

## Uses of Holography in Virtual meets

Raunak Seal

Department of Information Technology,  
Guru Nanak Institute of Technology,  
157/F, Nilgunj Road, Panihati, Sodepur,  
Kolkata-700114, West Bengal, India.

E-mail: [Raunakseal81@gmail.com](mailto:Raunakseal81@gmail.com)

published online at <https://gnitresearchmantra.in/>

---

**Abstract:** Learning and teaching through online occurs challenges on both students and teachers. Online learning is playing very relevant role in the present Covid-19 scenario. Teachers should be developed to meet particular requirements of teaching online like a range of device: desktop computers, a stable internet connection, microphones etc. Calculating and growing online courses need alliance of various people with verity of interest and skill, including administrators, teachers, designers and technical specialist. So, the “PATHWAY of ONLINE EDUCATION” has become one of the most present subjects for the researchers. On that account a new thing could be added to the list. That is Holography. Now one could ask the most relevant question. How we can implement Holography? In this research paper we discuss about how we can use holography as a meeting platform and its effectiveness. Online teaching and virtual meets have become the most essential part of our life. Because of looking at the screen through the whole day, had given birth of many diseases and also the students of 3-16 is mostly affected with that. Not only them all the people of every age, really have become irritated and frustrated with it. With the help of Holography, I can hope that most of the problems would be solved.

Keywords—Pathways, Holography, Covid-19, Internet, Desktop

## Introduction

From the very beginning of last two months of the year 2019, the entire world was introduced to a new deadliest virus 'COVID-19'. But due to our unconsciousness, it had been spread all over the world and created a pandemic situation. As a result, people needed to be locked in their houses. It gave a great impact on every sector, even the education system couldn't get rid of it. From the very beginning of the year 2020, a crucial question had arrived before us, that is, how we can continue our classes, and study. Then we were introduced to various softwares, which can conduct the virtual meetings. But, via this solution, the problem was not solved totally. Then we had introduced to another problems. That's were bugs, networks issues, way of teaching etc. We had found out solutions of mostly all problems, but still a problem had arrived before us, that may have to be treated as a highly important issue. It has become the headache of educationalists as well as scientists. We had tried many ways to cure this problem, but it can't be cured totally. The problem is the students as well as teachers aren't satisfied with the online classes. As the students can't see their teachers, and classmates before them physically, they seemed to be bored and they lost their attention to their classes. Because of virtual meetings they can't express their problems totally. As a result, it creates a void in their knowledge. Day by day the void increases and it causes a big gap in knowledge. On the other side, sometimes teachers can understand if the student is facing any problem or not by reading his/her face. But because of virtual meet this is likely to be impossible. Even the teaching had become a stereotype boring work. The scope of joyful teaching has gone. In case of, physical classes the teacher could understand whether the students are listening carefully or not, but because of virtual meets sometimes even they can't make out if the student is present in opposite side or not.

We had been introduced to various methods to make online teaching, interesting, but that's are not totally satisfactory. Even in case of higher studies, the practical lab classes are going on virtually, as a result the students can't gather complete knowledge of the experiment as they can't touch the equipment or gadgets.

I have discovered a solution, which can totally solve the problem. But it is comparatively a better solution, as there is not a better solution except physical classes. If we can use 'Holography' as a way of teaching, then the class would be sometimes more interesting and enjoyable.

We have to know "What is a 'Hologram'?", "What is 'Holography'?" and "How we can use it as a way of teaching?"

Before moving forward, let's look about the history.

## History

Holography dates from 1947, when British (native of Hungary) scientist Dennis Gabor developed the theory of holography while working to improve the resolution of an electron microscope. Gabor coined the term hologram from the Greek words holos, meaning "whole," and gramma, meaning "message". Further development in the field was stymied during the next decade because light sources available at the time were not truly "coherent" (monochromatic or one-color, from a single point, and of a single wavelength).

This barrier was overcome in 1960 by Russian scientists N. Bassov and A. Prokhorov and American scientist Charles Towns with the invention of the laser, whose pure, intense light was ideal for making holograms.

In that year the pulsed-ruby laser was developed by Dr. T.H. Maiman. This laser system Leith (unlike the continuous wave laser normally used in holography) emits a very powerful burst of light that lasts only a few nanoseconds (a billionth of a second). It effectively freezes movement and makes it possible to produce holograms of high-speed events, such as a bullet in flight, and of living subjects. The first hologram of a person was made in 1967, paving the way for a specialized application of holography: pulsed holographic portraiture.

In 1962 Emmett Leith and Juris Upatnieks of the University of Michigan recognized from their work in side-reading radar that holography could be used as a 3-D visual medium. In 1962 they read Gabor's paper and "simply out of curiosity" decided to duplicate Gabor's technique using the laser and an "off-axis" technique borrowed from their work in the development of side-reading radar. The result was the first laser transmission Upatniekshologram of 3-D objects (a toy train and bird). These transmission holograms produced images with clarity and realistic depth but required laser light to view the holographic image.

Their pioneering work led to standardization of the equipment used to make holograms. Today, thousands of laboratories and studios possess the necessary equipment: a continuous wave laser, optical devices (lens, mirrors and beam splitters)

for directing laser light, a film holder and an isolation table on which exposures are made. Stability is absolutely essential because movement as small as a quarter wave-length of light during exposures of a few minutes or even seconds can completely spoil a hologram. The basic off-axis technique that Leith and Upatnieks developed is still the staple of holographic methodology.

Also in 1962 Dr. Yuri N. Denisyuk from Russia combined holography with 1908 Nobel Laureate Gabriel Lippmann's work in natural color photography. Denisyuk's approach produced a white-light reflection hologram which, for the first time, could be viewed in light from an ordinary incandescent light bulb.

Another major advance in display holography occurred in 1968 when Dr. Stephen A. Benton invented white-light transmission holography while researching holographic television at Polaroid Research Laboratories. This type of hologram can be viewed in ordinary white light creating a "rainbow" image from the seven colors which make up white light. The depth and brilliance of the image and its rainbow spectrum soon attracted artists who adapted this technique to their work and brought holography further into public awareness.

Benton's invention is particularly significant because it made possible mass production of holograms using an embossing technique. These holograms are "printed" by stamping the interference pattern onto plastic. The resulting hologram can be duplicated millions of times for a few cents apiece. Consequently, embossed holograms are now being used by the publishing, advertising, and banking industries.

In 1972 Lloyd Cross developed the integral hologram by combining white-light transmission holography with conventional cinematography to produce moving 3-dimensional images. Sequential frames of 2-D motion-picture footage of a rotating subject is recorded on holographic film. When viewed, the composite images are synthesized by the human brain as a 3-D image.

In 70's Victor Komar and his colleagues at the All-Union Cinema and Photographic Research Institute (NIFKI) in Russia, developed a prototype for a projected holographic movie. Images were recorded with a pulsed holographic camera. The developed film was projected onto a holographic screen that focused the dimensional image out to several points in the audience.

Holographic artists have greatly increased their technical knowledge of the discipline and now contribute to the technology as well as the creative process. The art form has become international, with major exhibitions being held **throughout the world.**

#### Mechanism

We all know about voice recorder. It uses to record the vibration of sound wave. We can play it and listen, whenever we want. Hologram mostly works like that. We had to pass a laser beam through a laser splitter. As a result, a part of the laser beam will be reflected from the splitter and will fall on the photographic plate. And on the other side, the other part will fall on the object and the diffracted rays from the object will fall on the photographic plate. These rays will be super imposed with the ray reflected from the splitter and will create a 3d image behind the screen and it will be recorded.

Before moving forward, we first have to know how online platform works

The software in which the teacher uses to conduct the meeting, use to take quick pictures of the teachers (in case of screenshare it uses to take photos of screen) repeatedly. At the same time, it uses to also record the vibration of the sound coming from the teacher's side. It combines themselves and send the data of every second to satellite. The satellite sends the whole data to the software which the students are using at the same time. Then we can see the video as well as audio.

## Implementation in Virtual or online meeting

If we can build a software that will use holography (to capture the picture), instead of camera while conducting a virtual meet, that would be a great solution. The teacher can see the 3d image of the students, which will help them to understand the problems of the students. Even they can understand if the students listen the class attentively or not. On the other side Students will find the class more interesting and enjoyable. In case of practical classes, the student will can see the 3d image of equipment or gadgets, which will be quite helpful for them to understand or gather knowledge. It would be like the live classrooms. Even as they can see their teachers before them, it would likely to be a physical class. So overall if we can use holography as a media of virtual meet, it would be a better solution of the problem we are facing these days. We don't have to even use any gadgets to see them. We need just a projector.

### Effectiveness

After having focused on Computer screen or the screen of any gadgets through all the day, we could get stress or headache. The use of holography could help us to get rid of it. Looking to the small kids, they are facing too much stress. The online meeting through the day could also hamper the growth of their brain, but use of Holography could reduce their pressure. For a 2-5- or 6-years old child even for everyone online class couldn't be a solution. In this case use of Holography would be a great solution, as the teachers as well as the students can see the 3d Virtual live image of the opposite person.

### Conclusion

In India it's not at all too much difficult to built this kind of Software. But in case of use, it will face many kinds of problems. To present live holograms we must have a stable and fast network. Because, while we are recording image, processing the 3d video and at the same time sending to the satellite, we need more stable network and on the other hand while we are playing the role of spectator, we need more stable network to see them properly, because the slow network could hamper the virtual 3d video presentation. While talking about India, the network which use to be provided to the citizens or normal people, is not at all fast and stable. So, we have to wait for faster network. Even in India like developing countries, there are some places, where network is a big issue, so use the holography in those area is quite impossible. For some people a simple mobile phone is a matter of luxury, so for them the whole holographic setup, is a more far away fact. So the gov't must have to take necessary step to provide the fast network as well as the whole setup for free to everyone.