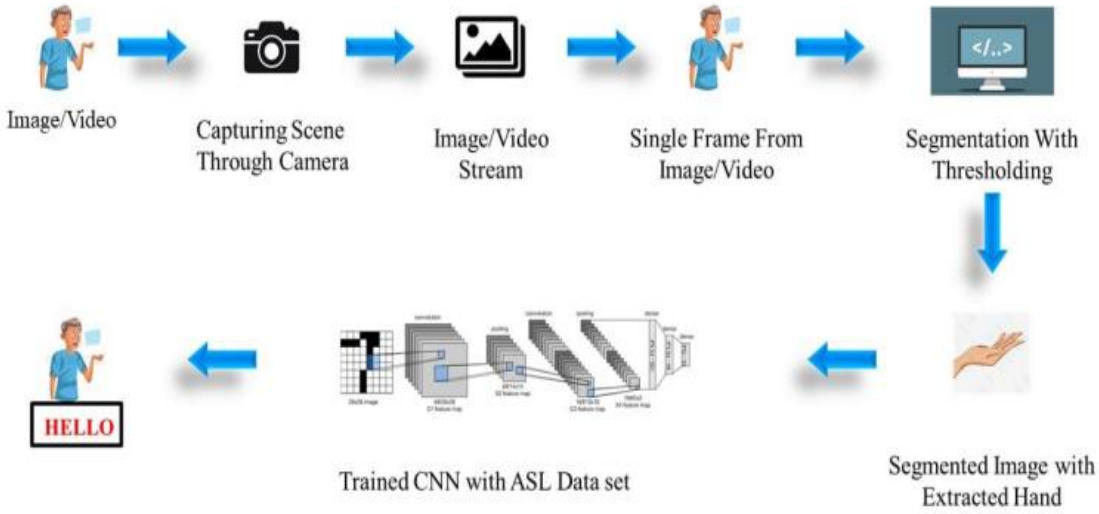
Project Design Phase-II
Technology Stack (Architecture & Stack)

Date	03 October 2022
Team ID	PNT2022TMID592632
Project Name	Project – Alphabet Image Recognition ASL
Maximum Marks	4 Marks

Technical Architecture:



Components & Technologies:

SNO	Component	Description	Technology
1	User Interface	Provides the front-end interface for users to interact with the ASL application, input text, or receive sign language translations.	HTML, CSS, JavaScript, and mobile app frameworks.
2	Sign Language Recognition	Utilizes computer vision and AI technologies to recognize ASL gestures and translate them into text or speech.	OpenCV and machine learning frameworks (e.g., TensorFlow).
3	Text-to-Sign Language Conversion	Converts textual input into sign language gestures or animations for communication.	Natural Language Processing (NLP) and 3D animation technologies.
4	User Authentication	Manages secure user access and authentication, including registration and password reset features.	OAuth 2.0, OpenID Connect, or custom authentication mechanisms.
5	Data Storage	Stores user inputs, processed data, and sign language translations to ensure data persistence and retrieval.	MySQL, PostgreSQL, NoSQL databases (e.g., MongoDB), or cloud-based data storage services.
6	External Services Integration	Interfaces with external services for tasks like language translation or multimedia content analysis.	Third-party APIs and RESTful APIs.
7	Accessibility Features	Enhances accessibility for users, including support for screen readers and keyboard navigation.	ARIA (Accessible Rich Internet Applications) and web accessibility guidelines.
8	Admin Interface	Provides an admin dashboard for administrators to manage user accounts and application settings.	Web technologies or application frameworks for admin-specific features.
9	Admin Authentication	Ensures secure admin authentication, limiting access to authorized administrators.	Similar technologies to user authentication for secure admin access.
10	Admin Controls	Allows administrators to view, manage, and respond to user data and application settings.	Programming languages and frameworks within the admin interface.
11	Security Module	Ensures data security, privacy, and protection against vulnerabilities, including encryption and access control.	SSL/TLS, firewalls, and security libraries for data security and privacy.

Application Characteristics:

SNO	Characteristics	Description	Technology
1	Accessibility	Ensures the application is accessible to users with disabilities, including those with visual or hearing impairments. Provides features like screen reader compatibility and keyboard navigation. Components & Technologies:	WCAG standards and ARIA attributes.
2	User-Friendly Interface	Offers an intuitive and easy-to-navigate user interface to enhance the user experience. Utilizes clear and concise design, user-friendly navigation, and responsive layout.	UX design principles and web/mobile design frameworks.
3	Real-Time Gesture Recognition	Employs computer vision and AI technologies to recognize and interpret sign language gestures in real time. Provides instant feedback to users as they input alphabet letters.	OpenCV and TensorFlow for gesture recognition.
4	Multilingual Support	Supports multiple languages to accommodate a diverse user base. Allows users to input and receive sign language interpretations for different languages.	Language recognition and translation services or APIs.
5	Security	Ensures data security and privacy for user inputs and interactions. Implements encryption, secure authentication, and access control measures.	OAuth 2.0, SSL/TLS, and encryption.
6	Customization	Allows users to personalize their experience, including settings for gesture speed, animation style, and user preferences.	Client-side and server-side technologies for user preferences.
7	Scalability	Accommodates a growing user base and increased usage. The application should be able to handle increased load and user interactions.	Scalable cloud infrastructure, load balancing, and auto-scaling.
8	Collaboration	Enables users to collaborate or communicate with others by sharing sign language messages and gestures. Supports chat and collaboration features.	Real-time messaging and collaboration tools, possibly video conferencing integration.
9	Content Management	Allows administrators to manage user-generated content, including monitoring and moderation of shared sign language content.	Content management systems (CMS) and admin dashboards.
10	Offline Mode	Provides limited functionality for users in areas with limited or no internet connectivity, allowing basic sign language interpretation even offline.	Local data storage and caching for offline functionality.
11	Machine Learning and AI	Utilizes machine learning models for natural language processing (NLP) and gesture recognition. May employ pre-trained models or develop custom models for ASL interpretation.	TensorFlow, PyTorch, and NLP models for ASL interpretation.