Curriculum Vita
August 2021

Instructor: Gerald (Jerry) Fudge, Assistant Professor
Academic Department: Engineering and Technology

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FORMAL EDUCATION

- M.A. in Science and Religion, Biola University, May 2020.
- Ph.D. Electrical Engineering, University of Texas at Dallas, Dec. 1994.
    - *Robust Calibrated Adaptive Beamforming for Wideband Signals in Non-ideal Conditions*.
- Masters Applied Mathematical Sciences, Rice University, May 1984.
- BA Math, Rice University, May 1983.

OTHER EDUCATION

- Introduction to Machine Learning, 2019 (L3Harris Work Study Group).
- Bioinformatics I, Oct 2014-Jan 2015, UC San Diego (Coursera).
- Military Courses, 1984-1989: Sonar theory and practice, ocean acoustics, introductory aeronautical engineering & compressible fluid flow, electric circuits & systems.
- Navy Nuclear Power School, June-Dec 1984: Thermodynamics, nuclear engineering theory and practice, power plant theory and practice, material science, radiochemistry.

TEACHING EXPERIENCE

- Visiting Research Professor, Naval Postgraduate School (courtesy appointment), Compressive Sensing Techniques for Electronic Warfare, EC4900 seminar, winter quarter 2012.
- Adjunct Lecturer, Signals and Systems, University of Texas at Dallas, Spring 1996 semester.
- Math Department Grader, Rice University, graded various classes in theoretical and applied mathematics, ranging from differential equations to abstract algebra / group theory, 1981-1984.

RESEARCH & PUBLICATION INTERESTS

- Statistical signal processing, systems biology, wideband receiver design (analog + digital), passive electronic warfare, innovation in engineering, issues in science & religion.

EMPLOYMENT

- Texas A&M University – Commerce, 8/21 – present (Assistant Professor).
    - Teach undergraduate classes in electrical engineering.
- L3Harris Technologies, Integrated Mission Systems, 9/94 – 7/21 (retired as Senior Fellow).

- Lead research and development projects involving electronic intelligence (ELINT) receiver technology; develop externally funded R&D; perform technical marketing to support business development of large programs; perform systems engineering for technology transition from R&D to operational deployment; develop ultra-wideband low size, weight, & power digital RF receiver technology motivated by compressive sensing principles; develop modeling and analysis tools and methodology for ELINT receivers; develop signal classifiers; and develop ELINT detection and measurement algorithms. Also, mentor engineers. Also, initiated autonomous intelligent network sensor research effort; developed spatial control algorithms for 3-axis ship-borne antenna; coded embedded systems.

- University of Texas at Dallas, 1/91 – 9/94 (Research Associate & Student).
  - Designed adaptive array processing algorithms that take into account real-world problems such as array errors, reverberation, and direction errors. Evaluated algorithms using data collected with acoustic arrays (8-channel and 32-channel) built at UTD.
- U.S. Navy Submarine Officer, 5/84 – 12/90 (honorable discharge as a Lieutenant).
  - Developed cruise missile and over-the-horizon targeting tactics based on system performance and targeting algorithms. Coordinated division-level nuclear engineering training. Conducted target tracking using a variety of passive sonar systems (towed array, cylindrical bow array, hull-mounted conformal array). Directed maintenance and repair of nuclear mechanical systems, diesel, and nuclear control & instrumentation equipment.

PUBLICATIONS

1. Robert Penno, Stephen T. Ha, G.L. Fudge, "The effect of spurious modes on the wideband application of the N-arm spiral to direction finding," *Proc. AeroConf 2017 IEEE Aerospace Conference,* 4 March 2017.
2. G. L. Fudge, H. M. Azzo, F. A. Boyle, "A reconfigurable direct RF receiver with jitter analysis and applications," *IEEE Trans. on Circuits and Systems I: Regular Papers,* pp. 1-10, January 2013.
3. R. Maleh, G. L. Fudge, F. A. Boyle, P. E. Pace, "Analog-to-information and the Nyquist folding receiver," *IEEE Journal on Emerging and Selected Topics in Circuits and Systems,* pp. 564-578, Sep. 2012.
4. R. Maleh, G. L. Fudge, "RIP analysis of modulated sampling schemes for recovering spectrally sparse signals," arXiv:1207.7347v1, 31 July 2012.
5. O. O. Odejide, C. M. Akujuobi, A. Annamalai, G. Fudge, "Joint design of channel-source coding for compressive sampling systems," *Proc. IEEE Consumer Communications and Networking Conference (CCNC), 2010,* 9-12 Jan 2010.
6. P.E. Pace, G.L. Fudge, A. Kusmanoff, "Nyquist folding analog-to-information autonomous information recovery using quadrature mirror filtering," *Asilomar Conference on Signals, Systems, and Computers (ACSSC),* 1 Nov. 2009.
7. O. O. Odejide, C. M. Akujuobi, A. Annamalai, G. Fudge, "Application of analytic wavelet transform for signal detection in Nyquist folding analog-to-information receiver," *Proc. IEEE International Conference on Communications* (*ICC*), June 14-18, 2009.
8. O. O. Odejide, C. M. Akujuobi, A. Annamalai, G. Fudge, "Signal and modulation type detection using wavelet transform," *Proc. 2009 WRI World Congress on Computer Science and Information Engineering,* March 31-April 2, 2009.
9. G. Fudge, R. Bland, M. Chivers, S. Ravindran, J. Haupt, P. Pace, "A Nyquist folding analog-to-information receiver," *ACSSC-2008,* Oct. 2008.
10. P. Scerri, V. Von Gonten, G. Fudge, S. Owens, K. Sycara, "Transitioning multiagent technology to UAV applications," *Autonomous Agents and Multi-Agent Systems* AAMAS 2008.

11. G. L. Fudge, M. A. Chivers, S. Ravindran, R. E. Bland, P. E. Pace, "A reconfigurable direct RF receiver architecture," *IEEE International Symposium on Circuits and Systems,* 2008.
12. C. M. Akujuobi, O. O. Odejide, G. L. Fudge, "Sparseness measures of signals for compressive sampling," *IEEE Symposium on Signal Proc. and Information Technology,* 15-18 Dec 2007.
13. G. Fudge, P. Deignan, J. Anderson, E. Owoye, P. Scerri, R. Glinton, "Adaptive distributed sensing for emitter localization with autonomous UAV team cooperation," *Adaptive Sensor Array Processing (ASAP) Workshop,* 5-6 June 2007, MIT-Lincoln Laboratory.
14. Frank A. Boyle, Jarvis Haupt, Gerald L. Fudge, Chen-Chu A. Yeh, "Detecting signal structure from randomly sampled data," *IEEE Statistical Signal Processing Workshop* 2007, Aug. 26-29.
15. Jarvis Haupt, Rui Castro, Robert Nowak, Alex Yeh, Gerald Fudge, "Compressive sampling for signal classification," *ACSSC-2006,* 29 Oct – 1 Nov 2006.
16. Gerald L. Fudge and Darel A. Linebarger, "Spatial blocking filter derivative constraints for the generalized sidelobe canceller and MUSIC," *IEEE Transactions on Signal Processing,* Jan. 1996
17. Gerald L. Fudge and Darel A. Linebarger, "Derivative constraints for high resolution direction finding with correlated interferers," *Proc. DSP Technology Conference, SPIE AeroSense Symposium,* April 1996.
18. D. A. Linebarger, R. D. DeGroat, E. M. Dowling, P. Stoica, and G. L. Fudge, "Incorporating *a priori* information into MUSIC- algorithms and analysis," *Signal Proc.,* vol. 46, no. 1, 1996.
19. D. Linebarger, R. DeGroat, E. Dowling, G. Fudge, P. Stoica, "Analysing the effects of constraints and inter-signal coherence on the MUSIC algorithm," ICASSP-95, 9-12 May 1995.
20. Gerald L. Fudge and Darel A. Linebarger, "A calibrated generalized sidelobe canceller for wideband beamforming," *IEEE Transactions on Signal Processing,* Oct. 1994.
21. Gerald L. Fudge and Darel A. Linebarger, "Steered response control of the generalized sidelobe canceller," *Proc. IEEE ICASSP,* May 1995.
22. Gerald L. Fudge and Darel A. Linebarger, "Optimal array calibration to minimize signal cancellation in adaptive wideband beamformers," *Proc. ACSSC-1993,* Nov. 1993.

PATENTS AWARDED

1. R. Maleh, F.A. Boyle, G.L. Fudge, "Systems and methods for signal detection and estimation," U.S. patent # 8,660,218.
2. Deepak Prasanna, G.L. Fudge, "Heterogeneous reconfigurable agent compute engine (HRACE)," U.S. patent # 8,589,935.
3. G.L. Fudge, M.A. Chivers, S. Ravindran, Alex Chen-Chu Yeh, "System and method for clock jitter compensation in direct RF receiver architectures," U.S. patent # 8,509,368.
4. G.L. Fudge, R.E. Bland, S. Ravindran, M.A. Chivers, "System and method for improved spur reduction in direct RF receiver architectures," U.S. patent # 8,509,354.
5. G.L. Fudge, Scott Burkart, Antone Kusmanoff, "Multiple projection sampling for RF sampling receivers," U.S. patent # 8,401,050.
6. G.L. Fudge, "Wideband frequency hopping spread spectrum transmitters and related methods," U.S. patent # 8,249,129.
7. G. L. Fudge, "Wideband frequency hopping spread spectrum receivers and related methods," U.S. patent # 8,184,673.
8. G. L. Fudge, "Wideband frequency hopping spread spectrum transceivers and related methods," U.S. patent # 8,149,894.
9. F. A. Boyle, G. L. Fudge, Alex Chen-Chu Yeh, "Systems and methods for construction of time-frequency surfaces and detection of signals," U.S. patent # 8,121,222.
10. G. L. Fudge, "Interference cancellation for reconfigurable bandpass sampling interference cancellation," U.S. patent # 8,081,946.

11. G. L. Fudge, R. Bland, A. Kusmanoff, “Systems and methods for interference cancellation”, U.S. patent, # 8,078,130.
12. Alex Chen-Chu Yeh, Gerald L. Fudge, “Compressed sensing characterization system and method,” U.S. Patent # 7,916,052.
13. Gerald L. Fudge, “Method and computer program for group delay and magnitude equalization with relaxed phase slope constraint,” U.S. Patent # 7,831,648.
14. Gerald L. Fudge, Boyd Gallatin, “Swept bandpass filter frequency modulated continuous wave (FMCW) receiver and related method,” U.S. Patent # 7,496,158.
15. Gerald L. Fudge, “Reconfigurable direct RF bandpass sampling receiver and related methods,” U.S. Patent # 7,489,745.
16. G. L. Fudge, J. E. Harvey, M. A. Chivers, S. Ravindran, “Nyquist folded bandpass sampling receivers and related methods,” U.S. Patent # 7,436,912.
17. G. L. Fudge, J. E. Harvey, M. A. Chivers, S. Ravindran “Nyquist folded bandpass sampling receivers with narrow band filters for UWB pulses and related methods,” U.S. Patent # 7,436,911.
18. G. L. Fudge, J. E. Harvey, M. A. Chivers, S. Ravindran, “Direct bandpass sampling receivers with analog interpolation filters and related methods,” U.S. Patent # 7,436,910.
19. Mark L. Wood, Alex Yeh, Gerald L. Fudge, “Method and apparatus for compressed sensing using analog projection,” U.S. Patent # 7,343,603.
20. Gerald L. Fudge, Mark L. Wood, Alex Yeh, “Method and apparatus for compressed sensing,” U.S. Patent # 7,289,049.
21. Gerald L. Fudge, Ross A. McClain, Jr., “Systems and methods for analog to digital conversion,” U.S. Patent # 7,091,984.
22. E. Scott Baker, Gerald L. Fudge and Ross A. McClain, Jr., “Systems and methods for multi-channel analog to digital conversion,” U.S. Patent # 6,956,517.
23. Stewart C. O'Dell, Clint D. Schreiner, Gerald L. Fudge, Michael R. Legako, “Method and system for-down-converting a signal,” U.S. Patent # 6,452,982.

TRADE SECRETS

1. Frank Boyle, Gerald Fudge, “Reduced Ambiguity Precision Interferometry Direction Finding (RAPIDF),” L3 ISR Systems, 2019.
2. G. L. Fudge, “System & Method for Nyquist Folding Receivers with Gain Differential, L-3 Communications,” 2013.
3. M.D. Sapp, F.A. Boyle, G.L. Fudge, C.A. Coffey, “Computationally Efficient High PRF Detection,” L-3 Communications, 2008.

SELECTED EXTERNALLY FUNDED RESEARCH & DEVELOPMENT WITH APPROXIMATE VALUES

- 2020-2024, AFRL-Rome, Advanced Exploitation of ELINT Signals, Task 2, $2.7M.
- 2016-2023, AFRL-Dayton, Multi-arm Antenna, Direction-Finding and Detection Architecture for Wideband Geolocation (MADDAWG), $5.4M.
- 2015-2019, AFRL-Rome, Enhanced ELINT Exploitation Processor, Task 2, $1.3M.
- 2013-2015, AFRL-Dayton, Wideband Array Time-delay steered Compressive-sensing High-band Receiver (WATCHeR), $760K.
- 2008-2012, DARPA / AFRL-Dayton, A2I Receiver Development, $5.6M.
- 2006-2007, DARPA / AFRL-Dayton, Analog-To-Information (A2I) Study, $800K.
- 2000-2002, U.S. Army CECOM, Spider-80 Digital ELINT Receiver, $880K.

SELECTED AWARDS

- 2020 Enterprise Collaboration Award.
- 2020 Advanced Technology Development Leadership Award.
- 2016 L3 Technologies Engineers of the Year (one of ten).
- 2010 L-3 Mission Integration Division Top Star Award (team award).
- 2004 L-3 Integrated Systems Tribute to Excellence Award, Technology and Innovation.
- 1996 Raytheon E-Systems Paper of the Year Award.

PROFESSIONAL PUBLICATIONS & PRESENTATIONS (CORPORATE AND GOVERNMENT)

- G. L. Fudge, Carlin Willard, Jerry Yancey, "MADDAWG: A Multi-arm Antenna, Direction-finding and Detection Architecture for Wideband Geolocation," *Proc. GOMACTech-2021*, March 29 - April 1, 2021, Virtual Conference.
- Jerry Fudge, Frank Boyle, Terry Johnson, "Reduced Ambiguity Precision Interferometry Direction Finding (RAPIDF)," *L3 Technologies TechEx18*, November 12-13, 2018.
- G. Fudge, S. Wilson, T. Simpson, "Photonic Nyquist folding receiver," *L-3 Communications TechEx16,* September 12-13, 2017 (selected as best paper in track).
- H. Azzo, G. Fudge, "Structured test vectors: methodologies and techniques," *L-3 Communications TechEx16,* September 12-13, 2017.
- G. Fudge, F. Boyle, W. Dunn, C. Johnson, "Nyquist folding receiver," *L-3 Communications TechEx16,* September 13-14, 2016.
- F. Boyle, B. Holden, Jerry Fudge, "Collaborative passive geolocation technologies for multiple platforms," *45th Annual Collaborative Electronic Warfare Symp.*, April 6-7, Pt. Mugu, 2016.
- R. Maleh, F.A. Boyle, G.L. Fudge, "Corduroy: enhanced adaptive compressed Sensing of LPI chirped signals," *L-3 Communications TechEx15*, September 15-16, 2015.
- Ray Maleh, Jerry Fudge, Frank Boyle, "Hypergraph learning of EW Network Topologies," *43rd Annual collaborative Electronic Warfare Symposium*, April 8-10, Pt. Mugu, 2014.
- R. Maleh, F.A. Boyle, H.A. Azzo, G.L. Fudge, "Sub-Nyquist detection and estimation of chirped pulse streams using auto-focus, X-gram, and the Nyquist folding receiver," *L-3 Communications TechEx13*, September 17-18, 2013 (selected as best paper in track).
- R. Maleh, F.A. Boyle, G.L. Fudge, "X-gram: rapid spectral visualization of parameterized signal types," *L-3 Communications TechEx13,* September 17-18, 2013.
- G. L. Fudge, Brian C. Rutherford, A. Agoston, "Nyquist folding receiver for analog-to-information," *Proc. GOMAC-2012*, 21 March 2012, Las Vegas, NV.
- G. Fudge, B. Rutherford, M. Legako, M. Sapp, "Nyquist folding receiver airborne test results for radar detection," *Proc. 57th Annual MSS Tri-Service Radar Symposium*, 27-30 June 2011, NPS, Monterey, CA.
- G. Fudge, F. Boyle, R. Maleh, "Nyquist-folding receiver for compressive sensing of LPI waveforms", *Proc. 2nd Annual AOC Symp. on LPI Radar Design Strategies & Counter-LPI Technology*, 15-18 February, 2011, NPS, Monterey, CA.
- G. Fudge, F. Boyle, R. Maleh, B. Rutherford, M. Legako, "Matched filter methods for processing of Nyquist-folding receiver data," *Proc. 2nd Annual AOC Symp. on LPI Radar: Design Strategies & Counter-LPI Technology*, 15-18 February, 2011, NPS, Monterey, CA.
- G. L. Fudge, R. Maleh, S. M. Burkart, T. B. Simpson, "Method for efficient wideband demodulation," *L-3 Communications TechEx10*, September 21-22, 2010.
- Gerald Fudge and Frank Boyle, "Nyquist folding receiver for LPI signals," *Proc. 2009 AOC Symposium on LPI Radar Design Strategies and Counter- LPI Technology*, Nov. 17-19, 2009, NPS, Monterey, CA.

- Gerald L. Fudge, "Receiver interference from own platform," *ONR Simultaneous Transmit and Receive (STAR) Workshop*, 23-14 September, 2009, Arlington, VA.
- Gerald L. Fudge, "A2I and direct RF interference cancellation," *ONR Simultaneous Transmit and Receive (STAR) Workshop*, 23-14 September, 2009, Arlington, VA.
- F. Boyle, G. L. Fudge, "Nyquist folding receiver & DARPA Analog-to-Information program," *L-3 Communications Engineering Conference*, 15-17 September, 2008.
- Gerald Fudge and Frank Brandon, "Multi-agent control of autonomous systems & DARPA LANdroids program," *2008 L-3 Engineering Conf.*, 16-17 Sept. 2008, Salt Lake City, Utah.
- Jerry Fudge, "FFT-based CFAR detection & estimation," *3rd Annual Processing Technology Expo, Raytheon PSTN*, June 6 – June 8, 2000, Tucson, Arizona.
- Jerry Fudge, "Fast approximate ArcTan algorithm for DSP applications," *3rd Annual Processing Technology Expo, Raytheon PSTN*, June 6 – June 8, 2000, Tucson, Arizona.
- Jerry Fudge, "SPIDER-80 digital ELINT receiver," *2nd Annual Processing Technology Expo, Raytheon Proc. Systems Technology Network (PSTN)*, Sept. 29 – Oct 1, 1999, El Segundo, CA.

OTHER PROFESSIONAL ACTIVITIES

- Reviewer for *IEEE Transactions Aerospace Electronic Systems* 2011-2017.
- Visiting Research Professor, Naval Postgraduate School (courtesy appointment), Compressive Sensing Techniques for Electronic Warfare, EC4900 seminar, winter quarter 2012.
- Jerry Fudge, "Digital ELINT receiver technology for airborne applications," *IEEE AESS Dallas Section Meeting*, 28 January 2003, Richardson, TX.
- Digital Receiver session co-chair, *3rd Annual Processing Technology Expo, Raytheon PSTN*, June 6 – June 8, 2000, Tucson, Arizona.
- Digital Receivers session co-chair, *2nd Annual Processing Technology Expo, Raytheon Proc. Systems Technology Network (PSTN)*, Sept. 29 – Oct 1, 1999, El Segundo, CA.
- Programmable Hardware session co-chair, *1st Annual Processing Technology Expo, Raytheon PSTN*, Oct. 1998.
- Jerry Fudge, Mike Legako, and Clint Schreiner, "The polyphase downconverter: An approach to efficient wideband digital downconversion," *Proc. International Conference on Signal Processing Applications and Technology*, September 1998, Toronto, Canada.
- Array Processing session chair, *DSP Technology Conference*, *SPIE Aero Sense Symposium*, April 1996, Orlando, Florida.
- Adjunct Lecturer, Signals and Systems, University of Texas at Dallas, Spring 1996 semester.
- Director, 1984 Rice Invitational Math Contest for High School Students.

PROFILES

- Google Scholar: https://scholar.google.com/citations?hl=en&user=67sSiYwAAAAJ
- Scopus: https://www.scopus.com/authid/detail.uri?authorId=6602572440