SYNOPSYS®
Synopsys, Inc.
Optical Solutions Group
199 S. Los Robles Avenue, Suite 400
Pasadena, CA 91101

T 626.795.9101
F 626.795.9102
http://optics.synopsys.com

Bill Cassarly, Ph.D.

Professional Experience

2010-Present	Senior Scientist/Illumination Engineering, Synopsys
2006-2010	Senior Scientist/Illumination Engineering, Optical Research Associates
1996-2005	Senior Systems Engineer/Illumination, Optical Research Associates
1992-1996	Optical Scientist, GE Lighting
1991-1992	Technical Staff, GE Corporate Research and Development
1987-1991	Electro-Optic Engineer, GE Astro-Space
1985-1987	Advanced Course Supervisor, GE Astro-Space
1983-1985	Edison Engineer, GE Electronics Laboratory & GE Astro-Space

Education

1990	Ph.D., Degree in Electrical Engineering, University of Pennsylvania
1982	BSEE, Degree in Electrical Engineering (plus Math Minor), Bucknell University

He is a driving force in the movement to create the field of computer-aided illumination engineering. His efforts include illumination optimization, illumination engineering consulting, numerous papers and invited talks, educational course development, and intellectual property development. Some highlights of his efforts include two SPIE illumination courses, submitting the winning solution for the 2006 IODC and 2010 IODC Illumination Design Problem, and authoring a chapter in the OSA Handbook of Optics on Illumination Engineering. In addition, he is the inventor on 46 US patents and 2 patents pending, the optics developer for the TIROS lens for LED flashlights, and a key contributor to major feature development in LightTools®, including the recent first in the industry introduction of a practical and effective optimization environment for illumination systems.

He has worked extensively in the areas of illumination modeling, design, and optimization. Areas of special emphasis include; etendue limited systems, non-imaging optics, LED optics, backlights, lightpipe systems, high brightness LED and discharge source development, photometry, and lens-reflector design. Systems he has designed and which have been demonstrated include: fiber optic headlights, compound parabolic concentrators, fiber optic systems, laser illuminators, light pipe systems, theater projection illuminators, video projection illuminators, room lighting, informational signs, spotlights, floodlights, and UV systems. He has developed optics for halogen infrared, ceramic metal halide, standard metal halide, halogen, and electrodeless lamp products.

He joined the research staff of GE Corporate Research and Development in 1991, continuing as Principle Investigator for the Phase-Integrated-Laser-Optic-Transmitter program that was started at GE Astro-Space. Primary areas of research included non-imaging optics, laser diode arrays, liquid crystal devices, coherent wavefront control, and flame spectroscopy. He also won a position on the Bridge Program, a GE CRD technology transfer program. While at GE, he received numerous GE management awards for patents and product introduction efforts.

He obtained his Ph.D. with a dissertation focused on liquid crystal arrays for signal processing and coherent wavefront control while working at GE Astro-Space. GE research focused on liquid crystal

phase control arrays for laser communication systems, liquid crystal device development, intra-cavity laser diode wavefront correction, and Fourier optic mathematics.
His career with GE began in the Edison Engineering program, with assignments in space radiation effects, signal processing communication systems, and speech wavefront analysis. Following this, he supervised an advanced course in engineering at GE Astro-Space, a Masters in Engineering training program for top GE Engineers, where he was responsible for teaching more than 30 people each year.

Awards/Honors

2011 promoted to Fellow by the Society of Photographic Instrumentation Engineers (SPIE).
2010 Winner of 2010 International Optical Design Conference Illumination Design Problem.
2006 Winner of 2006 International Optical Design Conference Illumination Design Problem.
2004 Commendation for Excellence in Technical Writing from Laser Focus World
1994 GE Lighting General Manager Award for XMH60 Product Development.
1990 GE Astro-Space Technical Excellence Award for significant technical contributions.
1988 GE Corporate D. R. Mack Advanced Course Supervisor Award for demonstrated leadership.

Patents

U.S. 7,866,871 Light enhancing structures with a plurality of arrays of elongate features
U.S. 7,777,955 Rippled mixers for uniformity and color mixing
U.S. 7,674,028 Light enhancing structures with multiple arrays of elongate features of varying characteristics
U.S. 7,651,243 Phosphor wheel illuminator
U.S. 7,588,342 Lighted refrigerated display case with remote light source
U.S. 7,549,783 Efficient luminaire with directional side-light extraction
U.S. 7,545,569 Optical apparatus with flipped compound prism structures
U.S. 7,374,313 Luminaire with improved lateral illuminance control
U.S. 7,366,393 Light enhancing structures with three or more arrays of elongate features
U.S. 7,360,899 Beamsplitting structures and methods in optical systems
U.S. 7,330,632 Fiberoptic luminaire with scattering and specular side-light extractor patterns
U.S. 7,277,609 Methods for manipulating light extraction from a light guide
U.S. 7,206,133 Light distribution apparatus and methods for illuminating optical systems
U.S. 7,196,849 Apparatus and methods for illuminating optical systems
U.S. 7,163,326 Efficient luminaire with directional side-light extraction
U.S. 6,864,861 Image generator having a miniature display device
U.S. 6,819,505 Internally reflective ellipsoidal collector with projection lens
U.S. 6,488,389 Image generator having an improved illumination system
U.S. 6,280,054 Image generator having an improved illumination system
U.S. 6,220,740 High efficiency dual output light source
U.S. 6,219,480 Optical coupler for coupling light between one and a plurality of light ports
U.S. 6,192,176 Compact optical system with turn and color mixing
U.S. 5,927,849 Low angle, dual port light coupling arrangement
U.S. 5,924,792 Modular dual port central lighting system
U.S. 5,896,004 Double ended quartz lamp with end bend control
U.S. 5,877,681 System and method for broadcasting colored light for emergency signaling
U.S. 5,842,765 Tricolor lighting system
U.S. 5,826,963 Low angle, dual port light coupling arrangement
U.S. 5,812,713 Optical coupling system with bend
U.S. 5,774,608 Optical coupling systems with bend

U.S. 5,692,091	Compact optical coupling systems
U.S. 5,691,696	System and method for broadcasting colored light for emergency signals
U.S. 5,675,677	Lamp-to-light guide coupling arrangement for an electrodeless high intensity discharge lamp
U.S. 5,664,863	Compact uniform beam spreader for a high brightness centralized lighting system
U.S. 5,654,610	Electrodeless discharge lamp having a neon fill
U.S. 5,636,915	High brightness projection lighting system
U.S. 5,567,031	High efficiency dual output light source
U.S. 5,563,977	Display system having greyscale control of fiber optic delivered light output
U.S. 5,560,699	Optical coupling arrangement between a lamp and a light guide
U.S. 5,515,243	Retrofit optical assembly for lighting system
U.S. 5,469,337	Multiple port high brightness centralized lighting system
U.S. 5,420,769	High temperature lamp assembly with improved thermal management properties
U.S. 5,317,484	Collection optics for high brightness discharge light source
U.S. 5,107,357	Low insertion loss optical beam steerer
U.S. 5,059,008	Wide angle beam steerer using translation of plural lens arrays
U.S. 5,015,080	Continuous wide angle beam steerer using lens translation and phase shifter
D 508,510	Optical Lens (To Be Reissued)
D 511,787	Optical Lens (To Be Reissued)

Patents Pending

2 U.S. Patent applications on Lighting Sources and/or Optics

Publications

"Fast freeform reflector generation using source-target maps", F. Fournier with J. Rolland, Optics Express, 18, 5295-3404, (2010).

"Design of Efficient Illumination Systems," SPIE Short Course presented 2-3 times per year starting July 1999. (Also available in CD-ROM format)

"Light Source Modeling," SPIE Short Course presented 1-2 times per year starting (January 2000).

"Illumination devices for photodynamic therapy of the oral cavity," (with C. Canavesi, F. Fournier, T. H. Foster, and J. P. Rolland) Biomedical Optics Express, Vol. 1, Issue 5, pp. 1480-1490 (2010)

"Iterative Reflector Design Using a Cumulative Flux Compensation Approach", SPIE/IODC 2010

"Freeform Reflector Design Using Integrable Maps," (with F.R.Fournier and J.P. Rolland) SPIE/IODC 2010

"Fast freeform reflector generation using source-target maps," (with F.R.Fournier and J.P. Rolland) Optics Express, Vol. 18, Issue 5, pp. 5295-5304, 2010

"Designing freeform reflectors for extended sources," (with F.R.Fournier and J.P. Rolland) SPIE Vol 7423, 2009

"Tailored Freeform Reflectors for Extended Non-Lambertian Sources," (with F.R.Fournier and J.P. Rolland) Frontiers in Optics, 2009

"Method to improve spatial uniformity with lightpipes," (with F.R.Fournier and J.P. Rolland) Optics Letters, Vol. 33, No. 11, pp 1165-1167, 2008

"Recent advances in mixing rods," SPIE Vol 7103, September 2008

"Optimization of single reflectors for extended sources," (with F.R.Fournier and J.P. Rolland) SPIE Vol 7103, 2008

"High Brightness LEDs", OPN, January 2008.

"Backlight Pattern Optimization", SPIE Vol 6834, Paper 191, November 2007.

"Illumination Merit Functions", SPIE Vol 6670, September 2007.

"Advanced Helmet Mounted Display (AHMD)", (with A. Sisodia, M. Bayer, P. Townley-Smith, B. Nash; J. Little, and A. Gupta) SPIE 6557, May 2007.

"Rippled Mixers for Uniformity", Illumination Technical Group talk, SPIE Annual, (August 2006).

"Optimizing density patterns to achieve desired light extraction for displays," (with T. Davenport), International Optical Design Conference, Proc. SPIE 6342, (June 2006).

"Non-rotationally symmetric mixing rods," (with T. Davenport), International Optical Design Conference, Proc. SPIE 6342, (June 2006).

"Automotive Interior Lighting System Design and Optimization," (with J. Li and M. Hayford), Transactions of the Society of Automotive Engineers of Japan, 36, 5, 217-222, (September 2005).

"Optimizing angle-to-area-converting, light-piping systems using surface features," (with T. Davenport and T. Hough), Proc. SPIE 5942, (August 2005).

"LED Source Modeling," Strategies in Light Workshop, (February 7, 2005).

"Noise tolerant illumination optimization applied to display devices," (with B. Irving), Proc. SPIE 5638, (February 2005).

"Automated Optimization Advances Software for Illumination Design," Laser Focus World, (November 2004)."Optimization for efficient angle-to-area conversion in illumination systems," (with T. Davenport and T. Hough), Proc. SPIE 5524, (October 2004).

"Better Illumination Design Through Automated Optimization," (with T. Hough and T. Davenport), Photonics Spectra, (October 2004).

"Optimization for illumination systems: the next level of design," (with T. Davenport and T. Hough), Proc. SPIE 5456, (September 2004).

"Taming light using nonimaging optics," Invited paper, Proc. SPIE 5185, (January 2004).

"The art of making efficient illuminator design fun," Invited paper, Proc. SPIE 5186, (November 2003).

“From Out of the Dark: Fun Illumination Demonstrations,” Invited OSA Talk, (October 6, 2003).

“Taming Light,” OE Magazine, 16-18, (December 2002).

“Illumination Optimization: The Revolution Has Begun,” (with M. Hayford), International Optical Design Conference, Proc. SPIE 4832, (December 2002).

“LED Modeling: Pros and Cons of Common Methods,” Photonics Tech Briefs, NASA Tech Briefs, IIa – 2a, (April 2002).

"Accurate Illumination System Predictions Using Measured Spatial Luminance Distributions," (with D. Jenkins and H. Mönch), Proc. SPIE 4775, (August 2002).

“Error estimation and smoothing of 2D illumination and chromaticity distributions,” (with E. Fest and D. Jenkins), Proc. SPIE 4769, (September 2002).

“Nonimaging Optics: Concentration and Illumination,” OSA Handbook of Optics 3, Chap 2, (2001).

“Automating the Illumination Design Process Using Optimization,” Invited talk, OSA Annual Meeting, (October 17, 2001).

“Automating the Illumination Design Process with Optimization,” Invited talk, Optical Design Symposium, Munich, Germany, (October 26, 2001).

“Lightpipes: Hidden Devices That Light Our World,” (with D. Jenkins, A. Gupta, and J. Koshel), OPN 12, 8, (2001).

"Dissecting the Optics of an LED," University of Arizona Optical Sciences Colloquium, (April 26, 2001).

“Designing Efficient Illumination Systems: The Art of Uniformly Coupling Flux From a Source,” 2nd International Conference on Optical Design and Fabrication, Tokyo, (November 2000).

“Analysis of Single Lens Arrays Using Convolution,” (with A. Riser), Optical Engineering 40, 5, 805-813, (2001).

“Automated Design of a Uniform Distribution Using Faceted Reflectors,” (with T. Davenport, S. David, D. Jenkins, and A. Riser), Optical Engineering 39, 7, 1830-1839, (2000).

“Optimization Methods for Illuminators for sub-100nm Lithography,” (with K. Thompson, T. Kuper, J. McGuire, T. Davenport, R. Shack), DARPA Advanced Lithography Conference, Oral Presentation, (May 2000).

“Fiber Optic Lighting: The Transition from Specialty Applications to Mainstream Lighting,” (with J. M. Davenport), SAE, 1999-01-0304, (1999).

“Advances in Fiber Optics: Fiber Applications Move into the Mainstream,” (with J. Davenport), The 8th International Symposium on the Science and Technology of Light Sources (LS-8), (September 1998).

“Faceted Reflector Design for Uniform Illumination,” (with S. David and C. Walker), Presented at International Optical Design Conference, Kona, Hawaii, Proc. SPIE 3482, (1998).

"Computer Software Tools Used in Illumination System Design," Invited Oral Presentation, SAE International Congress and Exposition, (1998).

"Changes in Angular and Spatial Distribution Introduced into Fiber Optic Headlamp Systems by the Fiber Optic Cables," (with G. Allen, R. Buelow, T. Davenport, R. Hansler, and T. Stenger), Presented at SAE International Congress and Exposition, 981197 (1998).

"Illumination System Design Using Optical Solid Modeling Software," (with M. Hayford), Invited Oral Presentation, OSA Annual Meeting, (1997).

"Comparison of Dual Focus Collector Schemes for Fiber Systems," (with G. Allen, T. Davenport, and R. Hansler), SAE International Congress and Exposition, 970254, (1997).

"Uniform Light Delivery Systems," (with J. Davenport and R. Hansler), Presented at SAE International Congress and Exposition, 960490 (1996).

"Distributed Lighting Systems: Uniform Light Delivery," (with J. Davenport and R. Hansler), SAE International Congress, Book SP-1081, SAE Transaction 104, 6, 950904, (1995).

"Phase Locking of a Two-dimensional semi-Semiconductor Laser Array in an External Talbot Cavity," (with J. Ehlert, J. Finlan, K. Flood, D. Nam, S. Sanders, R. Waarts, and D. Welch), Proc. SPIE 2148, 72, (1994).

"High Power Coherent Two-dimensional Semiconductor Laser Array," (with J. Ehlert, J. Finlan, K. Flood, D. Nam, S. Sanders, D. Scifres, R. Waarts, and D. Welch), Applied Physics Letters, 64, 12, 1478, (1994).

"Automated Phase Sensing and Control of an External Talbot Cavity Laser Diode Array Using Phase Contrast Imaging," (with S. Chakmakjian, J. Ehlert, J. Finlan, and K. Flood), Applied Optics, 33, 24, 5550, (1994).

"Phased 2D Semiconductor Laser Array for High Coherent Output Power," (with J. Ehlert, J. Finlan, K. Flood, D. Nam, D. Scifres, R. Waarts, and D. Welch), Proc. SPIE 1850, 270, (1993).

"Automated Two-Dimensional Phase Sensing and Control Using Phase Contrast Imaging," (with S. Chakmakjian, J. Ehlert, J. Finlan, K. Flood, D. Harnesberger, D. Nam, R. Waarts, and D. Welch), Procs. SPIE 1634, 299, (1992).

"Semiconductor Laser Array in an External Talbot Cavity," (with J. Ehlert, J. Finlan, K. Flood, D. Mehuys, D. Nam, R. Waarts, and D. Welch), Proc. SPIE 1634, 288 (1992).

"Intracavity Phase Correction of an External Talbot Cavity Laser Using Liquid Crystals," (with J. Ehlert, J. Finlan, K. Flood, and R. Waarts), Optics Letters 17, 607, (1992).

"Liquid Crystal Inversion Wall Caused by Field Fringing," (with S. Young), Mol Cryst. Liq. Cryst. 210, 1, (1992).

"900mW, CW Nearly Diffraction-Limited Output From a GaAIAs Semiconductor Laser Array in an External Talbot Cavity," (with J. Ehlert, J. Finlan, K. Flood, D. Mehuys, D. Nam, D. Scifres, W. Streifer, R. Waarts, and D. Welch), CLEO-CWE7, (May 1991).

"Low Insertion Loss High Precision Liquid Crystal Optical Phased Array," (with J. Ehlert and D. Henry), Proc. SPIE 1417, 110, (1991).

"A Nematic Liquid Crystal Phase and Amplitude Spatial Light Modulator for Optical Signal Processing Application," Ph.D. Dissertation, University of Pennsylvania, (July 1990).

"Continuous Wide Angle Beam Steering Using Translation of Binary Microlens Arrays and a Liquid Crystal Phased Array," (with J. M. Finlan, K. M. Flood, and C. Sigg), Proc. SPIE 1211, 296, (1990).

"Aperture Filling Using Phase-Plates at Self-Imaging Planes," (with J. Finlan), OSA Annual Meeting, (1989).

"Phase Control of Coherent Diode Laser Arrays Using Liquid Crystals," (with M. DeJule, J. Finlan, and C. Stein), Proc. SPIE 1043, 130 (1989).

"Effect of Word-Length Truncation on Quantized Gaussian Random Variables," (with D. Morgan), IEEE, ASSP-34, 4, 1004, (1986).

"Voice Privacy for Cordless Telephones," (with W. Ludescher), GOSAM, (June 1986).

Professional Societies

Committee Member, SPIE	The International Society for Optical Engineering
2002, 2006, 2010, 2014	Technical member, International Optical Design Conference
Member, SAE	The Society of Automotive Engineers
Fellow, SPIE	The International Society for Optical Engineering
Member IESNA	Illuminating Engineering Society of North America