**1. System Design**

* **Crowdsourcing Platform**: Develop a platform where users (mainly the deaf community and language experts) can submit, review, and validate gestures. This platform should include features for:
  + User registration
  + Gesture submission (with guidelines)
  + Editorial process for quality control
  + Conversion of gestures into machine-readable format (e.g., HamNoSys)
  + Validation and feedback from experts and the deaf community

**2. Data Collection & Organization**

* **Gesture Collection**: Collect gestures from a wide range of contributors, covering various dialects of PSL (Pakistan Sign Language). This can be done via a user-friendly interface where contributors can submit videos or image-based gestures.
* **Categorization**: Organize the gestures into categories such as letters, numbers, basic words, common phrases, etc.
* **Metadata**: Each gesture should be tagged with additional data like regional dialect, associated meaning, etc.

**3. Machine-Readable Format & Avatar Generation**

* **HamNoSys Notation**: Convert the collected gestures into HamNoSys format (or another suitable sign writing system) to make them machine-readable.
* **Avatar Technology**: Develop or integrate an avatar system that can translate the machine-readable gestures into dynamic, comprehensible avatar-based translations.

**4. Translation System Development**

* **Word-Level Translation**: Focus on developing a word-level translation system where a user can input an English word, and the system outputs the corresponding PSL gesture.
* **Sentence-Level Translation**: Extend this to sentence-level translation, where users can input English sentences, and the system renders the translation in PSL.

**5. Evaluation & Usability Testing**

* **Comprehensibility**: Conduct evaluation sessions with deaf users and language experts to assess the naturalness, expressiveness, and understandability of the avatar-based translations.
* **Usability**: Collect feedback on how easy the system is to use, and whether the avatar provides a clear translation. This feedback will help in improving the system.

**6. Deployment & Scaling**

* **Platform Deployment**: Make the system available to a wide audience, ideally including educational institutions, sign language researchers, and the general deaf community.
* **Scalability**: As the system evolves, work on scaling the database, adding more contributors, and ensuring the system can handle increasing amounts of data.
* **Multi-Dialect Support**: Allow for different dialects and regional variations within PSL to be submitted, stored, and translated in the system.

**7. Continuous Improvement**

* Regularly update the system based on user feedback, adding new words, phrases, and improving gesture recognition and translation accuracy.
* Explore options to integrate with existing sign language learning tools or applications to increase adoption.

### Use Cases and User Stories for a Crowdsourcing-Based Sign Language Corpus Platform

#### **Use Case 1: User Registration and Authentication**

**Description:** A user (contributor, reviewer, or admin) registers and logs in to the platform.

**Actors:**

* Contributor
* Reviewer
* Admin

**Preconditions:**

* The user must have a valid email address.
* The platform is live and accessible.

**Basic Flow:**

1. User visits the platform.
2. User selects "Register" or "Log in."
3. User provides the required credentials (name, email, password, etc.).
4. Platform verifies credentials.
5. User is redirected to their dashboard based on their role.

**Alternate Flow:**

* Invalid credentials result in an error message, and the user is prompted to retry.

**User Stories:**

* As a contributor, I want to register on the platform so that I can submit sign language gestures.
* As a reviewer, I want to log in to my account so that I can validate gestures submitted by contributors.
* As an admin, I want to manage user accounts to ensure platform security and compliance.

#### **Use Case 2: Gesture Submission**

**Description:** Contributors upload sign language gestures in video format to the platform.

**Actors:**

* Contributor

**Preconditions:**

* The user is logged in as a contributor.
* The user has prepared a video file of a gesture.

**Basic Flow:**

1. Contributor selects "Submit Gesture."
2. Contributor fills in metadata (word, dialect, description, etc.).
3. Contributor uploads the video.
4. System validates the format and size of the video.
5. Gesture is submitted for review.

**Alternate Flow:**

* If the video format or size is invalid, the user is prompted to correct the issue.

**User Stories:**

* As a contributor, I want to upload sign language gesture videos so that they can be added to the corpus.
* As a contributor, I want to add metadata to my gesture submissions to provide context for the reviewers.

#### **Use Case 3: Gesture Review and Validation**

**Description:** Reviewers evaluate submitted gestures for accuracy and quality.

**Actors:**

* Reviewer

**Preconditions:**

* The user is logged in as a reviewer.
* There are pending gestures in the review queue.

**Basic Flow:**

1. Reviewer accesses the review queue.
2. Reviewer selects a gesture to review.
3. Reviewer watches the video and verifies metadata.
4. Reviewer provides feedback, approves, or rejects the gesture.
5. Approved gestures are added to the repository.

**Alternate Flow:**

* If a gesture is rejected, it is sent back to the contributor with feedback.

**User Stories:**

* As a reviewer, I want to evaluate submitted gestures to ensure they meet quality standards.
* As a reviewer, I want to provide feedback to contributors on rejected gestures so that they can improve their submissions.

#### **Use Case 4: Gesture Conversion to Machine-Readable Format**

**Description:** The system converts approved gestures into a machine-readable format.

**Actors:**

* System
* Technical Team

**Preconditions:**

* The gesture has been approved by a reviewer.
* The necessary conversion tools are available.

**Basic Flow:**

1. System retrieves the approved gesture video.
2. System converts the video into a machine-readable format (e.g., HamNoSys or SiGML).
3. Converted data is stored in the digital repository.

**User Stories:**

* As a technical team member, I want the system to convert gestures into a machine-readable format so that they can be used by avatar systems.
* As a system admin, I want the converted data to be stored efficiently to optimize storage and retrieval.

#### **Use Case 5: Avatar Rendering and Evaluation**

**Description:** Users evaluate avatar-rendered sign language gestures.

**Actors:**

* Contributor
* Reviewer

**Preconditions:**

* The system has converted gestures into a machine-readable format.

**Basic Flow:**

1. User selects a gesture from the repository.
2. The system generates an avatar rendering of the gesture.
3. User evaluates the avatar’s performance for accuracy and expressiveness.
4. User provides feedback or rates the avatar’s gesture.

**User Stories:**

* As a contributor, I want to view how my submitted gesture looks when performed by the avatar so that I can assess its accuracy.
* As a reviewer, I want to validate avatar-rendered gestures to ensure they are comprehensible.

#### **Use Case 6: Corpus Query and Download**

**Description:** Users query and download gestures or sentences from the repository.

**Actors:**

* Researchers
* Developers

**Preconditions:**

* The user is logged in with appropriate permissions.
* The repository contains data.

**Basic Flow:**

1. User navigates to the repository.
2. User enters query parameters (e.g., keyword, dialect).
3. System displays matching gestures or sentences.
4. User selects and downloads the required data.

**User Stories:**

* As a researcher, I want to query the corpus by keyword and dialect to analyze linguistic variations.
* As a developer, I want to download gesture data to train a machine translation model.

#### **Use Case 7: Crowdsourcing Campaign Management**

**Description:** Admins manage campaigns to collect specific types of gestures.

**Actors:**

* Admin

**Preconditions:**

* Admin is logged in.
* A new gesture collection initiative is planned.

**Basic Flow:**

1. Admin creates a new campaign with specific guidelines.
2. Admin defines the target gestures and metadata requirements.
3. System sends notifications to contributors.
4. Contributors submit gestures as per the campaign.

**User Stories:**

* As an admin, I want to create campaigns for collecting specific types of gestures to fill gaps in the corpus.
* As a contributor, I want to participate in campaigns to contribute to targeted data collection efforts.

#### **Use Case 8: Performance Analytics and Reporting**

**Description:** Admins monitor platform performance and user contributions.

**Actors:**

* Admin

**Preconditions:**

* System is actively in use.

**Basic Flow:**

1. Admin accesses the analytics dashboard.
2. Admin views statistics (e.g., number of submissions, reviews, approved gestures).
3. Admin generates reports for stakeholders.

**User Stories:**

* As an admin, I want to monitor user activity to ensure the platform is actively contributing to corpus development.
* As an admin, I want to generate reports to showcase progress to stakeholders.