CSY4010 (Computing Dissertations) Interim Report on

**Sign Language Interpreter**

**BY**

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## Project Introduction

The development of a sign language interpreter system aims to address the communication barriers faced by the deaf and hard-of-hearing community. Sign language, a visual-gestural language, poses challenges for non-sign language users to understand and communicate effectively. This project utilizes deep learning techniques, specifically Python's Keras library, to convert sign language gestures into textual representations in real-time. By doing so, it enables seamless communication between deaf and non-deaf individuals.

Advancements in deep learning and computer vision have paved the way for automatic sign language interpreter systems. However, existing systems still require improvements in handling various sign languages and adapting to different signing styles. To enhance accessibility and usability, the project incorporates the Django framework to create a user-friendly web-based interface.

The project's main objectives include developing a robust and accurate sign language interpreter system, capable of real-time interpretation, and promoting inclusivity by breaking down communication barriers. By leveraging the power of deep neural networks, efficient data processing techniques, and the integration of a web-based platform, this system aims to facilitate effective communication and foster inclusivity in various domains, such as education, employment, healthcare, and social interactions.

Through this project, the goal is to contribute to the advancement of sign language interpreter systems and empower the deaf community to participate fully in society. By providing a reliable and accessible means of communication, the system can bridge the gap between sign language users and non-sign language users, promoting understanding, inclusion, and equal opportunities for all.

### Project background

The development of a sign language interpreter system arises from the recognition of communication challenges faced by the deaf and hard-of-hearing community. Sign language, a complex visual-gestural language, presents barriers for non-sign language users. This project utilizes deep learning techniques, specifically Python's Keras library, to convert sign language gestures into real-time textual representations. By doing so, it aims to foster effective communication between deaf and non-deaf individuals.

While previous research has paved the way for sign language interpreter systems, there is a need for robust solutions that handle various sign languages, adapt to different signing styles, and operate in real-time. The project addresses these needs by leveraging deep neural networks, efficient data processing techniques, and integrating the Django framework for a user-friendly web-based interface.

The project's goals include developing a reliable and accurate sign language interpreter system, capable of real-time interpretation, to promote inclusivity and overcome communication barriers. By harnessing the power of deep learning, the system empowers the deaf community to participate fully in education, employment, healthcare, and social interactions.

Through this project, the aim is to contribute to the advancement of sign language interpreter systems, bridging the gap between sign language users and non-sign language users. By providing an accessible means of communication, the system promotes understanding, inclusivity, and equal opportunities for all individuals, irrespective of hearing abilities.

### Project Aims and Objectives

#### Aims:

The main aims of the project are mentioned below:

* Develop a sign language interpreter system for effective communication between sign language users and non-sign language users.
* Promote inclusivity by breaking down communication barriers faced by the deaf and hard-of-hearing community.
* Improve accessibility and participation in various domains, including education, employment, healthcare, and social interactions.
* Leverage deep learning techniques and Python's Keras library to achieve accurate conversion of sign language gestures into textual representations.
* Enhance usability and user experience through the integration of a user-friendly web-based interface using the Django framework.

#### Objectives:

* The main objective of the project is mentioned below:
* Train deep learning models to recognize and interpret sign language gestures accurately.
* Develop algorithms and techniques to handle various sign languages and adapt to different signing styles.
* Implement real-time processing to enable seamless and immediate translation of sign language gestures.
* Integrate Python's Keras library to facilitate efficient deep learning model training and inference.
* Create a web-based interface using the Django framework to provide easy access and usability for users.
* Evaluate and refine the system to improve accuracy, reliability, and performance.
* Validate the system's effectiveness through user feedback and testing in real-world scenarios.
* Contribute to the advancement of sign language interpreter systems by addressing limitations and exploring further enhancements.
* Raise awareness and advocate for the importance of inclusivity and accessibility for individuals with hearing impairments.

### Problem Domain Research:

In this phase, extensive research is conducted to understand the challenges and requirements of sign language interpretation systems. Existing literature, studies, and technologies related to sign language interpretation are explored to gain insights into the domain. The goal is to identify the limitations and shortcomings of current systems, which will inform the proposed solution and ensure that it addresses the specific needs of the users.

#### Information Gathering:

Information gathering involves actively engaging with domain experts, sign language users, and stakeholders to gather insights into their needs and expectations. Various methods such as interviews, surveys, and consultations are employed to understand the requirements of the sign language interpreter system. By directly involving the target users and stakeholders, the system can be designed to meet their specific needs and enhance usability.

#### Identification of Alternative Solutions from Existing Systems:

This phase involves investigating and analyzing existing sign language interpretation systems. Different approaches, technologies, and methodologies employed in those systems are identified. By evaluating the strengths and weaknesses of these alternatives, the project team can make informed decisions and leverage the best-suited techniques for the proposed system. This analysis ensures that the system is built upon existing knowledge and takes advantage of proven solutions.

#### Proposed Solution Strategy:

The proposed solution strategy outlines the overall approach, architecture, and design principles of the sign language interpreter system. It encompasses the methodologies, algorithms, and technologies that will be used to address the identified challenges. Factors such as accuracy, real-time performance, adaptability to different sign languages, and user-friendliness are considered to ensure an effective and efficient solution.

#### Functional Requirements:

Functional requirements define the specific functionalities and features that the sign language interpreter system should possess. This includes capturing and processing video input, recognizing sign language gestures accurately, and generating textual representations in real-time. Additionally, user interaction requirements, such as video uploading, playback, and text output display, are determined. Any additional modules or features needed to enhance the system's functionality are also specified, such as user authentication, error handling, or language support.