**CANTILEVER AIML PROTERNSHIP 2025**

**ABSTRACT**

**Project Title:**

Sign Language Recognition and Translation System

**Team Details:**

|  |  |  |
| --- | --- | --- |
| **S.No** | **Name** | **Roll No** |
| 1 | Palla Praveen Reddy | 23R11A67D3 |
| 2 | Rayala vikyath | 23R11A67D5 |
| 3 | Shyamala Hari prasad | 23R11A67D9 |

A Sign Language Recognition and Translation System leverages computer vision and natural language processing (NLP) to interpret sign language gestures and convert them into spoken or written language. By employing advanced techniques such as deep learning, the system analyses hand movements, facial expressions, and body postures to identify specific signs and generate meaningful text or speech output. This technology aims to bridge the communication gap between hearing-impaired individuals and non-signers.

1. **Sign Language Recognition:**

* Input Modalities: The system can accept input through cameras, data gloves, or specialized sensors to capture gesture data.
* Pose Estimation: Computer vision algorithms are used to estimate hand and body positions accurately.
* Feature Extraction: Key features such as hand shapes, finger configurations, and body postures are extracted for further analysis.
* Gesture Classification: Deep learning models, including Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs), classify these features to identify specific signs.

2**. Sign Language Translation:**

* Gloss-to-Text Conversion: Recognized signs are mapped to glosses (intermediate representations) and translated into coherent text or speech.
* Natural Language Processing: NLP techniques handle grammatical structure and contextual understanding to produce syntactically correct and meaningful sentences.
* Contextual Translation: Using rule-based or statistical translation models, the system converts identified signs into the target spoken or written language.

3. **Key Technologies:**

* Computer Vision: Essential for image processing, gesture detection, and tracking of sign components.
* Machine Learning: CNNs and RNNs are critical for learning complex gesture patterns and performing accurate classification.
* Natural Language Processing: Used for syntax parsing, semantic analysis, and language generation from sign inputs.

4. **Applications:**

* Communication Aid: Bridges the gap between deaf and hearing communities by enabling real-time sign-to-speech/text translation.
* Assistive Technology: Useful in educational tools, mobile apps, and real-time interpretation services for the hearing-impaired.
* Human-Computer Interaction: Opens new modalities of interaction by allowing users to communicate with devices through sign language gestures.