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| Home | AIUB PROJECT REPORT **COURSE:**  HUMAN COMPUTER INTERACTION |

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**Introduction:**

Around 90 million deaf people utilize more than 300 distinct sign languages together throughout the world. Deaf people and their community engage in a distinctive form of personal communication known as sign language. Hand gestures, signs, facial expressions, and visual gestures all communicate meanings and information. These physical gestures can be used singly or in combination to convey letters, numbers, words, and sentences. The use of sign language is not just for one-on-one communication; it can also be used in sophisticated interactive environments. For instance, in smart home applications, a hand gesture can be used in place of a verbal phrase to refer to a feature or an option. Technically speaking, the hand movements employed in sign languages can be divided into two categories: static hand gestures and dynamic hand motions. The significance of researching sign language linguistics and categorizing their gestures resides in how deaf people use the language elements and how they can be understood by those who receive sign language messages from other people.

Human-computer interaction (HCI), which has a wide range of uses, has become a necessary component of daily life. One of these applications is gesture recognition for sign language interpretation, in which pictures of hand movements from a sign language are input to a computer, processed, and turned into auditory or written output signals that users, including deaf individuals, may comprehend. Because of this, such HCI algorithms must be dependable, quick, flexible, and precise, especially when deaf persons are involved in emergencies. Therefore, there may be many methods and approaches for gesture input, gesture processing, and output interpretation depending on these criteria.

**Project Background:**

* **Identification of problem:** Hand gestures can be used in a variety of situations to interact with technology, including playing video games, piloting unmanned aerial vehicles, operating medical equipment, etc. People with disabilities can also use these hand signals to communicate with the systems. The way we engage with the system may be constrained by traditional interface methods like the keyboard, mouse, touchscreen, etc. To communicate with any of these systems, physical contact is necessary. The same functionality can be interpreted by gestures without a physical interaction with the interfaced devices. Understanding these gestures might be difficult because they can seem differently on various people when executing the same action. The application of Deep Learning techniques might be able to solve this issue.
* **Background Study:** Interpreters of sign language have a great deal of practice doing both simple and sophisticated hand motions rapidly and for extended periods of time. For a hearing-impaired audience, the work typically entails interpreting teachers' or conference speakers' words into American Sign Language (ASL). Designing a gesture language for computer input may benefit from the particular insight sign language interpreters have into whether hand movements are or are not related to hand and arm pain. While sign language interpreters employ intricate hand gestures to represent words, they are also well-versed in the straightforward hand gestures and motions that will likely be used in 3D gestures for HCI. Examples are the gestures for the letters and digits O, A, C, and V. These less complex movements are appealing for HCI because the hand postures are easily recognizable, distinct, and easier to distinguish via image capture.
* **Goal:** The goal is to identify the hand motions that are easy to produce and the ones that are related to hand pain when sign language interpreters made them repeatedly. The idea is that after frequently forming certain hand movements, sign language interpreters might relate them to various degrees of hand pain. If some motions are uncomfortable while others are not, the results can assist direct the design of 3D hand gestures for HCI tasks to lessen computer users' discomfort and weariness and increase productivity.