



NORTH SOUTH UNIVERSITY

PROJECT PROPOSAL

Human-Computer Interaction based AI Assistant(ISHARA)

Group Members

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Abstract

ISHARA is a gesture recognition system that aims to simplify computer navigation and web browsing using intuitive hand gestures. By utilizing a camera to capture users' hand movements, the system will translate these movements into corresponding actions on the computer, such as moving the cursor, opening and closing files, and browsing web pages. To accurately recognize and interpret user gestures, ISHARA will use machine learning algorithms and open-source computer vision models and algorithms. The system will also feature a user interface that allows users to customize gestures for different actions based on their preferences. To ensure scalability, flexibility, and maintainability, the system will be developed using open-source software and libraries. Extensive testing will be performed to ensure the system's accuracy, reliability, and usability. In summary, ISHARA offers an innovative and user-friendly way for users of all technical proficiency levels to navigate their computers and browse the web using hand gestures. It will provide a seamless and intuitive learning curve for first-time users, making computer navigation more accessible and convenient.

1 Introduction

ISHARA is an innovative project that aims to develop an intelligent system for hands-free assistance and remote accessibility. The project is designed to assist people with disabilities by utilizing gesture-based AI assistance that can be accessed through a webcam. The system aims to improve the quality of life of individuals with disabilities, by providing a hands-free, intuitive, and convenient interface for accessing and controlling digital devices and services. The idea behind ISHARA is to create a smart system that can understand and interpret the user's gestures in real-time, allowing them to interact with their digital devices and services without the need for physical input devices like keyboards or mouse. The primary goal of ISHARA is to provide a new level of accessibility and convenience to people with disabilities, by enabling them to control their digital devices and services using only gestures. This will help to improve their overall quality of life, by making it easier for them to interact with the world around them and access the information and services they need. By utilizing AI and machine learning technologies, we hope to create a system that can provide hands-free assistance and remote accessibility, enabling individuals with disabilities to live more independently and improve their overall quality of life.

2 Objectives

1. To develop an intelligent system that provides hands-free assistance and remote accessibility to people with disabilities.
2. To design and develop a gesture recognition system that can accurately interpret user gestures in real-time.
3. To create an intuitive user interface that can be easily accessed and controlled through gestures.
4. To integrate AI and machine learning technologies into the system to enable it to learn and adapt to the user's individual needs and preferences over time.
5. To provide remote accessibility to caregivers and family members, enabling them to remotely access and control the user's devices and services.

Ultimately, ISHARA aims to improve the quality of life of individuals with disabilities by providing them with a hands-free, intuitive, and convenient interface for accessing and controlling digital devices and services.

3 Hardware and Software Requirements

Hardware Requirements:



Camera



Computer

Camera: A regular webcam will be sufficient. This will be used to capture the video

Computer: This will be used to process the data captured by the camera and run AI algorithms

Software Requirements:

OpenCV: This is an open-source computer vision library. Offers a variety of functions for real-time computer vision and image processing.

Mediapipe: It is an open-source framework that offers a variety of ML solutions including hand tracking

Pygui: This is an easy-to-use graphical user interface toolkit that is specifically designed for python.

Offers a variety of features for creating a user-friendly and efficient UI.

VSCode: this will serve as the development environment for writing, testing, and debugging code.

4 Functional Diagram

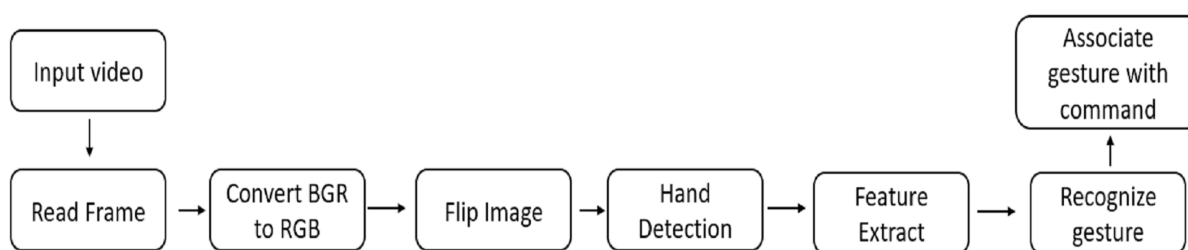


Figure 1: Functional Diagram

5 Applications and Functionalities

ISHARA will be designed to provide users with a natural and intuitive way to interact with their computer and web browser. With this system, users can use hand gestures to navigate through their files and folders, browse the web, and perform common tasks with ease. In this section, we will outline the key features of our system that enable these capabilities.

1. **Cursor Movement:** Users will be able to move their mouse cursors and click by simply by moving their hands and fingers and providing gestures.
2. **File Navigation:** Users will be able to open, close, explore and navigate files/applications, pause and play through simple and intuitive gestures. This will minimize and, in some cases, eliminate the need

for a mouse for basic computer navigation.

3. Application shortcuts: Users will be able to launch their preferred applications through simple gesture shortcuts. For example, the user can set up a particular app like Chrome to launch when he raises his index and middle finger of his right hand forming a 'V' shape. Users will be able to customize and modify which app they want to assign to a particular gesture to conveniently utilize the given set of gestures.
4. Volume Control: Users can control the sound volume of his computer through simple hand gestures.
5. Simplified Web Browsing: Swiping up and down in web browsers, opening and closing tabs, and other common web browsing practices will be easier with simple and easy to remember gestures. This will allow for a more seamless and intuitive web browsing experience.

6 Previous Project

All of us have worked on a variety of projects because of which we have a wide range of expertise across various fields in CS.

Volume Controller: This was my first experience in the field of AI and this was the project that inspired me to pursue a similar kind of problem in CSE299. The project was fairly simple but had some interesting applications. The software that I developed was able to decipher between certain gestures and control the intensity of the volume of the computer accordingly. It could also adjust the brightness of the monitor.

[Sadman Sakib Alif]

Web Reviewing Platform: As part of my Software Engineering course, I developed a product/service reviewing web platform that allows users to share reviews of products/services and receive feedback. The platform honed my web development, database management, and UI design skills. But more importantly, it drastically improved my understanding of how to make a technical projects like these more marketable, profitable and sustainable. [Md. Kashef Kaiyum]

Blood Donation Management Web App: This project was a complete website where blood donors and recipients can create an account with their blood groups and some basic contact information. So that at times of need blood donors and their contact information can be found easily and quickly. This website also had a section for unregistered users so that they can find blood donors if they don't have the time to create an account. [Nasim Anzum Promise]

7 Work Breakdown Structure (WBS)

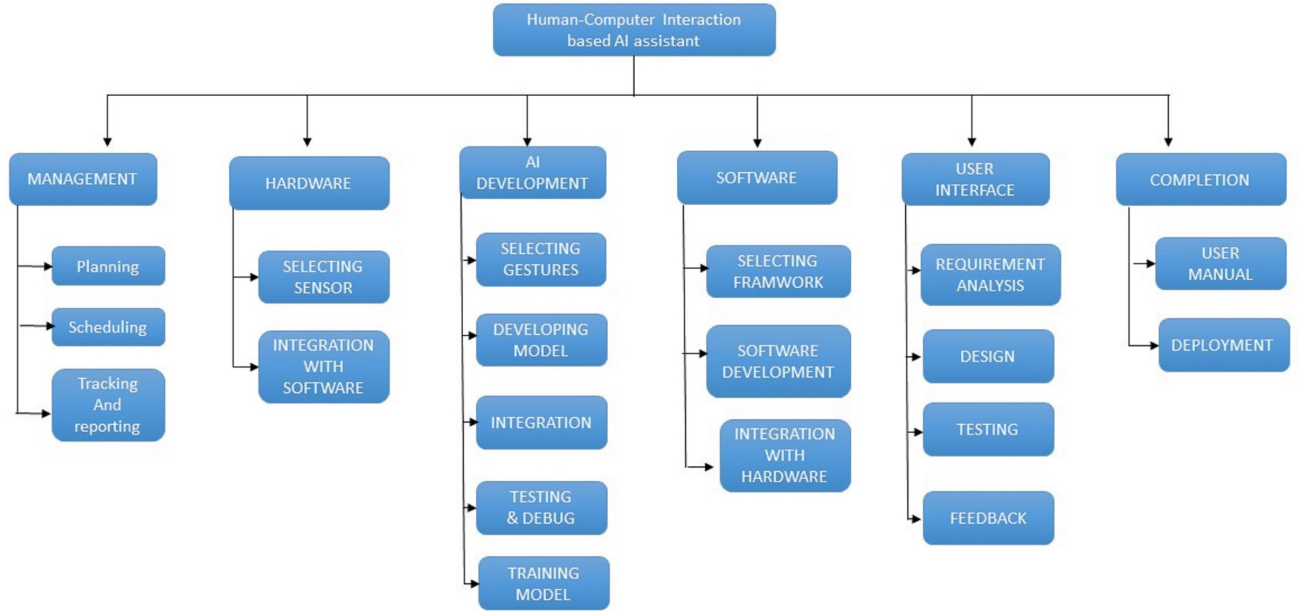


Figure 2: Work Breakdown Structure

8 Impact of our Project

Increased Accessibility: ISHARA provides a hands-free and intuitive interface that can be accessed using gestures, making it more accessible to individuals with disabilities. This will help to improve their ability to access and control digital devices and services, and reduce the need for physical input devices like keyboard or mouse.

Improved Independence: By enabling individuals with disabilities to control their digital devices and services using only gestures, ISHARA can help to improve their independence and reduce their reliance on caregivers and family members. This will give them greater freedom and control over their daily lives.

Remote Accessibility: ISHARA also offers remote accessibility, enabling caregivers and family members to remotely access and control the user's devices and services. This will provide greater support and assistance to individuals with disabilities, even when their caregivers are not physically present.

Improved Quality of Life: By providing hands-free assistance and remote accessibility, ISHARA has the potential to significantly improve the quality of life of individuals with disabilities. It can help them to access information, communicate with others, and perform daily tasks more easily, improving their overall well-being.

In conclusion, ISHARA has the potential to make a significant impact on the lives of individuals with disabilities by providing them with a hands-free, intuitive, and convenient interface for accessing and controlling digital devices and services.

9 Limitations

Although we aim to develop a robust system that will accurately recognize gestures and run commands accordingly, there are some potential limitations we have to take into account.

Camera limitations: The accuracy and reliability of gesture recognition can be affected by how much clear and recognizable video data we can extract out of a given camera. With varying quality of live video footage from different cameras, the precision of results may also vary.

Environmental Factors: Adverse lighting conditions, background clutter, and other environmental factors may influence the data quality extracted from the camera and the system may not perform as expected.

Limited gesture set: While the system can recognize a variety of gestures, there are limits to the number of unique gestures that can be reliably recognized. This may limit the functionality of the system to a certain degree.

Physical limitations: Users with certain physical disabilities or impairments may not be able to use the system effectively or at all. For example, users with hand tremors or limited range of motion may have difficulty performing the necessary gestures.

Privacy concerns: The use of a camera for gesture recognition can raise privacy concerns, as users may not want to be constantly monitored or recorded while using their computers.

10 Tentative Schedule



Figure 3: Tentative Schedule

11 Important Links:

[*CLICK HERE*](#) -Overleaf Project Proposal

[*CLICK HERE*](#)- Github Repository