

SIGGRAPH 1990

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On Computer Graphics and
Interactive Techniques**

**Dallas Convention Center
August 6th—10th**

COURSE NOTES

6

STEREOGRAPHICS

Chair

**David F. McAllister
North Carolina State University**

Lecturers

**Robert J. Beaton
Virginia Tech**

**Larry F. Hodges
Georgia Institute of Technology**

**Phil Johnson
Tektronix, Inc.**

**Lennie Lipton
Stereographics Corporation**

**Shaun Love
North Carolina State University**

**David F. McAllister
North Carolina State University**

**Rodney Don Williams
Texas Instruments**

Abstract

The course will discuss the current state-of-the-art in stereoscopic, parallax barrier and multi planar display technologies, techniques for generation of stereographic images, stereo perception and stereo animation issues. Some new and novel technologies for the presentation of 'true 3D' will also be covered.

Preface

The first version of this course was taught in 1985 as a half-day course at SPIE in Arlington, Virginia. It was also presented later that year as a full day course at SIGGRAPH '85 under the title: "Three-Dimensional Display Technology and Techniques for Computer Generated Images." Since 1985 the course has been taught at SIGGRAPH or the SPIE O-E Lase Symposium or the SPSE/SPIE imaging symposium a total of 9 times. This will be our tenth presentation. Each course has been updated with new material and presenters to try to keep abreast of advances in the field.

The chapters in these notes have been written by experts in the field of true 3D. Some of the presentations will be technical, some mathematical, and some artistic. We hope we have developed a course which has the correct mix to suit most people. We also hope that you enjoy the course and don't forget to observe the numerous examples of true 3D in the art and video shows.

SPEAKER BIOGRAPHIES

Larry F. Hodges is currently an Assistant Professor in the School of Information and Computer Science at Georgia Institute of Technology. He received his Ph.D. in computer engineering at North Carolina State University in 1988. He also holds a MS in computer studies from NCSU and a BA with a double major in mathematics and physics from Elon College. His professional interests are in computer graphics, three-dimensional display and scientific visualization. Dr. Hodges has presented numerous technical courses and invited talks in raster graphics, true 3-D display technologies, and stereographics and is the National Chair for the Society for Information Display's Special Technology Committee on 3-D Display and Visualization. He is a member of the ACM, IEEE-CS, SID, and SPIE.

Phil Johnson is program manager of the liquid crystal shutter group at Tektronix. He received his BS in physics from Albion College in 1964. He has been with Tektronix since 1964 where he has worked with various display technologies and published papers on displays and liquid crystal technology. Mr. Johnson is the coinventor of the π -cell, a fast-switching liquid-crystal device that is the basis for the stereoscopic shutter system used by Tektronix and several other workstation vendors.

Shaun Love is a visiting instructor in Computer Science at North Carolina State University. His research interests include computer graphics and holography. He has written papers on computer generated holography and true 3D display. Mr. Love received his BA from the University of North Carolina, Chapel Hill and the MS degree in Computer Studies from North Carolina State University. He is currently a Ph.D. candidate in Computer Engineering at NCSU. He is a member of ACM, SPIE and Upsilon Pi Epsilon.

David F. McAllister is a Professor in the Computer Science Department of North Carolina State University. He has developed and taught short courses in graphics for industry and major computer science and display technology conferences. He is the author of numerous papers on curve and surface representation and three-dimensional display technology. His research interests include computer graphics and software reliability. Dr. McAllister received his MS and BS in mathematics from Purdue University and the University of North Carolina, Chapel Hill, respectively. He obtained his Ph.D. in Computer Science from the University of North Carolina, Chapel Hill in 1972. He is a member of ACM, IEEE, and SPIE.

Lenny Lipton--Vice President, Advanced Development; Chairman of the Board; Founder. Lenny Lipton was born in New York City in 1940 and graduated from Cornell University in 1962 with an undergraduate degree having majored in physics. While a freshman at Cornell he wrote the lyrics of the popular song, "Puff, the Magic Dragon." He worked as a researcher for Time Inc. in 1963 and then became an editor at Popular Photography Magazine where he worked for two years until moving to California to pursue careers as a filmmaker and author. For the next ten years he wrote film criticism for a local newspaper, numerous articles for magazines, and the standard text book "Independent Filmmaking," published by Simon & Schuster in 1972. In his career as a filmmaker he produced many documentaries, some independently and some for the BBC and Italian TV. In 1974 Lipton began to devote himself to stereoscopic research, which led to his founding StereoGraphics Corp. in 1980. In 1982 his book, "Foundations of the Stereoscopic Cinema," was published by Van Nostrand Reinhold. In the course of his work Lipton has been granted six patents in the field of stereoscopy, and he is a member of various professional and scientific organizations. Recently he was appointed chairman of the Society of Motion Picture and Television Engineers group working on establishing standards for stereoscopic projection of theatrical films.

Rodney Don Williams, Ph.D.

R. Don Williams, is the co-inventor of the TI autostereoscopic multiplanar 3D display. He holds a Ph.D. in Industrial Engineering from Texas A&M University, with a specialty in Human Factors Engineering. He has worked for over 10 years in the information display area and has focused in the last 3 years on the evaluation of alternative technologies for 3D displays.

He previously supervised and supported the human factors aspects of programs in the military, symbolic processing, office automation, industrial systems, and manufacturing business areas. Among his many professional activities he has served as a member of the technical program committee for the Society for Information Display (SID) and co-authored the recent ANSI standard for the human factors engineering of visual display terminal workstations. Dr. Williams has published 17 technical papers and has filed 8 patents.

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1. Introduction <i>David McAllister</i>	8:30-8:45
2. Human Factors in 3-D Stereoscopic Display Systems <i>Robert J. Beaton</i>	8:45-9:45
3. Stereo Hardware and Applications <i>Phil Johnson</i>	9:45-10:45
Break, Demonstrations	10:45-11:00
4. Computing Stereo Pairs <i>Larry Hodges</i>	11:00-11:40
5. Stereoscopic Composition <i>Lenny Lipton</i>	11:40-12:00
Lunch	12:00-1:30
6. Issues in Interactive Stereo <i>David McAllister</i>	1:30-2:00
7. 3D Hardcopy <i>Shaun Love</i>	2:00-3:00
Break, Demonstrations	3:00-3:15
8. Other Techniques <i>David McAllister</i>	3:15-4:15
9. Laser Volumetric Display <i>Rodney Don Williams</i>	4:15-4:45
Course Evaluations, Demonstrations	4:45-5:00