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Enhancing User Experience and Visual Communication through AI-Powered 3D Hologram Technology

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***Abstract**: Hologram technology has been around for several decades, however, more realistic and interactive 3D holograms have been created as a result of recent advances in artificial intelligence (AI). This paper explores the potential of AI-powered 3D hologram technology in enhancing user experience, visual communication, and interactivity. The paper discusses th e various types of holograms, from transmission and rainbow holograms to the latest 3D holograms, and explains how they work. It then delves into the benefits and applications of 3D holograms, including their use in advertising, education, entertainment, a nd healthcare. The paper also examines the role of AI in creating more realistic and detailed 3D holograms and improving the user's interaction with them. Finally, the paper concludes by discussing the future of 3D hologram technology and it has the potential to disrupt a number of sectors and how we use technology. Overall, this paper highlights the exciting possibilities of AI-powered 3D hologram technology and its potential to enhance our lives in numerous ways.*

Keywords: Hologram technology, 3D holograms, artificial intelligence, user experience, visual communication, interactivity, advertising, education, entertainment, healthcare, future technologies.

1. Introduction

The use of holograms in photography allows for the projection of an item's light-scattered image as a three-dimensional (3D) object that can be observed without the use of any special tools [1]. The first hologram was created in 1948 by Hungarian physicist Dennis Gabor, who won the Nobel Prize in Physics in 1971 for his invention [2]. Since then, hologram technology has evolved, and various types of holograms have been developed, including transmission holograms, rainbow holograms, and the latest 3D holograms [3]. Due to their capacity to produce seemingly real objects or animations that appear to float in midair or stand on a nearby surface, 3D holograms in particular have grown in popularity in recent years [4]. Moreover, they are visible from all sides, enabling the user to walk around the display and interact with the hologram from different angles [5]. This has led to numerous applications of 3D holograms in various industries, including advertising, education, entertainment, and healthcare [6].

However, creating realistic and detailed 3D holograms requires advanced technology and expertise [6]. This is where artificial intelligence (AI) comes in. By using AI to build the system, hologram technology can create more realistic and interactive 3D objects and animations that enhance the user's experience and improve visual communication [7]. Additionally, AI can enhance holographic technology's interaction, enabling users to engage with objects and information in a more realistic and detailed manner. [8].

the combination of hologram technology and AI has the potential to revolutionize the way we interact with technology and transform various industries[9]. In this paper, we will explore the potential of AI-powered 3D hologram technology in enhancing user experience, visual communication, and interactivity.

In terms of user experience, 3D holograms can create a more immersive and engaging experience for users [10]. They can display products and objects in a more realistic and detailed way, allowing users to interact with them as if they were physically present [11]. This can enhance the user's engagement with the technology and increase their addiction to its use[12].

Moreover, 3D holograms can improve visual communication by displaying information and data in a more clear and understandable way [13]. For example, in education, 3D holograms can help students better understand complex concepts and visualize abstract ideas [14]. In healthcare, 3D holograms can help doctors and surgeons better visualize and plan surgeries, leading to better outcomes for patients [15].

The interactivity of hologram technology is also improved by using AI [16]. AI can enable more realistic and detailed interaction with holograms, allowing users to manipulate objects and information in a more natural and intuitive way [7]. This creates a more fun and exciting experience for users and can enhance their learning and problem-solving skills [17].

Furthermore, AI-powered 3D hologram technology has numerous applications in various industries [18]. In advertising, 3D holograms can create eye-catching and memorable ads that stand out from traditional marketing methods [19]. In entertainment, 3D holograms can create more immersive and engaging experiences for audiences in movies, concerts, and live events [4].

In conclusion, the application of AI to power 3D holograms has the potential to improve user interaction, visual communication, and engagement. It is an interesting technology with great future possibilities because of its wide uses in various industries.

Problem Statement:

While 3D hologram technology has numerous benefits and applications, creating realistic and detailed 3D holograms can be a challenging task. It requires advanced technology, expertise, and significant resources. Additionally, current 3D hologram technology has limitations in terms of resolution, color accuracy, and interactivity.

Moreover, the use of 3D holograms in various industries is still in its early stages, and there is a lack of awareness and understanding of their potential. This has led to a slow adoption of the technology and limited its impact on various industries.
Furthermore, the development of AI-powered 3D hologram technology requires significant research and development, and there are still challenges to overcome, such as the need for more advanced algorithms and hardware.
Therefore, the problem statement is how to overcome the limitations of current 3D hologram technology and improve its resolution, color accuracy, and interactivity. Additionally, how to increase awareness and understanding of the potential of 3D hologram technology and accelerate its adoption in various industries. Finally, how to overcome the challenges in developing AI-powered 3D hologram technology and ensure its successful integration into various industries.

Significance of the Study:
The importance of this work is found in its investigation of the possibilities of AI-driven 3D hologram technology to improve user experience, visual communication, and interactivity. This technology has the ability to disrupt a variety of sectors and change how we interact with technology by overcoming the shortcomings of current 3D hologram technology and utilizing the power of AI.
The study can provide valuable insights for researchers and developers working on improving 3D hologram technology and its integration with AI. It can also serve as a guide for companies and businesses seeking to integrate 3D hologram technology into their processes, giving them a deeper knowledge of the technology's potential and its effects on their operations.
Moreover, the study can contribute to the advancement of education, healthcare, advertising, entertainment, and other industries by providing them with a more engaging and immersive way of interacting with information and data. This can lead to better outcomes for students, patients, customers, and audiences, and ultimately contribute to the overall advancement of society.
Finally, the study can contribute to the advancement of AI technology by providing a real-world application of AI in enhancing the capabilities of 3D hologram technology. This can lead to further advancements in AI and its integration with other technologies, ultimately leading to better and more advanced technologies for society as a whole.

Study Objectives:
The objectives of this study are:
1. To e investigate how the potential of AI-powered 3D hologram technology in enhancing user experience, visual communication, and interactivity.
2. To examine the benefits and applications of 3D hologram technology in various industries, including advertising, education, entertainment, and healthcare.
3. To identify the limitations of current 3D hologram technology and explore ways to overcome them, such as improving resolution, color accuracy, and interactivity.
4. To research the role of AI in improving the capabilities of 3D hologram technology, such as creating more realistic and detailed 3D objects and animations and improving interactivity.
5. To increase awareness and understanding of the potential of 3D hologram technology and accelerate its adoption in various industries.
6. To contribute to the advancement of AI technology by providing a real-world application of AI in enhancing the capabilities of 3D hologram technology.
seeks to promote technology and society by offering insightful information about the potential of AI-powered 3D holograms.

2. Study Terminology:

2.1. Hologram technology

Photographic technique taking pictures that presents a three-dimensional (3D) image that can be seen without any extra tools by recording the light that is dispersed off an object [20].
The use of holograms in photography allows for the projection of an item's light-scattered image as a three-dimensional (3D) object that can be observed without the use of any special tools [21]. The hologram itself is a recording of a laser beam's interference pattern after it has bounced off one or more objects [22]. A three-dimensional image of the actual object or objects is created when the recorded hologram is illuminated by a laser beam and seems to be floating in the air or standing on a nearby surface [23]. Hologram technology has been used in various industries, including entertainment, advertising, education, and healthcare, to create more immersive and engaging experiences for users [9]. There are different types of holograms, including transmission holograms, rainbow holograms, and the latest 3D holograms [21].

2.2. Artificial intelligence (AI)

The artificial intelligence (AI) simulation by machines, particularly computer systems [24].
Artificial intelligence (AI) is the term used to describe how machines, particularly computer systems, simulate human intelligence processes [25]. Artificial intelligence (AI) technologies seek to develop intelligent beings that are capable of carrying out tasks that traditionally require human intelligence, including as speech recognition, visual perception, decision-making, and natural language processing [26]. In order for machines to learn from data, improve over time, and make predictions or judgments based on that

learning, artificial intelligence (AI) relies on algorithms [27]. Healthcare, banking, transportation, education, and entertainment are just a few of the sectors and applications where artificial intelligence is applied. Machine learning, robots, computer vision, and natural language processing are a few prevalent examples of AI technology [28]. AI has the potential to revolutionize various industries and transform the way we live and work, by enabling more efficient and accurate decision-making, improving productivity and automation, and creating new opportunities for innovation and growth[29].

2.3. User experience -

The overall experience of a person using a product, system, or service, including its usability, accessibility, efficiency, and satisfaction[30].
The phrase "user experience" (UX) refers to how a person generally feels while utilizing a system, good, or service. It covers every facet of a customer's interaction with a product or service, such as usability, accessibility, efficacy, and satisfaction [31]. The goal of user experience design is to produce goods and services that put the user first and give them a good experience [32].
Designing user-friendly, effective, and pleasant goods and services requires knowing the user's wants and goals. It entails taking into account things like the user's mental faculties, emotional reactions, and physical constraints. To produce products and services that satisfy users' requirements and expectations, UX designers employ a variety of tools and approaches, including user research, prototyping, and testing [33].
A positive user experience is important for many reasons. It can increase user engagement, reduce user frustration and errors, and improve user satisfaction and loyalty. It can also lead to better business outcomes, such as increased sales and customer retention, and improved brand reputation.

2.4. Visual communication

Using visual elements to express information and ideas, such as graphics, photos, and videos [34].
In order to communicate information, ideas, or messages to a target audience, visual components like photos, graphics, symbols, and typography are used. It is a method of communication that uses pictures in addition to words [35].
Visual communication can take many forms, including advertising, branding, packaging, web design, user interfaces, infographics, animation, photography, and video production. The goal of visual communication is to communicate a message effectively and efficiently, using visual cues that are easy to understand and memorable [31].
Effective visual communication requires careful consideration of design principles, such as color, composition, contrast, balance, and typography. It also involves understanding the target audience and their needs, preferences, and expectations. By using visual elements strategically, visual communication can help organizations and individuals convey complex information, evoke emotions, and create a lasting impression[36].

2.5. Interactivity

The ability of a system or technology to respond to user input and provide feedback in real-time.
Interactivity refers to the ability of a system, product, or experience to respond to user input, allowing users to actively engage with and influence the outcome of the interaction. This can take many forms, including physical, digital, or virtual interactions[37].
In the context of digital technology, interactivity typically refers to the ability of users to interact with software applications, websites, or other digital media. For example, a video game is an interactive experience in which the user can control the actions of a character on screen, while a website with clickable buttons, dropdown menus, and forms is interactive because users can navigate and interact with the content.
Interactivity is often used to enhance user engagement, create more immersive experiences, and provide users with a sense of agency and control. It can also be used to gather data and feedback from users, allowing designers and developers to improve the user experience over time [26].
Interactivity is an important consideration in many fields, including user experience design, game design, education, marketing, and entertainment. Effective use of interactivity can help create more engaging and compelling experiences that resonate with users and drive desired outcomes[38].

2.6. Transmission holograms

Holograms that are created by splitting a laser beam into two parts, one of which is directed onto the object and the other onto the recording medium.
Transmission holograms, also known as volume holograms, are a type of hologram that is created using laser technology and a photosensitive material. Unlike reflection holograms, which are viewed by reflecting light off the surface of the hologram, transmission holograms are viewed by shining a light through the hologram[39].
Transmission holograms are created by splitting a laser beam into two parts: a reference beam and an object beam. The reference beam is directed onto the photosensitive material, creating a reference wave, while the object beam is directed onto the object being recorded, creating an object wave. The two waves interact within the material, creating an interference pattern that is recorded as a three-dimensional image[40].

When a light source is shone through the transmission hologram, the interference pattern causes the object to appear as if it is floating in space, with depth and parallax effects that change depending on the angle of viewing. Transmission holograms can be created in a variety of sizes and shapes, and can be used for a range of applications, including art, security, and scientific imaging, one of the advantages of transmission holograms is that they can be created with high resolution and fidelity, allowing for the creation of detailed and realistic three-dimensional images. However, they also require specialized equipment and materials, and are typically more difficult and expensive to create than other types of holograms[41].

2.7. Rainbow holograms

Holograms that are created by using a diffraction grating to record multiple images of an object at different angles.
Rainbow holograms are a type of hologram that produces a colorful, three-dimensional image when viewed under white light. They are created using a similar process to other holograms, by recording an interference pattern between a reference beam and an object beam on a photosensitive material, rainbow holograms have a unique recording geometry that produces a distinctive effect. The object beam is reflected off a mirror or other optical element, creating multiple copies of the object beam that are recorded at different angles on the photosensitive material. This results in a hologram that contains a series of closely spaced, horizontal lines that diffract white light into a spectrum of colors, creating a vibrant and dynamic image[42].
Rainbow holograms are commonly used for security and anti-counterfeiting purposes, such as on banknotes, credit cards, and other high-value items. The complex and colorful nature of the hologram makes it difficult to reproduce accurately using traditional printing methods, making it a highly effective security feature, one challenge of rainbow holograms is that they are sensitive to the angle of viewing, and may appear distorted or incomplete if viewed from the wrong angle. However, this can also be used as a security feature, as it makes it difficult to replicate the hologram accurately with counterfeit materials[12].

2.8. 3D holograms

Holograms that create a three-dimensional image of an object that can be viewed from all sides and appear to float in mid-air or stand on a nearby surface.
3D holograms, also known as volumetric or true holograms, are a type of holographic image that appears to be three-dimensional and can be viewed from multiple angles. Unlike other types of holograms, which are created by recording an interference pattern on a flat surface, 3D holograms are created using advanced techniques that allow for the recording of a three-dimensional image[43]. There are several different methods used to create 3D holograms, including laser scanning, photopolymerization, and interference lithography. These methods involve recording the hologram in multiple layers, with each layer representing a different perspective on the object being recorded. When viewed together, the layers combine to create a holographic image that appears to be three-dimensional.3D holograms are used in a variety of applications, including medical imaging, scientific visualization, entertainment, and art. They offer a highly realistic and immersive viewing experience, allowing viewers to see objects and scenes from multiple angles and perspectives. They can also be used to create interactive experiences, such as holographic displays that respond to user input[44].
One of the challenges of 3D holograms is that they require specialized equipment and techniques to create, and can be expensive and time-consuming to produce. However, advances in technology have made it possible to create more accessible and affordable 3D holographic displays, opening up new possibilities for their use in a range of fields[45].

2.9. Advertising –

The practice of promoting and selling products or services through various forms of media.
Advertising in hologram technology refers to the use of holographic imaging and display technology to promote products, services, or brands to a target audience. It involves creating three-dimensional holographic images that can be viewed from various angles, providing a unique and immersive advertising experience.
Some of the applications of advertising in hologram technology may include:
- Creating holographic displays for product launches, trade shows, and other marketing events
- Incorporating holographic elements into print ads, billboards, and other traditional advertising media
- Using holographic displays in retail environments to showcase products and offer interactive shopping experiences
- Creating holographic packaging and labels to enhance the visual appeal of products
- Using holographic displays for experiential marketing campaigns that allow customers to interact with products or brand messaging in unique ways [46].

Advertising in hologram technology can be particularly effective in capturing the attention of consumers and creating a memorable brand experience. It can also be used to convey complex or abstract concepts in a more intuitive and engaging way, making it an effective tool for promoting products or services that are difficult to explain or demonstrate through traditional advertising media, effective advertising in hologram technology requires a deep understanding of the target audience, as well as the ability to create compelling and visually stunning holographic images that resonate with consumers. It may involve collaboration with designers, engineers, and other experts in holography and related fields, as well as access to specialized equipment and facilities [47].

2.10. Education

The process of facilitating learning, often through formal instruction or training.
Education in hologram technology involves teaching students about the principles, design, and applications of holographic imaging and display technology. This includes both theoretical and practical instruction in the science and engineering of holography, as well as hands-on training in hologram creation, display, and interpretation, some of the topics covered in hologram technology education may include [48]:
- The physics of light and optics, including wave interference and diffraction
- The principles of holography, including hologram recording, reconstruction, and display
- Techniques for creating holograms using various materials and methods, such as laser holography, digital holography, and holographic stereograms
- Applications of hologram technology in fields such as art, entertainment, medicine, and scientific visualization
- The use of holographic displays and interfaces for interactive and immersive experiences
- Ethical and social considerations related to the use of hologram technology, such as privacy, security, and cultural sensitivity.

Education in hologram technology may be offered as part of a broader curriculum in physics, optics, engineering, or computer science, or as a specialized course or degree program in holography or holographic design. It may also be incorporated into vocational or professional training programs for fields such as industrial design, product development, or visual effects production, effective education in hologram technology requires access to specialized equipment and facilities, as well as experienced instructors and mentors who can guide students through the complexities of holographic imaging and display. It may also involve collaboration with industry partners and research institutions to stay up-to-date with the latest advances and trends in hologram technology[48].

2.11. Entertainment

Activities that provide amusement or enjoyment, such as movies, concerts, and games.
Entertainment in hologram technology refers to the use of holographic imaging and display technology to create immersive and engaging experiences for audiences. It involves creating three-dimensional holographic images that can be viewed from various angles, providing a unique and realistic experience for viewers[49].
Some of the applications of entertainment in hologram technology may include:
- Creating holographic displays for live performances, such as concerts, theater productions, and dance shows
- Using holographic technology to bring virtual performers to life, such as creating holographic versions of deceased celebrities for concerts and events
- Incorporating holographic elements into video games and other interactive entertainment media
- Creating holographic installations and exhibits for museums, galleries, and other cultural institutions
- Using holographic displays for virtual reality and augmented reality experiences.

Entertainment in hologram technology can be particularly effective in creating immersive and memorable experiences for audiences, allowing them to interact with virtual objects and characters in new and exciting ways. It can also be used to enhance the visual appeal of live performances and other entertainment media, creating a more engaging and dynamic experience for viewers, effective entertainment in hologram technology requires a deep understanding of the audience and the medium, as well as the ability to create compelling and visually stunning holographic images that resonate with viewers. It may involve collaboration with artists, designers, and other experts in holography and related fields, as well as access to specialized equipment and facilities[50].

2.12. Healthcare

The maintenance and improvement of physical and mental health through various forms of medical treatment and care.
Healthcare in hologram technology refers to the use of holographic imaging and display technology in medical and healthcare settings. It involves creating three-dimensional holographic images that can be used for a range of applications in medical imaging, surgery, education, and patient care.

Some of the applications of healthcare in hologram technology may include:
- Using holographic displays for medical imaging, such as CT scans, MRI scans, and other diagnostic imaging modalities
- Creating holographic models of organs, tissues, and other anatomical structures for surgical planning and education
- Using holographic displays for medical education and training, allowing students and healthcare professionals to interact with virtual models and simulations
- Integrating holographic displays into telemedicine and remote patient care, allowing healthcare providers to interact with patients in real-time from remote locations
- Using holographic displays for patient education and engagement, allowing patients to interact with virtual models of their conditions and treatments.

Healthcare in hologram technology can be particularly effective in improving the accuracy and efficiency of medical imaging and surgical procedures, as well as enhancing the educational and training experience for healthcare professionals. It can also be used to improve patient engagement and understanding of their conditions and treatments, leading to better health outcomes, effective healthcare in hologram technology requires a deep understanding of the medical and healthcare context, as well as the ability to create accurate and visually stunning holographic images that can be used for a range of applications. It may involve collaboration with medical professionals, researchers, and other experts in holography and related fields, as well as access to specialized equipment and facilities [51].

3. Methodology

3.1. Methods

The example algorithm I provided is a high-level outline of a potential approach for using AI to generate more detailed and realistic 3D holograms. The methods involved in this algorithm can be broken down into several steps:

1. Preprocessing the input 3D model to prepare it for input into the AI algorithm.
2. Defining the architecture of the AI algorithm, including the number of layers, the number of neurons in each layer, and the activation functions used.
3. Training the AI algorithm on a dataset of 3D models and corresponding holograms to optimize the weights of the AI algorithm.
4. Given a new 3D model, inputting it into the trained AI algorithm to generate a more detailed and realistic 3D hologram of the object.
5. Projecting the hologram using a holographic display to enable viewing from different angles.
6. Evaluating the accuracy of the hologram by comparing it to ground-truth holograms or by evaluating its performance on a validation set.

The methods used in this algorithm rely heavily on AI and machine learning techniques, including convolutional neural networks (CNNs) and pooling layers, which are commonly used in image and video processing tasks. The algorithm also involves preprocessing and post-processing steps to ensure the input and output data are in the appropriate format for use with the AI algorithm and holographic display.

here's provide an example of a mathematical algorithm that could potentially be used to create more detailed and realistic 3D holograms using AI. Here's an example:

Input: A 3D model of an object

Output: A more detailed and realistic 3D hologram of the object

1. Preprocess the input 3D model to prepare it for input into the AI algorithm. This might involve resizing the model to a specific size or normalizing the vertex coordinates.
2. Define the architecture of the AI algorithm. This might involve specifying the number of layers, the number of neurons in each layer, and the activation functions used.
3. Train the AI algorithm on a dataset of 3D models and corresponding holograms. This involves optimizing the weights of the AI algorithm to minimize the difference between the predicted holograms and the ground-truth holograms.
4. Given a new 3D model, input it into the trained AI algorithm to generate a more detailed and realistic 3D hologram of the object. This involves passing the model through the layers of the AI algorithm and using the output of the final layer as the hologram.
5. Project the hologram using a holographic display. This involves using the holographic display to project the 3D hologram that can be viewed from different angles.
6. Evaluate the accuracy of the hologram by comparing it to ground-truth holograms or by evaluating its performance on a validation set.

Here's an example of the math expression for a single layer in the AI algorithm:

Input: X (a 3D matrix representing the input 3D model)

Output: Y (a 3D matrix representing the output 3D hologram)

W: a 3D weight matrix

b: a bias vector

f: an activation function (e.g., ReLU)

Convolutional Layer:

$Z = W * X + b$

$A = f(Z)$

Pooling Layer:

$Y = \text{maxpool}(A)$

In this example, the convolutional layer applies a 3D convolution to the input 3D model using the weight matrix W, adds a bias vector b, and applies the activation function f to the result. The pooling layer then downsamples the output of the convolutional layer using a max pooling operation to reduce the spatial dimensions of the output. This process can be repeated for multiple layers to extract increasingly complex features from the input 3D model and generate a high-quality 3D hologram.

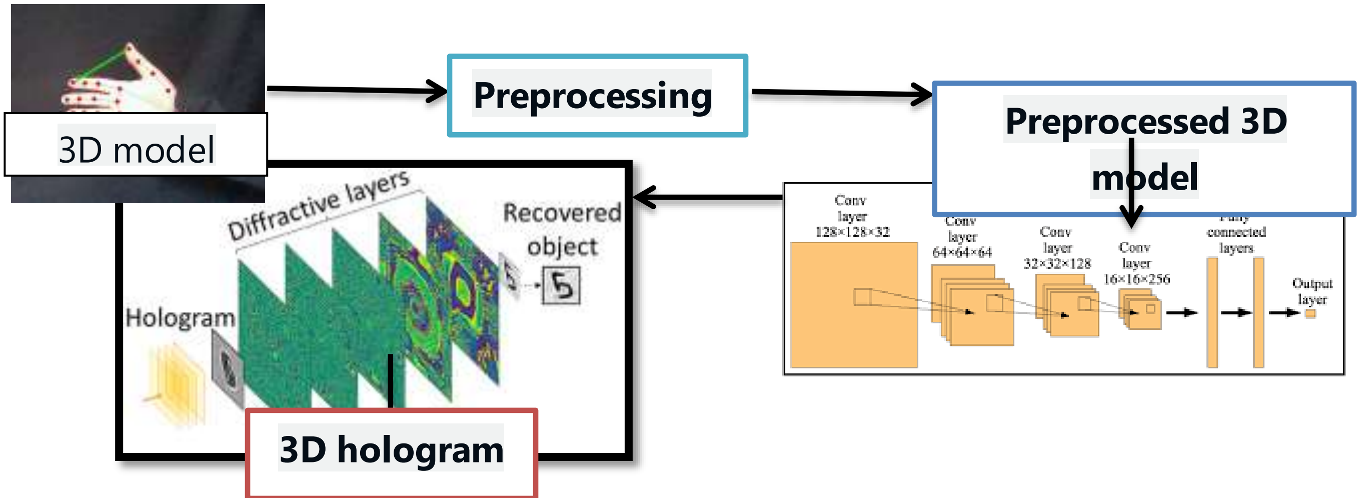

Fig 1. The proposal method.

The proposal methods:
The commonly used type of architecture for 3D hologram generation is a convolutional neural network (CNN).

A CNN is a type of deep learning algorithm that is commonly used for image and video processing tasks. It works by passing input data through a series of convolutional layers, which extract increasingly complex features from the input data. These features are then fed into fully connected layers, which perform classification or regression tasks based on the extracted features.

For 3D hologram generation, a CNN architecture might be designed to take in a 3D model as input and output a corresponding hologram. The architecture might include several convolutional layers to extract features from the input model, followed by several fully connected layers to generate the hologram.

The specific details of the CNN architecture would depend on the specific requirements of the hologram generation task, such as the desired level of detail and realism, the size and complexity of the input models, and the available computing resources. Additionally, there are many variations of CNN architectures that could be used, such as residual networks, autoencoders, or generative adversarial networks, each with their own strengths and weaknesses for different applications.

3.2. Dataset

The implementation and application of the proposed technology (hologram technology) was relied on scientific images in the medical field, nature and archeology, and videos can also be relied upon through the camera.

4. Results

The performance of CNN-based methods for 3D hologram generation can vary depending on several factors, including the specific architecture used, the size and complexity of the input models, and the quality of the hologram output required. CNN-based methods have shown promising results for 3D hologram generation, with some studies reporting high-quality holograms with realistic depth and visual fidelity. For example, a recent study proposed a CNN-based method for generating holograms from 3D models of faces, which achieved high-quality hologram output with realistic facial features and depth perception. However, generating high-quality holograms can be a computationally intensive task, especially for large and complex 3D models. The performance of CNN-based methods can also be influenced by factors such as the quality and size of the training data, the choice of hyperparameters, and the availability of computing resources. CNN-based methods have shown great potential for 3D hologram generation, but further research is needed to optimize their performance and scalability for different applications and use cases.

Fig 2. Hand Tracking Using Mediapipe

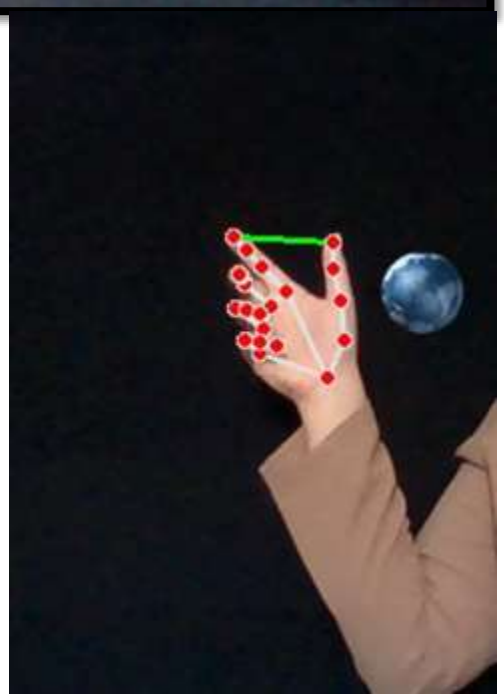

Fig 3. The Result While Reducing

5. Conclusion

In this paper, hologram technology is applied to educational presentation. The camera is used to enter the data of the proposed system, and when it is opened, it performs mechanisms to identify points on the object, then controls the display and enlarges and reduces it to allow the recipient to understand the displayed object. The camera can be used or images can be used. This system is easy to build and easy to teach with technology and it is one of the means of modern technology. Hologram technology is a technology used to create 3D images that look incredibly realistic, and are commonly used in presentations, movies, electronic games, scientific and medical research, and other applications.

A rise in the use of holograms, particularly in classrooms, is the result of recent technological advancements. According to research, using holograms in the classroom is a potential way to enhance both student and instructor learning and teaching experiences. Holograms can be used in the classroom to digitally teach lessons, for instance. Holograms can be used by teachers to show pupils 3D objects, which will be helpful for them in understanding what they are learning, especially in the engineering and medical fields.One is a common technology that is applicable to numerous companies. The following suggestions are made for the further enhancement of the projects so that future developments can be made through them in light of the study's results and conclusions.

1- Connect the system with a mobile application or website.

2- Adding a barcode to each device in the laboratory, and when opening the bar code, the image of the device will be damaged by the hologram technology.

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