

Stephen Benton

1941-2003

We are sad to announce the death of professor Stephen A. Benton, director of the Center for Advanced Visual Studies at the Media Lab of the Massachusetts Institute of Technology. He was a founding member of the Media Lab, the brainchild of Nicholas Negroponte. Steve's death is a tremendous loss for the optics community in general and for holographic science in particular.

Steve completed his doctoral degree at Harvard and made significant contributions to the understanding of photographic granularity whilst falling under the spell of Edwin Land. He became fascinated by holography (circa 1968); his special area of interest became the chromatic aberrations of transmission holograms, the study of which culminated in his discovery of the white light transmission hologram. This type of hologram allows the observer to dispense with one of the viewing parallaxes of the traditional transmission hologram and to substitute the viewing of similar colors at the two eyes of the observer. This discovery was of great interest to the artistic community: for the first time, fiercely bright images which could be manipulated in an artistic context were observed. The glitzy colors paved the way for mass market commercialization of holograms.

The most important aspect of Steve's seminal discovery was that such holograms could be replicated via their topographically simple surface relief. This made easy mass replication possible; a famous example is the dove hologram on the VISA card. In a perspicacious comment, Emmett Leith pointed out that Steve was almost certainly responsible for the manufacture of more holograms than anyone else in history. Thanks to its simplicity, the surface replication technique introduced the world to three-dimensional images created by pressing techniques using metalized plastic as the image-forming medium. We should also note that Steve was one of the great pioneers of holograms formed from per-



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Faced with the demand for more refined holograms (not all holograms produced by means of the replication method discussed briefly above are visually satisfactory) Steve and co-worker Michael Klug developed a machine-based method for forming volume holograms of the type invented by the Soviet researcher Yuri Denisjuk. This development led to fabrication methods which were significantly more sophisticated than those involved with white light transmission or "rainbow holograms," whilst retaining both levels of parallax. The new production techniques would ultimately lead to results that were visually more satisfactory than those offered by the surface relief of "embossed" holography. However, since the machinery for the manufacture of the color holograms created by the Benton-Klug method imposed a whole new ball game in terms of production rates, concerns were initially voiced about potential commercial production rates. This was

to suggest serious commercial restrictions with potentially long timescales for creation of the finished product. In simple terms, the embossed holography would be ultra-quick to produce, whilst the Russian style holography (albeit in proper color with full parallax) would perhaps be beset by serious manufacturing rate limitations.

Thanks to the work carried out by Steve and Michael Klug, for the first time the world was able to see big (2 ft x 2 ft) holograms recorded in photopolymeric material on a pixel by pixel basis. The two are thus credited with the advent of large-scale full-parallax holograms seen by proper reflected color.

For just one of these inventions to emerge from Steve's Media Lab facility would have been a sufficient accolade for Steve and his co-workers; that two fundamentally different approaches of such basic importance should emerge from one laboratory is remarkable.

Steve was a great physicist and a major polymath of uncommon ability. His level of knowledge and his teaching ability were on par with those of the best nuclear scientists. His answers to complex physical questions, delivered with remarkable agility, were always correct. A master physicist and raconteur, he was quick to respond, whether the discussion involved optical engineering of holography or the minutiae of photographic chemistry. Steve's inventions—worthy of the same level of admiration as those of Gabor, Denisjuk and Leith—will go down in history.

— *Nicholas J. Phillips*
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Correction

The family of Henry Hemmendinger requests that donations in his name be made to The Nature Conservancy. The Nature Conservancy's address is 4245 N. Fairfax Drive, Arlington, Va. 22203.

Please write us at opn@osa.org should you learn of the death of a friend or colleague active in optics so that we may recognize them in the pages of OPN. Please include a phone number where you can be reached.