SUDHEE 2025
CBIT HACKATHON

AI-Powered Real-Time Sign Language Translation from Spoken Language

Domain Name : AI & ML

Problem Statement ID : A1

WHILE (1) INNOVATE

PELLI SREE MADHAV

GURUNANAK INSTITUTIONS

TECHINICAL CAMPUS

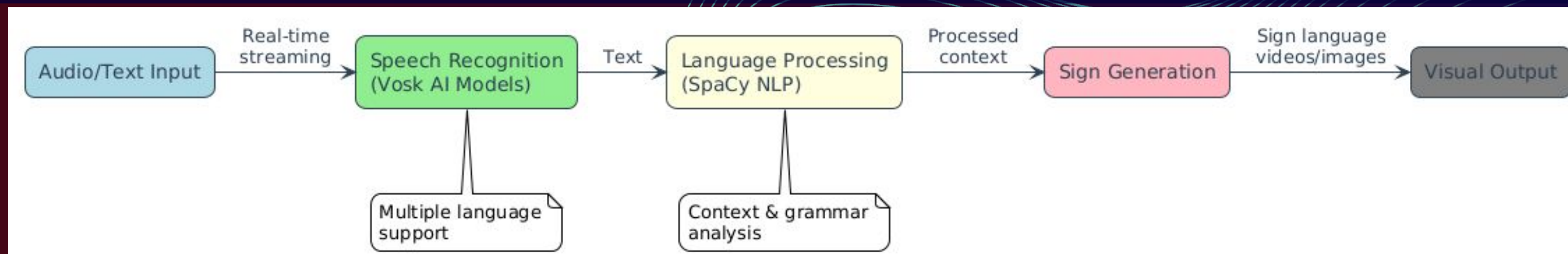# ABSTRACT

The Challenge

Over 70 million deaf individuals worldwide face daily communication barriers, with existing solutions being expensive, fragmented, and requiring specialized hardware.

Our Mission

To create an accessible, real-time speech-to-sign language system that works across all devices and platforms. "Making communication seamless and inclusive for the global deaf community through innovative AI technology.

Our project develops a revolutionary real-time system that converts spoken language into visually accessible sign language, bridging the communication gap for the Deaf and Hard of Hearing community. Using advanced AI technologies including Vosk speech recognition and SpaCy NLP, we've created a solution that supports multiple sign languages (ASL, ISL) and regional Indian languages.
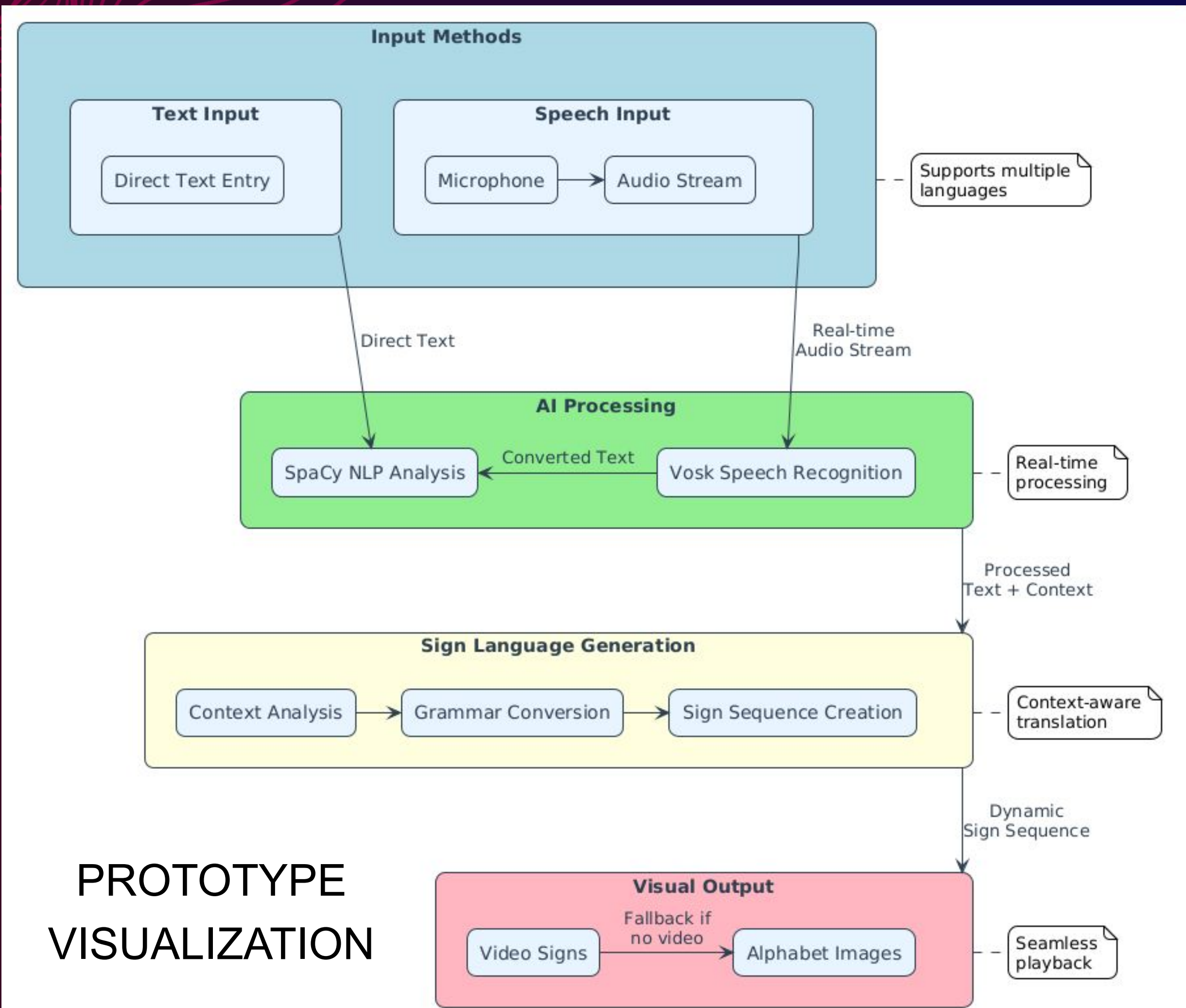
Audio/Text Input → Real-time streaming → Speech Recognition (Vosk AI Models) → Text → Language Processing (SpaCy NLP) → Processed context → Sign Generation → Sign language videos/images → Visual Output

Multiple language support

Context & grammar analysis

IDEA/PROTOTYPE

Innovative Features

• Real-time speech-to-sign conversion

• Multi-language & regional support

• Context-aware grammar adaptation

• Dynamic visual sign representation

• User feedback for improvement

Key Innovations

• Video signs + alphabet images

• Emotion-aware sign detection

• Low-latency real-time streaming

• Smart grammar adaptation

PROTOTYPE
VISUALIZATION

TECH STACK

AI/ML Components:

- Vosk Speech Recognition Models
- SpaCy Natural Language Processing
- Custom Context Analysis System

Backend:

- Python/Flask
- PyAudio for audio processing
- Real-time streaming architecture

Frontend:

- HTML5/CSS3/JavaScript
- Server-Sent Events (SSE)
- Bootstrap 5 UI Framework

USE CASES

- **Education:**

Real-time sign translation for learning.

- **Healthcare:**

Aids doctor-patient communication.

- **Workplace:**

Supports meetings and training.

- **Entertainment:**

Translates events and media.

- **Social Use:** Improves daily interactions.

- **Tourism:** Helps travelers communicate.

127.0.0.1

## Sign Language Translator

International

🌐 Indian Sign Language   🕙 American Sign Language

Regional

हिंदी   తెలుగు   ગુજરાતી

Playback Speed   0.5x **1x** 1.5x 2x

योजना बनाने लगे कि आखिर ये...   Translate   Reset

● HINDI - Microphone Active   🎙 Stop Live Translation

SHOWSTOPPER

DEPENDENCIES

Showstopper:

- First-of-its-kind web-based real-time sign language generator
- Supports multiple languages and regional sign systems
- Context-aware translation system
- Integrated feedback learning mechanism
- Platform-independent accessibility
- Unmatched efficiency in processing speed and resource use

1. **AI Models:**

- Vosk speech recognition models
- SpaCy language models
- Custom sign language datasets

2. **Hardware Requirements:**

- Microphone input
- Sufficient processing power
- Network connectivity

TEAM DETAILS

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THANK YOU