Charles Poynton

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Books	***Digital Video and HD Algorithms and Interfaces,* Second edition** (Burlington, Mass.: Morgan Kaufmann/Elsevier, 2012); 752 pages, in press. I wrote, designed, illustrated, and typeset this book, to appear in early 2012.
	Digital Video and HDTV Algorithms and Interfaces (San Francisco: Morgan Kaufmann, 2003; 736 pages). I wrote, designed, illustrated, and typeset this book, which is currently in its sixth printing. It reached rank 3,339 on Amazon.com.
	A Technical Introduction to Digital Video (New York: John Wiley & Sons, 1996; 352 pages). I wrote, designed, illustrated, and typeset this book; it reached fifth printing, and was superseded by *Digital Video and HDTV Algorithms and Interfaces*.
Other publications	I have published extensively; please refer to separate *List of Publications*.
Lectures, courses, seminars, workshops	I have lectured and taught extensively; please refer to separate *List of Presentations*.
Awards	David Sarnoff Gold Medal, awarded by SMPTE in 1993 for significant contributions toward the integration of digital video and computing technologies.
Honours	Fellow of the Society of Motion Picture and Television Engineers (SMPTE), 1992–.
	Honorary Fellow of BKSTS, The Moving Image Society, 1999–.
Patents	US 5 334 998, issued 1994-08-02, *Method and apparatus for utilizing blanking on both zero setup and pedestal setup display monitors with a conventional computer system* (with Curtis Priem, assigned to Sun Microsystems, Inc.).
Professional service	Co-chair (with Peter Symes), *138th SMPTE Technical Conference* (Los Angeles, Oct. 1996)
	Co-chair (with Jan Morovic), *15th IS&T/SID Color Imaging Conference* (Albuquerque, N.M., Nov. 2007)
	Session chair at numerous conferences
	Paper reviewer for several journals and numerous conferences
	I registered the <smpte.org> domain in 1995, and built and deployed SMPTE's first web site. On behalf of IBC, I registered the <ibc.com> domain.
Special duties	in 2001 and in 2003, I juried the OCAD *Sumo Robot Wrestling* competition.
Licences	I hold a Canadian Private Pilot's Licence, issued prior to my first driver's licence.
Education	B.A. (Mathematics and Computer Science) from Queen's University at Kingston, Ontario, Canada, 1976.
	Ph.D. candidate at Simon Fraser University (Special Arrangements/ Interdisciplinary), 2006– ; Ph.D. expected spring 2012.

Work experience

Free lance contracting, *1996–*

Since completing my first book in 1996, I have been an independent contractor engaged in short-, medium-, and long-term consulting contracts, performed in my office in Toronto and in Belgium, Canada, England, Germany, Japan, Korea, Netherlands, Taiwan, and U.S.A. My clients have included Apple, Inc., ARRI, ATI Technologies, Autodesk, Avid, Barco, CBC, Connex Technology, c.o.r.e. Digital Productions, DCI LLC, Cypress Semiconductor, Discreet Logic, Dolby Labs, Dreamworks SKG, ETRI, iFire Technology, Intel, Khronos, Kodak, National Film Board of Canada, The MathWorks, Microsoft, Microvision, On2 Technologies (later acquired by Google), Philips, Pinnacle Systems, S3, Silicon Graphics (SGI), Silicon Light Machines (SLM, later acquired by Cypress), Silicon Optix, Snell & Wilcox, Sony, Stream Processors Inc., Teranex (later acquired by Silicon Optix), SpectraCal, Texas Instruments, Walt Disney, Warner Bros., and Zilog.

Colour and image science – I have performed contracts to analyze colour specification, calibration, capture, processing, storage, and display systems for digital cinema, computer animation, computer generated imagery (CGI), and broadcast, industrial, and consumer video. For three manufacturers of emerging displays for digital cinema, I consulted on colour science, helped to establish image coding standards, and assisted in the development, testing, and evaluation of signal processing algorithms. I have consulted to several film studios on establishing image coding standards, and helped to introduce colour characterization, colour calibration, and colour management into their production pipelines. I have taught seminars and workshops to display engineers; to digital video and HD engineers and technicians; to digital cinema and post-production engineers and technicians; and to cinematographers and colorists. I am active within the AMPAS STC IIF initiative.

Algorithm development – I have developed, characterized, modelled, and analyzed algorithms for motion image processing at quality levels from digital cinema, through studio video, down to PCs, with implementation technologies from high-level software, through firmware, to commercially available VLSI. Generally I performed high-level architectural work and delivered algorithms as some combination of textual description, equations, and/or *Mathematica* or MATLAB code. Sometimes I provided bit-accurate C-code. My clients typically implemented my algorithms in VHDL or Verilog. (I read these languages, but do not write them.) For a startup company developing revolutionary new film scanning technology, I assisted in colour characterization of their highly unusual device, and in the development of unique image signal processing algorithms. For a manufacturer of graphics accelerator chips, I designed filtering algorithms for NTSC decoding and encoding, deinterlacing, reinterlacing, resizing, and frame rate conversion.

Technology assessment and forecasting – To assist companies to exercise due diligence with respect to licensing or acquisition, I have assessed the value of intellectual property (patent) portfolios. Sometimes, such activities verge into product planning. For a company that designs and manufactures standard (commercial) integrated circuits, I consulted on the technological aspects of a business strategy to enter the domain of consumer electronics. For a large manufacturer of studio video equipment, I assisted in the evaluation of the technology and patent portfolio of a company that was a candidate for acquisition.

Expert witness – I have been engaged on several occasions as an expert witness in intellectual property and patent matters. For a company that designs and manufactures video equipment, I examined the arguments of an inventor that claimed that his patent had been infringed. I gave testimony that cast doubt on the validity of his argument; an out-of-court settlement in favour of my client ensued. I gave testimony as an expert witness at the International Court of Arbitration in London: The developer of an advanced video codec had licensed its technology to a foreign entity that subsequently claimed that the developer's code could not be effectively ported to a DSP architecture. I argued to the contrary; my client prevailed.

Tools – My main tools for mathematical modelling and simulation are *Mathematica* and MATLAB. I occasionally write conventional compiled code in C. I write scripts using classic tools such as *csh* and *bash; awk*, *sed*, and *grep*; and lately, Python.

Communication – I pay a great deal of attention to communicating my work, both to my clients (by writing technical reports, proposals, analysis documents, and the like), and to the wider community (by teaching courses and seminars and by writing papers, articles, and books). I execute my own illustrations (using Adobe Illustrator), and typeset my own work (using Adobe FrameMaker and $\LaTeX$).

Sun Microsystems Computer Corporation, Mountain View, Calif., 1988–1994. Staff Engineer.

Colour Management – I conceived and executed the strategy that brought colour management technology to Sun. I investigated colour technology, and provided technical leadership to Sun's technical, business and contract teams. I worked closely with Kodak to define APIs, profile format, and colour data interchange standards. I provided industry leadership to achieve agreement on an industry standard for colour device profiles in the group that was the predecessor to today's International Color Consortium (ICC). I was a key contributor to the inclusion of accurate colour capability in the TIFF 6.0, JPEG, and JFIF image interchange standards (which later influenced Exif). I contributed to the sRGB and PNG standards. I introduced the BT.709 HD primaries to sRGB; I was responsible for the introduction of the Adobe RGB (1998) colourspace into graphics arts.

Digital Video and HD Standards – I have been a key contributor to SMPTE standards for digital video, high-definition television (HD), and digital cinema. I was the document editor for the SMPTE 274M standard for 1920×1080 high definition television – the HDTV studio standard. I was a member of the Working Group on Colorimetry, where I worked to establish standards for colour image exchange in HD, video, and print, leading to the BT.709 standard. I was founding chairman of SMPTE's Working Group on Digital Pictures; under my leadership, that group developed and standardized the SMPTE 268M (DPX) standard for the exchange of digital film, widely used for the past 15 years in digital cinema. I introduced "square pixels" to HD, and introduced the number "1080" into HD standards (1080*p*60) and subsequently into digital cinema standards (2048×1080).

High-Definition Television (HDTV) – Along with Glenn Reitmeier of David Sarnoff Research Center, I responded to DARPA's 1989 Request for Proposals for a High Resolution (High-Definition) Workstation. Glenn and I conceived the system architecture, wrote the specification, and provided technological leadership to the design and implementation teams. I wrote HDTV interface standards. I specified the prototype 1920×1080, 72 Hz non-interlaced display that was commercialized as Sony's GDM-W900 and GDM-FW900, 1920×1200 CRT monitors. The 1920×1200 display format has since become an industry standard widely used today (e.g., by Apple).

Northernlight and Picture, Ottawa, Canada, 1984–1986. Founder and president.

This television production company undertook co-production, with CBC (and executive producer Mark Blanford), of *Chasing Rainbows,* an $11M, 14-hour miniseries produced using experimental HDTV equipment assembled, configured, and operated by Charlie Pantuso. *Chasing Rainbows* was by a very wide margin the largest and most challenging HDTV production of its time.

Poynton Vector Corporation, Ottawa, Canada, 1982–1988. Founder and principal.

I performed contracts for the specification, design, development, implementation, testing, and installation of special-purpose studio-quality digital video equipment.

Ross Video, Ottawa, Canada, 1988.
I performed a consulting contract to investigate the use of DSP and RISC computing in pattern generators for digital video production switchers.

Vertigo Computer Imagery, Vancouver, Canada, 1986–87.
I designed and built codec equipment to convert component analog video to component digital video (SMPTE RP 125), to interface Vertigo's computer graphic software and hardware to studio video equipment.

National Research Council of Canada, Ottawa, Canada, 1986. I designed and built interface equipment to capture video from the Space Shuttle's CanadArm into a general-purpose minicomputer, for algorithm development and testing.

Hewlett-Packard Labs, Palo Alto, California, 1985–87.
I performed consulting on the integration of video and computer graphics; I designed an experimental multi-port framestore system.

NASA (Johnston Space Center), Houston, Texas, 1982–86.
I specified and designed – and, with Pierre Deguire, built – the digital video processing equipment used at JSC to convert field-sequential video from the Space Shuttle into NTSC; C.R. Caillouet, Pierre Deguire, and I deployed the equipment. This equipment processed Space Shuttle video in real time to prepare it for display at Mission Control (about 50 milliseconds later), and for subsequent processing, recording, and distribution.

Digital Video Systems, Toronto, Canada, 1979–1981. Hardware/Software Engineer. (DVS was later acquired by Scientific Atlanta, in turn acquired by Cisco.)

I designed and wrote microcode to control the company's highly successful DPS-1 framestore synchronizer. I applied DSP theory to characterize the adaptive comb filter and NTSC chroma decoder used in that product.

Teaching experience

Ontario College of Art (now Ontario College of Art and Design University, OCADU), Toronto, Canada, 1976–1978. Faculty member.

I inaugurated the full-course *Electronics for Art*, and taught the course for 2 years. I purchased the school's first (micro)computer.

I have taught extensively in academic, conference, and commercial situations; please refer to separate *List of Presentations*.