

DENNIS M. AKOS

PROFESSOR

AEROSPACE ENGINEERING SCIENCES
UNIVERSITY OF COLORADO BOULDER



<https://www.colorado.edu/aerospace/dennis-akos>

<https://www.colorado.edu/lab/rf-satnav/>

Dennis M. Akos has a deep background in satellite navigation technology having pioneered the Global Positioning System (GPS)/Global Navigation Satellite System (GNSS) software radio implementation. He has been involved with GPS/GNSS related research for more than 20 years investigating all elements of the receiver from the antenna, front end radio design, signal processing and navigation solution. He was the co-founder of Nordnav Technologies, a start-up developing GPS/GNSS receivers for the mobile market, which was acquired for \$70M by Cambridge Silicon Radio.

His Ph.D. dissertation was on the use of the software radio design philosophy for GPS receiver architectures. This was done at the Ohio University Avionics Engineering Center which has had strong connections for FAA related project. His first academic position was with Lulea Technical University in Sweden where he focused on radio architectures of all types from the antenna design, downconversion, mixing, and filtering, as well as amplification. While in Sweden he conducted research for Eurocontrol, investigating the potential of the VDL Mode 4 system. He returned to the US to the Stanford University GPS Laboratory and heavily involved in GPS/GNSS related research for the FAA's Local Area Augmentation System (LAAS) and Wide Area Augmentation Systems (WAAS). Since 2004 he has been a faculty member with the University of Colorado Boulder.

Since arriving in Boulder his research has had three main thrusts: 1) further of the software radio concept for all satellite navigation constellations (GPS, GLONASS, Beidou, and Galileo); 2) use of the GPS/GNSS receiver for remote sensing applications (wind speed, soil moisture, vegetation growth, and atmospheric parameters); 3) GPS/GNSS receiver architectures for radio frequency interference mitigation as well as GPS/GNSS spoof detection and mitigation

EDUCATION

Doctor of Philosophy, Electrical and Computer Engineering, Ohio University; 1997

- Coursework Emphasis: Computer Architecture/Digital Systems
- Dissertation Title: "A Software Radio Approach to Global Navigation Satellite System (GNSS) Receiver Design"
- Dissertation Synopsis: Complete system design and implementation of a Global Positioning System (GPS) receiver utilizing the software radio design methodology

Master of Science, Mathematics, Ohio University; 1996

- Coursework Emphasis: Computer Science
- Degree Synopsis: Completion of a second M.S. degree in Applied Mathematics

Master of Science, Electrical and Computer Engineering, Ohio University; 1992

- Coursework Emphasis: Digital Signal Processing (DSP)/Digital Communications
- Thesis Title: "A Hybrid Modulation for the Very High Frequency (VHF) Aeronautical Channels"
- Thesis Synopsis: Addition of a digital phase modulation to an existing amplitude modulated carrier to increase the spectral efficiency of the channel

Bachelor of Science, Electrical and Computer Engineering, Ohio University; 1990

- Coursework Emphasis: Communications/Control

PROFESSIONAL EXPERIENCE

- PROFESSOR; UNIVERSITY OF COLORADO BOULDER; BOULDER, COLORADO; 2017 – PRESENT (ASSOCIATE PROFESSOR 2008-2017; ASSISTANT PROFESSOR: 2004-2008)
- ASSOCIATE CONSULTING PROFESSOR; GLOBAL POSITIONING SYSTEM (GPS) LABORATORY; STANFORD UNIVERSITY; STANFORD, CALIFORNIA; 2004 - PRESENT (RESEARCH ASSOCIATE; 1999 - 2004)
- VISITING PROFESSOR; LULEÅ INSTITUTE OF TECHNOLOGY; LULEÅ, SWEDEN; 1999 - PRESENT (ASSISTANT PROFESSOR; 1997 - 1999)
- VISITING SCIENTIST; TELECOMMUNICATIONS LABORATORY; OULU UNIVERSITY; OULU, FINLAND; 1998
- GRADUATE ASSOCIATE; AVIONICS ENGINEERING CENTER; ATHENS, OHIO; 1990-1997
- GRADUATE INTERN; WRIGHT LABS, WRIGHT-PATTERSON AIR FORCE BASE; DAYTON, OHIO; SUMMER 1996 & SUMMER 1995
- GRADUATE INTERN; NASA LEWIS RESEARCH CENTER; CLEVELAND, OHIO; SUMMER 1993 & SUMMER 1992

PUBLICATIONS (selected from over 125 book chapters, refereed journal publications, conference papers, and patents)

1. K. Borre, D. Akos, N. Bertelsen, P. Rinder, S. Jensen, A Software-Defined GPS and Galileo Receiver, A Single-Frequency Approach, ISBN: 978-0-8176-4390-4, Birkhäuser, 2007.
2. D. Akos, "Who's Afraid of the Spoofer? GPS/GNSS Spoofing Detection via Automatic Gain Control (AGC)", NAVIGATION, Journal of the Institute of Navigation, Vol. 59 No. 4, pp. 281-290, 2012.
3. Y.H. Chen, J.C. Juang, J. Seo, S. Lo, D. Akos, D. DeLorenzo, P. Enge, "Design and Implementation of Real-Time Software Radio for Anti-Interference GPS/WAAS Sensors", Sensors 2012, No.10; doi:10.3390/s121013417; pp.13417-13440, 2012.
4. E. Griggs, E. R. Kursinski, and D. Akos, "Short-term GNSS satellite clock stability", Radio Sci., 50, pp. 813–826, doi:10.1002/2015RS005667, 2015.

E. Axell, F. M. Eklöf, P. Johansson, M. Alexandersson, D. M. Akos, "Jamming Detection in GNSS Receivers: Performance Evaluation of Field Trials", NAVIGATION, Journal of The Institute of Navigation, Vol. 62, No. 1, pp. 73-82, Spring 2015.