International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 11 Issue: 11 | Nov 2024 www.irjet.net p-ISSN: 2395-0072

REDEFINING MOUSE CONTROL THROUGH SEAMLESS INTEGRATION OF HAND GESTURES

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Abstract - Gesture-Craft proposes a paradigm shift in computer interaction by integrating hand gestures seamlessly into mouse control, offering users an enhanced computing experience. Traditional mouse input methods have limitations in terms of precision, speed, and intuitiveness. Gesture-Craft addresses these limitations by harnessing the power of hand gestures, which are natural and expressive forms of communication. By fusing gesture recognition technology with mouse control mechanisms, Gesture-Craft provides users with a novel way to interact with digital interfaces, applications, and environments.

This project aims to develop a robust system capable of accurately interpreting a wide range of hand gestures and translating them into meaningful actions within the computing environment. Through extensive experimentation and user testing, Gesture Craft seeks to demonstrate its effectiveness in improving productivity, efficiency, and user satisfaction across various computing tasks and domains.

Key Words: Media pipe (MP), convolutional neural networks (CNNs)

1.INTRODUCTION

The "Gesture-Craft" project endeavors to redefine traditional computer interaction paradigms by seamlessly integrating hand gestures as a primary input method. Through the recognition and analysis of hand movements captured by depth-sensing cameras or motion capture devices, users can interact with their computing devices in a manner that is more intuitive, and immersive. . This innovative approach not only enhances the overall user experience but also significantly improves accessibility and inclusivity by providing an alternative input method for individuals with mobility impairments or disabilities. . By leveraging hand gestures for interaction, users can perform a wide range of tasks with ease, including navigating through applications, controlling media playback, executing system commands. Moreover, gestures enhance efficiency and productivity, streamlining common tasks and reducing reliance on traditional input devices such as mice or keyboards.

1.1 LITRATURE SURVEY

1. Gesture Recognition Methods using Machine Learning Matsumoto et al. (2016): Discusses the use of Convolutional Neural Networks (CNNs) for dynamic gesture recognition, where the system learns to classify hand gestures based on training data. Its opens up news possibilities for enhancing user interaction with digital environments through intuitive and natural gestures, eliminating the need for physical input devices.

2. Challenges in Hand Gesture Recognition Accuracy and Reliability: Arif et al. (2014): Discusses the challenge of ensuring accurate gesture recognition in real-time, especially with varying lighting conditions and hand occlusion.

3. Hand gesture recognition: A Literature Review by S.M. Hassan and M. A. Hannan (2021): This Literature review provides a comprehensive overview of hand gesture recognition techniques and their application in human – computer interaction (HCI). It examines recent advancements in hand gestures recognition, including machine learning, computer vision, and sensor – based approaches, and discusses their implications for HCI

1.2 METHODOLOGY

Creating a virtual mouse using hand gestures typically involves a combination of computer vision techniques and machine learning algorithms. Here's general methodology along with algorithms commonly used:

1. **Gesture recognition module.**

This module is responsible for capturing hand movements and gestures using depth-sensing cameras and infrared sensors. It includes algorithms for processing sensor data, analyzing hand movements, and recognizing predefined gestures in real-time. The module interfaces with the hardware sensors to ensure accurate and reliable gesture recognition.

2. **Accessibility module**

This module focuses on providing accessibility features to accommodate users with disabilities or impairments. It includes alternative input methods, customizable interaction settings, and assistive technologies to ensure inclusivity for all users. The module prioritizes usability and accessibility, allowing users with diverse needs and abilities to effectively interact with the system.

3.Performance Optimization Module

The Performance Optimization Module in the "Gesture-Craft" project is designed to ensure that the system runs efficiently and provides real-time feedback without lag. This module focuses on optimizing the processing of video input and gesture recognition to maintain high responsiveness.

1.3 DIAGRAMS

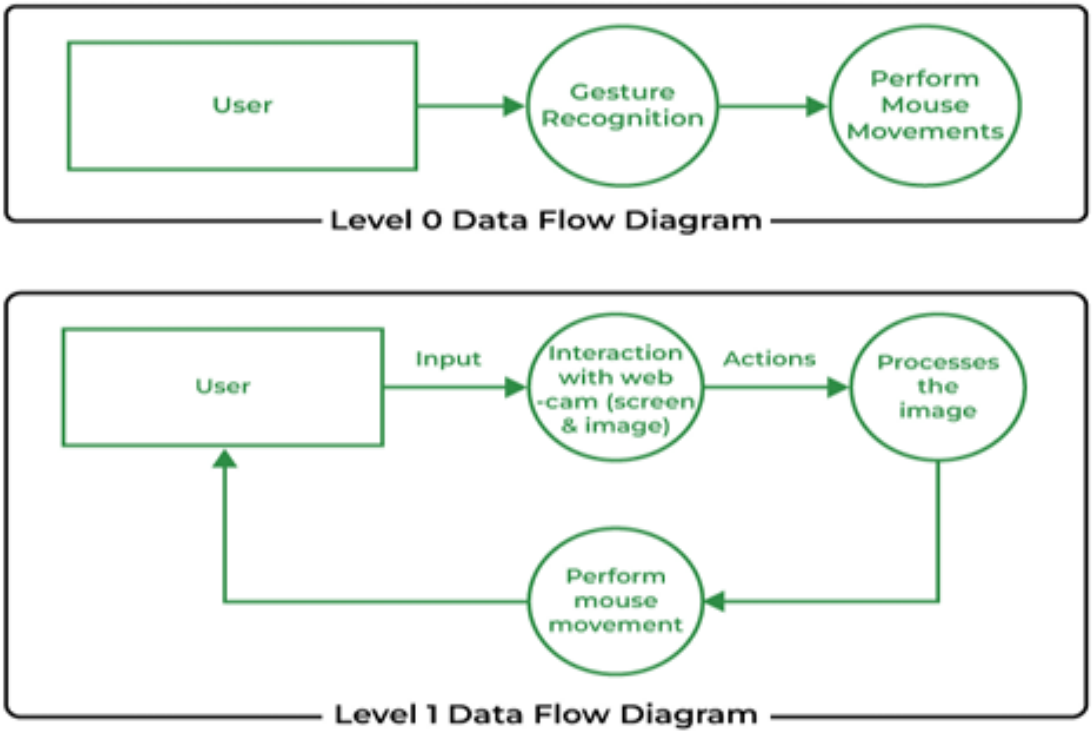

FIGURE 1-DFD Diagram

1.4 SYSTEM ARCHITECUTRE

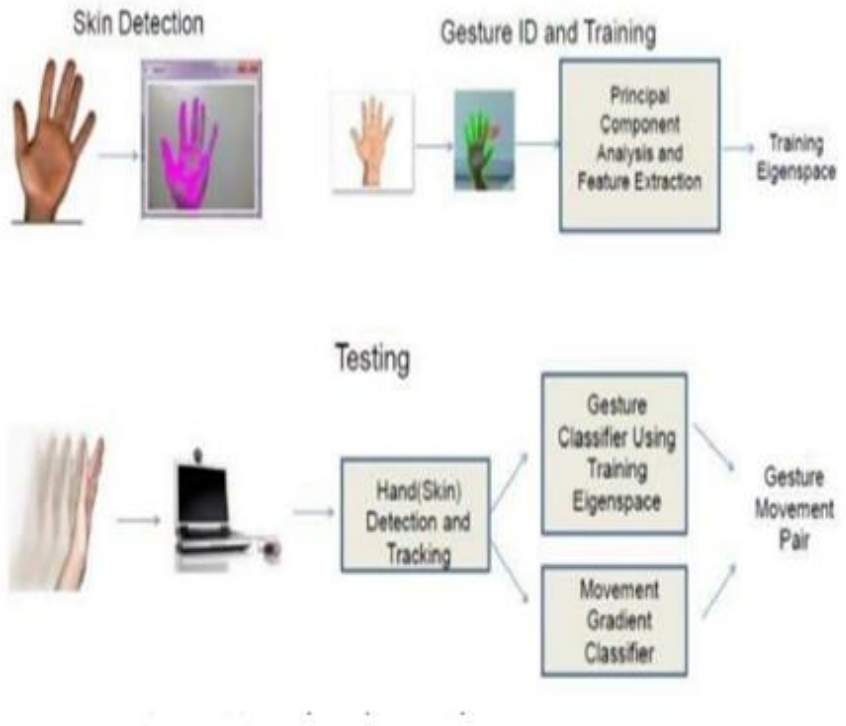

FIGURE 1-Architecture Design

1.5 RESULT

FIGURE 3: Home Page

FIGURE 4: Cursor Selection

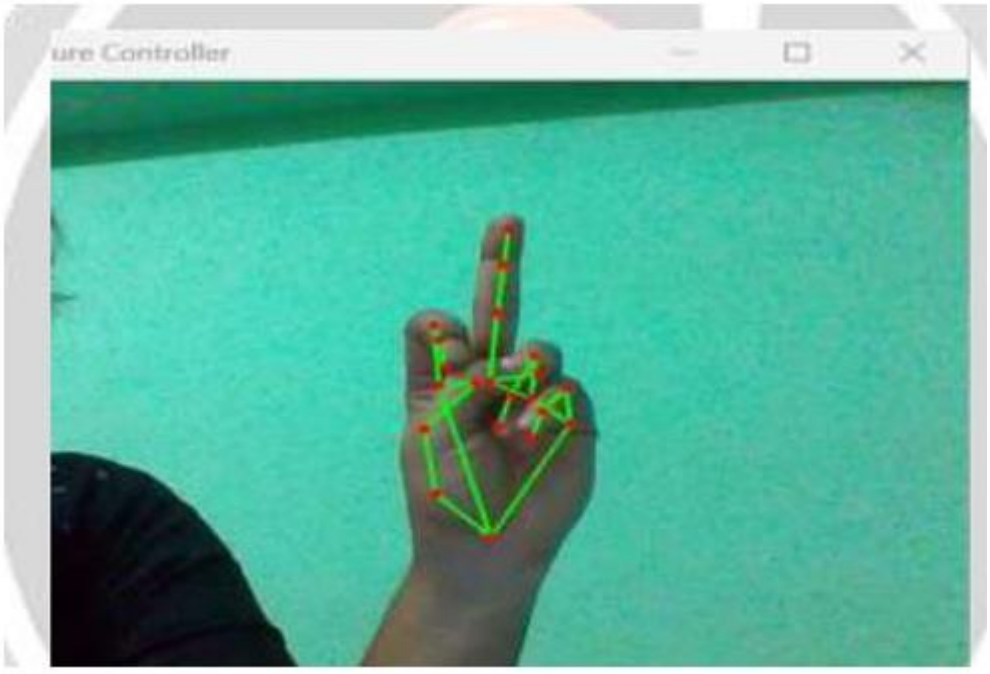

FIGURE 5: Left Selection

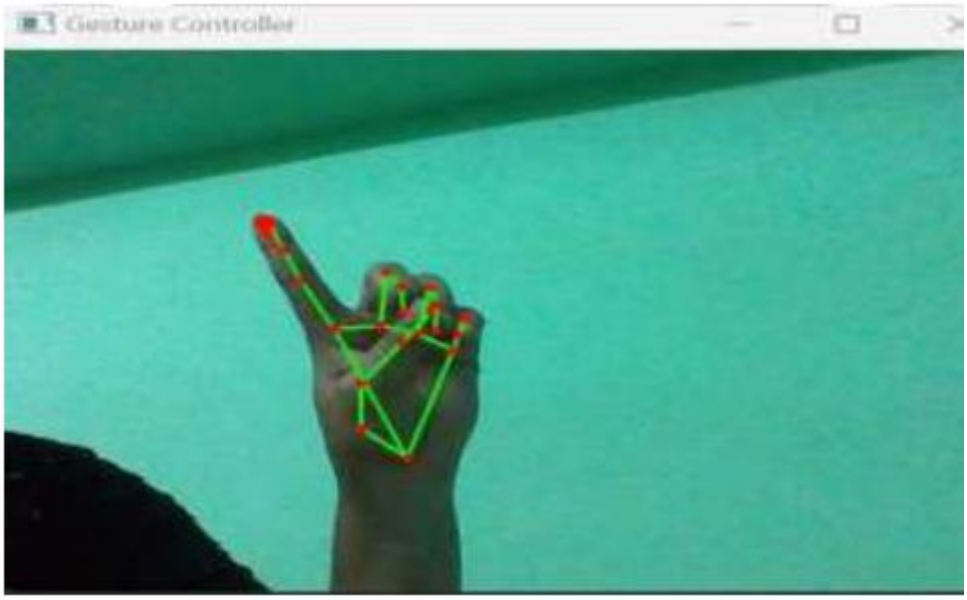

FIGURE 6: Right Selection

1.6 PROBLEM DEFINITION

The "Gesture-Craft" project addresses the limitations of traditional mouse and keyboard interaction methods in computing by introducing hand gestures as a primary input method. Traditional input devices may be cumbersome, especially for users with mobility impairments or disabilities. Additionally, they may not fully leverage the capabilities of modern computing devices. The project aims to overcome these challenges by developing a system that seamlessly integrates hand gestures, enabling intuitive and natural interactions with computing devices. However, implementing gesture recognition systems poses technical challenges, including accurately capturing and interpreting a wide range of hand movements in real-time. Ensuring robustness, accuracy, and responsiveness while minimizing latency and false positives is crucial for delivering a seamless user experience. Therefore, the problem definition encompasses designing and implementing an efficient and reliable gesture recognition system to enhance user interaction with computing devices.

1.7 CONCLUSIONS

In conclusion, "Gesture-Craft: Redefining Mouse Control through Seamless Integration of Hand Gestures for Enhanced Computing Experiences" presents a promising avenue for revolutionizing human-computer interaction. By harnessing hand gestures, the project offers users an intuitive and natural way to interact with computing devices, potentially enhancing productivity and accessibility. Through extensive testing, including functional, usability, performance, compatibility, and security assessments, the system aims to deliver a seamless and reliable user experience. The integration of gesture recognition algorithms, intuitive user interfaces, and real-time feedback mechanisms underscores the project's commitment to usability and user satisfaction. Moving forward, ongoing refinement and innovation in gesture control technology hold the potential to further advance this field, paving the way for more intuitive and immersive computing experiences.

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