

Title of Research

Speech Recognition System Using Deep Learning
Techniques for Assamese Sign Language.

Prepared by

Name	Eng. Sultan Ali Senan
Academic ID No	253002563
Program	Master of Science in Artificial Intelligence
Course Name	Final Project (1) " AI900a"
Supervised	Dr. Amjad Qatish

2026

Task 7

Thesis Completion Project Plan (12–14 Weeks)

Phase 1: Methodology & System Architecture (Weeks 1–3)

Goal: Complete Chapter 3 (Proposed Approach).

- **Week 1: Data Finalization.** Finalize the collection of the Assamese Sign Language dataset (the 2,094 data points mentioned in your review). Perform data augmentation (rotation, flipping, brightness) to increase model robustness.
- **Week 2: Preprocessing Pipeline.** Implement the **MediaPipe** landmark extraction scripts. Convert raw video/images into coordinate-based sequences (21 hand landmarks).
- **Week 3: Model Design.** Define the hybrid **CNN-LSTM** architecture.
 - Draft Chapter 3: Explain the mathematical flow, the layers of the CNN (for spatial features), and the LSTM (for temporal movement).

Phase 4: Implementation & Training (Weeks 4–7)

Goal: Build the engine for Chapter 4.

- **Week 4: Environment Setup.** Set up Python, TensorFlow/PyTorch, and GPU acceleration.
- **Week 5: Training.** Train the model on the Assamese dataset. Perform hyperparameter tuning (learning rate, dropout layers, batch size).
- **Week 6: Speech Integration.** Integrate the **Text-to-Speech (TTS)** module (e.g., using gTTS or pyttsx3) so that recognized signs trigger audio output.
- **Week 7: Real-Time Prototype.** Develop a simple GUI or OpenCV window that captures webcam feed and displays the recognized Assamese sign and plays the corresponding audio.

Phase 3: Testing & Results Analysis (Weeks 8–10)

Goal: Complete Chapter 4 (Experimental Results).

- **Week 8: Performance Metrics.** Calculate Accuracy, Precision, Recall, and F1-Score. Generate **Confusion Matrices** to see which Assamese signs are being confused by the AI.
- **Week 9: Comparative Analysis.** Compare your CNN-LSTM results against baseline models (like a simple CNN or Random Forest) to justify your methodology.
- **Week 10: Writing Chapter 4.** Document the results with charts, graphs (Accuracy/Loss curves), and screenshots of the real-time system in action.

Phase 4: Finalizing & Submission (Weeks 11–12)

Goal: Complete Chapter 5, References, and Formatting.

- **Week 11: Conclusion & Future Work.** Draft Chapter 5. Discuss the limitations (e.g., lighting, background noise) and future goals (e.g., mobile app deployment).
- **Week 12: Final Review.**
 - Ensure all **References** are in the correct format (as seen in your list).
 - Check **List of Figures** and **List of Tables** for correct page numbering.
 - Submit the final draft to your supervisor for feedback.

Key Deliverables for the Term:

1. **A Functional Model:** A trained .h5 or .pth file capable of recognizing Assamese signs.
2. **The Speech Module:** A working script that converts detected signs into audio.
3. **Complete Chapters 3, 4, and 5:** Moving your thesis from an "overview" to a "completed work."
4. **Final Thesis Document:** Ready for submission to the College of Informatics, Midocean University.