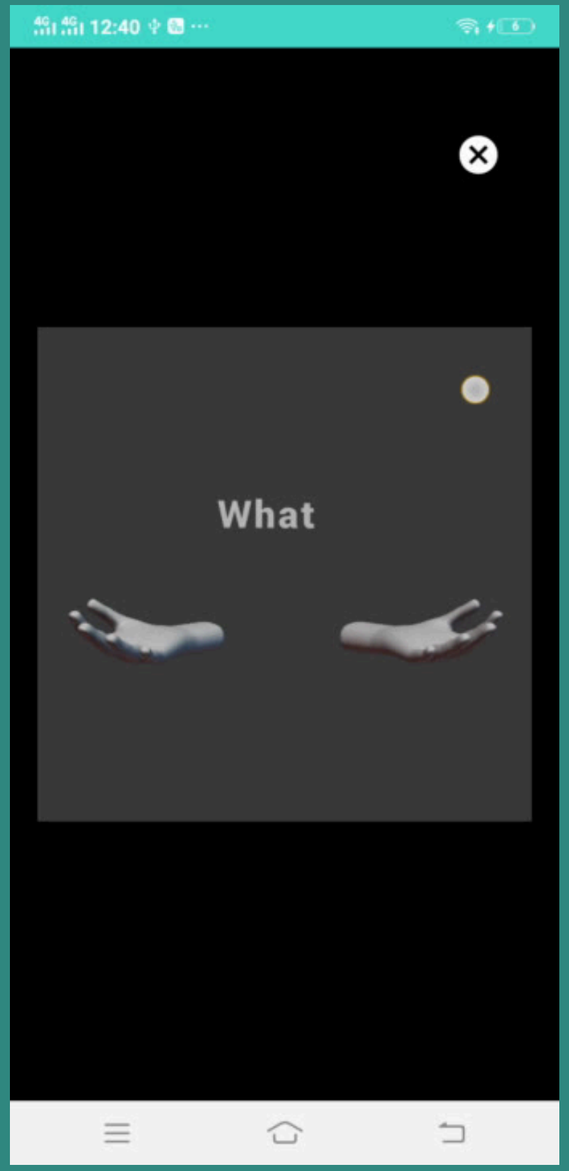
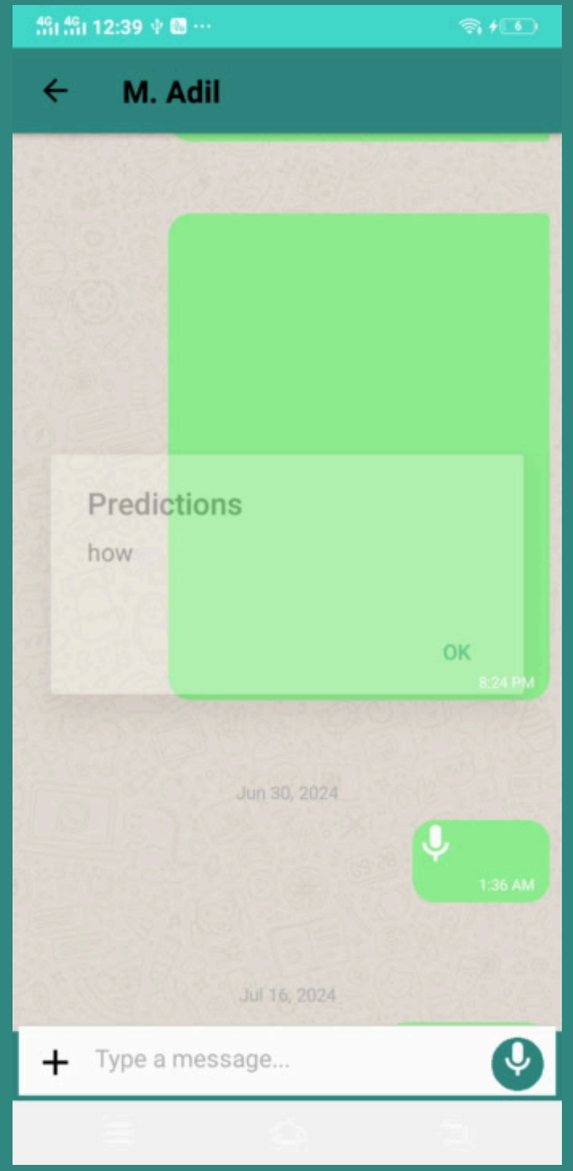
i am reading book sign frame

Result

Text to gesture



voice to gesture



video to text or voice

Future work

- Dataset Expansion
- Model Optimization
- Real-Time Gesture Recognition
- Multi-Modal Integration
- Language Support Expansion
- User Personalization
- Emotion Detection

References

- [1] Chang, Victor, et al. “An Exploration into Human–Computer Interaction: Hand Gesture Recognition Management in a Challenging Environment.” SN Computer Science, vol. 4, no. 5, 2023, p 441
- [2] Madhiarasan, M., and Partha Pratim Roy. “A Comprehensive Review of Sign Language Recognition: Different Types, Modalities, and Datasets.” arXiv.org, 2022
- 3] Khaleghi, Leyla, et al. “Multi-View Video-Based 3D Hand Pose Estimation.” arXiv.org, 2021

Thank you :)