



# DEVELOPMENT OF VIRTUAL HOLOGRAM ASSISTANT USING ARTIFICIAL INTELLIGENCE

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**Abstract:** The proposed work explores the potential of holographic projection technology and artificial intelligence (AI) to create a 3D holographic assistant that can be interacted with through speech-based input. The proposed system will assist users with a variety of tasks, such as communication, internet searches, video playback, weather updates, news, games, and reminders. Holographic projection technology, which allows for graphical interaction, is increasingly being used by multinational companies due to its complexity and versatility in various fields such as medicine, virtual reality, digital art, and security. The developed technique seeks to enhance the user experience by giving AI more control over the hardware, thereby making the virtual assistant more comfortable to talk to. The system uses a speaker, microphone, personal computer, extended display, and holographic projection setup to produce high-quality holograms and effectively transmit and receive video streams.

**Index Terms - Holograms, Holographic Artificial Intelligent Assistant, 3D Display, Interactive Display, Voice Assistant, pyttsx, Google API, Google Search.**

## I. INTRODUCTION

People are becoming increasingly accepting of the virtual world as the world moves closer to a technologically ideal society. People are using more and more virtual tools today for creating, thus anything from little circuits to massive networks are created virtually and tested before being put into use. Virtual reality is becoming a part of everyday life. Artificial intelligence has revolutionized the digital world with its vast potential. The discipline is dedicated to creating intelligent machines, software, and computer-controlled robots that can perform tasks that typically require human intelligence. Artificial intelligence is a broad field that includes reasoning, learning, problem-solving, natural language processing, and many other sub-fields. The development of virtual assistants with natural language processing is a prominent application of artificial intelligence. The first digital voice recognition device was IBM Shoebox, which made its debut in the market in 1961 and was exhibited at the 1962 Seattle World's Fair. Siri, which was launched with the iPhone 4S on October 4, 2011, was the first virtual assistant to be integrated into a smartphone. Today, every smartphone comes with a virtual assistant that can be accessed through voice commands to access a range of services. The evolution of artificial intelligence and virtual assistants has transformed the way we interact with technology, making our lives more convenient and efficient.

In today's digital age, holographic projection technology is emerging as a game-changer in the world of visual experiences [1]. To grasp the mechanics of a holographic projector, it's important to first understand what a hologram is. Essentially, holography is the process of recording the interference patterns of light to produce a three-dimensional image that we call a hologram. The technology behind 3D holographic projection takes inspiration from the optical illusion technique known as Pepper's Ghost, which creates the illusion of a ghostly image [2]. Holograms have been around for a while, but recent advancements in technology have made it possible to create more realistic and interactive 3D holographic images. Combining this technology with AI-powered virtual assistants can create a more immersive and engaging user experience. The hologram screen, connected to a projector, enables the creation of a virtual overlay that appears to be a real object, allowing for a variety of applications in entertainment, education, and construction of building models.

Our innovative solution utilizes the power of Virtual AI Assistance combined with the immersive experience of a 3D holographic projector display. The widely available virtual assistants such as Amazon's Alexa, Google Assistant, Apple's Siri, and Microsoft's Cortana can communicate with users using voice commands. This integration enhances the realism and interactivity of the holographic effect, making virtual objects appear like real ones. These virtual assistants have the ability to comprehend human speech and respond using synthesized voices. By leveraging this technology, users can effortlessly control their home automation devices, manage their emails, to-do lists, calendars, and even playback media using simple voice commands. With the incorporation of hologram technology, our project takes a step further in creating an exceptional experience for users. The technology enables the projection of a person which interacts with the user through a hologram projector, giving the impression of an actual conversation. Notably, virtual assistants are already in use in various technologies such as Google Maps where users can input their destination

address via voice commands on their mobile app, and it automatically detects their location using GPS technology. The holographic AI assistant system discussed in this paper has potential applications beyond the medical field. One of the possible applications is in the education system, where it can enhance the learning experience by creating a better understanding of complex concepts. It can also be used in malls and stores for product demonstrations, allowing customers to view products that are not physically present or not yet available. This technology has the potential to revolutionize the way businesses and educational institutions interact with their customers and students, providing them with an immersive and interactive experience [3]. Further research and development can lead to the creation of more advanced holographic AI assistant systems that can be used in various fields [4].

Advanced medical imaging technologies like magnetic resonance imaging (MRI), computed tomography (CT) scans, positron emission tomography (PET) scans, or ultrasound scans produce complex electronic data that can be challenging for patients and students to understand. Traditionally, this data is viewed as flat images on a computer screen [5]. However, this paper proposes using holographic technology to create interactive 3D holographic images that can teach and educate students and patients in a simple and inexpensive manner. Although the hologram presented in this paper is still in the virtual image stage, it has the potential to be transformed into a real and interactive image in the future. This technology could revolutionize medical education and provide a more intuitive way of reading and interpreting medical scanner data [6].

## II. LITERATURE SURVEY

The paper "Holography and its applications for Industry 4.0: An overview" by [1] Abid Haleem, et al. presents a review of the current research on the applications of holography in the field of cultural heritage preservation. The authors examine the benefits and limitations of holography for preserving cultural artifacts and structures, such as ancient buildings and artworks. They also provide examples of how holography has been used in the past for cultural heritage preservation, including holographic reconstructions of damaged artifacts. The paper also discusses the potential for holography to improve the accessibility and understanding of cultural heritage for wider audiences. Overall, the authors emphasize the importance of holography as a valuable tool for preserving and sharing cultural heritage.

The paper "Holographic Artificial Intelligence Assistance" by [4] Patil Girish, et al. presents a holographic artificial intelligence assistant system that utilizes a combination of holographic projection and artificial intelligence technologies to provide real-time assistance to users. The authors describe the design and implementation of the system, which uses natural language processing and speech recognition techniques to interact with users and provide personalized assistance. The paper also presents the results of user testing, which demonstrate the effectiveness of the system in providing accurate and timely assistance. The authors conclude by discussing the potential applications of the system in various domains, including education, healthcare, and entertainment. Overall, this paper provides a valuable contribution to the field of holographic technology and demonstrates the potential of the proposed system for enhancing user experiences in various domains.

The paper "Pyramid hologram in projecting medical images" by [6] Than, Minh H. N., et al. explores the use of pyramid hologram technology for displaying medical images in 3D. The authors describe the design and implementation of a system that uses a pyramid hologram and a smartphone to project high-quality 3D medical images. The paper presents the results of a study in which medical professionals evaluated the effectiveness of the system for diagnosing medical conditions. The authors conclude that the system has the potential to improve medical imaging and diagnosis, making it a valuable tool in the medical field. This paper provides a valuable contribution to the field of medical imaging and holographic technology, demonstrating the potential of pyramid hologram technology for revolutionizing medical education and diagnosis.

This paper "Holographic Projection Technology: The World is Changing" by [7] Ahmed Elmorshidy provides an overview of holographic projection technology and its potential impact on various fields, including entertainment, education, and advertising. The author discusses the basic principles of holography and the evolution of holographic projection technology over time. The paper also highlights some of the challenges associated with implementing holographic technology, such as the need for high-quality projectors and specialized software. The author concludes by discussing the potential applications of the technology and the opportunities it presents for innovation and growth in various industries. Overall, this paper provides a useful introduction to the field of holographic projection technology and its potential impact on the future.

The paper "Holographic Virtual Personal Assistant" by [8] Shubham G Kalsait, et al. presents an advanced personal assistant that employs holographic technology to deliver a more engaging and interactive user experience. The authors highlight the limitations of traditional virtual assistants and the possibilities of holographic technology to address these issues. They describe the system's design and implementation, which integrates voice recognition, natural language processing, and holographic display technology to provide customized assistance to users. The article also includes the results of user testing, which reveal the system's effectiveness in delivering accurate and helpful information. Furthermore, the authors discuss potential applications of the system in diverse areas, such as healthcare, education, and entertainment. This study represents a significant contribution to the field of virtual assistants, showcasing the potential of holographic technology to elevate user experiences.

"Holographic Artificial Proposed System for Mid-air Holography Projection Using Conversion of 2D to 3D Visualization" by [9] Pranav Fruitwala, et al. This paper proposes a holographic artificial system for mid-air holography projection using the conversion of 2D to 3D visualization. The authors describe the design and implementation of the system, which uses a combination of holographic projection and image processing techniques to generate high-quality 3D images in real-time. The paper also presents the results of experimental testing, which demonstrate the effectiveness of the system in producing realistic and accurate holographic images. The authors conclude by discussing the potential applications of the system in various domains, including entertainment,

education, and medical imaging. Overall, this paper provides a valuable contribution to the field of holographic projection technology and demonstrates the potential of the proposed system for enhancing the user experience in various domains.

The paper “3D Hologram Virtual Personal Assistant using Cloud Services: A Survey” by [10] Tareek Pattewar, et al. presents a comprehensive analysis of holographic virtual personal assistants that utilize cloud services. It delves into the advantages and limitations of such systems and provides an in-depth understanding of the technologies involved in their creation, such as machine learning, speech recognition, and natural language processing. Furthermore, the authors provide a detailed case study of a holographic virtual assistant that utilizes cloud services to enhance healthcare provision. This paper contributes significantly to the field of holographic virtual assistants and demonstrates the potential of cloud services to improve the performance of such systems in various domains.

The paper “ALLY: An Intelligent Virtual Assistant Using AI” by [11] Akash, et al. presents an innovative virtual assistant named "ALLY" that uses artificial intelligence to offer personalized assistance to users. The authors discuss the need for creating an AI-based system that can cater to the diverse needs of users and the challenges involved in developing such a system. They then describe the design and implementation of the system, which employs advanced natural language processing and deep learning algorithms to understand and respond to user queries. The paper also presents the results of user testing, which reveal the effectiveness of the system in providing accurate and timely information. The authors also discuss the potential applications of the system in various domains, such as finance, gaming, and personal shopping. Overall, this paper makes a valuable contribution to the field of AI-based virtual assistants and highlights the potential of such systems to enhance user experiences.

The paper “Hologram Based Three Dimensional Projection” by [12] T. Vishnu, et al. describes a novel approach to holographic projection technology that utilizes advanced algorithms and specialized optical components to project high-quality 3D holographic images. The authors provide a detailed description of the system's design and implementation, including its various components and how they work together to create the holographic effect. The paper also explores the potential applications of holographic projection technology in areas such as advertising, gaming, and education. The authors discuss the limitations of the current system and suggest future research directions that could overcome these limitations, such as improving the resolution and brightness of the holographic images. Overall, this paper presents an exciting new technology that could have significant implications for how we interact with digital content in the future.

The paper “Voice Assistant using Artificial Intelligence” by [13] Preethi G, et al. presents a study on the impact of augmented reality (AR) technology on the learning outcomes of students in a science classroom. The authors describe the design and implementation of an AR-based learning system, which uses a smartphone app to overlay 3D models onto real-world objects. The paper presents the results of a controlled experiment, which demonstrates that students who used the AR-based learning system outperformed their peers who used traditional learning methods. The authors also discuss the potential of AR technology for enhancing the effectiveness of science education and suggest future research directions in this area. Overall, this paper provides valuable insights into the use of AR technology in education and highlights its potential to improve learning outcomes.

### III. PROPOSED MODEL

In the proposed concept, using a speech recognition library with many built-in functions is the most efficient way to implement a Virtual Hologram using artificial intelligence. This will enable the system to capture the command provided by the user in the type of voice with the help of Text to Speech functions. The system will record any commands given by the user, carry out the tasks, and show the results in the form of a virtual hologram. Figure-1 shows the Proposed Architecture of the proposed Virtual Holographic System.

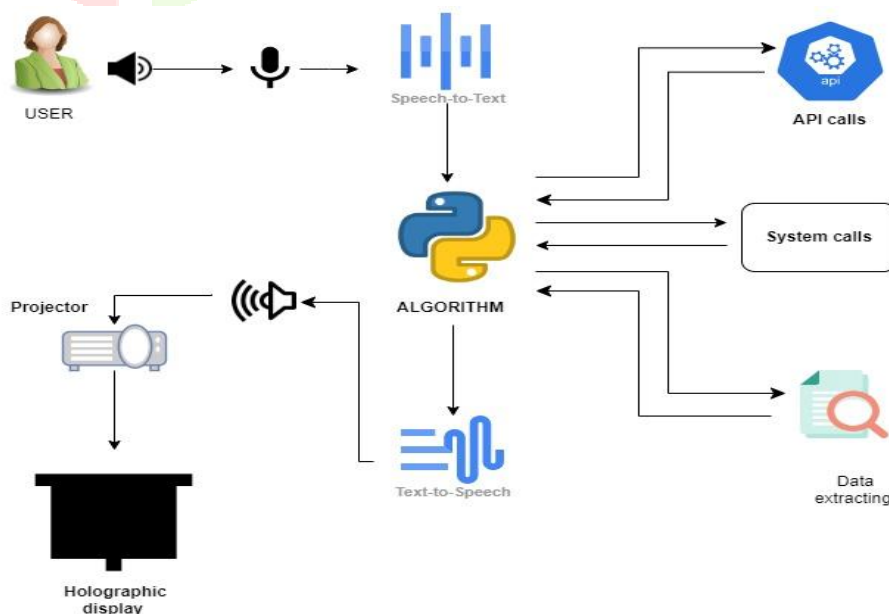


Fig.1 Proposed Architecture

The system's design consists of the following steps:

1. Using a microphone, it receives input in the form of speech patterns.
2. Recognizes audio data and translates it to text.
3. The algorithm will compare the user-provided input with predetermined commands.
4. The final result will be displayed as Holograms.

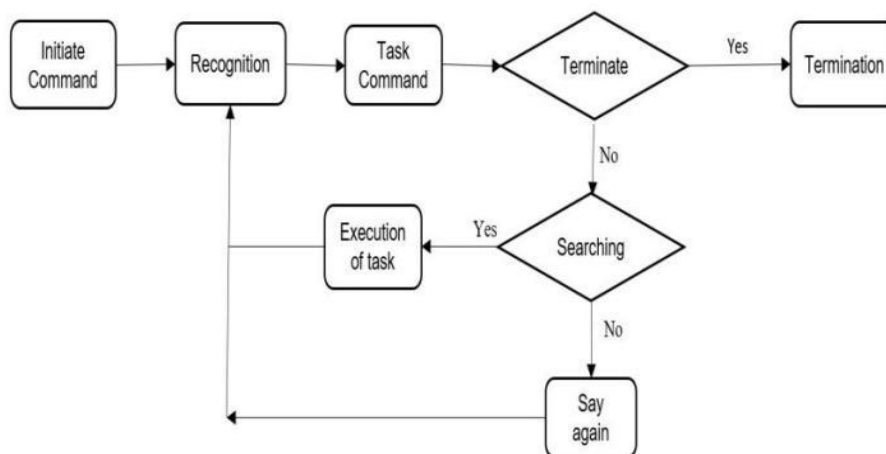
Using a microphone to record speech-based data is the first step. In the second step, NLP is used to process and convert the obtained data into textual data. The generated result string is then modified using Python script to produce either text or speech using TTS in the following stage. In the final step, a projector is used to display the system output on the hologram screen.

The system must be created to provide the upcoming functionalities.

1. The system listens continuously even when it is not in use and activates when a certain Hotword function invokes it.
2. Upon receiving user commands, the system begins to surf the web on the user's specified criteria before producing the output through audio and holographic display using a projector.

#### IV. METHODOLOGY

Users provide natural language input through virtual assistants, which are translated into executable commands using natural language processing. With the help of human speech, it understands and responds to command and perform tasks based on them. By using the user command, it understands the command by searching the operation to be performed if defined in predetermined functions, execution of tasks takes place else it terminates by telling say again.



**Fig. 2 Flow Chart of Hologram Virtual Assistant**

Making the code competent in using system voice by implementing sapi5 and pyttsx3. One of the API developed by Microsoft is the Speech Application Programming Interface (SAPI) enables the use of speech recognition and speech synthesis within Windows applications. The main functionality of the program is defined below:

- (a) The assistant prompts the user for input and continues to listen for commands. The listening time can be set as per the user's requirements.
- (b) If the assistant fails to understand the command clearly, it will request the user to repeat the command by saying "please say again."
- (c) The virtual assistant supports various features, such as displaying 3D building models, medical surgery videos, checking weather updates, sending WhatsApp messages, sending and checking emails, providing news bulletins, searching Wikipedia, taking photos, providing weather reports, opening applications, taking and showing notes, checking the time, opening YouTube and Google, performing calculations, setting alarms, and creating reminders.
- (d) The hologram will display the same features in a mesh format with a 3D effect.

#### Modules imported:

##### Speech Recognition module

In creating a virtual voice assistant, one of the most critical functionalities is voice recognition. The Speech Recognition module allows machines to listen to spoken words and identify them. Python can then convert the spoken words to text, enabling users to ask and answer questions.

##### Date Time module

The current date and time can be displayed by using the package Datetime. This run-time module is built using Python.

##### Wikipedia

Wikipedia contains an extensive amount of data and information that is useful in our daily lives. By installing the Wikipedia module in Python, users can access this data.

##### Web browser

The Webbrowser module allows users to access web-based information by searching various websites in a browser. This module is included in Python's standard utility modules.

##### OS



This module function is to interact with the operating system. This module includes Python's standard utility modules and enables users to use functions depending on the operating system.

### Pyaudio

PyAudio is a set of Python bindings that allows for the recording and playing of audio on any platform.

### Pywhatkit

Pywhatkit is a Python library that is useful in sending WhatsApp messages through virtual assistance.

## V. RESULTS AND DISCUSSION

Upon starting the program, the user will be prompted to enter a password and a designated wake-up command, which will activate the system. Once the system is activated, it will listen for and capture the user's commands, and search for specific keywords within them. If a keyword is found, the system will perform the corresponding task and display holograms on the connected projector, as well as textual output in the terminal window. If the system is unable to properly capture a command, it will request the user to repeat it. Each of these functionalities is crucial to the proper functioning of the system and the projection of holograms.

Wake up Command- The user must issue this command as their first action after inputting a password, as shown in the Figure.3

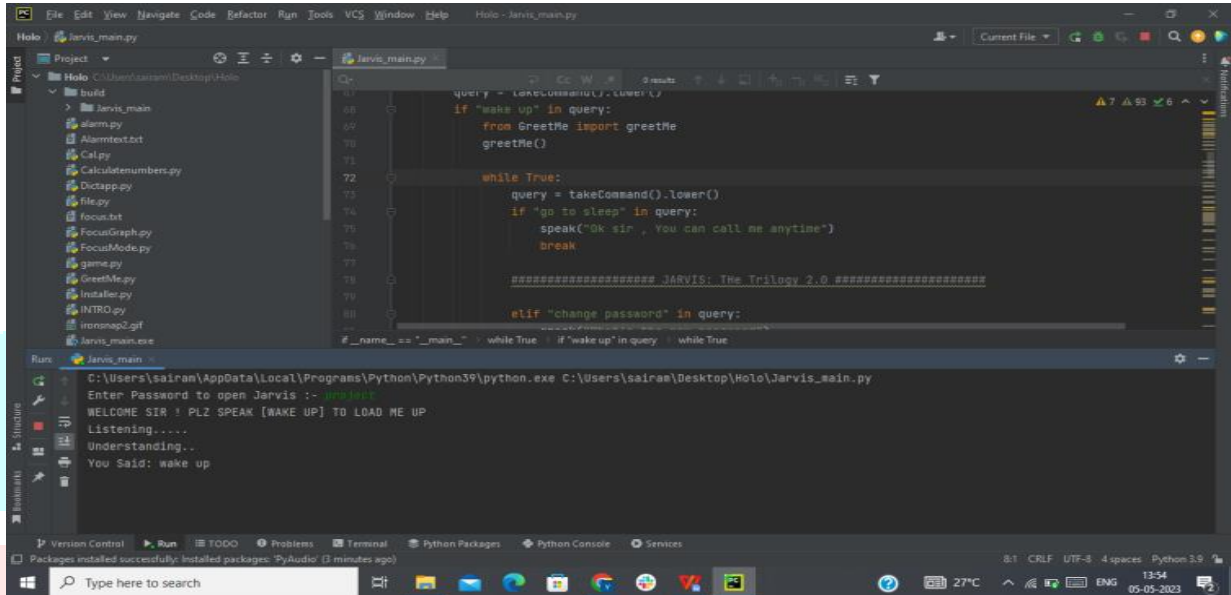


Fig.3 Wakeup command given by user after entering password

Opening an application- The system will launch an application that the user specifies, as shown in the Fig.4,5,6.

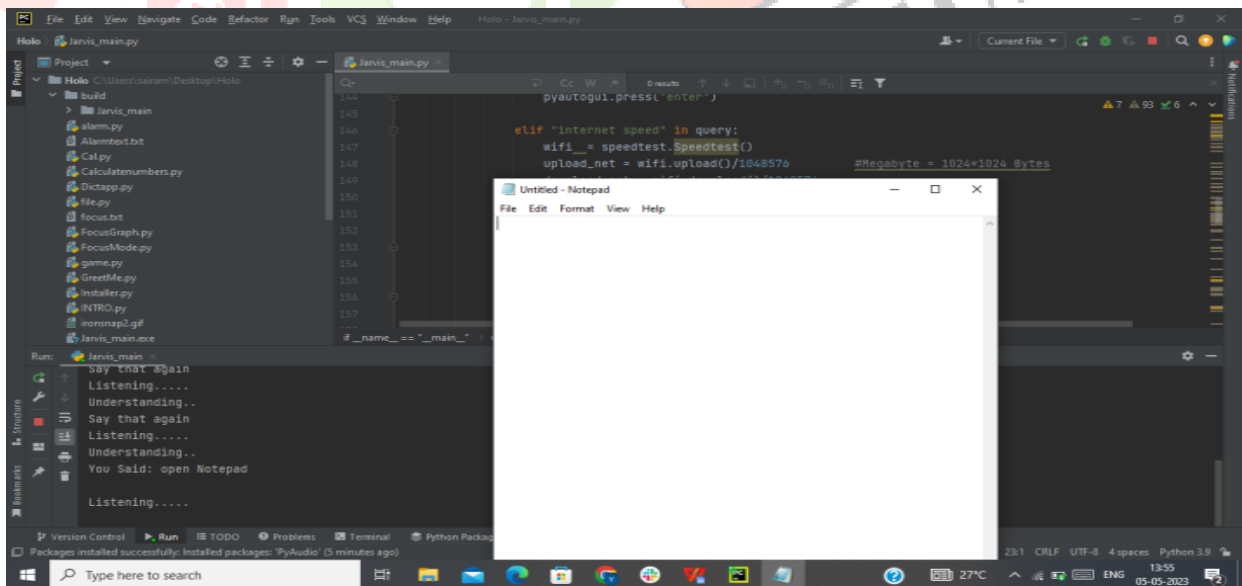


Fig.4 System will open the notepad

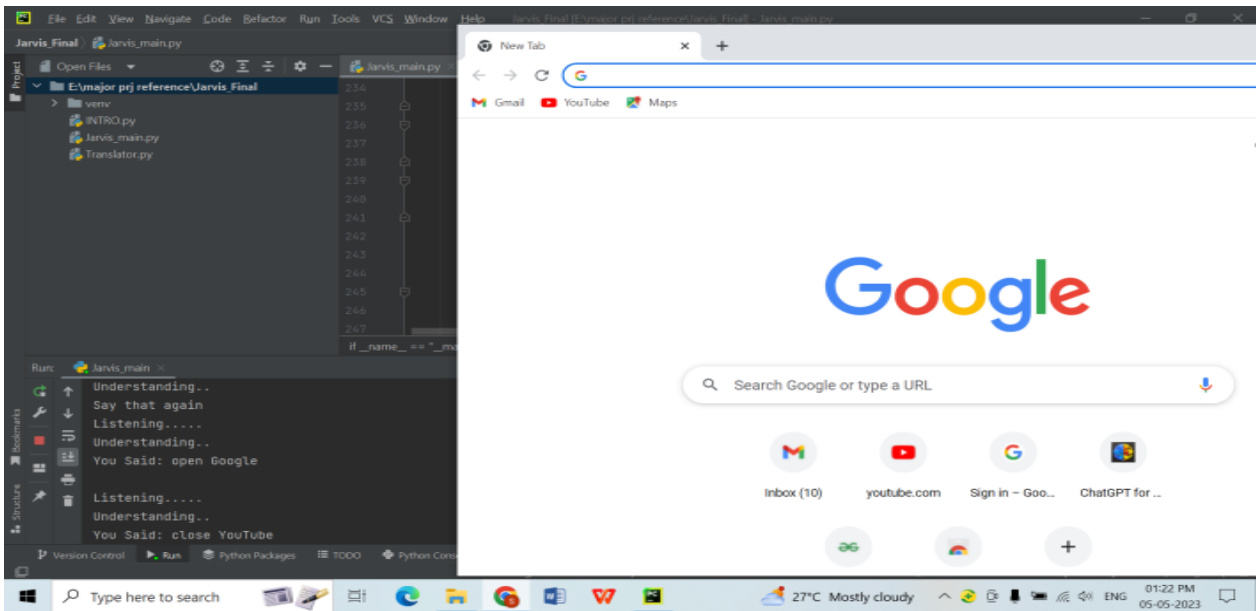


Fig.5 User Commands to open Google Chrome

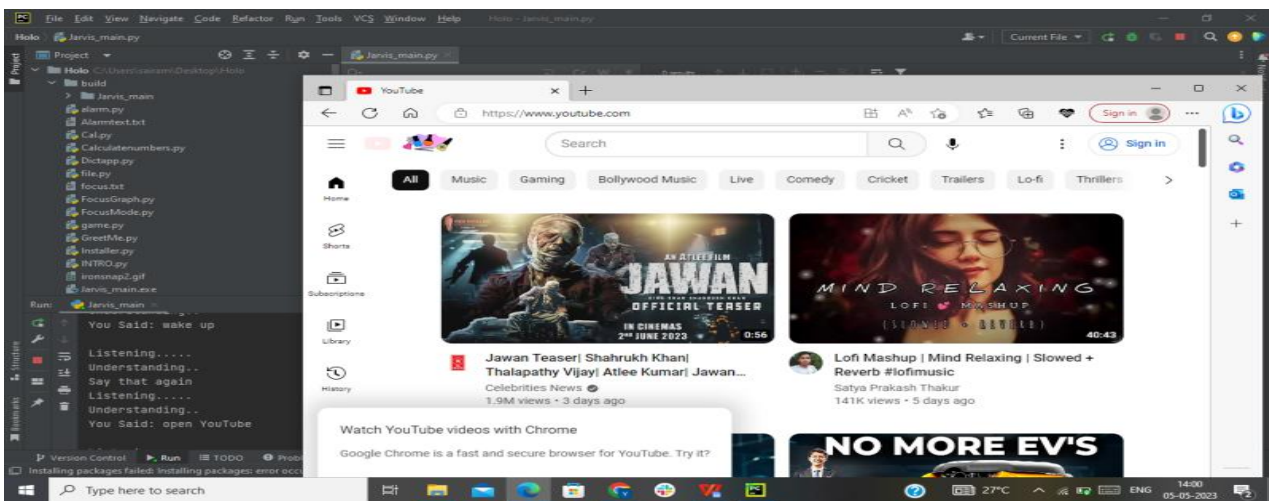


Fig.6 System opens YouTube

The Holographic Projection-When user commands to play a video it is displayed on the hologram projection,as shown in the Fig 7&8.

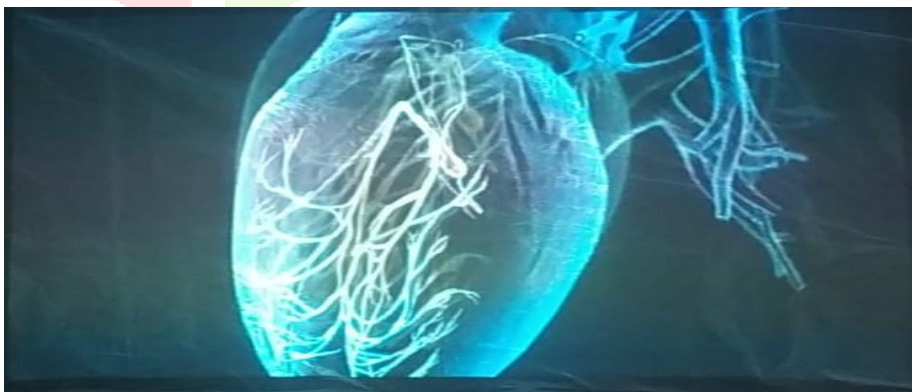


Fig 7: Hologram projection of Human Heart



**Fig 8: The Hologram projection of a building**

## VI. CONCLUSION

This proposed project delves into the creation and deployment of a Python-based Virtual Hologram, utilizing Artificial Intelligence technology. The implementation of a Holographic communication system has potential advantages in managing and organizing one's schedule and assisting individuals with disabilities, as opposed to traditional voice-based assistants. The Virtual Hologram system can understand and execute user commands, such as playing videos, sending desktop notifications, automating YouTube and Google functions, retrieving information from Wikipedia, and accessing various other automated services, all while displaying the results on a holographic screen via projector. Additionally, this project can easily accommodate the introduction of new features without disrupting the current operation of the system.

## VII. ACKNOWLEDGMENT

We would want to offer our heartfelt thanks to our college- Global Academy of Technology, Bangalore for allowing us to conduct this project, as well as to our guide, Dr. Ravi J.

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