

## **Leonard Laub**

### **Intellectual Property Consulting and Support of Litigation and Reviews**

**Video • Audio • Mass Storage • Imaging • Telecommunications**

**Portfolio Review • Licensing**

Leonard Laub is a consultant and patent owner with over 50 years of experience in developing and supporting the development and commercial exploitation of new technologies in areas including digital television; image acquisition, processing, content extraction, storage, and retrieval; interactive presentation of audiovisual content; consumer electronics; broadcast, mobile, and fiber telecommunications; video and audio recording, storage, and presentation; and computer and storage networks, including development and execution of major patent licensing programs and portfolio evaluations and acquisitions, along with over 30 years of supporting patent owners, alleged infringers, and their counsel (in firms of all sizes) in developing, constructing, and successfully presenting well over 50 large, complex patent infringement litigations, ITC investigations, IPR proceedings, and arbitrations.

### **Areas of Expertise**

#### Digital Television – 50+ yrs

- Invented early television bandwidth reduction technique

- Supported numerous litigations and proceedings regarding deep inner workings of digital television systems

#### Video and audio recording, storage, and presentation – 45 yrs

- Invented, developed, and supported commercialization of and litigation regarding optical disc hardware, media, and systems for consumer video recording and computer data storage

- Built and demonstrated prototype consumer videotape system with novel television bandwidth reduction technique

- Supported litigations regarding uni- and bidirectional streaming of audio and video

#### Consumer Electronics – 45 yrs

- Developed and demonstrated advanced large direct-view television displays

- Investigated holographic image displays and real-time optical computing

- Supported scientific design of loudspeaker systems

#### Image acquisition, processing, content extraction, storage, and retrieval – 45 yrs

Built and supported businesses making systems for mass digital acquisition, storage, and retrieval of document images

Supported litigations regarding advanced image acquisition and processing for enhancement and data reduction

Supported development of optics and image processing for advanced digital camera systems

Supported development of advanced OCR and free-text searching for indexing and retrieval of digitally stored document images

Interactive presentation of audiovisual content – 40 yrs

Supported young and established companies in developing and marketing interactive AV systems for entertainment and education

Broadcast, mobile, and fiber telecommunications - 25 yrs

Supported numerous litigations and investor inquiries into modulation techniques, antenna systems, jitter compensation in streaming systems, multiplexing strategies and hardware for fiber networks

Computer and storage networks – 25 yrs

Supported businesses and litigations regarding distributed mass data storage and database systems

Supported litigations regarding deep inner workings of wireless mesh networks

Portfolio review and license negotiations – 25 yrs

Supported companies and investors in assembling, evaluating, and negotiating valuation and licensing of large, complex patent portfolios

## **Education**

Undergraduate study of Physics and Mathematics at University of Chicago, 1963-1964; at Illinois Institute of Technology, 1964-1970 (B.Sc. in Physics, June 1970)

Graduate study of Mathematics at Northeastern Illinois University, 1971-1972 (toward M.Sc.)

Graduate study of Optics at University of Rochester, 1974

Graduate study of Physics at Northwestern University, 1974-1975 (toward Ph.D.)

## **Certifications & Publications**

Chaired sessions and gave presentations regarding mass data storage and management at numerous meetings of IEEE Computer Society and SPIE

Addressed National Association of Secretaries of State on advanced techniques for document capture, storage, retrieval, and security

Chaired sessions at Microsoft CD-ROM conferences

Patents

US patents (fields including optical system design and modulation techniques for optical storage, non-contact surface profiling, high-density data encoding, and signal bandwidth compression):

Patent Number	Date Issued	Title
3,706,843	12/19/72	Narrow bandwidth television system
3,796,495	3/12/74	Apparatus and methods for scanning phase profilometry
3,919,465	11/11/75	Optical system for directly detecting spatially recorded signals
3,952,148	4/20/76	Optical video disc playback system with position servo
3,959,581	5/25/76	Self-compensating focus system for optical video playback device
3,988,531	10/26/76	System for compensating for incorrect duty factor when reading out information stored in a video disc
4,044,378	8/23/77	Optical system for reflective mode video playback apparatus
4,454,415	6/12/84	Tracking mirror assembly and control system for an optical data storage disc
4,458,144	7/3/84	Apparatus for reading information stored in a track pattern on a radiation reflecting record
4,464,567	8/7/84	Photoelectric information and focus detector

Related patents in other countries:

AU 8285471	CA 1060581	CA 1089984	CA 1203901	DE 2650568
DE 3273675	FR 2306584	FR 2331044	IL 66182	JP 58045632

Selected Publications:

- “Optics of Reflective Videodisk Players,” IEEE Transactions on Consumer Electronics, August 1976, pp. 258-265; reprinted in SMPTE Journal, Vol. 85, November 1976, pp. 881-886
- “Optical Disc Optics”, SID ‘82 Digest, pp. 72-73
- “Design of Optical Storage Products”, Laser Focus; part I: June 1985, pp. 74-86; part II: September 1985, pp. 104-120
- “The Evolution of Mass Storage”, Byte, May 1986, pp. 161-172
- “What is CD ROM?” in CD ROM, The New Papyrus, S. Lambert and S. Ropiquet, Eds.; Microsoft Press, Redmond, 1986
- “Intranets, the Internet, and Imaging”, AIIM International, 1998

Additional Publications:

Leonard J. Laub, "Demodulating an Unresolved Carrier," Paper FE15 presented at the 1974 Annual Meeting of The Optical Society of America

A. Korpel, L. J. Laub, and H. C. Sievering, "Measurement of acoustic surface wave propagation characteristics by reflected light," Applied Physics Letters, v. 10, p. 295 (1967)

A. Korpel, L. J. Laub, and H. C. Sievering, "Measurement of acoustic surface wave patterns by laser light," IEEE Journal of Quantum Electronics, v. 3, no. 6 (1967)

R. Whitman, L. Laub, and W. Bates, "Acoustic Surface Displacement Measurements on a Wedge-Shaped Transducer Using an Optical Probe Technique," IEEE Transactions on Sonics and Ultrasonics, v. SU-15, p. 186 (1968)

Leonard Laub, "Resolution in light deflectors," Laser Focus, v. 7, no. 7, p.35. (1971)

L. J. Laub, "AC heterodyne profilometer," Journal of the Optical Society of America, v. 62, p. 737A (1972)

Leonard J. Laub, "Optics of Reflective Videodisc Players," Journal of the SMPTE, v. 85, pp. 881-886 (November 1976)

L. J. Laub, "Videodisc technology for mass image storage," Proceedings of the Workshop on Picture Data, IEEE Computer Society (1977)

Leonard J. Laub, "Optical mass storage technology," CAW '80 Proceedings of the fifth workshop on Computer architecture for non-numeric processing, pp. 8-10, ACM (1980)

Leonard J. Laub, "Optical mass storage technology," ACM SIGIR Forum Newsletter, v. 15, no. 2, March 1980

Leonard Laub, "Information Delivery Systems," in "CD ROM – Optical Publishing," editor S. Ropiquet, Microsoft Press (1987)

Leonard Laub, "Data Compression: Applications in Communications, Storage, Imaging, Audio, Video and Multimedia" – book begun but never completed or published; shows in some on-line lists as published 1996 by Thomson but out of print.

## Technical Tools and Environments

Diverse source code text editors

Diverse audio and video analysis and editing systems

Diverse tools for capturing and parsing bitstreams from broadcast and network traffic

Well-equipped optics and electronics workbenches

## Professional Experience

**July 1981 to present: Founder and President, Keryston Associates, Inc., Westerlo, New York (successor to Vision Three, Inc.).**

Provide management and technology consulting and licensing and litigation support services to companies, investors, law firms, and government agencies. Conduct and supervise consulting, business development, and R&D activities in the areas including the following: planning, growth, and management of high-tech businesses; semiconductor manufacturing and process control, high capacity and high accessibility storage and retrieval of data, sound, and images; optical and magnetic disk and tape hardware, media, and systems; efficient computer architectures for file finding, graphics, and other multi-dimensional processes; telecommunication of voice, data, and video; interactive systems for entertainment and instruction, including application of modeling of light sources and interaction of surfaces and volumes with light in synthetic still and moving imagery; electronic publishing of databases; simulator and exhibit design; laser and other electro-optical systems; audio and video systems; photopolymers; special materials; thin and thick film coating technology; solar energy. Provide business planning, product planning, market forecast services; support development and marketing of new products. Evaluate investment opportunities. Participate in startups and joint ventures; arrange and conduct seminars on high-technology subjects; perform contract and independent R&D. International clientele includes several companies (e.g., Kodak, IBM, General Electric) which rarely employ consultants. Provide full-spectrum support for evaluation, protection, application, and licensing of intellectual property. Provide intellectual property licensing and litigation clients with case construction, consulting support, and expert services, including review and analysis software and hardware source code at the application, firmware, and chip (VHDL, Verilog, etc.) levels.

**March 1981 to July 1981: Technical and Policy Liaison between Exxon Enterprises, New York, New York and Exxon Research, Linden, New Jersey.**

In charge of joint “directed-research” programs, reporting directly to a vice president of each unit; also helped coordinate the divestiture of Star Systems by Exxon Enterprises (sold to Storage Technology Corporation).

**November 1980 to February 1981: Director of Development, Star Systems Division, Exxon Enterprises Inc., Pasadena, California.**

Set up and ran a program of technology identification and development for a second-generation optical disk product which then went into engineering at Star.

February 1980 to November 1980: Director of Product Planning, Star Systems Division, Exxon Enterprises Inc., Pasadena, California. Responsible for conception, definition, system design, specification and planning of data storage and retrieval system products based on optical disk technology and advanced communication and file management methods; for market research, definition, quantification, and prediction for these products; for customer liaison and other

marketing and sales activities; for technical consultation to division's engineering department and parent company's headquarters staff.

**September 1978 to February 1980: Co-Founder and Technical Director, Star Systems Division, Exxon Enterprises Inc., Pasadena, California.**

Responsible for establishment, management, and technical direction of all engineering and R&D efforts for to new division's sole product, an optical disk data storage subsystem for attachment to IBM and compatible mainframe computers. Program required design, engineering, and construction of high-performance optical disk drives and media, along with control and interface hardware and software. Showed working prototype, developed entirely in house, nine months from total scratch startup. Recruited and organized all staff, planned entire program, specified product, set milestones, managed all work, established contact with initial customers. Signed all checks, approved all requisitions, set policy. Disciplines directed included mechanical engineering, analog, and digital electrical engineering, computer system design, optical system design, optical and electro-optical component development, vacuum coating, and materials science.

**August 1976 to September 1978: Manager, Optical Storage Technology, Xerox Electro-Optical Systems, Pasadena, California.**

Established and directed a program to develop optical disk mass storage subsystems (including design and manufacture of optical disk drives and media) for corporate product and government contract applications. Went from empty rooms to working prototype in ten months. Converted program to one capable of meeting government contracts when corporate program which had called for optical disk equipment disappeared, sold a \$5 million system based on Xerox-built optical disk drives and media to the Library of Congress for "demand printing" of library cards. Additional activities included establishment of a marketing capability for custom systems based on optical disk and internal consulting on acousto-optics, signal processing, and transducer and nozzle design for ink jet devices. Worked extensively with US military and intelligence agencies; maintained Secret clearance.

**July 1975 to July 1976: Section Manager, Electro-Optics, Research Department, Zenith Radio Corporation, Chicago, Illinois.**

Responsible for technical supervision and co-ordination of the electro-optics group, for consultation within the corporation, and for personally conducted research. Specifically responsible for videodisc master recording (including design, construction, and operation of high performance laser recorders, development of photoresist and direct-reading recording media, and replication and quality control of mass produced disks), videodisc optical design, projection television, injection laser applications, participation in international videodisc

standardization committees, development of signal encoding and decoding methods, consultation to audio engineering, electron and laser beam machining, and presentation of Zenith research work to the public.

**February 1970 to July 1975: Physicist, Light Modulation Group, Research Department, Zenith Radio Corporation, Chicago, Illinois.**

Responsible for support of videodisc player engineering. Active in fields of videodisc player and disk optical design, diffraction theory of optical scanners, surface measurement by active interferometry and holography, laser recording of digital data and document images, signal and data coding and information theoretical investigations, image storage and projection by conventional and holographic means, modeling of light sources and interaction of surfaces and volumes with light, acousto-optics, active image detection, and technical education of Zenith research staff. Served as internal consultant on matters involving physics, optics, and applied mathematics.

**June 1965 to February 1970: Co-op student (apprentice physicist), Light Modulation Group, Research Department, Zenith Radio Corporation, Chicago, Illinois.**

Alternated semesters of professional work and attendance at Illinois Institute of Technology. Areas of responsibility included ultrasonics, surface measurement, laser recording of information on silver halide film and photoresist, signal processing, acousto-optics, diffraction theory of scanners, and imaging systems.

**Additional:**

Consultation to academic, government, and industrial clients on signal processing, laser metrology, optical storage, telecommunication, video systems, and business development (1972 to 1981)

Direction and delivery of seminars and courses for OSA, IEEE, SPIE, IGC, and University of Wisconsin - Extension (1974 to date)

Chairman and organizer of 1984 Lake Arrowhead Workshop on Usable Computers; Technical Editor of Optical Memory Report; Moderator of Technology Opportunity Conferences (1983 through 1986)

Tutorial Instructor and Session Chairman at Microsoft's First and Second International Conferences on CD ROM (1986 and 1987)

Presented seminars and workshops on optical disk technology and digital storage of documents at many major meetings including AIIM Conferences (1987 and 1988) and Seminars (1992), USPDI Conferences (1990, 1991, and 1993), Federal Office Systems Expos (1990, 1991, and 1992), Imaging Expo (1993 and 1995), and the 1993 meeting of the National Association of Secretaries of State

Presented seminars and workshops on CD and CD ROM technology and applications at CD ROM Expos (1987, 1988, 1989, and 1990).