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Luna – An Intelligent Voice and Gesture-Controlled Virtual Assistant

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ABSTRACT: Luna is a smart virtual assistant designed to help users control their computer using both voice and hand gestures. It allows users to open apps, search the internet, send messages, and more—without touching the keyboard or mouse. Luna uses voice recognition and gesture detection to understand commands and also collects real-time information from the web using web scraping. Unlike other assistants, Luna learns user preferences over time and gives personalized suggestions. This project aims to make digital tasks easier, faster, and more accessible through a hands-free and intelligent system

KEYWORDS: Phishing, Fraud prevention, Cyber crime, Selenium, Python, Web driver.

I. INTRODUCTION

In today's world, technology is becoming more advanced, and people expect faster and easier ways to interact with their devices. Traditional methods like using a keyboard, mouse, or even basic voice commands can sometimes feel slow or limited. To solve this problem, we created **LUNA – Your AI Comrade**, a smart assistant that lets users control their system using both **voice** and **hand gestures**. LUNA is designed to make everyday tasks easier. You can open apps, send messages, get information from the internet, and more—without even touching your device. It uses **voice recognition**, **gesture detection**, and **natural language processing (NLP)** to understand what the user wants. It also uses **web scraping** to find and summarize real-time information from the internet. What makes LUNA different from other assistants like Siri or Google Assistant is that it combines both **voice and gesture control**. It also **learns from the user's behavior** over time, giving more personalized responses and suggestions. With LUNA, users get a smart, hands-free experience that is more interactive and helpful. It's not just a tool—it's a digital companion that understands and grows with the user, making daily life more efficient and connected.

II. LITERATURE SURVEY

1. In 2017, pei xu proposed a real-time hand gesture recognition and human-computer interaction system , which used computer vision and machine learning to detect hand gestures for controlling devices without touching them. this idea supports systems like luna that use gesture-based interaction.
2. In 2024, xiao zhan and noura abdi introduced healthcare voice ai assistants: factors influencing trust and intention , which discussed how user trust and personalized responses are important for voice assistants.
3. In 2013, akash created braina – ai voice assistant [3], a simple voice-based desktop assistant without gesture support or learning abilities. microsoft's voice access – windows 11 feature [4], launched in 2021, lets users control their computer with voice commands, but it only works with fixed commands and doesn't adapt or support gestures.
4. In 2017, amit mittal and deepak aggarwal published hand gesture recognition system using artificial neural networks , where they showed how hand gestures can be used to control systems using trained neural networks, which is similar to how luna detects hand movements

III. METHODOLOGY

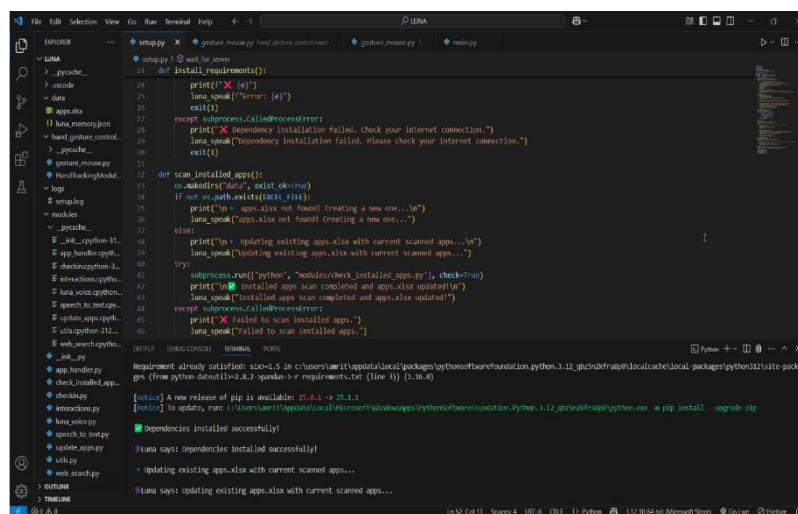
1. **Requirement Analysis:** The development of the LUNA virtual assistant began with identifying both functional and non-functional requirements. Functional needs included voice command recognition, gesture-based control, web scraping, and personalized user interaction. Non-functional requirements focused on usability, platform independence, real-time performance, and security. These were gathered through observation of existing voice assistant limitations and discussions with users who desired a hands-free, adaptive assistant.
2. **System Design:** The system architecture was designed using a modular approach to separate major components—voice recognition, gesture detection, natural language processing (NLP), web scraping, and system automation. UML diagrams such as use case diagrams, sequence diagrams, and class diagrams were used to map interactions between users and the system. A three-layer architecture was adopted, consisting of the Input Layer (voice/microphone and webcam), Processing Layer (AI logic and NLP/gesture recognition), and Output Layer (visual/audio feedback and actions).
3. **Development Tools and Technologies:** The frontend was built using HTML, CSS, and JavaScript to create a user-friendly interface. Python was used extensively on the backend for logic and AI features, supported by libraries such as SpeechRecognition for voice input, MediaPipe and OpenCV for gesture recognition, and BeautifulSoup/Selenium for web scraping. Flask was used to build the web framework and integrate modules into a unified application. Visual Studio Code served as the primary development environment.
4. **Implementation:** The implementation followed the Incremental Model. The voice module was developed first, allowing for basic voice-controlled tasks such as opening applications and checking time or battery level. Next, the gesture module was integrated using real-time hand tracking. Web scraping was implemented to allow real-time fetching of information like news and weather. All modules were connected under a Flask server with an interactive landing page to accept and respond to user inputs. Each module operated independently and could be updated or debugged without affecting others.
5. **[Testing:** The system was rigorously tested using unit testing for individual modules like voice recognition and gesture detection. Integration testing ensured smooth operation across modules. Performance testing was carried out to measure system responsiveness and reduce latency in real-time execution. User testing involved feedback collection from trial users to identify bugs and improve usability, especially the gesture control accuracy and voice command flexibility.
6. **[6]Deployment:** After successful testing, LUNA was deployed on local machines with a setup script that auto-configured environment variables and dependencies. Gesture calibration and microphone setup were included in the deployment process. The system runs on startup and can be accessed via a web interface. Future deployment plans include cloud synchronization, cross-device support, and integration with wearable tech like smart glasses or watches for enhanced mobility.

IV. EXISTING MODEL

Current virtual assistants like Siri, Google Assistant, Alexa, and Cortana are widely used to perform tasks such as setting reminders, sending messages, or searching online. However, these systems mainly rely on voice-based commands and are often restricted to predefined functions. They require internet connectivity for most tasks and usually cannot adapt their behavior based on user preferences over time. Most importantly, they lack gesture-based control, which limits hands-free interaction to just voice. These assistants also do not perform real-time web scraping; instead, they rely on built-in APIs or limited sources for information. The responses are often generic and may not fully consider the user's context or history. Furthermore, these systems typically do not support personalization, multi-modal control, or offline operation, reducing their flexibility and usefulness in dynamic environments

V. PROPOSED SYSTEM

The proposed model, LUNA, introduces a more advanced and adaptive virtual assistant that combines voice recognition, gesture detection, natural language processing (NLP), and real-time web scraping into a unified system. Unlike existing assistants, LUNA supports multi-modal interaction, allowing users to control applications through either voice commands or hand gestures, making it more versatile in different situations.



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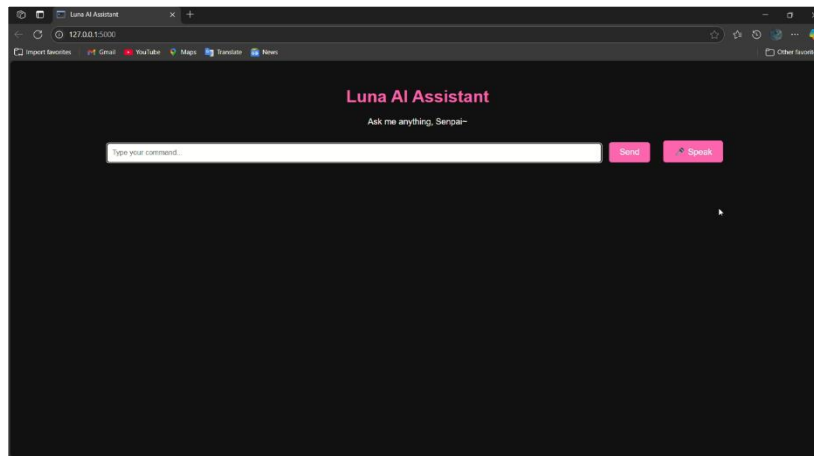


Fig:7.2 Interactive landing page

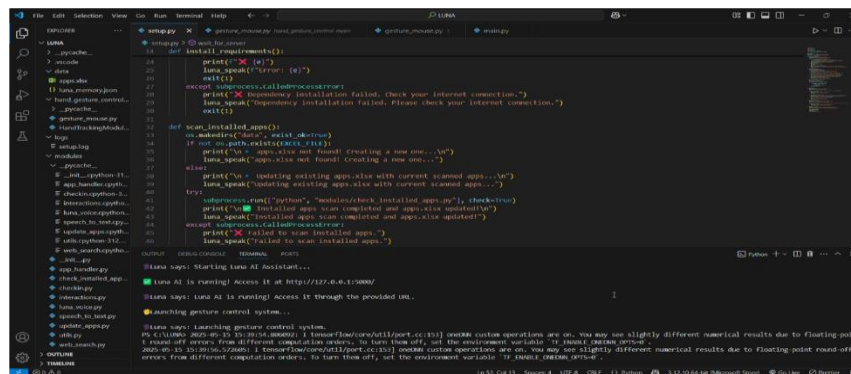


Fig:7.3 Initializing Gesture control

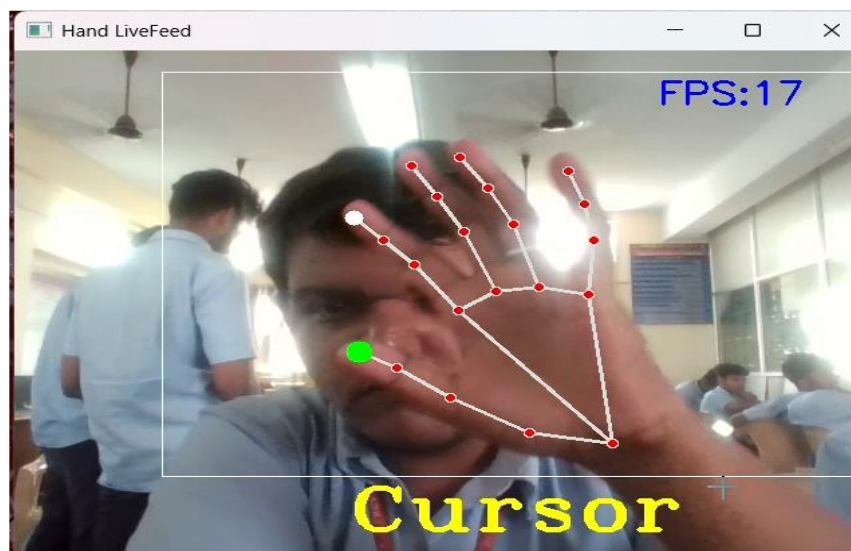


Fig:7.4 web based searching

VIII. CONCLUSION

Luna offers an advanced, multi-modal experience by combining voice and gesture recognition, making it easier and faster to interact with digital systems. It enhances productivity and accessibility by reducing the need for physical interaction. With features like real-time web scraping and personalized behavior, Luna acts more like a smart digital companion than a basic assistant. This innovation represents a step forward in creating more natural and user-centered AI systems.

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