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Statement of Research Interests and Activities

Whereas academic funding typically accrues to pure research activities, Electronics Engineering is a discipline apart, in that it tends to emphasize practical hands-on projects. As an EE professor, my personal history and interests have tended to veer toward the Development side of the Research-and-Development continuum. The following examples of my past research activities are indicative of my range of professional interests. They show how I lead my students in taking an idea through its conceptual stages, through design, prototype, and testing, all the way to commercial development. These examples illustrate the kinds of funded research activities which I contemplate bringing with me to any new institution.

1972 – 1975: Itek/Applied Technology (under contract to USAF and US Navy) – performed radar threat analysis and developed active and passive countermeasures systems. Various classified publications. This research resulted in my being inducted into the Society of Wild Weasels.

1975 – 1977: Microcomm and IEEE – developed first practical microwave receiver system for a new generation of geostationary weather satellites. Reference: "A cost-effective modular downconverter for S-band WEFAX reception," *IEEE Transactions on Microwave Theory and Techniques* 25(12): 1127-1131, December 1977. This research won the John T. Chambers Memorial Award.

1977 – 1978: Microcomm – designed, prototyped, and manufactured pioneering microwave receivers for the Instructional Television Fixed Service (ITFS) and Multipoint Distribution System (MDS) markets. Reference: "Vidiot's guide to microwave TV," *MicroWaves* 18(6): 40-46, June 1979.

1978 – 1979: Microcomm and SPTS – designed, developed, manufactured and marketed world's first commercial home satellite TV receiver. Reference: "A low cost modular receiver for DOMSAT video," *Satellite TV and the Private User*: 18-25, WESCON Professional Program Session 25, September 1979. This research resulted in my being inducted as a Fellow of the Radio Club of America.

1983: San Jose City College, SAREX, AMSAT and NASA – let students in completing the first Space Shuttle Amateur Radio contacts. This research won the San Jose City College President's Award.

1983 – 1987: FAA, Experimental Aircraft Association and Microcomm – developed, prototyped, test-flew and patented Binaural Doppler Collision Alert System (BiDCAS). References: "A new approach to collision avoidance," *Sport Aviation* 36(6): 26-28, June 1987; *Binaural Doppler collision alert system for general aviation aircraft.* U.S. Patent #4713669, December 15, 1987. This research won the EAA/Avco Lycoming Safety Achievement Award for 1987, and the Dr. Robert H. Goddard Scholarship for 1988.

1988 – 1990: Hertz Foundation, UC Berkeley – system analysis and re-design of national airspace system, to reduce midair collision risk. References: "Collision avoidance - engineering considerations for aircraft," *Sport Aviation* 37(1): 25-28, January 1988; "General aviation collision avoidance alternatives," *Journal of Transportation Engineering* 115(5): 474-492, September 1989; *Near midair collisions as an indicator of general aviation collision risk*, UCB-ITS-DS-90-2, University of California, Berkeley CA, March 1990. This research was awarded the Hertz Foundation Fellowship and Doctoral Thesis Prize.

1990 – 1991: Pennsylvania College of Technology – led students in applying microwave lunar reflective observations to geodesic measurement. Reference: "Measuring the mass of the earth: the ultimate moonbounce experiment," *QEX* (115): 8-10, September 1991. This research won the ARRL Technical Achievement Award.

1991 – 1992: Pennsylvania College of Technology – observed solar radiation to develop radio wave propagation models. Reference: "Correlating sun noise measurements to solar activity data," *Proceedings, 26th Conference of the Central States VHF Society*: 1-10, American Radio Relay League, July 1992.

1991 - 1993: Pennsylvania College of Technology – students used frequency measurements of microwave satellite beacons to derive Keplerian elements and perform orbital analysis. References: "Demonstrating celestial mechanics through measured Doppler shift," *Proceedings of the AMSAT-NA Ninth Space Symposium*: 140-150, Amateur Satellite Corp., November 1991; "Orbital analysis by sleight of hand," *Communications Quarterly*, 5(3): 35-42, Summer 1995. This research led to receipt of the Dayton Hamvention Technical Excellence Award.

1992 - 1993: AOPA Air Safety Foundation – quantified risk perception from a stochastic analysis of aircraft midair collision data. References: "The influence of flight experience on midair collision risk perception," *Accident Analysis and Prevention* 24(6): 655-660, October 1992; "TCA incursion trends: a statistical analysis," *AOPA Air Safety Foundation Flight Instructor's Safety Report* 19(2): 7 - 11, April 1993.

1992 – 1993: Pennsylvania College of Technology – led students in designing, testing and documenting a novel technique for increasing capacity of fiber-optic communications networks. References: "Wavelength division multiplexing," *Communications Quarterly* 3(3): 39-42, Summer 1993; "Fiber optics: waveguide of the future," *Proceedings of Microwave Update 94*: 280-294, American Radio Relay League, September 1994.

1994 – present: SETI League – as principle investigator for Project Argus, supervised the design, construction, testing and operation of a network of 123 research-grade radio telescopes in 22 countries around the world. References: "Project Argus and the challenge of real-time all-sky SETI," in *Astronomical and Biochemical Origins and the Search for Life in the Universe*, 693 -700, IAU, January 1997; "Project Argus: a global search for our cosmic companions," *Journal of the British Interplanetary Society* 52(7/8):276-285, July/August 1999; "One hundred up, 4900 to go!" *51st International Astronautical Congress Preprints*, IAF, October 2000. This research resulted in my being inducted as a Fellow of the British Interplanetary Society,

1998 – present: SETI League – developed standards for quantifying credibility and significance of radio astronomical observations. References: "Standards of proof for the detection of extraterrestrial intelligence," in *Bioastronomy 99: A New Era in Bioastronomy*: 628 - 634, Astronomical Society of the Pacific Conference Series Volume 213, 2000; "SETI sneak attack: lessons learned from the Pearl Harbor Hoax," *54th International Astronautical Congress Preprints*, Bremen Germany, October 2003. This research resulted in my being inducted as a member of the International Academy of Astronautics.

1999 – 2002: SETI League, American Astronomical Society – designed, prototyped and patented an innovative microwave phased array adaptive antenna system. References: "The very small array," *QST*, 86(9): 28-30, September 2002; "*Adaptive microwave antenna array*," U. S. Patent #6593876, July 15, 2003.

2001 – SETI League, ARRL Foundation – designed and implemented a lunar reflective calibration beacon to support a global network of radio telescopes. Reference: "2001: a moonbounce odyssey," *QST*, 85(11): 38-43, November 2001. Winner of the QST Cover Plaque Award.

2002 – 2003: SETI League – designed, prototyped, tested and documented a low-cost antenna for amateur radio astronomy. Reference: "SETI horn of plenty," *CQ VHF* 6(1):cover + 6-8 + 80-82, Spring 2003.