**CHAPTER 1**

**INTRODUCTION**

In recent years, gesture-based systems for user interface control have gained popularity due to their intuitive and natural interaction. A gesture-based system allows users to interact with a computer or a device using hand or body movements, without the need for physical input devices such as a keyboard or mouse. The use of gesture-based systems has expanded beyond entertainment and gaming, and now extends to fields such as healthcare, education, and industrial design.

As the computer technologies are growing rapidly, the importance of human computer interaction becomes highly notable. Some persons who are disabled cannot be able to use the computers. Eye ball movement control mainly used for disabled people. Incorporating this eye controlling system with the computers will make them to work without the help of other individual. Human-Computer Interface (HCI) is focused on use of computer technology to provide interface between the computer and the human. There is a need for finding the suitable technology that makes the effective communication between human and computer. Human computer interaction plays the important role .Thus there is a need to find a method that spreads an alternate way for making communication between the human and computer to the individuals those who have impairments and give them an equivalent space to be an element of Information Society

The aim of a gesture-based system is to create a more natural and seamless interaction between humans and computers. Unlike traditional input methods, such as a keyboard or a mouse, gesture-based systems allow users to interact with a computer in a more human-like manner, which can lead to improved productivity, better user experience, and increased user satisfaction.

Gesture-based systems have become more prevalent with the development of advanced computer vision technology, which allows computers to recognize and interpret hand and body movements accurately. With the rise of mobile and wearable technology, gesture-based systems are becoming more accessible and user-friendly, as they can be used on a range of devices, including smartphones, tablets, and smartwatches.

The potential benefits of using gesture-based systems for user interface control are vast, ranging from improved accessibility for people with disabilities to increased efficiency and productivity for professionals

In addition to body gestures, gesture-based systems also include eye and hand gestures. Eye tracking technology allows computers to detect the direction and focus of the user's gaze, enabling users to navigate through a user interface, select objects, or activate functions with their eyes. Hand gestures, on the other hand, use the movement of the hands and fingers to control user interfaces, including scrolling, zooming, and selecting objects.

Hand and eye gestures have the potential to make interactions with technology more natural and intuitive. For example, eye tracking can be used to control the movement of a cursor on a screen, allowing users to navigate through a user interface or select objects by simply looking at them. Hand gestures, such as pinch-to-zoom or swipe-to-scroll, have become popular in mobile devices, enabling users to interact with interfaces in a more tactile and intuitive manner.

Youth now a days are addicted to video games and which causing them to sit at one place for a longer periods of time. This is leading to Obesity problem in the youth. So by making the user interface by body poses we can increase the body movement and there by reducing the Obesity in young kids.

**CHAPTER 2**

**LITERATURE SURVEY**

Gesture-based user interface control is a technology that enables users to interact with electronic devices through natural body movements. This technology has gained considerable interest from researchers and developers due to its potential for improving the user experience in various applications, such as gaming, virtual reality, and mobile devices. In this literature survey, we review some of the key research works that have contributed to the development of gesture-based user interface control.

Gesture-based approaches are becoming an increasingly popular technique in Human Computer Interaction. Recent developments in the hardware field have made it more affordable and more reliable to use gesture-based interfaces and they are becoming more of a standard way for human users to interact with computers. Most of the research has been investigating the usage of gestures in personal and limited access situations. But gesture interfaces are promising great benefits to usage scenarios in public spaces or general access environments. This paper will summarize and evaluate the particular aspects of using gesture-based interfaces in application contexts in public and semi-public spaces.[1]

As for physical development, previous evidence has found traditional seated video games to be associated with increased caloric intake and a 2-fold increase in obesity per hour/day played [2].

obesity was independently associated with the time spent playing electronic games and the time spent watching television and was inversely associated with physical activity. Our data also suggest that children may be at higher risk for obesity if their father smokes or mother works outside of the home.

To our knowledge, this study provides the strongest evidence for an independent association between time spent playing electronic games and childhood obesity.[3]

Building applications that perceive the world around them is challenging. A developer needs to select and develop corresponding machine learning algorithms and models, build a series of prototypes and demos, balance resource consumption against the quality of the solutions, and finally identify and mitigate problematic cases. The MediaPipe framework addresses all of these challenges. A developer can use MediaPipe to build prototypes by combining existing perception components, to advance them to polished cross-platform applications and measure system performance and resource consumption on target platforms. We show that these features enable a developer to focus on the algorithm or model development and use MediaPipe as an environment for iteratively improving their application with results reproducible across different devices and platforms.[4]

**CHAPTER 3**

**PROBLEM STATEMENT**

**3.1 PARTICULAR PROBLEM**

People with disabilities find it hard to use traditional user interface like mouse,keyboard.This is making them away from using a computer and accessing internet. If a person is unable to access internet he is losing the advantages of modern technology in this information driven era. Even the available interface devices for the disabled are costly.We need a cheaper solution that is readily integrable into the computer and easy to use with little to no training.

Youth now a days are addicted to playing video games for long hours which is making them to sit at one place . Research saying playing video games for longer hours may lead to Obesity. Evidence has found traditional seated video games to be associated with increased caloric intake and a 2-fold increase in obesity per hour/day played. Obesity can be associated with increased heart risks . So we need to change the user interface to a physical movement controlled system so that they no longer need to sit at one place for longer hours and can escape from the risk of obesity .

**3.2 PROPOSED SYSTEM**

**3.2.1 Methodology**

We are building a model has three modules that are built using mediapipe to solve our problem statement

First module employs a variety of hand gestures to control the computer cursor.

Second module is helpful for those with disabilities, our model implements the same functionality by using eyeball movement rather than hand motions to control the cursor.

Third module is helpful in playing games .It is integrated with a video game that a real person is playing, with the controls adjusted to different body movements

**3.3 OBJECTIVES**

* **Setting up the environment**: The first step in creating a gesture-based user interface using MediaPipe and OpenCV is to set up the environment. This involves installing the necessary software and libraries, such as Python, MediaPipe, and OpenCV. Once the environment is set up, we can proceed with the next steps.
* **Capturing video**: The next step is to capture video input from the camera. This can be done using OpenCV, which provides an interface for accessing video streams from cameras. We can also use pre-recorded videos as input.
* **Hand detection**: Once we have captured video input, the next step is to detect the user's hand using MediaPipe. MediaPipe offers a pre-trained model for hand detection, which can be used to locate the user's hand in the video stream. The hand detection model uses machine learning algorithms to detect hand landmarks, which can be used to track the position and movement of the user's hand.
* **Gesture recognition**: After detecting the user's hand, the next step is to recognize gestures. This can be done using machine learning algorithms, such as Support Vector Machines (SVM) or Convolutional Neural Networks (CNN). We can train a gesture recognition model using labeled data, where each gesture is associated with a specific label. The model can then be used to predict the label of the gesture performed by the user.
* **User interface control**: Once we have recognized the user's gesture, the final step is to use it to control the user interface. This can be done by mapping the gesture to specific user interface controls, such as buttons, sliders, or menus. For example, a swipe gesture can be mapped to scrolling, while a pinch gesture can be mapped to zooming.

**3.4 SCOPE OF THE PROJECT**

The scope of gesture-based user interface control system is broad and has applications in various fields. With advancements in technology, these systems have become more accurate, reliable, and user-friendly, making them applicable in different environments and scenarios.

One of the primary applications is in the field of gaming. Gesture-based systems can be used to control games, providing a more immersive and interactive experience. For example, body movements can be used to control characters or objects in the game, while eye movements can be used for aiming or selecting items

Another application is in healthcare. These systems can be used to control medical devices, such as prosthetics or wheelchair, allowing people with disabilities to control their devices using natural and intuitive gestures. In addition, these systems can be used to assist medical professionals in performing surgeries, by enabling them to control equipment without physical contact.

Gesture-based user interface control system can also be used in education and training

Furthermore, gesture-based user interface control systems can be used in home automation and entertainment systems. These systems can be used to control various home appliances, such as lights, air conditioning, or TV, using natural and intuitive gestures. This can provide a more convenient and accessible way of controlling devices, particularly for people with disabilities.

**CHAPTER 4**

**REFERENCES**

# [1] Gesture-Based User Interfaces for Public Spaces

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**[4]** MediaPipe: A Framework for Building Perception Pipelines <https://arxiv.org/abs/1906.08172>

**[5]** GOOGLE LLC, “MediaPipe”. Avaiable: <https://mediapipe.dev/>.