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MIT-educated technical and software consultant. Highly experienced expert witness in patent and technology litigations. Areas of expertise include touchscreen and tablet hardware, capacitive touch and proximity sensors, styli/electronic pens, haptics; gestures, user interfaces (UIs), touchscreen graphics, and accessibility user interfaces (blind/visually-impaired); digital rights management (DRM), digital encryption (PKI), and malware detection; programming/coding, source-code analysis, and firmware. Public speaking experience for non-technical audiences. Author of technical reference bibliography cited by USPTO, academic dissertations and technical publications by others. Clients include Google, Samsung, Ericsson, Lenovo, Motorola, Nokia, and Lucent Technologies. Granted multiple US patents, additional published patent applications.

Professional Experience

Rueters-Ward Services, Brooklyn, New York 2008-present

Consulting/development for multiple clients, including:

* Laboratory information processing for biomedical drug-discovery company.
* Digital audio HW/SW Agile verification automation for massive VOIP technology.
* Consulting/development for TV-band datacasting architecture with authentication/DRM.
* Technical consulting, review, development for web-based collaborative work systems.
* Prior-art research and source-code analysis in patent litigations (confidential).
* Technical assistance to Boston-area attorney in solo practice (patent prosecution only).

Litigation Support/Expert Witnessing

* Patent analysis / prior art research.
* Source-code analysis / reverse engineering.
* Expert report writing.
* Testimony at deposition and trial.
* Cases involve major high-tech entities such as Google and Samsung
* Federal Court, USPTO, State Court (California), and internationally (Australia, Brazil).

(*) (Please check spelling carefully when using this email address.)

Samsung v. Cerence
IPR2024-01267
Exhibit 1003

Professional Experience (continued)

Bluesocket, Inc., Burlington, Massachusetts 2007-2008
(Staff) Software development and engineering process (with QA Director and VP Eng.) for a distributed wireless network controller product with integrated security, verification of SSL/TLS and VPN features in multiple hardware devices and SIP mobile phones. Agile/Jira.

Cylant Security, Burlington, Massachusetts 2005-2006
(Staff: Principal Engineer) Computer security technology: Multi-platform product for malware/virus detection, applying techniques of machine learning and statistical analysis in automated system behavioral analysis. Two patent filings on novel techniques (violation of invariant conditions) for detection of rootkits and malware.

Digimarc, Burlington, Massachusetts 2003-2004
(Consultant) Application of PKI technology in fabrication and production of secure identity documents and manufactured items. One patent filing regarding PKI signatures to ensure authenticity and track unauthorized issuance of security documents such as passports.

Independent Consultant (Multiple Projects) 2002-2003

* Web development in high-availability/high-performance applications.
* Mobile payments (both client and server development) using modified mobile phones.
* International certification of a life-critical annunciation system.
* Prior-art research for two clients: pen-computing hardware and handwriting recognition.

CertCo Incorporated, Cambridge, Massachusetts 1999-2002
(Staff: PKI Systems Architect) Development of distributed web applications involving proprietary PKI in e-commerce. Three patent filings regarding PK infrastructure for distributed electronic signing.

Siemens-Nixdorf USA, LCP Business Unit, Burlington, Massachusetts 1998-1999
(Consultant) Design and development of cryptographic PKI/security technology for electronic DRM licensing of documents and materials distributed without restriction over the public Internet.

e-parcel.com, Newton, Massachusetts Division of Mitsubishi Electronics 1996-1998
(Staff: Development Group Leader) Secure, encrypted document and software delivery systems for secure automatic delivery over the public Internet. Instituted engineering tracking and QA process.

FAX International, Burlington, Massachusetts 1995-1996
(Consultant) Automated Email-to-FAX gateway, routing of fax traffic over private TCP/IP network.

DEC/Digital VXT Division, Marlboro, Massachusetts 1994-1995
(Consultant) WindowsNT-based graphics/applications terminal product using ALPHA technology.

DMR Group, Waltham, Massachusetts 1994
(Consultant) Proprietary application scripting language, associated compilers, debuggers, and tools.

Phoenix Technologies Ltd., PAGE Division Cambridge, Massachusetts 1993-1994
(Consultant) Firmware for a multiple-language, multiple-resolution network printer (PostScript/PCL).

Termiflex Corporation, Merrimac, New Hampshire 1993
(Consultant) Compiler, linker, interpreter, and related tools for an object-based programming language for applications in hand-held touchpad industrial controller terminals.

Professional Experience (continued)

Slate Corporation, Newton, Massachusetts 1991-1993
Development of tablet and pen computing applications products for the Microsoft PenWindows and GO/PenPoint pen-computing operating systems.
Company representative and technical co-chair of an industry standardization effort ("JOT") for electronic ink data format and compression applications.

Wang Laboratories, Lowell, Massachusetts 1989-1991
(Staff: Senior Software Architect) Lead developer for touchscreen hardware and controller/driver software to provide enhanced functionality to a portable computer as part of the "Freestyle" tablet-based computer applications family. Company technical representative to early Pen Windows discussions with Microsoft concerning mobile tablet computers. Hardware design of an electrostatic tablet digitizer/touchscreen for a mobile tablet computer. Patents on pen-based UI involving virtual devices.

Teledyne/TAC, Woburn, Massachusetts 1987-1989
(Staff: Dir. of S/W Engineering) Computer-controlled industrial automation for IC wafer testing.

Pencept Inc., Waltham, Massachusetts (Later: Numonics, Inc. 1979-1987
(Staff: Lead Engineer) Group leader for Pencept's handwriting/gesture pattern recognition and pen-computing digitizer tablets and hardware controllers through three generations of products, using dedicated co-processors. Patents related to pen-computing UI (user interface) and pen-computing digitizers. IEEE journal publications on both pattern-recognition techniques, and hardware design.

Dynatron Corporation, Waltham, Massachusetts 1977-1979
(Staff: Senior Engineer/Analyst) Specialized implementation tools for real-time digital audio signal processing and testing. Early work as consultant for Penverter Partners (predecessor to Pencept).

Data General Corp., Westboro, Massachusetts 1974-1977
(Staff: Senior Systems Programmer) Compiler development, source-code-level emulation.

Expert Witness/Litigation Support/Fact Witness

1) Declarations in support of petitioner Valve Corporation for *Inter Partes* Review of U.S. Patents 7,366,260 (IPR2024-00477), 8,749,507 (IPR2024-00556), and 9,430,042 (IPR2024-00478) (owned by Immersion Corporation) concerning haptic/force feedback in interactive systems.
Status: (ongoing)
Law firm: Wolf Greenfield Intellectual Property Law, Boston, Massachusetts, http://wolfgreenfield.com

2) Expert witness for defendant Bia Capital Management in *Red Wolf Energy Trading, LLC v. Bia Capital Management, LLC et al*, Civil Action No 1:19-cv-10119-MLW, US District Court, Massachusetts, concerning intellectual property dispute in energy trading systems.
Outcome: Partial judgment entered by the court September 2022: Settlement March 2023.
Law Firm: Todd & Weld LLP, Boston, Massachusetts, http://toddweld.com.

3) Expert witness for defendant Cypress Semiconductor in *Neodron Ltd. v. Cypress Semiconductor Corporation*, WDTX Case No. 6:20-cv-523, concerning capacitive touch sensing technologies in U.S. Patents 8,054,090, 8,253,706, and 9,411,472.
Outcome: Settled shortly prior to reports due September, 2021.
Law Firm: Fish and Richardson, San Diego, California, http://fr.com

4) Declarations in support of petitioner Lenovo, Inc. for *Inter Partes* Review of U.S. Patents 8,289,688, 8,612,888, 8,624,944, 9,880,715, 10,289,154 (owned by LiTL LLC) concerning multi-mode streamlined computing devices and managing digital media content, IPR2021-00681, IPR2021-00821, IPR2021-00822, IPR2021-00786, IPR2021-00800.
Law Firm: Sheppard Mullin, San Diego, http://sheppardmullin.com

5) Declarations in support of Samsung in matters related to *Certain Touch-Controlled Mobile Devices, Computers, and Components Thereo*f, Inv. No. 337-TA-1162; and Neodron Ltd v. Samsung Electronics Co., Ltd. et al, No. 6-19-cv-00323 (W.D. Tex.)
Outcome: Resolved following declaration regarding claims construction September 2019
Law Firm: O'Melveny & Myers LLP, Los Angeles, http://omm.com

6) Declarations in support of petitioner Elo Touch Solutions Inc. for *Inter Partes* Review of U.S. Patents 8,179,381, 8,274,494 8,704,799, and 9,823,786 concerning patterned materials for touchscreens, IPR2019-00254, IPR2019-0256, IPR2019-00278 and IPR2018-00261.
Outcome: Settled February 2019 before depositions, after petitions (November 2018)
Law Firm: Jones-Day, New York. http://JonesDay.com

7) Declaration in support of validity of Brazil Patent PI 9814565-7 (P8877), corresponding to US Patent RE43931, concerning touch user interfaces in hand-held radiotelephones. 13th Federal District Court of Rio de Janeiro, case no. 0025037-30.2018.4.02.5101. TCT Mobile Telefones Ltda. (Plaintiff), Telefonaktiebolaget LM Ericsson (Defendant),
Brazilian Patent and Trademark Office (*Pro forma* Co-Defendant) (Declaration submitted October 2018)
Law Firm: Licks Attorneys, Rio de Janeiro, Brazil. http://Lickslegal.com

8) (Projects as consulting expert)
   * Consulting project on touchscreen user-interface design (2023) (confidential)
   * Cooperative consulting project on touchscreen and tablet hardware errors and testing (2021)
   * Investigation/analysis for patents regarding sales systems with pen-based computers (2020).
   * Source-code analysis (Web site and Smartphone apps) for contract on-boarding (2020).
   * Remote O/S access (2020).

   Earlier:
   * Display hardware technology.
   * Power management in portable devices.
   * Touchscreen materials and fabrication

9) Declarations in support of petitioner Samsung for *Inter Partes* Review of U.S. Patents 6,429,846, 7,982,720 and 8,031,181 concerning haptics in touchscreen user interfaces.
(Petitions submitted August 2018, Settlement 2019)
Law Firm: Fish and Richardson, Minneapolis, Minnesota, http://fr.com

10) Declarations and depositions in support of petitioner Samsung for *Inter Partes* Review of U.S. Patents 8,717,303, 8,743,076, 8,866,785 and 8,878,810 (related to 6,610,917) concerning user interfaces and hardware for pressure-sensing capacitive touchscreens.
(Depositions October 2016, February 2017)
Outcome: PTAB found all contested claims unpatentable.
Law Firm: Ropes and Gray, East Palo Alto, CA. http://Ropesgray.com

11) Declaration and USPTO interview in support of patent owner Wimo Labs for Re-examination of U.S. Patents 9,092,077 and 8,847,930 concerning styli for capacitive touchscreens.
(Declaration, PTAB interview September 2016)
Outcome: PTAB held amended claims valid.
Law Firm: Neal Gerber Eisenberg, Chicago, Illinois. http://ngelaw.com

12) Declarations and deposition in support of patent owner Ericsson for *Inter Partes* Review of U.S. Pat. RE43931 (6,131,047), touchscreen user interfaces for hand-held radiotelephones
(Declaration and deposition May/June 2016).
Outcome: PTAB found contested claims unpatentable
Law Firm: Oblon, McClelland, Maier and Neustadt, Alexandria, Virginia. http://Oblon.com

13) Expert witness for defendant Google in *ContentGuard Holdings, Inc. v. Google Inc*. (with co-defendant Samsung), Case No 2:14CV0061, (Eastern District of Texas, Marshall Division), concerning U.S. Patent 8,393,007 and seven related patents on multimedia Digital Rights Management (DRM) and Secure Systems for mobile devices.
(Multiple reports. Deposition June 2015, trial September 2015.)
Outcome: Jury returned verdict of no infringement of any of the asserted claims.
Law Firm: Kaye Scholer, New York, New York. http://kayescholer.com

14) Expert witness for plaintiff GO Computer in *GO Computer, Inc. v. Microsoft,* CGC-05-442684 in Superior Court, State of California/San Francisco concerning business practices in California under the Cartwright Act.
(Report and Deposition August 2015.)
Outcome: Settled September 2015.
Law Firm: Kellog, Huber, Hansen, Tood, Evans & Figel, Washington DC. http://Khhte.com

15) Expert witness for defendant Lenovo in *MAZ Encryption Technologies LLC v Lenovo Inc.*, Case No. 13-303-LPS (District of Delaware), U.S. Patent 8,359,476 concerning encryption and decryption in conjunction with smartcards.
(Report December 2014, Deposition April 2015.)
Outcome: Settled before trial.
Law Firm: Kenyon and Kenyon, Washington, DC. http://Kenyon.com

16) (Non-expert deposition as subpoenaed fact witness in *Flatworld v. Samsung Electronics Co. LTD. et al,* Case No 12-804-LPS, District of Delaware, April 2015.)

17) Declaration/report in support of petitioner Google, Inc. for *Inter Partes Review* of U.S. Patent 6,121,960, concerning rendering of transparency (e.g. alpha blending, screen door transparency, composite video) in graphics images and touch screen user-interface methods.
(Report May 2014. Depositions February and May 2015, and December 2018 after further court order.)
Law Firm: Kilpatrick Townsend and Stockton, Atlanta, Georgia. http://Kilpatricktownsend.com

18) Expert witness for defendant Samsung in *Apple, Inc. v Samsung Electronics Co. Limited, Proceeding No. NSD 1243 of 2011, Federal Court of Australia*, concerning Australian counterpart to US patent 5,825,352 regarding multi-touch hardware for mobile devices.
(Two reports, trial testimony June 2013 in Sydney, Australia.)
Outcome: Litigation agreement by parties.
Law Firm: Nigel Bowen Chambers, Sydney Australia http://nigelbowen.com.au
Ashurst Australia, Melbourne Australia http://ashurst.com

19) (Projects as consulting expert)
* Transparent graphical displays.
* Gestures on a virtual keyboard.
* Layered display of information.
* Rotation of window views in touchscreen devices.

20) Expert witness for defendant Motorola in *Certain Mobile Devices Incorporating Haptics*, case number 337-2875, in the U.S. International Trade Commission, concerning touch haptics, US Patents 7,148,875, 7,982,720, and related patents.
Outcome: Settled prior to reports due 2012.
Law Firm: Steptoe and Johnson, Washington, DC http://steptoe.com

21) Expert witness for defendant Motorola in *Microsoft Corporation v. Motorola Mobility, Inc.,* Case No. 10-24063-CIV-MORENO (Southern District of Florida) US Patents 6,781,536 and 6,897,583 concerning touchscreen gestures in smartphones.
(Two reports, deposition, affidavit in related re-examination. 2011-2012).
Outcome: All contested claims canceled in re-examination.
Law Firm: Ropes and Gray, New York, New York. http://Ropesgray.com

22) Expert witness for defendant Nokia in *Apple, Inc. v. Nokia Corporation*, Case No. C.A. 09-791-GMS, (District of Delaware). Prior art and other research on patents regarding touch user-interfaces, color rendering, touchscreen integration, development tools for hand-held devices.
Outcome: Settled shortly before reports due. 2010-2011.
Law Firm: Alston and Bird, Atlanta, Georgia. http://Alston.com

23) Expert witness for plaintiff Lucent Technologies in *Lucent Technologies, Inc., v. Gateway, Inc., Microsoft et al.*, Case No. 02-CV-2060-B (WMC), consolidated with Case No. 03-CV-0699-B (WMC) and Case No. 03-CV-1108-B (WMC) (S.D. Cal.), concerning US Patent 5,347,295 regarding gesture user interfaces and hardware integration in tablet-type computers.
(Three expert reports, testimony in three depositions and at trial. 2006-2008).
Outcome: Jury held asserted claims valid and infringed.
Law Firm: Kirkland and Ellis, Chicago, Illinois. http://Kirkland.com

24) Expert witness for defendant in patent case *Sekendur v. Anoto AB*, Case 03-C-4723, Northern District of Illinois, concerning US Patent 5.852,434 for optical (video) stylus digitizer hardware and firmware, (Expert report and deposition. 2004)**.**
Outcome: Opposing expert disqualified, summary judgment of both invalidity and non-infringement.
Law Firm: Finnegan, Henderson, Farabow, Garret and Dunner, Washington, DC. http://Finnegan.com

25) Expert witness for defendant LCS in *Schumer v. Laboratory Computer Systems* concerning US Patent 5,768,492 regarding hardware controllers and virtual devices for digitizing tablets and WINTAB industry standard. (One expert report, 2001)
Outcome: Combined with larger litigation with different experts: eventual settlement after appeals.
Law Firm: Sullivan and Worcester, Boston, Massachusetts http://sandw.com

Published Patent Applications (Known, may not include foreign counterparts)

1) US Published Patent Application 20070169192, June 19, 2007
"Detection of system compromise by per-process network modeling

2) US Published Patent Application 20070067623, March 22, 2007
"Detection of system compromise by correlation of information objects"

3) US Published Patent Application 20050132194, June 16, 2005
"Protection of identification documents using open cryptography"

4) European Patent Application Publication EP1421464 A1, May 26, 2004
"System and method for trust in computer environments"

5) US Published Patent Application 20030163686, August 28, 2003
"System and method for ad hoc management of credentials, trust relationships and trust history in computing environments"

6) European Patent Application EP693724A1, January 24, 1996,
"A method of reconfiguration of a simulated keyboard device in a computer system"

Granted Patents (Known, does not include foreign counterparts)

1) US 5,491,495 "User interface having simulated devices"

2) US 5,148,155 "Computer with tablet input to standard programs"

3) US 4,608,658 "Method and apparatus for removing noise at the ends of a stroke caused by retracing"

4) US 4,562,304 "Apparatus and method for emulating computer keyboard input with a handprint terminal"

5) US 4,534,060 "Method and apparatus for removing noise at the ends of a stroke"

Selected Publications

"Anomalies in measuring speed and other dynamic properties with touchscreens and tablets",
Proc. 2019 International Conference of the Biometrics Special Interest Group (BIOSIG), Darmstadt, Germany, Sep. 18..20, 2019.

"Annotated Bibliography in On-line Character Recognition, Pen Computing, Gesture User Interfaces and Tablet and Touch Computers," published and revised on-line from 1999 to the present at
http://www.ruetersward.com/biblio.html

"Under the Hood: Digitizer Technology and Pen Computing", BYTE Magazine, January, 1993.

"Pen computing -- Fad or revolution?," Information Display, pp. 14-19, March 1992.

"History of Pen-Based Computing - March 1992, Jean Renard Ward", recording of presentation given to Boston Computer Society regarding pen/touchscreen computing from 1914 to 1992, available at http://www.youtube.com/watch?v=4xnqKdWMa_8 (Posted 2013 by Dan Bricklin, http://bricklin.com)

"The 'How to' of Electronic Ink: Tablet Error Mechanisms and Performance Analysis for Handwriting Capture" (with Robert Kabel of Scriptel), Research Report, Wang Laboratories, July 1990.

"One view of outstanding problems in handwriting recognition systems," Proc. 3rd International Symposium on Handwriting Recognition and Applications, pp. 101-108, Montreal, Quebec, April 1990.

"A model for variability effects in hand-printing, with implications on the design of on-line character recognition systems", IEEE Trans. on Systems, Man, and Cybernetics, May 1988.

"Digitizer technology: Performance characteristics and the effects on the user interface", IEEE Computer Graphics and Applications, April 1987.

"UNIX as a development tool for a non-UNIX microprocessor", CommUNIXations, Vol. V No. 5, August/September 1985.

"Interactive Recognition of Handprinted Characters for Computer Input", IEEE Computer Graphics and Applications, Vol. 5 No. 9, September 1985.

(See also http://www.ruetersward.com/shortarticles)

Presentations/Presentation Organizing

Session chair and instructor Society for Information Display (professional society: SID.org)
Tutorial seminars on integration of touchscreen/pen interfaces and digitizer technology with graphics displays at the 1992 (Boston) and 1993 (Seattle) annual conferences for the Society for Information Display. Consultant to various clients on tablet technology and pen computing interfaces 1991-1993.

Panel organizer
"Issues in the validity of testing protocols and criteria for on-line recognition of handwritten text," presented at the 1st International Symposium on Handwriting and Applications, Montreal, Canada, July 1987.

Organizer
Multi-company presentation to PHIGS Standardization Committee concerning pen/tablet computing and gesture-recognition input devices, Boston, 1986.

Current Professional Society Memberships

Associate Member, IEEE (Institute of Electrical and Electronics Engineers)
Member, ACM (Association for Computing Machinery)
Member, SID (Society for Information Display)
Member, ACS (American Chemical Society)
Member, AAAS (American Association for the Advancement of Science)
Member, VIBUG (Visually-Impaired/Blind User Group: New England regional technical group)

Education

S.B. in Computer Science and Electrical Engineering
Massachusetts Institute of Technology, Cambridge, Massachusetts 1974

Independent Study, **Philipps-Universität**, Marburg, Germany 1972

Other

Familiarity with accessibility technology for visually-impaired/blind.
Fluent in German.