Kevin T.C. Jim, Ph.D.

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Education
Ph.D. (2001), M.S. (1995) Astronomy, University of Hawai`i, Honolulu, HI
B.A. (1986) Physics *(cum laud*e), Cornell University, Ithaca, NY

Experience
Consultant, KJ Imaging, Milwaukee, WI and Honolulu, HI,
http://kjimaging.com, 2003-present
Provided scientific consulting for private companies in designing imaging systems, solving general experimental issues, fixing existing optical instrumentation problems, and writing image processing algorithms.

- Redesigned a 2D barcode reading system for higher performance
- Performed technology development surveys to reduce the costs of imaging systems and negotiated with focal plane manufacturers for custom imaging devices
- Advised in the integration of LWIR cameras and designing systems for spectrograph calibration
- Engineered ruggedized Cell Matrix Chip systems for mobile use. Wrote imaging algorithms and software to analyze the behavior of cells in the Cell Matrix Chips, with living cells growing on imaging sensors (patent pending.)
- Developed electronic and optical interfaces to live, cultured neurons to create massively parallel neuronal sensors. The Neural Matrix Chip technology won a 2005 R&D 100 award.
- Found funding agencies and led the writing of over $1.5 M in successful grant applications for a bio-tech start-up company
- Performed atmospheric radiative transfer, hyperspectral imaging analysis; developed algorithms for water vapor extinction analysis for airborne search and rescue
- Assisted in CCD camera development for adaptive optics systems

Senior Scientist and Electrical Engineer: Science and Technology International, Honolulu, HI, http://www.sti-hawaii.com, 2001-2003
Responsible for solving general imaging problems for a variety of medical diagnostic, airborne, and underwater sensor systems. All of these sensors operated in the visible to near infrared wavelengths, and were either hyperspectral or multispectral. This involved design and implementation at the hardware, embedded software, algorithms, and systems level. I selected and specified the sensors for many systems built at STI, including cameras for airborne, underwater, and medical diagnostic systems.

- Improved system sensitivity and calibration procedures.
- Increased the dynamic range of the cervical cancer sensors.
- Designed the real-time system architecture for airborne detection of submerged submarines.

- Supervised the design, construction, and calibration of an airborne, six-channel, multispectral sensor head for a time-domain, underwater mine detection system in the surf-zone. Designed a high-speed, parallel data acquisition system. Led the selection of many of the major components of the system.
- Helped refine and implement techniques for measuring the MTF of airborne imagers and deconvolving the different contributions to the degradation of image quality.
- Built two underwater imaging systems – one used to characterize bottom types in Hawai`i, the other for coral imaging of oilrig pylons in the Gulf of Mexico.

Program Manager: TerraSystems, Honolulu, HI 1999 – 2001
Responsible for underwater optical mapping system design and construction. I designed subsystems and performed underwater radiative transfer analysis.
- Designed new multispectral camera concepts.
- Created the architecture for a high-volume, parallel image processing and archiving system for multi-spectral imagery.
- Co-authored a paper on a comprehensive strategy to map all of the U.S. coral reefs. This strategy was accepted by U.S. Coral Reef Task Force and is now being used.

Graduate Student: Institute for Astronomy, University of Hawai`i, Honolulu, HI, http://www.ifa.hawaii.edu, 1990 – 2001
Responsible for performing research in observational astronomy and instrumentation
- Astronomical research:
  - Dissertation: *The Hawai`i Tip-tilt System and Infrared Gravitational Lensin*g. Advisor: Dr. Gerard Luppino.
  - Performed deep observations of distant, massive clusters of galaxies in a search for high-redshift galaxies that are gravitationally lensed by the clusters. Found 42 candidate objects.
  - Performed deep observations of quasars to image their host galaxies.
  - Imaged interacting galaxies to verify modeling of galaxy collisions
- Software:
  - Developed extensive software (50K+ lines) for image processing and data reduction in C, Perl, IRAF, and IDL. Modified large, legacy FORTRAN programs. Wrote real-time data acquisition/control systems in DSP assembler (30K lines).
- Instrumentation:
  - Designed and implemented the control system for a high speed, low order, adaptive optics system for the UH 88-inch telescope on Mauna Kea.
  - Helped design the user interface for this system. Performed systems integration of the system, now in use nightly.
  - Invented a new clocking method for rapid CCD readout.
  - Built CCD cameras and created interface software and hardware for image acquisition under NEXTSTEP in C and DSP assembler.
  - Integrated a CCD camera with the UH high order adaptive optics system.
  - Worked with researchers at Caltech in the construction of a CCD camera with a movable focal plane for image motion correction.

Webmaster: Sierra Club, Honolulu, HI, http://www.hi.sierraclub.org 1996 – 2003
As a volunteer, created an extensive web site used for intra-organizational communication and community outreach. Supervised many volunteers.

Member of the Technical Staff: Systems Engineering Development Division, Space and Defense Sector, TRW, Redondo Beach, CA 1986-1990

- Analyzed radiation effects on electronics.
- Wrote analysis code and database (in C and FORTRAN) for time-varying radiation effects on active circuits by modifying SPICE.
- Advised the Air Force on missile guidance computer design and security issues.
- Led an effort to study radiation effects on high temperature superconductors.

Software Engineering Skills
Programming Languages: C, image processing tools (IRAF, IDL, ENVI, Octave, MATLAB), Assembler (68000, DSP56000), FORTRAN, BASIC, HTML, Mathematica, Perl.
Systems: UNIX (MacOS X, Linux, Solaris), Windows.

Professional Societies
SPIE – The International Society for Optical Engineering
American Astronomical Society

Awards
2005 R&D 100 for the Neural Matrix CCD technology
Patent for the Cell Matrix Chip, pending

Publications and Talks:

"In-flight MTF characterization for high-resolution multispectral MCM"
DeWeert, M.J., Jim, K.T.C., Hearne, M., 2003, in *Detection and Remediation Technologies for Mines and Minelike Targets VIII (part of Aerosense 2003), Proc. SPIE*, **5089**, pp. 413-424.

"Surf-Zone Multispectral Imager"
Jim, K.T.C., Atkinson-Derman, L., Chan, C.W., Chock, B., DeWeert, M.J., Evans, G., Higashi, L., Leonard, C.L., Potuzak, S., Rapaport, B., Noguchi, R., Will, R., Wong, T., Yoon, D., 2002, in *Ocean Optics XVI, Proceedings of the SPIE.*

"Advanced Airborne Hyperspectral Imaging Sensors (AAHIS)"
Topping, M.Q., Pfeiffer, J.E.; Sparks, A.W., Jim, K.T.C.; Yoon, D., in *Imaging Spectroscopy VII*, Shen, Sylvia S. ed., *Proceedings of the SPIE*, **4816**, pp. 1-11.

The Hawai`i Tip-tilt System and Infrared Gravitational Lensing,
Jim, K.T.C., 2001, Ph.D. dissertation, University of Hawai`i.

"A Cryogenically Cooled, Piezo-electrically Translating CCD Camera for Image Stabilization"
McCarthy, J.K., Lu, B.W., Butcher, B.A., Behr, B.B., Jensen-Grey, S., Stubbs, C., Jim, K.T.C., & Brown, Y., *Publications of the Astronomical Society of the Pacific*, in preparation.

"The Near Infrared Spectrum of Miranda: Evidence of Crystalline Water Ice"
Bauer, J.M., Roush, E.L., Geballe, T.R., Meech, K.J., Owen, T.C., Vacca, W.D., Rayner, J.T., & Jim, K.T.C., 2002, *Icarus*, **158**, 1, pp. 178-190.

"The UH 2.2-m Fast Tip-tilt Secondary System"
Jim, K.T.C., Pickles, A., Yamada, H., Graves, J.E., Stockton, A., Northcott, M., Young, T., Cowie, L.L., Luppino, G.A., Kupke, R., Thornton, R., Sousa, E., Cavedoni, C.P., Keller, T., Nakamura, W., & Metzger, M.R., 2000, *Publications of the Astronomical Society of the Pacific*, **112**, pp. 716-732.

"Marine Remote Sensing and GIS in Hawai`i and the Pacific"
Gradie, J.C., Jim, K.T.C., & Low, R., 1999, presented at the International Workshop on the Use of Remote Sensing Tools for Mapping and Monitoring of Coral Reefs, June 7-10, 1999, at the East-West Center, University of Hawai`i at Manoa, Honolulu, HI, sponsored by USDOC/NOAA/NESDIS, NOAA/CSC, & ICLARM.

"The $z = 1.6748$ C I Absorber Toward the QSO PKS 1756+237"
Roth, K.C., Bauer, J.M., Jim, K.T.C., 1999, in *Chemical Evolution from Zero to High Redshift*, Proceedings of the ESO Workshop held at Garching, Germany, 14-16 October 1998, Edited by Jeremy R. Walsh & Michael R. Rosa, p. 278.

"Imaging of Damped Ly-□ Absorbers"
Jim, K.T.C., & Roth, K.C., 1998, poster session at the American Astronomical Society 192nd Meeting in San Diego, CA.

"The Absorption Spectrum of PKS 1756+237"
Bauer, J.M., Roth, K.C., & Jim, K.T.C., 1998, poster session at the American Astronomical Society 192nd Meeting in San Diego, CA.

"A Near Infrared Survey of X-ray Selected Clusters of Galaxies"
Jim, K.T.C., Luppino, G.A., & Gioia, I.M., 1997, talk at the American Astronomical Society 191st Meeting in Washing-ton, D.C.

"Searching for Those Damped Ly-□ -Absorbers"
Roth, K. & Jim, K.T.C., 1997, poster session at the American Astronomical Society 190th Meeting in Winston-Salem, NC.

"A Fast Tip-tilt System for the University of Hawai`i 88-inch Telescope"
Jim, K.T.C., Pickles, A. Cavedoni, C., Cowie, L., Graves. J.E., Keller, T., Kupke, R., Luppino, G., Metzger, M., Northcott, M., Nakamura, W., Sousa, E., Stockton, A., Yamada, H., & Young, T., 1996, poster session at the American Astronomical Society 189th Meeting in San Antonio, TX.

"Adaptive Optics Imaging of GG Tauri: Optical Detection of the Circumbinary Ring"
Roddier, C., Roddier, F., Northcott, M. J., Graves, J.E., & Jim, K., 1996, *Astrophysical Journal,* **463**, pp. 326-335.

"A Fast Tip-tilt System for the University of Hawai`i 88-inch Telescope"
Jim, K.T.C., 1995, *Bulletin of the American Astronomical Societ*y, **18**7, #76.05.

"The UH/IfA Fast Tip-tilt Secondary"
Pickles, A.J., Young, T.T., Nakamura, W., Cowie, L. L., Graves, J.E., Jim, K.T., Keller, T.J., Luppino, G.A., Northcott, M.J., Roddier, C.A., Stockton, A., Wainscoat, R. J., Yamada, H., & Cavedoni, C.P., 1994, *Proceedings of the. SPIE,* **2199**, pp. 504-515.
"Curvature-based Adaptive Optics Instrument for the UH 2.2-m Telescope"
Northcott, M.J., Jim, K.T., Graves, J.E., Luppino, G.A., Keller, T.J., Pickles, A.J., & Tokunaga, A.T.,
1993, *Proceedings of the SPIE,* **2019**, pp. 386-394.

"The U. H. Institute for Astronomy CCD Camera Control System"
Jim, K.T.C., Yamada, H.T., Luppino, G.A., & Hlivak, R.J., 1993*, Astronomical Data Analysis Software and Systems II*, Astronomical Society of the Pacific Conference Series, R. J. Hanisch, R. J. V. Brissenden, & Jeannette Barnes, eds., **52**, pp. 289-292.

"Astronomical CCD Mosaics: First Results with the University of Hawai`i 4096 x 4096 Pixel CCD Camera System"
Luppino, G.A., Jim, K.T.C., Hlivak, R.J., & Yamada, H., 1992, *Proceedings of the SP*IE, **1656**, pp. 414-426.

"On the Stability of Low-leakage Silicon Photodiodes Used with Crystal Calorimeters"
Bean, A., Bian, Z., Dobbins, J., Jim, K., Kandaswamy, J., & Mistry, N., 1986, *IEEE Transactions on Nuclear Scien*ce, **NS-33**, 1, pp. 411-414.