

Like magic, it's holography

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"Holography is still new and exotic," explains the dapper young scientist who is head of the Physics Department at Lake Forest College.

Like a magician performing a trick, Dr. Tung Jeong shows examples of holography by letting you see first the bare glass plate or plastic cylinder. "You see, there is nothing behind it, nothing there inside," he motions. Then he lets the light shine in, and — behold — a three-dimensional object so real looking that you want to reach in and touch it.

DR. JEONG IS a towering figure in this new field of holography which is both an art form and a technology.

He produced the first circular hologram in 1967, in which the viewer can see all around an object which appears to be suspended inside a cylinder. It is, indeed, like viewing a magic show.

Down in the Holography Laboratory of the Johnson Science Center at the college, he has created holograms in motion. "The Russians are working on holography films now," he states. They will be the first to have them." (Such a medium would exist in four dimensions, with motion being the extra dimension.)

A LAKE FOREST resident, Dr. Jeong has just returned from a trip to London, Prague and Paris. In Prague, over 100 people gathered by invitation to share the latest in the field of holography. He was the only one from the United States, although there are several dozen scientists active in the field in this country. The Soviet Union had 35 representatives at the meeting and while in Prague, Dr. Jeong was able to persuade them to send 100 holograms of some of their large works of art from The Hermitage Museum to this country for an exhibit.

In England, he said, rock groups are taking an interest in holography as an art form, and "The Who" have recently contributed \$400,000 towards research.

He was also in Paris for a two-day seminar for architects who can use holography for making architectural models and to create space where space doesn't exist.

He travels and lectures the world over. Last year he lectured in Peking and Shanghai.

HOW DOES one go about making a hologram?

Images are recorded on photographic film using two beams of laser light. The interference of light waves is recorded. One

beam is reflected from the same laser.

A hologram has little in common with an ordinary photograph except that they both use film. To view the processed film, a single beam of light is used.

The entire recorded image can be seen through any small piece of the hologram.

The equipment system with all the optics to make holograms costs about \$2,000 and the prototype for the ones used in this country were made right there in the machine shop at the Johnson Science Center in Lake Forest.

A 12-ton sheet of slate is required, designed to eliminate the slightest vibration, for even a sound in the room can cause enough vibration to ruin an exposure.

Also needed are a laser (It is now cheaper for the department to buy them than to make them.); a set of front-surfaced mirrors; a few beam-splitting mirrors; a set of divergent lenses and a film holder.

A cheaper version can be constructed for about \$200 using a sand box sitting on rubber tubes instead of the heavy sheet of slate, Dr. Jeong points out. This is easily afforded by most high school science departments.

BESIDES TEACHING a course in the regular curriculum at the college spring term and supervising undergraduates who are experimenting in holography in independent study, Dr. Jeong also offers three workshops at Lake Forest College in June. One is for college professors, another is for high school teachers, and the third is open to anybody with an interest.

Many groups have underwritten his research, and with grants from the Veterans Administration and Encyclopedia Britannica he has helped to create two prize-winning films on holography.

Dr. Jeong is a special consultant to the new school of holography located at 1134 W. Washington in Chicago called the Fine Arts Research and Holographic Center where some of his holograms are on permanent display, including the famous one of his three children playing inside a cylinder.

DR. JEONG has an interesting background. He was a refugee from China who came to live with a family in Amarillo, Texas, at the age of 12. He recalled learning by reading comic books.

Later, he became salutatorian of his high school class, and went to Yale on a full, four-year scholarship for his undergraduate degree. He earned his Ph.D. in



Dr. Tung Jeong with a hologram of a lion's head, made in Russia. (Photo courtesy of Lake Forest College)

nuclear physics from the University of Minnesota, and immediately joined Lake Forest College in 1963.

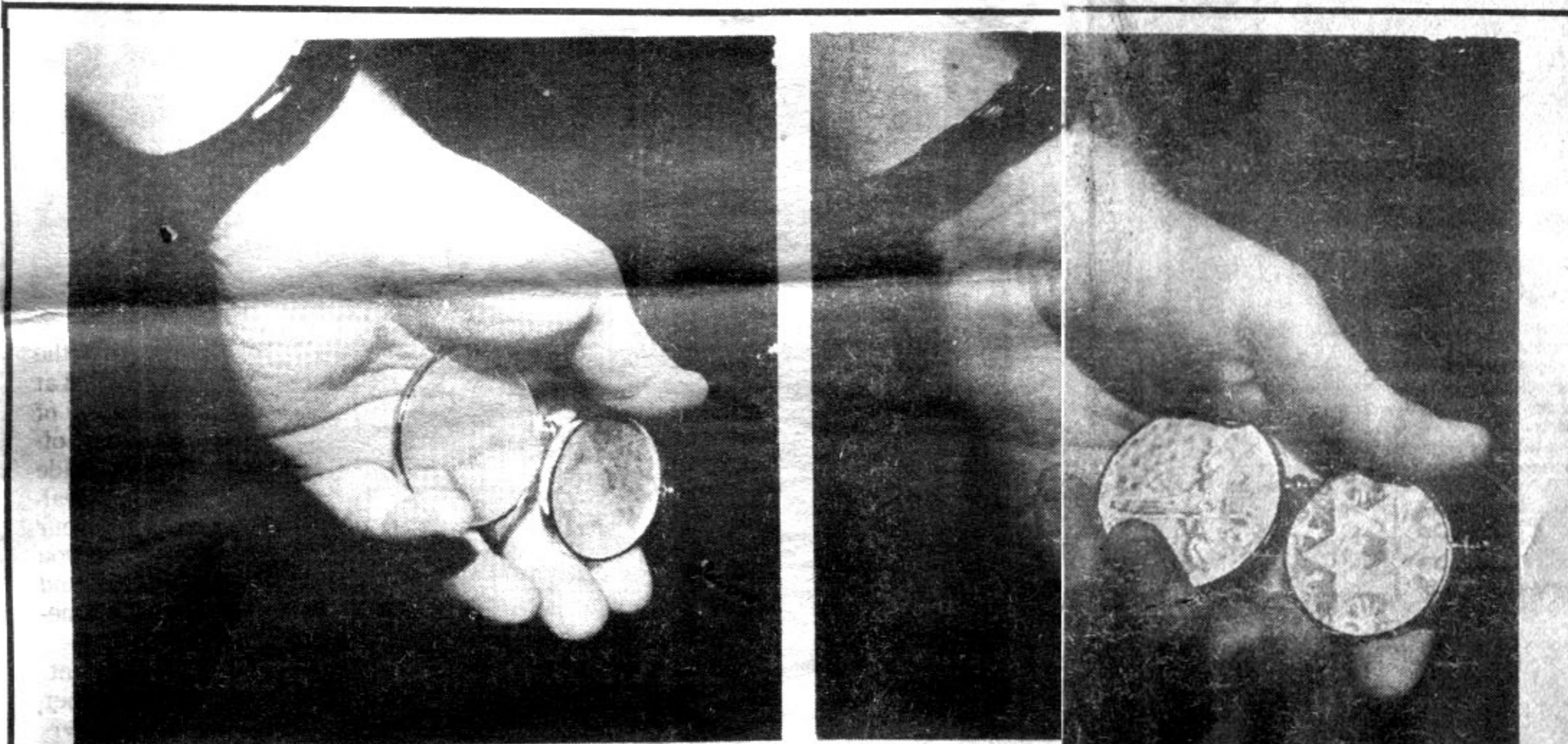
At Yale he was a gymnast and a cheerleader. He is also an accomplished violinist.

Where is holography going from here? According to Jeong, its applications are legion — for storing data, since it is almost an indestructible medium; for visual aids in many kinds of education; as a testing mechanism in the fields of science and industry (there is even microscope holography); for display in advertising and exhibits; and as an art form in itself.

Dr. Jeong feels that its primary importance right now is in the area called holometry — non-destructive testing. The technique can show stress in metal, measuring displacements of the order of 15-millionths of an inch.

It can also show miniscule growth patterns in plant and animal tissue.

And the second area of advancement, he predicts, will be in advertising displays. "Cartiers had a \$10,000 necklace in their window in New York in which it appeared to be suspended on a hand reaching out into the street," he elaborated. "It was a hologram and it drew hordes of people."



Now you see it

Like a magic trick, colorless plastic discs (left above) become three-dimensional objects when light is shown through them. Dr. Jeong shows this example of holograms used as trinkets (Staff photos by Jon Langham)

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