BIOGRAPHICAL SKETCH

NAME	POSITION TITLE
Thomas Weller	Professor

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE	YEAR(s)	FIELD OF STUDY
University of Michigan, Ann Arbor	B.S.(Summa cum laude)	1988	Electrical Engineering
University of Michigan, Ann Arbor	M.S.	1991	Electrical Engineering
University of Michigan, Ann Arbor	Ph. D.	1995	Electrical Engineering

Experience

- 11/11 to present – Chair, Electrical Engineering Department, College of Engineering, University of South Florida.
- 05/08 to 11/11 – Associate Dean for Research, College of Engineering, University of South Florida. Implemented a non-tenure earning (research) faculty track, annual college research symposium, annual faculty research award, young faculty CAREER program, interdisciplinary scholarship seed-funding program, Eminent Scholars Lecture Series, and College of Engineering Research Council.
- 08/06 to present – Professor, Electrical Engineering Department, University of South Florida and Director of the Center for Wireless and Microwave Information Systems (the WAMI Center). Direct a research group studying new antenna technologies, tunable microwave electronics and microwave/mm-wave sensors. Co-developer of the NSF- and Hewlett Packard-sponsored Wireless and Microwave Instructional Laboratory. Teach undergraduate and graduate courses in the areas of electromagnetics and wireless/microwave circuit and system design. Successful fundraising to support Center activities including graduate student fellowships, major equipment purchases, undergraduate student project support.
- 05/01 to 2006 – Associate Professor, Electrical Engineering Department, University of South Florida.
- 4/01 to present – Co-founder and Technical Consultant to Modelithics, Inc., a company specializing in RF/microwave characterization and modeling.
- 08/95 to 05/01 – Assistant Professor, Electrical Engineering Department, University of South Florida.
- 03/97 to 04/98 – Technical consultant to Lockheed Martin Microwave, Rancho Cordova, CA. Provided consultation on the design and simulation of microwave (1-10 GHz) passive components.
- 09/90 to 05/95 – Graduate Student Research Assistant, University of Michigan. Performed research in the fields of microwave/mm-wave micromachining and numerical electromagnetic simulation.
- 07/88 to 08/90 – Member of Technical Staff – Systems Engineer, Space and Communications Group, Hughes Aircraft Company, Los Angeles, CA. Performed communications subsystem engineering tasks and contributed to several commercial satellite proposal efforts. Participated in internal research and development projects to study the performance of satellite communications links for high-definition television and developed a rack-mounted satellite link simulator.
- 10/88 to 08/89 – Software Systems Engineer, Edge Technology, Pleasanton, CA. Developed software focusing on commercial robotics applications.

- 05/86 to 05/88 – Research Engineering Asst., Environmental Research Institute of Michigan. Performed statistical data analysis and developed application-specific software to analyze satellite remote sensing data.

Expertise

Tunable and reconfigurable microwave circuits, microwave/mm-wave sensors, passive circuits and interconnects, planar and 3D electrically-small antennas, equivalent circuit modeling, micromachining/MEMS, hybrid and MMIC packaging, numerical electromagnetic modeling.

Awards and Distinctions

- William R. Jones Outstanding Mentor Award, Florida Education Fund (2010)
- USF Diversity Honor Roll (2010)
- USF Academy of Inventors, Charter Member (2009 –)
- IEEE MTT Society Outstanding Young Engineer (2005)
- University of South Florida President's Award for Faculty Excellence (2003)
- IBM Faculty Partnership Award (2000, 2001)
- National Science Foundation CAREER Award (1999)
- IEEE MTT Society Microwave Prize for Best Technical Paper (1996) - For significant contributions to the field of endeavor in the Microwave Theory and Techniques Society, for the paper entitled *Terahertz-Bandwidth Characteristics of Coplanar Transmission Lines on Low Permittivity Substrates*
- *MTT-S International Microwave Symposium*, Student Paper Competition Award (1995)
- NASA Graduate Fellowship (1994-1995)
- University of Michigan Regents Scholarship
- James B. Angell Scholar (University of Michigan)
- Listed in Academic Keys Who's Who in Engineering Higher Education (WWEHE) (2008-)
- Student Awards
  - *2014 ARFTG Roger Pollard Memorial Student Fellowship in Microwave Measurement* (Student: Maria Cordoba, 2014)
  - *USF College of Engineering Research Day Poster Competition Prize* (Student: Maria Cordoba, 2014)
  - *USF College of Engineering Research Day Poster Competition Prize* (Student: Michael Grady, 2014)
  - *Outstanding Student Poster Award, 2014 International Microelectronics and Packaging Society Symposium* (Student: Maria Cordoba, 2014)
  - *Outstanding Student Poster Award, 2014 International Microelectronics and Packaging Society Symposium* (Student: Jon O'Brien, 2014)
  - *IEEE Microwave Theory and Techniques Society Graduate Student Fellowship* (Student: Michael Grady, 2014)
  - *2014 IEEE AP-S RFID Design Contest* – Semi-Finalist (Eduardo Rojas, Ramiro Ramirez, Sean Murphy and William Mitchell, 2013)
  - *Wireless and Microwave Technology Conference*, Student Paper Competition – First Prize (Student: I. Nassar, 2013)
  - *Wireless and Microwave Technology Conference*, Student Research Presentation – First Prize (Student: M. Cordoba, 2013)
  - *IEEE MTT-S Graduate Fellowship* (Student: Ibrahim Nassar, Spring 2013)
  - *IEEE MTT-S Undergraduate/Pre-graduate Scholarship* (Student: Bryce Hotalen, Spring 2013)
  - *USF Electrical Engineering Department Capstone Poster Competition – First Place* (Students: Federico Diamante, Robert Donatto, Elisha Stevenson, Fall 2012)

- *Louis Stokes Alliance for Minority Participation (LSAMP) Conference, 1st Place in Engineering Poster Competition* (Students: Federico Diamante and Robert Donatto, 2012)
- *USF College of Engineering Research Day Poster Competition Prize* (Student: David Cure, 2012)
- *USF College of Engineering Research Day Poster Competition Prize – Honorable Mention* (Student: Timothy Palomo, 2012)
- *USF College of Engineering Summer REU Poster Competition* – Second Place (Students: Robert Donatto and Federico Diamante)
- *Wireless and Microwave Technology Conference*, Student Paper Competition – First Prize (Student: T. Price, 2012)
- *International Antennas and Propagation Symposium Student Paper Competition – Honorable Mention* (Student: David Cure, 2012)
- *IMAPS Advanced Technology Workshop on 3D and Conformable Printed Electronic Packaging Materials, Manufacturing and Applications – Best Paper Award* (Student: Ibrahim Nassar, 2012)
- *USF Electrical Engineering Department Capstone Poster Competition – Third Place* (Student: Yohannes Samuel, Spring 2012)
- Automatic Radio Frequency Techniques Group Student Fellowship Award – Silver (Student: Evelyn Benabe, 2011)
- *USF College of Engineering Research Day Poster Competition Prize* (Student: Maria Cordoba, 2011)
- *HENAAC Conference*, Student Poster Competition – Second Prize (Student: David Cure, 2011)
- *International Antennas and Propagation Symposium Student Paper Competition – Honorable Mention* (Student: David Cure, 2011)
- *USF College of Engineering Research Day Poster Competition Prize* (Student: David Cure, 2010)
- *IEEE Microwave Theory and Techniques Society Graduate Student Fellowship* (Student: Evelyn Benabe, 2010)
- *IEEE Microwave Theory and Techniques Society Graduate Student Fellowship* (Student: Quenton Bonds, 2009)
- *NASA GSRP Fellowship* (Student: David Cure, 2010 and 2011)
- *NASA GSRP Fellowship* (Student: Quenton Bonds, 2009)
- *HENAAC Conference*, Student Poster Competition – Third Prize (Student: David Cure, 2010)
- *Wireless and Microwave Technology Conference*, Student Poster Competition – First Prize (Student: Q. Bonds, 2010)
- *Wireless and Microwave Technology Conference*, Student Poster Competition – First Prize (Student: T. Price, 2009)
- *Wireless and Microwave Technology Conference*, Paper Competition – First Prize (Student: S. Melais, 2009)
- *USF College of Engineering Research Day Poster Competition Prize* (Student: Quenton Bonds, 2008)
- *Wireless and Microwave Technology Conference*, Student Poster Competition – First Prize (Student: S. Balachandran, 2006)
- *Wireless and Microwave Technology Conference*, Student Paper Competition – First Prize (Student: S. Natarajan, 2006)
- *Commercialization of Micro-Systems (COMS) 2006 Conference*, Student Poster Competition- Third Prize (Student: S. Natarajan, 2006)
- 2006 University of South Florida Undergraduate Research Symposium, First Place in Engineering Research (Student: Suzette Presas)
- 2006 IEEE Sarnoff Symposium Student Paper Competition – First Place (Student: Erick Maxwell, 2006)
- Skin Cancer Award, National Skin Cancer Foundation (Student: Tom Ricard, 2006)

- University of South Florida Graduate School Outstanding Dissertation Award (Student: Balaji Lakshminarayanan, 2005)
- *Emerge Conference*, Graduate Technology Category – First Prize (Student: Q. Bonds, 2005)
- *5th International Workshop of Biosignal Interpretation*, Student Paper Competition – Finalist Nominee (Student: T. Ricard, 2005)
- *MTT-S International Microwave Symposium*, Student Paper Competition Award – Semi-Finalist (Student: B. Lakshminanarayanan, 2005)
- *Wireless and Microwave Technology Conference*, Student Poster Competition – First Prize (Student: S. Natarajan, 2005)
- University of South Florida Master's Thesis Prize (Student: Steve Eason, 2001)

Patents and Applications (Total of 26 issued U.S. patents)

1. Notch Filter Circuit Apparatus; application filed by Raytheon Corporation; U.S. Patent No.: 6,657,518. Patent awarded January 2004.
2. System and Method for Planar Transmission Line Transition; application filed by Raytheon Corporation; U.S. Patent No.: 6,750,736. Patent awarded July 2004.
3. Global Equivalent Circuit Modeling System for Substrate Mounted Circuit Components Incorporating Substrate Dependent Characteristics; U.S. Patent No.: 7,003,744 (awarded February 21, 2006) and U.S. Patent No.: 7,269,810 (awarded September 2007).
4. Rectifying Antenna and Method of Manufacture, U.S. Patent No.: 7,091,918. Patent awarded August 2006.
5. High Frequency Feed Structure Antenna Apparatus and Method of Use," U.S. Patent No.: 7,486,236. Patent awarded February 2009.
6. Dual-Polarized Feed Antenna Apparatus and Method of Use; U.S. Patent No.: 7,362,273 awarded March 2008, and U.S. Patent No.: 7,619,570 awarded December 2009.
7. Microelectromechanical Slow-Wave Phase Shifter Device and Method, U.S. Patent No.: 7,259,641 awarded August 2007 and U.S. Patent No.: 7,676,903 awarded March 2010.
8. A Tunable Micro Electromechanical Inductor, U.S. Patent No.: 7,274,278 and 7,741,936. Patent awarded September 2007.
9. Microwireless Integrated Environmental Sensor and Transmitter System; U.S. Patent No.: 7,386,289. Patent awarded June 2008.
10. Nanometer electromechanical switch and fabrication process; U.S. Patent No.: 7,463,123 and 7,718,461. Patent awarded December 2008.
11. Total Fluid Conductivity Sensor System and Method; U.S. Patent No.: 7,479,864. Patent awarded January 2009.
12. High-frequency feed structure antenna apparatus and method of use; U.S. Patent No.: 7,486,236. Patent awarded February 2009.
13. Wireless Micro-Electro-Opto-Fluidic-Mechanical Foldable Flex System, U.S. Patent No.: 7,656,673. Patent awarded January 2010.
14. A Smart Zero-Order Energy Antenna and Repeater, U.S. Patent No.: 7,720,437. Patent awarded April 2010.
15. System and Method for a Single Stage Tunable Ultra-Wideband Pulse Generator, U.S. Patent No.: 7,869,526. Patent awarded January 11, 2011.
16. Dual-Feed Series Microstrip Patch Array, U.S. Patent No.: 8,063,832. Patent awarded November 22, 2011.
17. RF Microwave Circuit and Pulse Shaping Method, U.S. Patent Nos.: 8,134,394 and 8,248,125. Patent awarded March 13, 2012 and August 21, 2012.
18. Dual-band Microwave Radiometer for Remote Underground Thermal Sensing, U.S. Patent No. 8,485,722. Patent awarded July 16, 2013.

19. Electronically-Tunable Flexible Low Profile Microwave Antenna, U.S. Patent No. 8,872,725. Patent awarded October 28, 2014.
20. Periodic Spiral Antennas, U.S. Patent No. 8,922,452. Patent awarded December 30, 2014.
21. A Method to Obtain Full Wave Rectification of Radiation Received from Antenna, USF Ref. No. 04B067, filed 8/2004.
22. A Dual Polarized Feed Structure Applicable to a Single Antenna or an Array, USF Ref. No.: 05A034PR, filed 9/23/05. Utility patent application filed 9/23/2006.
23. A Compact, Reconfigurable Channel Emulator for Wireless Communication Device Characterization, application filed 8/2007 by University of South Florida Research Foundation, USF Ref. No.: 60/973,915.
24. Technique and Methods for a Simple Coaxial Transmission-Line Dielectric Measurement of Liquid Samples, provisional patent application filed 5/2007, USF Ref. No.: 07A021PR.
25. Magnetically Tunable Nanocomposite Polymer for Microwave Applications, Provisional Patent Application filed 6/2010, USF Ref: 10A068PR. US patent filed 5/2011.
26. A Method and Means for User-Influenced Organization of Multi-Media Content, Provision Patent Application filed 4/2011, USF Ref: 11A043PR.
27. Nanocrystalline Diamond RF-MEMS Capacitive Switch, Patent Application filed 6/2011, USF Ref: 11A017PR.
28. Miniature and Broadband Non-Dispersive Microwave Phase Shifter, Patent Application filed 9/2011, USF Ref: 11B153PR.
29. Mechanically-Reconfigurable Antennas, Patent Application filed 11/2012, USF Ref: 61/724,418.
30. Compact Repeaters for Wireless Sensing, Patent Application filed 11/2013, USF Ref: 14/073,256.
31. Non-Dispersive Microwave Phase Shifters, Patent Application filed 12/2013, USF Ref: 14/096,446.

Courses Developed and Taught

1. Electromagnetics (undergraduate)
2. Senior Capstone Design (undergraduate)
3. Wireless Circuits and Systems Design Laboratory (undergraduate/graduate)
4. Wireless Sensor System Design (undergraduate)
5. Professional Issues and Engineering Design (undergraduate)
6. RF/MW Circuits I – Passive Circuits (undergraduate/graduate)
7. RF/MW Circuits II – Active Circuits (undergraduate/graduate)
8. Numerical Methods in Electromagnetism (graduate)
9. Antenna Theory and Advanced Antenna Theory (graduate)
10. Antennas and Wireless System Applications (graduate)
11. Materials and Sensors Characterization Laboratory (graduate)
12. Analog Radio Frequency Integrated Circuits (graduate)
13. Advanced Analog Radio Frequency Integrated Circuits (graduate)
14. Wireless Sensor Networks (undergraduate)

Graduate Students Advised

Ph.D. Students

1. Ibrahim Nassir, Ph.D. 2013, *Long-Range, Passive Wireless Monitoring Using Energy-Efficient, Electrically-Small Sensor Nodes & Harmonic Radar Interrogator*. Currently at Ansys (2014).
2. David Cure, Ph.D. 2012, *Reconfigurable Low Profile Antennas Using Tunable High Impedance Surfaces*. Currently at Kymeta (2013).
3. Bojana Zivanovic, Ph.D. 2012, Dissertation: *Series-Fed Aperture-Coupled Antennas and Arrays*. Currently at Waveconnex (2013).
4. Tony Price, Ph.D. 2012, Dissertation: *Nonlinear Properties of Nanoscale Barium Strontium Titanate Microwave Varactors*. Currently at TriQuint (2015).

5. Quenton Bonds, Ph.D. 2010, Dissertation: *A Microwave Radiometer for Close Proximity Core Body Temperature Monitoring: Design, Development, and Experimentation*. Currently at NASA Goddard Space Flight Center (2010).
6. Sergio Melais, Ph.D. 2009, Dissertation: *A Quasi Yagi Antenna with End Fire Radiation over a Metal Ground*. Currently at CST (2014).
7. Srinath Balachandran, Ph.D. 2009, Dissertation: *Nanocrystalline Diamond for RF MEMS Applications.* Currently at IMT MEMS (2010).
8. Thomas Ricard, Ph.D. 2008, Dissertation: *Active and Passive Radiometry for Transcutaneous Measurements of Temperature and Oxygen Saturation*.
9. Erick Maxwell, Ph.D. 2007, Dissertation: *Ultra-Wideband Electronics, Design Methods, Algorithms, and Systems for Dielectric Spectroscopy of Isolated B16 Tumor Cells in Liquid Medium.* Currently at Georgia Tech Research Institute (2009).
10. Saravana Natarajan, Ph.D. 2007, Dissertation: *Three Dimensional Micro Coaxial Transmission Line based Circuits and Applications*. Currently at WiSpry (2009).
11. Thomas Ketterl, Ph.D. 2006, Dissertation: *Micro- and Nano-Scale Switches and Tuning Elements for Microwave Applications.* Currently at USF (Research Professor, 2013).
12. James Culver, Ph.D. 2005, Dissertation: *Electromagnetic Modeling of Lossy, Multi-Layer Coplanar Waveguides Using Generalized Transverse Resonance*. Currently at ATK (2009).
13. Balaji Lakshminarayanan, Ph.D. 2005, Dissertation: *RF MEMS Phase Shifters*. Currently at Skyworks (2009). Currently at Skyworks (2012).
14. Mark Weatherspoon (co-major Professor), Ph.D. 2002, Dissertation: *Microwave Characterization of One-Port Noise Sources*. Currently at Florida State University/FAMU (2009).

Master's Students

1. Jonathon O'Brien, MSEE 2013, Thesis: *Medium Power, Compact Periodic Spiral Antenna*.
2. Scott Skidmore, MSEE 2012, Thesis: *Analysis and Optimization of Broadband Measurement Cells for the Characterization of Functional Magnetic Nanocomposite Polymer Films for Tunable RF Device Applications*.
3. Rebeka Davidova, MSEE 2011, Thesis: *Ultra-Low Power Electronics for Autonomous Micro-Sensor Applications*.
4. Luis Ledezma, MSEE 2011, Thesis: *A Study on the Miniaturization of Microstrip Square Open Loop Resonators*.
5. Ibrahim Nassar, MSEE 2010, Thesis: *Small Antenna Design for 2.4 GHz Applications*.
6. Jagan Rajagopalan, MSEE 2010, Project: *System Analysis and Design of RF Hardware for a Wireless Sensor Network using Passive Nodes*.
7. James Cooper, MSEE 2010, Thesis: *A Multi-Wilkinson Power Divider Based Complex Reflection Coefficient Detector*.
8. Rakesh Shirodkar, MSEE 2010, Thesis: *An Investigation on Radiometric Measurements of Subterranean Heat Sources*.
9. James McKnight, MSEE 2009, Thesis: *A Cavity-backed Coplanar Waveguide Slot Antenna Array*. Currently at Northrop Grumman (2009).
10. Suzette Presas, MSEE 2008, Thesis: *Microwave Frequency Doubler Integrated with Miniaturized Planar Antennas*. Currently a Ph.D. student at the University of Wisconsin (2008-).
11. Aswin Jayaraman, MSEE 2007, Project: *Design of a Voltage Controlled Lumped Element Tunable Bandpass Filter*
12. Venkat Gurumurthy, MSEE 2007, Thesis: *Barium Strontium Titanate Films for Tunable Microwave and Acoustic Wave Applications*.
13. Sam Baylis, MSEE 2007, Thesis: *Tunable Patch Antenna Using Semiconductor and Nano-Scale Barium Strontium Titanate Varactors*. Currently at Trak Microwave (2009).
14. Diana Aristizabal, MSEE 2006, Electromagnetic Characterization of Miniature Antennas for Portable Devices. Currently at Trak Microwave (2009).

15. Leonard Guerra, MSEE 2006, Thesis: *IEEE 802.11b Wireless LAN Sensor System and Antenna Design*.
16. Quenton Bonds, MSEE 2006, Project: Ultra-Wideband Antenna Characterization for Wireless Sensor Networks.
17. David Zaiden, MSEE 2005, Project: Design of a 2.4 GHz Silicon-Germanium Fully-Differential Class AB Mixer.
18. Sergio Melais, MSEE 2005, Thesis: *Low Profile Baluns and Broadband Dipole Antennas*.
19. Marianna Raimondo, MSEE 2004, Project: *A Phase Locked Loop Synthesizer*
20. John Giannone, MSEE 2004, Project: *The Application of Genetic Algorithms to Microwave Model Extraction*.
21. Caroline Sequiera, MSEE 2004, Project: *Establishing the Accuracy of Impedance Measurements*.
22. Brian Trabert, MSEE 2004, Project: *Body Borne Mobile Personal Wireless Communication System for UHF Band*.
23. Srinath Balachandran, MSEE 2004, Thesis: *MEMS Tunable Planar Inductors for Millimeter Wave and Microwave Applications*.
24. Eid Alsabbagh, MSEE 2004, Thesis: *Thin Film Micro-bolometers for Microwave Power Detection*.
25. John Capwell, MSEE 2003, Thesis: *Planar Spiral Inductor Modeling and Stack Parasitic Modeling.*
26. Hari Kannan, MSEE 2003, Thesis: *Design and Fabrication of Multi-Dimensional RF MEMS Variable Capacitors*
27. Lester Lopez, MSEE 2003, Thesis: *Low Loss, Cross-Coupled Microwave Filters on Low Resistivity Silicon Substrates*.
28. Jason Naylor, MSEE 2003, Thesis: *Microwave and Millimeter-Wave Planar Circuit Transitions*.
29. Catherine Boosales, MSEE 2003, Thesis: *Millimeter Wave Antipodal Tapered Slot Antenna Design and Miniaturization.*
30. Khaled Obeidat, MSEE 2003, Thesis: *Design and Characterization of Multi-Layer Coplanar Waveguide Baluns and Inductors*.
31. Saravana Natarajan, MSEE 2002, Thesis: *Microwave Characterization of Pyroelectric Capacitors and Toroidal Inductors*.
32. Lavanya Emmadi, MSEE 2002, Thesis: *Microwave Equivalent Circuit Models for Surface Mount Varactor Diodes Including Substrate and Temperature Effects*.
33. Yisub Ahn, MSEE 2002, Project: *Microwave Capacitor Modeling for Antenna Applications*.
34. Steve Eason, MSEE 2001, Thesis: *Fractal Dipole Antennas for Use in Global Positioning System Applications*.
35. Kevin Thompson, MSEE 2001, Thesis: *Live Via Modeling*.
36. Thomas Ketterl, MSEE 2000, Thesis: *Fabrication and Characterization of Micromachined Microfluidic Channels and Tunable Microwave Inductors*.
37. Rajesh Baliram Singh, MSEE 2000, Thesis: *Coplanar Waveguide Components Using Capacitive Loading*.
38. Evelyn Benabe, MSEE 2000: Thesis: *Microwave Characterization and Modeling of Air Coil Inductors and Ceramic Capacitors*.
39. Balaji Lakshminarayanan, MSEE 1999, Thesis: *Development of Equivalent Circuit Models for Multi-Layer Surface Mount Capacitors*.
40. Michael Imparato, MSEE 1999, Thesis: *On the Accuracy of Calibration for On-Wafer Mm-Wave Measurement*.
41. Maximillian Scardelletti, MSEE 1999: Thesis: *Power Dividers and Printed Antennas Using Coplanar Transmission Lines*.
42. Nadia Babik, MSEE 1998, Thesis: *A Microwave Oscillator and Frequency Doubler Design Using Nonlinear CAD Techniques*.
43. Michael Yore, MSEE 1998, Thesis: *GaAs Chip Area Reduction Through the Implementation of Stacked Capacitors*.
44. Michael Oldenburg, MSEE 1997, Thesis: *Planar Multi-Level Transitions and Antennas Applied to Microwave Position Sensing*.

Current Graduate Students

Eduardo Rojas (Ph.D.), John Koutsoyannis (MSEE), Jonathan O'Brien (MSEE), Hugo Morales (MSEE), Evelyn Benabe (Ph.D.), Ibrahim Nassar (Ph.D.), Eid Alsabbagh (Ph.D.), David Cure (Ph.D.), Michael Grady (Ph.D.), Maria Cordoba (Ph.D.), Abhishek Dey (Ph.D.), Timothy Palomo (Ph.D.).

Graduate Student Committee Service

Ivan Rivera (Ph.D. 2014), Mian Wei (Ph.D. 2014), Amar Amouri (Ph.D. 2015), Ahmad Gheethan (Ph.D. 2014), Olawale Ajayi (Ph.D. 2014), Ahmad AlQasimi (Ph.D. 2012), Justin Boone (Ph.D. 2013), Cesar Morales (Ph.D. 2011), Ahmad Almutawa (MSEE 2011), Julio Dewdney (Ph.D. 2012), Mingke Xiong (MSEE 2009), Julio Costa (MSEE 2008), Hasari Celebi (Ph.D., 2008), Ranko Heindl (Ph.D., 2006), Shyam Aravamudhan (Ph.D. 2007), Abdur Rahman (Ph.D. 2007), Tevfik Yucek (Ph.D. 2007), Stefan Cular (Ph.D. 2006), Rahul Agarwal (Ph.D. 2006), Geralyn Burke (MSEE 2006), Mustafa Sahin (MSEE 2006), Krishnan Srinivasan (MSEE 2005), Sriram Akella (MSEE 2005), Nicholas Sapankevych (Ph.D. 2007), Sriraj Manavalan (MSEE 2005), Nigel Brown (MSEE 2005), Joshua Nicodemus (MSEE 2005), Sonoko Akamatsu (MSEE, 2005), Ismail Guvenc (Ph.D., 2006), Ravi Sankar (MSEE, 2004), Amol Chaudhari (MSCE, 2004), Charles Baylis (Ph.D., 2007); Dinesh Divakaran (Ph.D., 2005); Charles Baylis (MSEE, 2004), William Clausen (MSEE, 2003), Sriram Srinivasan (MSEE, 2003), Peter Kirby (MSEE, 2001), James Black (MSEE, 2001), Dan Benny Lassessen (MSEE/Project, 200), Shay Gross (MSEE, 2000), Charles Wells (MSEE, 2000), John D'Amico (Ph.D., 2000), John Obara (Ph.D.), Jose Carlavilla (MSEE, 1999), Alberto Rodriguez (MSEE, 1999), Oliver Grinbergs (MSEE, 1999), Anbuselvan Kuppusamy (MSEE, 1998), Alen Fejzuli (MSEE, 1997), Steven Lardizabal (Ph.D., 1997), Lee Kidd (MS Project, 1997), Eric Wolfe (MSEE, 1997), William Shuts (MSEE, 1996), Gregory Bonaguide (MSEE, 1996).

Undergraduate Senior Design Projects Advised

Edward Grimes, 1996, *A Packaged 6 GHz Amplifier/mixer with High Testability*; David Homol, 1996, *Microstrip 2.4 GHz Patch Antennas*; Pedro Torres, 1996, *Microstrip Coupled-line Bandpass Filters*; Michael Imparato, 1996, *Micromachined Inductively Coupled Bandpass Filter*; Max Scardelletti, 1997, *Coplanar Waveguide Phase Detector*; Tim Gittemeir, 1997, *A Tunable Microstrip Patch Antenna*; James Neumann, 1997, *A 5 GHz Cross-polarized Transceiver using Patch Antennas*; Andrew Smith, 1997, *A 2x2 Microstrip Patch Antenna Array at 6 GHz*; Michael Salazar, 1997, *A 2 GHz Digital Step Attenuator*; Nicholas Cafaro, 1998, *A 2.4 GHz Receiver Board*; Oliver Grinbergs, 1998, *A 1-2 GHz Frequency Multiplier*; Joseph Ollei, 1998, *A 2.45 GHz Transceiver Board*; Kris Skowronski, 1998, *Boonton Line Automation*; Wayne Bomstad, 1999, *Contrawound Toroidal Helical Antenna* (Honor's Thesis); Kevin Thompson, 1999, *Contrawound Toroidal Helical Antenna*; Peter Kirby, 1999, *Contrawound Toroidal Helical Antenna*; Robert Bennett, 1999, *1 GHz Mixer*; David Arft, 1999, *I/Q Modulator/Demodulator*; John Capwell, 1999, *2.45 GHz Microstrip Couplers*; Jason Lenoir, 1999, *2.45 GHz Oscillator*; Alexander Shepherd, 1999, *Microwave Modulator*; Kyle Wills, 1999, *2.45 GHz Transceiver Board* (Honor's Thesis); Robert Myer, 2000, *2.45 GHz Balanced Mixer* (Honor's Thesis); Kanix Bukkavesa, 2000, *2.45 GHz Low Noise Amplifier*; William Clausen, 2000, 2.*45 GHz High Power Amplifier*; Kendra James-Bickford, 2000, *2.45 GHz Antenna Matching Networks*; Charles Novak, 2000, *2.45 GHz High Directivity Microstrip Couplers*; Steven Tasi, 2000, *2.45 GHz Stripline Bandpass Filter*; John Wilson, 2000, *2.45 GHz Transmit/Receive Switch Network*; Catherine Boosales, 2001; Andrea Bruno, 2001; Patric Lockhart, 2001; Joshua Marlin, 2001; Ravi Varanasi, 2001; Perry Vincent, 2001; Ken O'Connor, 2001; Eid Alsabbagh, 2001; Clemente Toro, 2001; Leonard Guerra, 2002; Anand Mehta, 2002; Hugo Morales, 2002; Glen Heipp, 2002; Rob Harris, 2002; Chad Philips, 2004; Diana Aristizabal, 2004; Stephen Bates, 2004; Matthew Wilbanks, 2004; Michael Jourdain, 2004; Deron Hayslip, 2004; David Steiner, 2004; Jean Paul Ariaga, 2004; Sam Baylis, 2004; Richard Skrzyniarz, 2005; Stan Ivanov, 2005; Kevin Stichnot, 2005; Suzette Presas, 2006; Richard Daigler, 2006; Fritz Larco, 2006; Pierre Bontemps, 2006; G. Tu, 2006; Nestor Diaz, 2006; Dan Hunter, 2007; Edward Levy, 2007; Louis Torres, 2007; James Cooper, 2008; Joshua Robinson,

2008; Federico Diamante, 2012; Robert Donatto, 2012; Elisha Stevenson, 2012; Yohannes Samuel, 2012; Bryce Hotalen, 2013; Stephanie Kiley, 2013; Kyle Chapman, 2013.

Research Experience for Undergraduates Projects Advised

Sam Baylis, 2004-2005; Richard Skrzyniarz, 2005; Albert Ng, 2005; David Klinowski, 2005-2006; Suzette Presas, 2005-2006; Ebenezer Odu, 2006-2007; James Cooper, 2006-2007; Melanie Sutherland, 2008; Wayne Melton, 2008-2009; Daniel Cruz, 2008-2011; Yohannes Samuel, 2009-2012; Bryce Hotalen, 2010 -; Robert Donatto, 2010 2012; Scott Muir, 2010; Stephanie Kiley, 2010-2013; Federico Diamante, 2012 -2013; Elisha Stevenson, 2012 – 2013; Sean Murphy, 2013; Jesse Moody, 2013; William Mitchell, 2013.

Professional Activities and Service

- IEEE:
  - Senior Member of IEEE - Microwave Theory and Techniques Society (MTT), Antennas and Propagation Society (AP)
  - Vice-Chair, 2014 International Microwave Symposium (Tampa, FL)
  - Co-chair 1999, General Chair 2000, 2001, 2002. Registration Chair 2003-2010: Wireless and Microwave Technology: An Industry/Government/Education Form (University of South Florida).
  - IEEE MTT Society Technical Program Committee on RF-MEMS (1999 – present); Vice Chair Committee on RF MEMS (2005); Chair 2006/2007/ Vice Chair (2012).
  - IEEE MTT Society Technical Coordinating Committee on RF-MEMS (2001 – present); Chair (2006/07/08)
  - Vice President of Technical Operations, IEEE Sensors Council (2002-2006)
  - Member of IEEE MWCL Reviewers Board (2004 – present)
  - Technical Program Committee Member, Radio and Wireless Symposium (2007-2013)
  - Reviewer for IEEE MTT Graduate Fellowship Awards (2006, 2007, 2008)
  - Technical Guest Editor, IEEE Microwave Magazine, June 2007 issue (Special Issue on RF-MEMS)
  - IEEE MTT Society Distinguished Lecturers Selection Committee (2004 – 2008)
  - IEEE Educational Activities Board Representative, IEEE Sensors Council (2001-2006)
  - Member of the IEEE Sensors Administrative Committee (now Sensors Council) (1998-2006)
  - IEEE Sensors Council Distinguished Lecturer Program, Chair (2005-2007)
  - Local Arrangements Chair, IEEE Sensors Conference 2002, Orlando FL
  - Co-Chair of the focused session on Microwave Sensors and Product Applications, 2000 IEEE International Microwave Symposium
  - Co-Organizer of the Educational Forum at the 2000 IEEE International Microwave Symposium
  - Chairman of the IEEE MTT/AP/ED Florida West Coast Chapter (1997-98)
  - Vice-chairman of the IEEE MTT/AP/ED Florida West Coast Chapter (1996, 1999)
  - Steering Committee member for 1999 IEEE Antennas and Propagation Symposium (Workshop and Short Course Organizer)
  - Session Chair at the 1999 and 2000 AP/URSI Symposium
  - Session Co-Chair at the 1999, 2001, 2003, 2004 and 2006 International Microwave Symposium (IMS)
  - Session Chair at the 1996 SoutheastCon
- University of South Florida:
  - USF World Workgroup (2012-)
  - USF Office of Research Conflict of Interest Review Committee (2012-)
  - USF Office of Research Patent Royalty Distribution Policy Evaluation Committee (2010)
  - USF Proposal Development Taskforce (2010)
  - USF Academy of Inventors, Executive Committee Member (2009/2010)
  - Task Force of Faculty Roles, Responsibilities and Rewards, University of South Florida (2008/2009)
  - Research Coordinator for the USF Summer Institute of the McNair's Scholars Program (1997)

- Judge at 1997 Science Bowl Competition (USF St. Petersburg Campus)

- University of South Florida, College of Engineering:
  - Associate Dean for Research, 2008 – 2011
- University of South Florida, Department of Electrical Engineering:
  - Department Chair, 2011 – present
  - Co-director/Director of the Center for Wireless and Microwave Information Systems, 2001 – present
  - Member of Tenure and Promotion Committee (2007 - 2008)
  - Chair of the Nanomaterials and Nanomanufacturing Research Center Steering Committee (2007 - 2009)
  - Chair of the Curriculum Committee, 2006 - 2008.
  - Chair of the Wireless/Electromagnetics Curriculum Sub-Committee, 2006 - 2008.
  - Member of the Scholarship Committee, 2005
  - Member of Faculty Search Committee (EE Dept.), 2004, 2005, 2006
  - Co-director of the NSF IGERT SKINS Program, 2003 – 2008
  - Member of Faculty Search Committee (multiple years)
  - Member of VLSI Design Committee, 2000.
  - Chairman, Design Committee, Electrical Engineering Department, 1999-2001
  - Electrical Engineering Department Library Liaison, 1999 – 2005.
  - Member of Undergraduate Recruiting Committee, 1997 – 2004.
  - Comprehensive Qualifying Examination for Microwave Circuits, each spring beginning in 1999.
  - Comprehensive Qualifying Examination for Antenna Design and Analysis, Fall 1996.
  - Member: Advisory Committee on Undergraduate Students, 1995-96.
  - Member: Committee on Undergraduate EE Curriculum, Electromagnetics, 1995 – 2008.
- Reviewer for IEEE Microwave Theory and Techniques Society, IEEE Antennas and Propagation Society, IEEE Components, Packaging and Manufacturing Technology Society, the Institute of Electrical Engineers (IEE), the American Geophysical Union, IEEE Press, International Journal of Microwave and Millimeter-Wave Computer-Aided Engineering, Journal of MEMS, Wiley Interscience and Oxford Press
- Invited panelist, National Science Foundation JAM 2012 – Institute For Broadening Participation – Corporate Partnerships to Broaden Participation
- Proposal Reviewer for the National Science Foundation and National Research Council
- Lecturer at 1997, 2005-2010 Great American Teach-In (local elementary, middle and high schools)

Support of Visiting Researchers

Hosted Professor Adalbert Beyer (Duisburg University, Germany) from 1/5/04 – 12/20/04. Research topic: advanced microwave voltage controlled oscillator design and theory.

Hosted Dr. Nihad Dib (Jordan University of Science and Technology) from 7/20/97 – 8/21/97. Research topic: cylindrical mm-wave transmission lines. Dr. Dib and I collaborated to develop three-dimensional Finite Difference Time Domain software for the analysis of cylindrical transmission lines and designed and experimentally tested filter and antenna geometries.

Seminars Attended on Teaching Enhancement

The following seminars were attended at the University of South Florida's Center for Teaching Enhancement:

- Issues of Diversity in the Interactive Classroom
- Preparing Effective Overhead Transparencies
- Creating a Teaching Portfolio
- Teaching and Mentoring Graduate Students

- Active Learning: Creating Excitement in the Classroom
- Successful Beginnings: Handling the First Day of Class
- Teaching Excellence: The Views of Faculty and Students
- Style and Substance: Improving Your Lectures
- Improving Student's Study Skills: How Instructors Can Help
- Motivating Students to Learn
- Cooperative Learning: Students Working Together

Curriculum Development Efforts

- *Wireless Circuits and Systems Design Laboratory* (with L. Dunleavy, P. Flikkema, H. Gordon and R. Henning). The objective of this project was to develop an exciting, hands-on undergraduate laboratory course focusing on combined circuits and systems aspects of modern wireless applications. This goal has been accomplished with great success, with the realization of a state of the art teaching laboratory and a course centered on industry-standard design and simulation. The funding for the project was received from the National Science Foundation, the Hewlett Packard Educational Grants Foundation, and Honeywell. This funding enabled the development of the Wireless and Microwave Instructional (WAMI) laboratory, which is equipped with an array of CAD/CAE software packages and several pieces of microwave instrumentation. Presently there are seven student workstations, each equipped with a vector network analyzer, a spectrum analyzer, a digitizing oscilloscope, a PC, and related microwave components. The software provides capabilities for circuit and system level simulation, numerical electromagnetic modeling, and antenna design. The developed course, *Wireless Circuits and Systems Design Laboratory*, is now a required course for all electrical engineering students. The innovative approach adopted for the WAMI educational program has been enthusiastically received by industry and the academic community. A measure of proof has been the establishment of the WAMI Advisory Board, a 14-member group comprised of industry representatives and faculty from two other universities. This board meets annually at USF to provide guidance and feedback on both academic and research pursuits.
- *Wireless Sensor Systems Design Course* (with J. Frolik, University of Vermont). The goal of this course is to provide undergraduate students with application-oriented design experience in a multi-disciplinary setting. Each semester a case study is performed on a selected wireless sensor system, e.g., sensors used for traffic monitoring or environmental remote sensing. A partially- or fully-operating system comprised of commercial-off-the-shelf (COTS) parts is used as a test-bed, and students are required to design and implement subsystems to enhance the existing system or replace COTS components. The effort typically entails student teams focusing of multiple engineering facets (microwave, communications, signal processing, digital logic) and coordinating the overall system configuration. The course was partially sponsored by the National Science Foundation (Weller, 1999 NSF CAREER Award).
- *RF/MW Circuits I.* This course focuses on passive wireless/microwave circuit design and is simultaneously taught at the undergraduate and graduate levels, using a stratified assignment and grading scheme. The objective is to provide students with a firm grasp of distributed transmission line theory and high frequency design. In order to gain experience with modern CAE tools, several (typically 6-7) software-based laboratory experiments are performed using the Agilent Advanced Design System circuit simulation tool and the *Momentum* numerical electromagnetic simulator.
- *RF/MW Circuits II.* This course focuses on active wireless/microwave circuit design (amplifiers and oscillators) and is simultaneously taught at the undergraduate and graduate levels, using a stratified assignment and grading scheme. Several (typically 6-7) software-based laboratory experiments are performed using the Agilent Advanced Design System circuit simulation tool. A key component of the course is the low-noise amplifier design project, requiring students to develop a complete hybrid design meeting a full-set of specifications (gain, match, noise figure, and bandwidth) along with a board layout.

- *Antenna Theory.* This graduate course covers the fundamentals of electromagnetics that are relevant to antennas and radiation, antenna design, and microwave communications system analysis. Students are required to complete a literature study and project report on an emerging technology, e.g. fractal antennas, frequency selective surfaces, or reconfigurable antennas.
- *Numerical Techniques in Electromagnetism*. This graduate course was designed to provide students with a thorough understanding of numerical electromagnetic techniques, particularly as applied to microwave and mm-wave circuit and antenna simulation. One goal is to make the students well-educated users of modern, commercially available CAE software. Students are also required to develop their own algorithms as preparation for advanced study in this field. The course topics cover a broad span of differential and integral techniques, such as finite difference, finite element and the method of moments.
- *Sensors and Materials Characterization Laboratory* (with S. Hariharan, Physics Department, USF). This graduate course is oriented toward bio-medical applications of electromagnetic and magnetic sensors. It also covers topics that include nano-technology, advanced semiconductor metrology (AFM, SEM, TEM), and chem/bio sensors.
- *Wireless Sensor Networks* (with P. Flikkema (Northern Arizona University), J. Frolik (University of Vermont) and W. Shiroma (University of Hawaii). This senior-level undergraduate course was developed as part of a National Science Foundation sponsored Course, Curriculum and Laboratory Improvement Phase II project. The goal of this project is to develop portable, on-line curriculum addressing systems-centric thinking in the context of eco-system monitoring using wireless sensor networks.

Major Areas of Research

Microwave Circuit and Sensor Design

The combination of advanced materials, 3-D integration techniques and numerical electromagnetic simulation enables the development of miniaturized, high performance and reconfigurable microwave sensor systems. Among the materials/devices investigated at USF are (nanoscale) ferroelectric varactors for frequency tuning, and nanocomposite polymers which can be used to realize magneto-dielectric substrates. These technologies are being combined with 3-D micro-coaxial transmission lines and 3-D package-integrated antennas to realize small sensor systems for applications such as remote monitoring and non-contact impedance spectroscopy. Another application of strong interest is biomedical radiometry, particularly for core body temperature measurement.

Selected Publications and Patents:

- Maria Cordoba and Tom Weller, “Liquids Characterization using a Dielectric Resonator-Based Microwave Probe,” 2012 European Microwave Conference, October 2012.
- Ibrahim T. Nassar, Thomas M. Weller, and Jeffrey L. Frolik, “A Compact 3-D Harmonic Repeater for Passive Wireless Sensing," Microwave Theory and Techniques, IEEE Transactions on , vol.60, no.10, pp.3309-3316, Oct. 2012.
- K. Stojak, S. Pal, H. Srikanth, C. Morales, J. Dewdney, T. Weller and J. Wang, “Polymer nanocomposites exhibiting magnetically tunable microwave properties,” Nanotechnology, vol. 23, no. 13, 135602 (6 pp), February 2011.
- Bonds, Q.; Weller, T.; Herzig, P.; , "Towards Core Body Temperature Measurement via Close Proximity Radiometric Sensing," Sensors Journal, IEEE , vol. PP, no.99, February 2011.
- Morales, C.; Dewdney, J.; Pal, S.; Skidmore, S.; Stojak, K.; Srikanth, H.; Weller, T.; Jing Wang; , "Tunable Magneto-Dielectric Polymer Nanocomposites for Microwave Applications," Microwave Theory and Techniques, IEEE Transactions on , vol.59, no.2, pp.302-310, Feb. 2011.
- E. Maxwell, T. Weller and E. Odu, “Design and Analysis of a Multi-Port Circuit for Shaping Sub-nanosecond Pulses,” IEEE Trans. MTT, Vol. 56, No. 12, December 2008.

- Kumar, S. Manavalan, V. Gurumurthy, S. Jeedigunta and T. Weller, "*Dielectric and structural properties of Pulsed Laser Deposited and sputtered Barium Strontium Titanate thin films* ", Materials Science and Engineering: B, Volume 139, Issues 2-3, 15 May 2007, Pages 177-185.
- Saravana Natarajan, Thomas M. Weller and David P. Fries, "Sensitivity Tunable Inductive Fluid Conductivity Sensor based on RF Phase Detection", Sensors Journal, IEEE, Volume 7, Issue 9, Sept. 2007 Page(s):1300 – 1301.
- R. Heindl, H. Srikanth, S. Witanachchi, P. Mukherjee, A. Heim, G. Matthews, S. Balachandran, S. Natarajan and T. Weller, "Multi-functional Ferrimagnetic-Ferroelectric Thin Films for Microwave Applications," Applied Physics Letters, 252507, 2007.
- T. Ketterl and T. Weller, "Reflectenna: A Quasi Passive On-Off Keyed Microwave Telemetry System for Remote Sensor Applications," IEE Proc. Microwaves, Antennas & Propagation, Vol. 1, Issue 4, August 2007, pp. 843-846.
- Microwireless Integrated Environmental Sensor and Transmitter System; U.S. Patent No.: 7,386,289. Patent awarded June 2008.
- Total Fluid Conductivity Sensor System and Method; U.S. Patent No.: 7,479,864. Patent awarded January 2009.
- Wireless Micro-Electro-Opto-Fluidic-Mechanical Foldable Flex System, U.S. Patent No.: 7,656,673. Patent awarded January 2010.
- System and Method for a Single Stage Tunable Ultra-Wideband Pulse Generator, U.S. Patent No.: 7,869,526. Patent awarded January 11, 2011.
- RF Microwave Circuit and Pulse Shaping Method, U.S. Patent Nos.: 8,134,394 and 8,248,125. Patent awarded March 13, 2012 and August 21, 2012.

Microwave Antenna Design

As the increase in miniaturization and functionality of microelectronics continues, the significance of advanced antenna technologies likewise grows. In many modern communications and sensing systems, the physical size and operational bandwidth of the antenna(s) are frequently limiting factors. Similarly, adaptive antenna design techniques are important so that system performance can be maintained as the local operating environment changes. Recent research at USF focuses on low profile planar and conformal antennas using techniques that include frequency selective surfaces, flexible polymeric materials and integrated tuning with semiconductor and ferroelectric devices. There has also been a concentrated effort to develop very efficient, 3-D electrically-small antennas for zero-power sensing applications and using direct digital manufacturing approaches.

Selected Publications and Patents:

- D. Cure, T. Weller and F. Miranda, "Study of a Low Profile 2.4 GHz Planar Dipole Antenna Using a High Impedance Surface with 1-D Varactor Tuning," submitted to IEEE Trans. Antennas and Propagation; accepted for publication October 2012.
- B. Zivanovic, T. Weller and C. Costas, "Series-Fed Microstrip Antenna Arrays and Their Application to Omni-Directional Antennas," Antennas and Propagation, IEEE Transactions on , vol.60, no.10, pp.4954-4959, Oct. 2012.
- Nassar and T. Weller, "Development of Novel 3-D cube Antennas for Compact Wireless Sensor Nodes," IEEE Trans. Antennas and Propagation, Vol. 60, pp. 1059-1065, Feb. 2012.
- S. Baylis, S. Presas, and T. Weller, "Wide Bandwidth Varactor-Tuned Patch Antenna," IEE Electronics Letters, Vol. 45, Issue 16, pp. 816-818, July 2009.
- S. Melais and T. Weller, "A Quasi Yagi Antenna Backed by a Metal Reflector," Antennas and Propagation, IEEE Transactions on , vol.56, no.12, pp.3868-3872, Dec. 2008.
- Rectifying Antenna and Method of Manufacture, U.S. Patent No.: 7,091,918. Patent awarded August 2006.

- High Frequency Feed Structure Antenna Apparatus and Method of Use," U.S. Patent No.: 7,486,236. Patent awarded February 2009.
- Dual-Polarized Feed Antenna Apparatus and Method of Use; U.S. Patent No.: 7,362,273 awarded March 2008, and U.S. Patent No.: 7,619,570 awarded December 2009.
- A Smart Zero-Order Energy Antenna and Repeater, U.S. Patent No.: 7,720,437. Patent awarded April 2010.
- Dual-Feed Series Microstrip Patch Array, U.S. Patent No.: 8,063,832. Patent awarded November 22, 2011.

Microwave and Mm-Wave Applications of Micromachining and Micro Electromechanical Systems

The utilization of micromachining techniques in the design of microwave/mm-wave circuits and antennas has greatly advanced the levels of performance and versatility that can be achieved. At mm- to sub-mm wave frequencies, micromachined transmission line architectures have demonstrated propagation and efficiency characteristics that cannot be matched by conventional monolithic implementations. The use of MEMS also enables low cost, miniaturized wireless/microwave components that provide unique tuning capabilities for functions such as signal distribution and resonant networks. One significant outcome of developing viable microwave MEMS-related technologies is monolithic integration of wireless telemetry capabilities with chip-level sensor systems. The research conducted at the University of South Florida is concentrated on passive component design in the 5-100 GHz range and the development of tunable MEMS components for applications such as electronically-scanned antenna arrays, voltage-controlled oscillators and variable impedance transmission lines. Slow-wave, impedance-matched true-time-delay (TTD) RF MEMS phase shifters developed at USF have set world records for performance. High-power handling capability has been addressed using nanocrystalline diamond MEMS switches that operate at RF signal levels up to 45 W at 2 GHz. High-speed switching devices have also been investigated using nanofabrication methods, achieving switching times below 300 ns.

Selected Publications and Patents:

- S. Balachandran, D. Hoff, A. Kumar and T. Weller, "Nanocrystalline Diamond RF MEMS Capacitive Switch," 2009 IEEE International Microwave Symposium Digest.
- S. Natarajan, T. Weller and D. Hoff, "3-D Micro Coaxial Transmission Lines with Integrated MEM Capacitors," Microwave and Wireless Components Letters, IEEE, Volume 17, Issue 12, Dec. 2007 Page(s):858 – 860.
- B. Lakshminarayanan and T. Weller, "Optimization of Impedance-Matched True-Time-Delay Phase Shifters," *IEEE Trans MTT*, Vol. 55, No. 2, pp. 335-342, February 2007.
- B. Lakshminarayanan and T. Weller, "Design and Modeling of a 4-Bit MEMS Phase Shifter," *Microwave Theory and Techniques, IEEE Transactions on,* Volume 54, Issue 1, Jan. 2006 Page(s): 120 – 127.
- B. Lakshminarayanan and T. Weller, "Electronically Tunable Multi-line TRL Using an Impedance Matched Multi-Bit MEMS Phase Shifter, *Microwave and Wireless Components Letters*, IEEE [see also IEEE Microwave and Guided Wave Letters] Volume 15, Issue 2, Feb. 2005 Page(s):137 – 139.
- T. M. Weller, K. J. Herrick, and L. P. B. Katehi, "Quasi-Static Design Technique for Mm-Wave Micromachined Filters with Lumped Elements and Series Stubs," *IEEE Trans. MTT*, vol. 45, no. 6, pp. 931-938, June 1997.
- T. M. Weller, L. P. B. Katehi, M. I. Herman, P. D. Wamhof, K. Lee, and B. H. Tai, "New Results Using Membrane-Supported Circuits: A Ka-Band Power Amplifier and Survivability Testing," *IEEE Trans. MTT*, vol. 44, no. 9, pp. 1603-1606, Sept. 1996.
- T. M. Weller, L. P. Katehi, and G. M. Rebeiz, "A 250 GHz Microshield Bandpass Filter," *IEEE Microwave and Guided Wave Letters*, vol. 5, no. 5, pp. 153-155, May 1995.

- H. Cheng, J. F. Whitaker, T. M. Weller, and L. P. Katehi, "Terahertz-Bandwidth Pulse Propagation on a Coplanar Stripline Fabricated on a Thin Membrane," *IEEE Microwave and Guided Wave Letters*, vol. 4, pp. 89-91, March 1994.
- Microelectromechanical Slow-Wave Phase Shifter Device and Method, U.S. Patent No.: 7,259,641 awarded August 2007 and U.S. Patent No.: 7,676,903 awarded March 2010.
- A Tunable Micro Electromechanical Inductor, U.S. Patent No.: 7,274,278 and 7,741,936. Patent awarded September 2007.
- Nanometer electromechanical switch and fabrication process; U.S. Patent No.: 7,463,123 and 7,718,461. Patent awarded December 2008.

Mm-Wave Circuit Design

Advances in mm-wave semiconductor device technology coupled with widely-used consumer applications such as gigabit/second data communications and intelligent vehicle sensors heightens the need for research in mm-wave passive component design. Along side the potential uses of micromachining in this field, there are important areas to address such as measurement calibration, model development, and high performance packaging. Furthermore, the small size of mm-wave circuits and antennas can be used to great advantage in applications such as compact, high-resolution sensors. Notable work performed at USF includes the development of a 60 GHz proximity sensor for anti-lock brake and fuel-injector use, and the development of signal distribution networks for a 94 GHz, stacked-wafer phased array element. USF has also demonstrated new approaches to on-wafer calibration that greatly reduce the required wafer real-estate in comparison to the standard (thru-reflect-line, or TRL) techniques, including RF MEMS calibration standards that integrate a complete TRL calibration in a single line.

Selected Publications and Patents:

- J. Naylor, T. Weller, et al., "Slow Wave CPW for Phase Matching and Slot-Line Transition Design," *IEE Proc. Microwaves, Antennas and Propagation*, October 2005, 297-300.
- B. Lakshminarayanan and T. Weller, "Reconfigurable MEMS transmission lines with independent Zo- and β-tuning," Microwave Symposium Digest, 2005 IEEE MTT-S International , vol., no., pp. 4 pp., 12-17 June 2005.
- M. Smith, T. Weller, et al., "K-Band Direct Detect MMIC Si Micromachined Radiometer," Microwave Symposium Digest, 2001 IEEE MTT-S International, Volume: 3, 2001, Page(s): 2255 - 2258 vol.3
- T. Weller, "Edge-Coupled Coplanar Waveguide Bandpass Filter Design," *IEEE Trans. MTT*, pp. 2453-2458, December 2000.
- T. Weller, R. Henderson, K. Herrick, S. Robertson, T. Kihm and L. Katehi, "Three-Dimensional High Frequency Distribution Networks Part I: Optimization of CPW Discontinuities," *IEEE Trans. MTT*, Vol. 48, No. 10, October 2000, pp. 1635-1642.
- R. Henderson, T. Weller, K. Herrick, S. Robertson, T. Kihm and L. Katehi, "Three-Dimensional High Frequency Distribution Networks Part II: Packaging and Integration," *IEEE Trans. MTT*, Vol. 48, No. 10, October 2000, pp. 1643-1651.
- T. M. Weller, K. J. Herrick, and L. P. B. Katehi, "Quasi-Static Design Technique for Mm-Wave Micromachined Filters with Lumped Elements and Series Stubs," *IEEE Trans. MTT*, vol. 45, no. 6, pp. 931-938, June 1997.
- G. M. Rebeiz, L. P. B. Katehi, T. M. Weller, C-Y Chi, and S. V. Robertson, "Micromachined Membrane Filters for Microwave and Millimeter-Wave Applications," *Int. J. Microwave and Millimeter-Wave Computer Aided Engineering*, Vol. 7, pp. 149-166, 1997.
- Notch Filter Circuit Apparatus; application filed by Raytheon Corporation; U.S. Patent No.: 6,657,518. Patent awarded January 2004.
- System and Method for Planar Transmission Line Transition; application filed by Raytheon Corporation; U.S. Patent No.: 6,750,736. Patent awarded July 2004.

Microwave Equivalent Circuit Modeling Techniques

Intense competition in the commercial wireless/microwave market drives a constant need for reduced design-cycle time and a corresponding reliance on accurate simulation capabilities. Furthermore, the industry as a whole retains a large investment in capital equipment for hybrid board manufacturing, and component vendors continue to develop ever-smaller parts that enable operating frequencies to increase. From this follows a strong need for reliable, microwave component models. The research performed at the University of South Florida focuses on the development of model extraction techniques for passive surface mount components in the DC-30 GHz range. Significant accomplishments include the development of capacitor, inductor and resistor models that accurately predict parasitic effects induced by the PC board substrate; although substrate effects can radically influence the observed performance of these parts, no similar models are known that pre-date the USF work. This modeling technology formed the basis for a university spin-out company, Modelithics, Inc., in 2001.

Selected Publications and Patents:

- B. Lakshminarayanan, H. Gordon and T. Weller, "A Substrate-Dependent CAD Model for Ceramic Multi-Layer Capacitors," *IEEE Trans. MTT,* pp. 1687-1693, October 2000.
- Global Equivalent Circuit Modeling System for Substrate Mounted Circuit Components Incorporating Substrate Dependent Characteristics; U.S. Patent No.: 7,003,744 (awarded February 21, 2006) and U.S. Patent No.: 7,269,810 (awarded September 2007).

Book Contributions

L. Katehi, G. Rebeiz, T. Weller, R. Drayton, S. Robertson and C. Chi, The Industrial Electronics Handbook, ed. David Irwin, CRC Press, Inc., Section X, Si Micromachining in High-Frequency Applications, pp. 1547-1572, 1996.

S. Balachandran, T. Weller, A. Kumar, S. Jeedigunta, H. Gomez, J. Kusterer and E. Kohn, Emerging Nanotechnologies for Manufacturing, ed. Jeremy Ramsden, William Andrew Applied Science Publishers, Nanocrystalline Diamond for RF-MEMS Applications, pp. 277-300, 2010.

Journal Publications

1. Obrien, Jonathan, Grandfield, J., Mumcu, G., and Weller, T., "Miniaturization of a Spiral Antenna Using Periodic Z-Plane Meandering," accepted to IEEE Trans. Antennas and Propagation, January 2015.

2. Nassar, I.; Tsang, H.; Weller, T., "3D printed wideband harmonic transceiver for embedded passive wireless monitoring," Electronics Letters, vol.50, no.22, pp.1609,1611, 10 23 2014.

3. Cordoba-Erazo, M.F.; Weller, T.M., "Noncontact Electrical Characterization of Printed Resistors Using Microwave Microscopy," Instrumentation and Measurement, IEEE Transactions on , vol.PP, no.99, pp.1,1, 2014.

4. D. Cure, T. Weller, T. Price, F. Miranda and F. Van Keuls, "Low Profile Tunable Dipole Antenna Using Barium Strontium Titanate Varactors," IEEE Trans. Antennas and Propagation, Vol. 62, Issue 3, 2014.

5. I. Nassar and T. Weller, "A Compact Dual-Channel Transceiver for Long-Range Passive Embedded Monitoring," accepted for publication in IEEE Trans. MTT, October 2014.

6. R. Davidova and T. Weller, “High-Sensitivity, AM-modulated harmonic transceiver for wireless sensing,” Electronics Letters, 11th April 2013, Vol. 49, No. 8.

7. Palomo, T.; Herzig, P.; Weller, T.M.; Mumcu, G., "Wideband Band-Stop X-Band Filter Using Electrically Small Tightly Coupled Resonators," Microwave and Wireless Components Letters, IEEE , vol.23, no.7, pp.356,358, July 2013.

8. S. Melais, D. Cure and T. Weller, "A Quasi-Yagi Antenna Backed by a Jerusalem Cross Frequency Selective Surface," International Journal of Microwave Science and Technology, vol. 2013, Article ID 354789, 8 pages, 2013. doi:10.1155/2013/354789.

9. Cure, D.; Weller, T. M.; Miranda, F. A.; , "Study of a Low-Profile 2.4-GHz Planar Dipole Antenna Using a High-Impedance Surface With 1-D Varactor Tuning," Antennas and Propagation, IEEE Transactions on , vol.61, no.2, pp.506-515, Feb. 2013.

10. Nassar, I.T.; Weller, T.M.; Lusk, C.P., "Radiating Shape-Shifting Surface Based on a Planar Hoberman Mechanism," Antennas and Propagation, IEEE Transactions on , vol.61, no.5, pp.2861,2864, May 2013.

11. J. Frolik, P. Flikkema, W. Shiroma, T. Weller, C. Haden and R. Drayton, “Leveraging multi-university collaboration to develop portable and adaptable course materials that improve student learning of systems thinking,” ASEE Advances in Engineering Education, Vol. 03, Issue 03, Winter 2013.

12. Ibrahim T. Nassar, Thomas M. Weller, and Jeffrey L. Frolik, “A Compact 3-D Harmonic Repeater for Passive Wireless Sensing," Microwave Theory and Techniques, IEEE Transactions on , vol.60, no.10, pp.3309-3316, Oct. 2012.

13. E. Benabe, M. Crites, J. Whitaker and T. Weller, “In-Situ Characterization of PIN Diode Waveforms Using Electro-Optic Sampling,” Microwave and Optical Technology Letters, Volume 54, Issue 11, pp. 2653-2656, November 2012.

14. B. Zivanovic, T. Weller and C. Costas, “Series-Fed Microstrip Antenna Arrays and Their Application to Omni-Directional Antennas," Antennas and Propagation, IEEE Transactions on , vol.60, no.10, pp.4954-4959, Oct. 2012.

15. I. Nassar and T. Weller, “Development of Novel 3-D cube Antennas for Compact Wireless Sensor Nodes,” IEEE Trans. Antennas and Propagation, Vol. 60, pp. 1059-1065, Feb. 2012.

16. K. Stojak, S. Pal, H. Srikanth, C. Morales, J. Dewdney, T. Weller and J. Wang, “Polymer nanocomposites exhibiting magnetically tunable microwave properties,” Nanotechnology, vol. 23, no. 13, 135602 (6 pp), February 2011.

17. Bonds, Q.; Weller, T.; Herzig, P.; , "Towards Core Body Temperature Measurement via Close Proximity Radiometric Sensing," Sensors Journal, IEEE , vol. PP, no.99, February 2011.

18. Morales, C.; Dewdney, J.; Pal, S.; Skidmore, S.; Stojak, K.; Srikanth, H.; Weller, T.; Jing Wang; , "Tunable Magneto-Dielectric Polymer Nanocomposites for Microwave Applications," Microwave Theory and Techniques, IEEE Transactions on , vol.59, no.2, pp.302-310, Feb. 2011.

19. Natarajan, S. P., Hoff, A. M. and Weller, T. M. (2010), Polyimide core 3D rectangular micro coaxial transmission lines. Microwave and Optical Technology Letters, 52: 1291-1293.

20. S. Baylis, S. Presas, and T. Weller, “Wide Bandwidth Varactor-Tuned Patch Antenna,” IEE Electronics Letters, Vol. 45, Issue 16, pp. 816-818, July 2009.

21. Frolik, J.; Weller, T.M.; DiStasi, S.; Cooper, J., "A Compact Reverberation Chamber for Hyper-Rayleigh Channel Emulation," Antennas and Propagation, IEEE Transactions on , vol.57, no.12, pp.3962-3968, Dec. 2009.

22. S. Melais and T. Weller, “A Quasi Yagi Antenna Backed by a Metal Reflector," Antennas and Propagation, IEEE Transactions on , vol.56, no.12, pp.3868-3872, Dec. 2008.

23. Venkataramanan Gurumurthy, Sathyaharish Jeedigunta, Sam Baylis, Ashok Kumar, and Thomas Weller, “Structural and Electrical Properties of Nanocrystalline Diamond based Barium Strontium Titanate Varactors” International Journal of Ferroelectrics, 15 December (2008).

24. E. Maxwell, T. Weller and E. Odu, “Design and Analysis of a Multi-Port Circuit for Shaping Sub-nanosecond Pulses,” IEEE Trans. MTT, Vol. 56, No. 12, December 2008.

25. A. Kumar, S. Manavalan, V. Gurumurthy, S. Jeedigunta and T. Weller, "*Dielectric and structural properties of Pulsed Laser Deposited and sputtered Barium Strontium Titanate thin films* ", Materials Science and Engineering: B, Volume 139, Issues 2-3, 15 May 2007, Pages 177-185.

26. S. Natarajan, T. Weller and D. Hoff, “3-D Micro Coaxial Transmission Lines with Integrated MEM Capacitors,” Microwave and Wireless Components Letters, IEEE, Volume 17, Issue 12, Dec. 2007 Page(s):858 - 860.

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Conference Papers

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18. Microwave Variable Impedance Transmission Lines – Annual Report, submitted to The National Science Foundation, September 1999, 15 pages, T. Weller.

19. Development of Accurate Transfer Standards for Mm-Wave On-Wafer Calibration – Final Report, submitted to Anritsu/Wiltron, April 1999, 150 pages, M. Imparato, T. Weller, and L. Dunleavy.

20. Simulation of a 915 MHz Receiver using the HP Advanced Design System – Final Report, submitted to HP Eesof, February 1999, 22 pages, E. Benabe, A. Kuppusamy, T. Weller, P. Flikkema and L. Dunleavy.

21. Final Progress Report - Phase II: Development of Simulation, Modeling and Extraction Techniques for Passive (R,L,C) Components, submitted to Motorola, December 20, 1998, 135 pages, T. Weller, H. Gordon, B. Lakshminarayanan, E. Benabe.

22. Final Progress Report - Phase I: Development of Simulation, Modeling and Extraction Techniques for Passive (R,L,C) Components, submitted to Motorola, April 17, 1998, 85 pages, T. Weller, H. Gordon, B. Lakshminarayanan, E. Grimes.

23. Final Report: Advancements in Microwave/Mm-Wave Coplanar Waveguide Circuit Design, submitted to Southeastern Center for Electrical Engineering Education, July 8, 1998, 35 pages, T. Weller.

24. Final Report: A W-Band Wilkinson Power Divider, submitted to the University of Michigan, May 1998, 29 pages, T. Weller.

25. Final Report: Multi-Chip Hybrid/MMIC Packaging With High Testability, submitted to Raytheon E-Systems, September, 1997, 96 pages, E. Grimes, T. Weller, L. Dunleavy.

26. Final Report: Design and Fabrication of a 12 GHz Micromachined Bandpass Filter, submitted to USF Division of Sponsored Research, July 20, 1997, 10 pages, T. Weller.

27. Final Report: Millimeter-Wave Proximity Sensor, submitted to Wolff Controls, April 10, 1997, 78 pages, T. Weller, L. Dunleavy, P. Flikkema.

28. T. M. Weller, L. P. Katehi, "The Effect of Semi-Insulating, Semi-Conducting Materials on the Propagation Characteristics of Dielectric Loaded Waveguides," Radiation Laboratory, EECS Dept., University of Michigan, No. NSF-023827-3-T, April 1988.

Grants

1. Task Order 3, PI. T. Weller, Granting Agency: Telecommunications Systems, Amount: $20,000, Period: 9/2014 – 12/2014. Purpose: direction finding antenna design. Submitted 8/2014.

2. Affordable 3D Printed Phased Arrays; PI T. Weller; Granting Agency: Office of Naval Research (subcontract through Sciperio, Inc.); Amount: $75,000; Period 6/14 – 5/15; Person-Months Per Year Committed to Project: 0.25; Purpose: develop technology for active 3D digitally printed phased array modules. Submitted April 2014.

3. Rapid Design of Optimal Digitally-Manufactured 3D Electrically-Small Antennas; PI T. Weller; Granting Agency: Central Intelligence Agency; Amount: $360,000; Period 6/14 – 5/17; Person-Months

Per Year Committed to Project: 0.25; Purpose: investigate design and optimization tools for digitally manufactured small antennas. Submitted February 2014.

4. Bridge to the Doctorate 2014-2016 Cohort, PI T. Weller; Granting Agency: National Science Foundation; Amount: $978,911; Period: 5/14 – 5/16; Person-Months Per Year Committed to Project: 0; Purpose: fellowships related to the Florida Georgia Louis Stokes Alliance for Minority Participation. Submitted October 2013.

5. 2014 IEEE International Microwave Symposium Project Connect Support, PI T. Weller, Granting Agency: National Science Foundation; Amount: $8,000; Period: 5/15/14 – 12/31/14; Person-Months Per Year Committed to Project: 0; Purpose: participant support for students from underrepresented groups to attend the 2014 International Microwave Symposium. Submitted January 2014.

6. 3D Fabricated Low Cost Phased Array Technology, PI T. Weller, Co-PIs N. Crane and C. Lusk; Granting Agency: Sciperio, Inc. (subcontract on ONR grant); Amount: $200,000 (plus $200,000 Florida High Tech Corridor match); Period: 1/1/14 – 6/30/15; Person-Months Per Year Committed to Project: Summer 0.5; Purpose: develop a 2-18 GHz current sheet array unit cell using 3D direct digital manufacturing. Submitted July 2013.

7. Additive Manufacturing Technologies – Phase 1, PI. T. Weller, Granting Agency: Jabil, Amount: $150,000 (plus $150,000 Florida High Tech Corridor match), Period: 1/1/14 – 12/31/14. Purpose: Investigate the application of direct digital manufacturing for high frequency consumer electronics fabrication. Submitted December 2013.

8. Three-Dimensional (3D) Structural Radio Frequency (RF) Electronics, Granting Agency: Sciperio (Air Force SBIR Phase 2 subcontract), Amount: $315,273; Period: 8/13 – 811/13; Person-Months Per Year Committed to Project: Summer: 1.0; Purpose: investigate a 2.45 GHz phased array module using direct print additive manufacturing techniques; Submitted 2/2013.

9. Task Order 1, PI. T. Weller, Granting Agency: Telecommunications Systems, Amount: $8,087, Period: 9/2013 – 12/2013. Purpose: broadband antenna design. Submitted 8/2013.

10. REU Supplement - GOALI Collaborative Research: 3D RF Microsystems using Direct Digital Manufacturing Technology, PI. T. Weller, Granting Agency: The National Science Foundation, Amount: $12,500, Period: 5/1/13 – 12/31/13. Purpose: support for undergraduate students. Submitted 2/2013.

11. GOALI – Flexible Ferroelectric-Based Antenna for Conformal Radiometric Imaging – REU Supplemental Funding Request, Granting Agency: National Science Foundation, Amount: $16,000, Person-Months Per Year Committed to Project: 0; Period: 5/13-8/13; submitted 2/2013.

12. Design and Demonstration of Antennas for Selected RFID Applications, PI. T. Weller, Granting Agency: Silent Partners Technologies, Amount: $23,258 (with $23,258 match from Florida High Tech Corridor), Period: 4/2013 – 8/2014, Person-Months Per Year Committed to Project: 0.0. Purpose: The specific goal for the new tag antenna designs is to improve the achievable performance when the tags are mounted on either metallic objects or objects with high water content.

13. 3D Formable RF Materials, PI. T. Weller, Granting Agency: University of Texas – El Paso (Army sub-contract), Amount: $71,497, Period: 5/2013 – 5/2016, Person-Months Per Year Committed to Project: Acad: 0.5. Purpose: Microwave characterization of materials used in 3D printed RF electronics. Submitted 7/2012.

14. Collaborative Research: A Systems-Centric Foundation for Electrical and Computer Engineering Education, PI. S. Thomas, co-PI. T. Weller, Granting Agency: The National Science Foundation, Amount: $50,000 (USF portion), Period: 1/1/11 – 12/31/02, Person-Months Per Year Committed to Project: Sumr: 0.25. Purpose: develop new curriculum for introductory electrical systems course. Submitted 5/2011

15. GOALI Collaborative Research: 3D RF Microsystems using Direct Digital Manufacturing Technology, PI. T. Weller, co-PI. C. Lusk, Granting Agency: The National Science Foundation, Amount: $224,722 (USF portion), Period: 8/1/12 – 8/1/15, Person-Months Per Year Committed to Project: Sumr: 0.5. Purpose: investigate new 3D microwave systems using digital manufacturing techniques. Submitted 2/2012.

16. Miniaturized Low Frequency Resonant Antennas, PI Gokhan Mumcu, co-PI T. Weller, Granting Agency: Lockheed Martin, Amount: $20,000 (plus $10,000 match from the Florida High Tech Corridor), Period: 7/12 – 6/13, Person-Months Per Year Committed to Project: Sumr: 0.1. Purpose: investigate design of low frequency antennas for MRI applications. Submitted 4/2012.

17. Conformal Antennas for Autonomous Supply Tracking, PI T. Weller, Granting Agency: Draper Laboratory, Amount: $201,954 (plus $201,954 match from the Florida High Tech Corridor), Period: 1/13 – 12/14, Person-Months Per Year Committed to Project: Sumr: 0.0. Purpose: investigate design of antennas conformal antennas for networked supply tracking applications. Submitted 6/2012.

18. Miniature Low-Loss Ka-Band Phase-Shifter Using Broad-Band CRLH Unit Cells Integrated With High Reliability RF MEMS Switches, PI T. Weller, co-PIs G. Mumcu and J. Wang, Granting Agency: TECOMSYS, Amount: $40,000 (plus $40,000 match from the Florida High Tech Corridor), Period: 5/1/12 – 11/1/12, Person-Months Per Year Committed to Project: Sumr: 0.25. Purpose: investigate broad-band metamaterial based Ka-band phase shifters using RF MEMS devices. Submitted 9/2011.

19. Design and Characterization of 6 GHz True-Time-Delay Phase Shifter Fabricated Using Additive Manufacturing Techniques, PI T. Weller, Granting Agency: Sciperio (subcontract on Air Force SBIR Phase 1), Amount: $20,239 (plus $20,239 match from the Florida High Tech Corridor), Period: 5/12 – 12/12, Person-Month Per Year Committed to Project: Sumr: 0.05. Purpose: investigate direct-write phase shifter designs for C-band. Submitted 1/12.

20. Miniature X-band Filters with Coupled Metamaterial Resonators, P.I.: Gokhan Mumcu, co-P.I.: Thomas M. Weller, Granting Agency: **Raytheon**, Amount: $40,000 (plus $20,000 match from the Florida High Tech Corridor), Period: 3/29/11 - 12/20/11. Purpose: investigate designs for miniaturized X-band band-stop and band-pass filters. Submitted 2/2011.

21. GOALI – Flexible Ferroelectric-Based Antenna for Conformal Radiometric Imaging – GRDS Supplemental Funding Request, Granting Agency: National Science Foundation, Amount: $30,731, Person-Months Per Year Committed to Project: 0; Period: 8/11-8/12; submitted 1/2011.

22. GOALI – Flexible Ferroelectric-Based Antenna for Conformal Radiometric Imaging – REU Supplemental Funding Request, Granting Agency: National Science Foundation, Amount: $12,000, Person-Months Per Year Committed to Project: 0; Period: 1/11-12/11; submitted 12/2010.

23. Non-Linear Device Applications of Nano-Patterned Barium Strontium Titanate Thin Films – Supplement Request, P.I. T. Weller (50%), Co-P.I. A. Kumar and M. Smith (Raytheon), Granting

Agency: The National Science Foundation (ECS 0601536), Amount: $18,221, Period: 9/1/10 – 4/1/11. Submitted 4/10. Purpose: development of miniaturized non-linear BST microwave devices.

24. Injection-Moldable Thermal-Expansion-Matched Nanocomposites with Minimal Cure Shrinkage; PI: J. Wang, co-PI: H. Srikanth, R. Toomey and T. Weller; Granting Agency: Draper Laboratory, Amount: $130,000, Period: 6/30/2010-6/29/2011. Submitted 3/2010. Purpose: Through strategic selection or synthesis of polymer medium, low-CTE composites with monodispersed particles and minimal cure shrinkage will be pursued to result in a new class of injection-moldable nanocomposites for MCM assembly.

25. GOALI – Flexible Ferroelectric-Based Antenna for Conformal Radiometric Imaging – GRS Supplemental Funding Request, Granting Agency: National Science Foundation, Amount: $30,000, Person-Months Per Year Committed to Project: 0; Period: 8/10-8/11; submitted 5/2010.

26. Flexible Ferroelectric-Based Antenna Arrays for Conformal Radiometric Imaging, PI T. Weller, Granting Agency: NASA GSRP Fellowship Program, Amount: $90,000, Period: 7/1/10 – 7/1/13.

27. A Microwave Radiometer for Close Proximity Biomedical Sensing, PI T. Weller, Granting Agency: NASA GSRP Fellowship Program, Amount: $90,000, Period: 9/1/09 – 8/31/12.

28. Ultra Low Power Electronics for Autonomous Micro-Sensor Applications, PI T. Weller, Granting Agency: Sciperio, Inc. (subcontract on US AFRL SBIR Phase 1), Amount: $26,000 (plus $26,000 match from the State of Florida), Period: 1/1/10 – 9/1/10. Acad: 0.25. Purpose: development of low power wireless sensing methods.

29. Ferroelectric Antennas, P.I. T. Weller, Granting Agency: Raytheon, Amount: $50,000 (plus $25,000 cash match from the State of Florida), Period: 1/1/10 – 12/31/10, Person-Months Per Year Committed to Project: Acad: 0.25. Purpose: Continued design and demonstration of a low profile antenna using a tunable electromagnetic band-gap surface approach.

30. Uncooled Nanoscale Infrared High-Speed Sensors for Missile Seeker Applications, Funding Source: NanoCVD, Inc. and Florida High Tech Corridor; Amount: $152,310, Person-Months Per Year Committed to Project: 1; Period: 2/2009 – 2/2010. Purpose: investigate detection technologies for infrared radiation.

31. GOALI – Flexible Ferroelectric-Based Antenna for Conformal Radiometric Imaging, Granting Agency: National Science Foundation, Amount: $407,247, Person-Months Per Year Committed to Project: 1.; Period: 5/09-4/12; submitted 10/2008. Purpose: development of frequency tunable, flexible antenna arrays.

32. GOALI: Integrated Microwave Microneedle-Electrode System for Fine Scale Material and Device Characterization, PI S. Bhansali, co-PI. T. Weller, Granting Agency: The National Science Foundation, Amount: $370,000, Period: 8/1/09 – 8/30/12. Purpose: investigation of MEMS-based microwave microscopy for embedded materials characterization.

33. GOALI: COLLABORATIVE RESEARCH: Passive, Diamagnetic Inertial Sensing Integrated with High-Sensitivity Telemetry, PI J. Wang, co-PI. T. Weller, Granting Agency: The National Science Foundation, Amount: $370,000, Period: 8/1/09 – 8/30/12. Submitted 2/09. Purpose: development of low power wireless sensing methods for structural health monitoring.

34. Ferroelectric Antennas, P.I. T. Weller, Granting Agency: Raytheon, Amount: $30,000 (plus $20,000 match from the State of Florida), Period: 5/1/09 – 8/31/10, Person-Months Per Year Committed to Project: Acad: 0.5. Purpose: Design and demonstration of a low profile antenna using a tunable electromagnetic band-gap surface approach.

35. GOALI: Functional Magnetic Polymer Nanocomposites for Tunable RF Device Applications, Granting Agency: National Science Foundation, Amount: $6,000, Person-Months Per Year Committed to Project. Sumr: 0. Period: 3/08 – 3/09. Submitted 11/07. Purpose: Supplemental support for REU projects.

36. Compact Reconfigurable Channel Emulator, P.I.: Thomas Weller, Granting Agency: Goodrich, Amount: $107,439, Submitted 11/2007, Period: 11/1/07 – 8/31/08. Purpose: Development a laboratory-scale instrument for characterization of wireless sensor networks.

37. Low Cost Omni Antenna, P.I. T. Weller, Granting Agency: Raytheon, Amount: $107,755, Period: 8/1/07 – 8/31/2010. Submitted 7/07. Purpose: Design of a 4-6 GHz low cost steerable omni-directional antenna.

38. Collaborative Project: MUSE – An Undergraduate Learning Model for Complex-Engineered Systems, P.I. T Weller (along with J. Frolik (U. Vermont), P. Flikkema (N. Arizona U.) and W. Shiroma (U. Hawaii), Granting Agency: The National Science Foundation, Amount: $141,600 (USF share only; total is $500,000), Period: 6/1/07 – 5/30/11. Submitted 1/07. Purpose: development of a new undergraduate EE curriculum focused on complex engineering systems.

39. GOALI: Functional Magnetic Polymer Nanocomposites for Tunable RF Device Applications, Granting Agency: National Science Foundation, Amount: $360,000, Person-Months Per Year Committed to Project. Sumr: 1. Period: 8/07 – 7/11. Submitted 2/07. Purpose: development of advanced nanocomposite polymer substrates for microwave applications.

40. FUNCTIONAL MAGNETIC POLYMER NANOCOMPOSITE FILMS FOR TUNABLE RF DEVICE APPLICATIONS, P.I. T. Weller, Co-P.I. H. Srikanth, Granting Agency: University of South Florida, Amount: $40,000, Person-Months Per Year Committed to Project. Sumr: 0.1. Period: 4/07 – 4/08. Submitted 3/07. Purpose: development of advanced nanocomposite polymer substrates for microwave applications.

41. Wireless Communication Systems Lab - A Laboratory Course, P.I. H. Arslan, Co-PIs T. Weller and L. Dunleavy, Granting Agency: The National Science Foundation, Amount: $139,669, Period: 9/1/06 – 8/30/07. Submitted 6/06. Purpose: development of a new wireless communications systems laboratory course.

42. NIRT: Nanocrystalline Thin Film Diamond for MEMS and Biomedical Applications --- Supplemental Funding Request, P.I. Ashok Kumar, Co-PI: T. Weller (50%), Granting Agency: **The National Science Foundation**, Amount: $10,600 Period: 2/1/06-8/1/06. Purpose: Participant support funding for collaborative research with University of Ulm (Germany).

43. WIRELESS SIGNAL ROUTING ALTERNATIVES IN DENSE-CLUTTER ENVIRONMENTS, P.I.: Thomas Weller, Granting Agency: **Goodrich Hella Aerospace** ($23,175), Submitted 2/2006, Period: 8/1/06 – 8/1/07. Purpose: The objective of this work is to investigate solutions for routing signals in wireless environments where signal blockage and background clutter is potentially extreme.

44. Radiometric Sensors as Non-invasive Approach to Health Monitoring, P.I. T. Weller, Granting Agency: Raytheon, Amount: $51,849, Period: 8/1/06 – 8/31/08. Submitted 6/06. Purpose: Support the analysis and modeling of the dielectric properties of human tissue.

45. Non-Linear Device Applications of Nano-Patterned Barium Strontium Titanate Thin Films, P.I. T. Weller (50%), Co-P.I. A. Kumar and M. Smith (Raytheon), Granting Agency: The National Science Foundation (ECS 0601536), Amount: $299, 810, Period: 5/1/06 – 4/1/11. Submitted 10/05. Purpose: development of miniaturized non-linear BST microwave devices.

46. Planar Antennas for 2.4 GHz Wireless Sensors Nodes, P.I.: Thomas Weller, Granting Agency: **Goodrich Hella Aerospace** ($44,994) and State of Florida High Tech Corridor Program ($44,994), Submitted 12/2005, Period: 1/1/06 – 12/31/06. Purpose: Research relating to low-profile antennas for Zigbee applications.

47. Microwave Spectroscopy in Skin Cancer Detection and Diagnosis, P.I. T. Weller, Granting Agency: The Skin Cancer Foundation, Amount: $10,000, Period: 4/1/06 – 12/31/06. Submitted 10/05. Purpose: Study skin cancer detection using microwave spectroscopy techniques.

48. Cold Noise Path, P.I.: T. Weller, Granting Agency: Raytheon, Amount: $10,000, Submitted 10/2005, Period: 11/05 – 5/06. Purpose: Perform analysis of cold noise propagation experimental setup and data.

49. MEMS Acoustic Re-radiator System, P.I.: T. Weller, Granting Agency: Raytheon, Amount: $50,000, Submitted 10/2005, Period: 11/05 – 12/06. Purpose: Design and characterize RF sub-system for a miniature acoustical sensor.

50. WAMI – Connection One Research Site Planning Grant Proposal, P.I. H. Arslan, Co-PIs: T. Weller (20%), L. Dunleavy, M. Labrador and K. Christensen, Granting Agency: **The National Science Foundation**, Amount: $10,000, Submitted 4/2005, Period: 6/2005-12/2005. Purpose: Prepare full proposal to join Connection One Industry-University Cooperative Research Center.

51. Planar Antennas for 2.4 GHz Wireless Sensors Nodes, P.I.: Thomas Weller, Granting Agency: **Goodrich Halle Aerospace** ($14,559), Submitted 5/2005, Period: 6/1/05 – 12/31/05. Purpose: Research relating to low-profile antennas for Zigbee applications.

52. Ku-Band MHEMT MMIC Characterization and MEMS-Based Electronically Steered Array, P.I.: Thomas Weller, Granting Agency: **Raytheon** ($25,000 cash, $25,000 in-kind) and State of Florida High Tech Corridor Program ($25,000), Period: 12/1/04 – 12/30/05. Purpose: Design and characterization of GaAs MMIC microwave transceiver chip and RF-MEMS reconfigurable antenna array.

53. NIRT: Nanocrystalline Thin Film Diamond for MEMS and Biomedical Applications, P.I. Ashok Kumar, Co-PIs: T. Weller (25%), S. Bhansali, and I. Oleynik, Granting Agency: **The National Science Foundation** (ECS-0404137), Amount: $1,300,000, Period: 9/1/04-9/1/08. Purpose: Diamond thin films will be developed for use in high-power, high-reliability RF MEMS phase shifters.

54. RF MEMs Phase Shifters for Low Cost Electronically Steered Arrays, P.I.: Thomas Weller, Granting Agency: **Harris Corporation** ($100,000) and State of Florida High Tech Corridor Program ($50,000), Period: 7/1/04 – 6/30/05. Purpose: This project concerns 3-D, monolithic interconnects for microwave/mm-wave applications. These networks are intended for use in systems-on-chip designs incorporating analog and digital electronics.

55. Visible Light Rectenna Project, PI Elias Stefanakos, co-PI Shekhar Bhansali, Ken Buckle, Burt Krakow and Tom Weller (20%); Granting Agency: NASA, June 2002-September 2004, $50,000. This project concerns research on methods for optical rectification of visible light using rectenna techniques.

56. HIGH-EFFICIENCY MINIATURIZED ANTENNAS ON LOSSY SILICON SUBSTRATES, P.I.: Thomas Weller, Granting Agency: **Northrop Grumman / Xetron** ($30,000), Anritsu ($52,560), and State of Florida High Tech Corridor Program ($20,000), Period: 7/1/04 – 12/30/05. Purpose: Small-scale antennas will be developed that are intended for microwave/mm-wave chip-to-chip communications.

57. Wideband MHEMT-Based Receiver Architectures using Nano-scale Switches, P.I.: Thomas Weller (50%) and Lawrence Dunleavy, Granting Agency: **Raytheon** and I-4 Corridor High Technology Development Program, Amount: $105,000 Raytheon, $52,500 I4, Period: 8/1/03 – 7/30/04. Purpose: Advanced architectures for microwave receivers operating from 20-90 GHz will be studied. The designs will be tailored to meet emerging military communications applications that require signal identification over extremely wide frequency ranges.

58. HTC: Baluns & transformers for wireless applications using an advanced direct-write mesotool capability, P.I.: Thomas Weller, Granting Agency: **Sciperio, Inc., Harris Corporation**, and I-4 Corridor High Technology Development Program, Amount: $75,000 Sciperio, $25,000 Harris, $50,000 I4, Period: 8/1/03 – 7/30/04. Purpose: New design methodologies will be developed for miniaturized RF/microwave components that can be deposited directly onto conformal surfaces, e.g. the exterior of unmanned autonomous vehicles (AUV's), protective headgear (helmets) and personal wireless devices.

59. Microwave Variable Impedance Transmission Lines, P.I.: Thomas M. Weller, Granting Agency: **National Science Foundation** (1998 CAREER Program – Matching Funds, 2002), Amount: $25,000. Purpose: research related to 1998 NSF CAREER Award (supplemental funding to match contributions from Raytheon Systems).

60. Sensory Knowledge-Based Interface Science (SKINS), P.I.: S. Bhansali, co-P.Is.: S. Hariharan, D. Hilbelink, N. Ranganathan, T. Weller (20%), Granting Agency: **National Science Foundation – IGERT Program**, Amount: $3,018,000, Period: 7/1/02-6/30/08. Supplements of $137K in 2004, 2005 and 2006. Purpose: integrated education and research in MEMS skin sensors development.

61. Advanced microwave technology for space applications – MEMS switch architectures, P.I.: Thomas Weller, Granting Agency: **Raytheon Systems (St. Petersburg) and I-4 Corridor High Technology Development Program**, Amount: $20,000 Raytheon, $30,000 Raytheon (in-kind), $25,000 I4, Period: 8/20/02 – 8/19/03. Purpose: The proposed work targets the development of advanced architectures for RF micro electromechanical switch design.

62. Microwave Variable Impedance Transmission Lines, P.I.: Thomas M. Weller, Granting Agency: **National Science Foundation** (1998 CAREER Program – Matching Funds, 2001), Amount: $25,000. Purpose: research related to 1998 NSF CAREER Award (supplemental funding to match contributions from HRL Laboratories and Raytheon Systems).

63. Low Cost 60 GHz Proximity Sensor for Automotive Applications, P.I.: Thomas Weller, Granting Agency: **Wolff Controls and I-4 Corridor High Technology Development Program**, Amount: $40,000 Wolff ($8,650 additional funding for 2003), $20,400 Wolff (in-kind), $26,720 I4, Period: 7/1/01 – 6/30/03. Purpose: The goal of this work is to demonstrate a low-cost, mm-wave (60 GHz) proximity sensor that is intended for a variety of automotive applications.

64. Baluns & transformers for wireless applications using an advanced direct-write mesotool capability, P.I.: Thomas Weller, Granting Agency: **Raytheon Systems (St. Petersburg), CMS Technetronics and I-4 Corridor High Technology Development Program**, Amount: $25,320 CMS, $16,000 CMS (in-kind), $18,000 Raytheon (in-kind), $26,684 I4, Period: 8/1/01 – 7/30/02. Purpose: The goal of the project is to develop design and modeling solutions for baluns and transformers aimed at 1-4 GHz wireless applications.

65. Miniaturized Ka-Band Redundant Low Noise Amplifier Module for Space Applications, P.I.: Thomas Weller, Granting Agency: **Raytheon Systems (St. Petersburg) and I-4 Corridor High Technology Development Program**, Amount: $20,00 Raytheon, $30,000 Raytheon (in-kind), $20,000 I4, Period: 8/1/01 – 7/30/02. Purpose: The proposed work targets the development of miniaturized receiver modules for space applications in the 27.5-30 GHz band.

66. Precision Characterization for Wireless and mm-Wave Design, P.I.: Lawrence P. Dunleavy, co-P.I.: Thomas M. Weller (50%), Granting Agency: **USF I-4 Corridor Initiative Program**, Amount: $100,000 (I4), $190,000 from industry sources, $209,000 in-kind from industry sources, Period: 1/1/02 12/20/02. Purpose: develop techniques for W-band on-wafer characterization (including noise figure measurement) and novel techniques for amplitude control in the 75-110 GHz frequency range.

67. Micromachined Microwave Transmitter for an Integrated Sensor Assembly (Increment), P.I.: Thomas M. Weller, Granting Agency: **USF Center for Ocean Technology**, Amount: $21,750, Period: 4/1/01 - 12/20/01. Supplement: $26,250, 1/1/02 – 12/30/04. Purpose: investigate the design and fabrication of temperature and conductivity sensors with integrated RF-telemetry capability.

68. REU Supplement to CAREER Award, P.I.: Thomas M. Weller, Granting Agency: National Science Foundation, Amount: $5,000, Period: 4/01 – 8/01. Purpose: The REU (Research for Engineering Undergraduates) provides support for undergraduate students pursuing directed research projects.

69. Travel Grant to Attend International Symposium on Antennas and Propagation in Japan, Thomas Weller, Granting Agency: **USF Division of Sponsored Research**, Amount: $1,500, October 2000.

70. Microwave Variable Impedance Transmission Lines, P.I.: Thomas M. Weller, Granting Agency: **National Science Foundation** (1998 CAREER Program – Matching Funds, 2000), Amount: $25,000. Purpose: research related to 1998 NSF CAREER Award (supplemental funding to match contributions from HRL Laboratories and Raytheon Systems)

71. Active Device (BJT) and Varactor Diode Modeling, P.I.: Thomas Weller, Granting Agency: **USF I-4 Corridor Initiative Program, Motorola**, Period: 8/20/00-8/19/01, Amount: $56,000 (USF), $96,000 cash and $16,000 in-kind (Motorola). Purpose: investigate characterization and modeling techniques for transistors and varactor diodes.

72. Micromachined Components and Packaging for a K-Band Receiver: Broadband Antenna and Multi-Layer Integration, P.I.: Thomas Weller, Granting Agency: **USF I-4 Corridor Initiative Program, Raytheon E-Systems**, Period: 8/20/00-8/19/01, Amount: $20,000 (USF), $20,000 cash and $20,000 in-kind (Raytheon). Purpose: investigate novel microwave/mm-wave circuit and antenna architectures for receiver/radiometer applications.

73. On-Wafer Metrology for 100 GHz Microelectronics, P.I.: Lawrence P. Dunleavy, co-P.I.: Thomas M. Weller (25%), Granting Agency: **USF I-4 Corridor Initiative Program**, Amount: $156,500 (USF), $156,500 from industry sources, $301,000 in-kind from industry sources, Period: 1/1/01 12/20/01.

Purpose: develop techniques for W-band on-wafer characterization (including noise figure measurement) and novel techniques for amplitude control in the 75-110 GHz frequency range.

74. Micro-Monitoring Instrument, P.I.: Larry Langebrake, co-P.I.'s.: D. Fries, R. Short, S. Samson, T. Weller (15%), and P. Betzer, Granting Agency: **U.S. Army Space and Missile Command**, Amount: $15,756,619, Period: 2/2000 - 2/2006. Purpose: the primary objective is the development of a world-class design and fabrication facility for micro electromechanical systems (MEMS) and related technologies, directed at micro sensor development; T. Weller will direct basic research in RF MEMS communications sub-systems. Option 3 and Option 4 extensions in review as of 3/1/2003.

75. RF/Microwave Passive Circuit Integration on Semi-conducting Silicon Substrates, P.I.: Thomas M. Weller, Granting Agency: **IBM**, Amount: $40,000, Period: 8/1/00-8/1/01. Purpose: investigate innovative techniques for integrating microwave (MEMS) components on CMOS grade silicon substrates. Provided as an IBM Faculty Partnership Award. Renewed for additional $40,000 for 8/1/01-8/1/02.

76. Design and Characterization of Direct Write Circuits/Subsystems, P.I.: Thomas Weller, Granting Agency: **CMS Technetronics**, Period: 4/1/00-4/1/01, Amount: $7,000. Purpose: evaluate design techniques and performance of selected RF/microwave components that are produced using laser chemical vapor deposition.

77. Microwave Variable Impedance Transmission Lines, P.I.: Thomas M. Weller, Granting Agency: **National Science Foundation** (1998 CAREER Program – Matching Funds, 1999), Amount: $25,000. Purpose: research related to 1998 NSF CAREER Award (supplemental funding to match contributions from HRL Laboratories and Raytheon Systems).

78. Micromachined Components and Packaging for a K-Band Receiver, P.I.: Thomas Weller, Granting Agency: **USF I-4 Corridor Initiative Program, Raytheon E-Systems**, Period: 1/1/00-12/20/00, Amount: $25,000 (USF), $25,000 cash and $25,000 in-kind (Raytheon). Purpose: research relating to the design, fabrication and testing of planar, micromachined components for a K-Band receiver/radiometer.

79. Travel Grant to Attend European Microwave Conference in Germany, Thomas Weller, Granting Agency: **USF Division of Sponsored Research**, 12/6/99, Amount: $1,500.

80. On-Wafer Metrology for 100 GHz Microelectronics, P.I.: Lawrence P. Dunleavy, co-P.I.: Thomas M. Weller, Granting Agency: **USF I-4 Corridor Initiative Program**, Amount: $145,000 (USF), $145,000 from industry sources, Period: 1/1/00 12/20/00. Purpose: develop techniques for W-band on-wafer characterization (including noise figure measurement) and novel techniques for amplitude control in the 75-110 GHz frequency range.

81. Micromachined Coplanar Waveguide to Microstrip Transitions, P.I.: Thomas M. Weller, Granting Agency: **HRL Laboratories**, Period: 8/99-8/02, Amount: $40,000. Purpose: investigate designs for micromachined filter banks comprised of coplanar waveguide, microstrip and stripline and the requisite transitions; design low-loss, miniaturized stripline resonators.

82. Microwave Variable Impedance Transmission Lines, P.I.: Thomas M. Weller, Granting Agency: **National Science Foundation** (1998 CAREER Program), Period: 8/99-8/03, Amount: $210,000. Purpose: investigate novel techniques for realizing voltage-controlled, tunable MEMS-based transmission lines; curriculum development in the area of wireless sensor systems.

83. Microwave Multi-Media Module Based on USF's WAMI Lab, P.I. Lawrence Dunleavy, co-P.I.: Thomas Weller, Granting Agency: **IEEE MTT Society**, Period: 5/1/99-4/30/01, Amount: $30,000. Purpose: develop multi-media modules based on USF's Wireless Circuits and Systems Laboratory (part of the Wireless and Microwave---WAMI---program initiative).

84. Board Level Parasitic Modeling, P.I. Thomas Weller, Granting Agency: **Motorola**, Period: 5/11/99-6/30/00, Amount: $80,524. Purpose: investigate modeling techniques for discontinuities such as plated, multi-layer vias, planar spiral inductors and component pad-stack geometries in the DC-10 GHz frequency range.

85. Development of a Capacitor Model Library, P.I. Thomas Weller, Granting Agency: **Motorola**, Period: 1/1/99-9/30/00, Amount: $230,079. Purpose: develop an extensive CAD/CAE model library for surface mount capacitors, inductors and resistors.

86. Modeling of Active and Passive Microwave Devices, P.I.: Lawrence Dunleavy, co-PI: Thomas Weller, Granting Agency: **ITT GaAsTEK**, Period: 1/1/99-12/20/99, Amount: $61,011. Purpose: investigate modeling techniques for a power amplifier demonstration board, including passive components and a packaged, 3-stage FET amplifier.

87. A Mm-Wave Proximity Sensor, P.I.: Thomas Weller, Granting Agency: **USF I-4 Corridor Initiative Program**, **Wolff Controls**, Period: 1/1/99-8/20/00, Amount: $30,000 (USF), $30,000 cash and $30,000 in-kind (Wolff). Purpose: design and demonstrate a 60 GHz proximity sensor for automotive (fuel injector) applications.

88. A MEMS-Based Microwave Voltage Controlled Oscillator, P.I.: Thomas Weller, Granting Agency: **USF I-4 Corridor Initiative Program, Raytheon E-Systems**, Period: 1/1/99-8/20/00, Amount: $20,000 (USF), $25,000 cash and $123,000 in-kind (Raytheon). Purpose: investigate a 20 GHz voltage-controlled oscillator design utilizing MEMS varactors.

89. On-Wafer Metrology for 100 GHz Microelectronics, P.I.: Lawrence P. Dunleavy, co-P.I.: Thomas M. Weller, Granting Agency: **USF I-4 Corridor Initiative Program**, Amount: $100,000, Period: 1/1/99 12/20/99. Purpose: develop techniques for W-band on-wafer characterization (including noise figure measurement) and novel techniques for amplitude control in the 75-110 GHz frequency range.

90. Micromachined Microwave Transmitter for an Integrated Sensor Assembly, P.I.: Thomas M. Weller, Granting Agency: **USF Center for Ocean Technology**, Amount: $30,000, Period: 9/1/98 - 12/20/99. Supplemental award $12,325, Period: 1/10/00 – 6/10/00. Purpose: investigate the design and fabrication of microfluidic channels for electrophoresis sensors with integrated RF-interrogation capability.

91. Wireless Receiver Design Using ADS, P.I.: Thomas M. Weller, co-P.I.: Lawrence Dunleavy, Paul Flikkema, Granting Agency: **Hewlett Packard EESof** (276-LO), Amount: $8,000, Period: 5/1/98-10/15/98. Purpose: demonstrate the simulation of a wireless receiver using Agilent's Advanced Design System.

92. MEMS Fabrication, P.I.: Thomas M. Weller, Granting Agency: **Raytheon Systems, St. Petersburg Division** (274-LO), Amount: $20,000, Period: 4/20/98-12/20/98. Purpose: investigate the design, modeling and fabrication of MEMS varactors and switches.

93. Micromachined Mm-Wave Planar Distribution Network, P.I.: Thomas M. Weller, Granting Agency: **University of Michigan** (275-LO), Amount: $26,223, Period: 4/1/98-12/20/98. Purpose: investigate the design and modeling of W-band, coplanar waveguide power distribution networks.

94. Phase Noise Characterization, P.I.: Lawrence P. Dunleavy, co-P.I.: Thomas M. Weller, Granting Agency: **Honeywell** (222-LO), Amount: $15,000, Period: 2/1/98 - 12/20/98. Purpose: investigate various phase noise measurement techniques and develop a custom phase-noise measurement instrument.

95. Development of Simulation, Modeling and Extraction Techniques for Passive (RLC) Components, P.I.: Thomas M. Weller, Granting Agency: **Motorola LMPS** (257-LO), Amount: $43,908 (Phase 1), $48,276 (Phase 2), $44,443 (Phase 3), Period: 10/10/97-6/30/00. Purpose: develop modeling and extraction techniques for surface mount components in the DC-10 GHz frequency range.

96. Development of Accurate Transfer Standards for On-Wafer MM-Wave Measurements, P.I.: Thomas M. Weller, co-P.I.: Lawrence P. Dunleavy, Granting Agency: **Wiltron Company** (255-LO), Amount: $40,119, Period: 8/20/97-8/20/98. Purpose: investigate approaches for on-wafer calibration and verification in the DC-110 GHz frequency range.

97. Advancements in Microwave/Mm-Wave Coplanar Waveguide Circuit Design, P.I.: Thomas M. Weller, Granting Agency: **SCEEE Development Fund** (254-LO), Amount: $10,000 (with a $10,000 match from USF), Period: 7/97 - 6/98. Purpose: investigate the design and full-wave modeling of cylindrical coplanar waveguide structures.

98. Millimeter-wave Proximity Sensor: Phase II, P.I.: Thomas M. Weller, Granting Agency: **Wolff Controls Corporation** (248-LO), Amount: $42,000, Period: 6/1/97 - 1/31/98. Purpose: investigate approaches for cost-effective mm-wave proximity sensing and demonstrate a prototype sensor at X-band.

99. W-Band Wilkinson Power Divider, P.I.: Thomas M. Weller, Granting Agency: **University of Michigan** (247-LO), Amount: $25,000, Period: 5/1/97 - 12/20/97. Purpose: design and demonstrate coplanar waveguide power dividers at W-band.

100. Miniature RF Circuits, P.I.: Thomas M. Weller, Granting Agency: **Honeywell** (246-LO), Amount: $2,000, Period: 4/15/97 - 7/15/97.

101. Uniplanar Micromachined Bandpass Filter, P.I.: Thomas M. Weller, Granting Agency: **Hughes Aircraft Company** (241-LO), Amount: $15,000, Period: 10/15/96 - 9/30/97. Purpose: investigate design approaches for X-band narrow-band micromachined filters.

102. Wireless Circuit and System Design: A New Introductory Laboratory, P.I.: R. E. Henning, co-P.I.s: L. P. Dunleavy, P. G. Flikkema, H. C. Gordon, T. M. Weller, Granting Agency: **National Science Foundation**, Amount: $208,712, Period: 6/96-7/97. Purpose: development of a modern instructional laboratory and a new laboratory course in wireless circuits and systems.

103. Design of Wireless Systems: A New Introductory Laboratory, co-P.I.s: L. P. Dunleavy, P. G. Flikkema, H. C. Gordon, R. E. Henning, T. M. Weller, Granting Agency: **Hewlett-Packard University Grants Program**, Amount: $106,740, 5/96. Purpose: development of a modern instructional laboratory and a new laboratory course in wireless circuits and systems.

104. Computer-Aided Design and Analysis of Microwave Circuits, P.I.: Thomas M. Weller, Granting Agency: **Wolff Controls Corporation** (235-LO), Amount: $21,633, Period: 5/15/96 - 8/15/96. Purpose: develop full-wave simulation techniques using commercial software packages for complex, multi-dimensional microwave circuits.

105. Millimeter-wave Proximity Sensor, P.I. Thomas M. Weller, co-P.I.: Lawrence P. Dunleavy, Granting Agency: **Wolff Controls Corporation** (through Technology Reinvestment Program) (2118-044), Amount: $178,607, Period: 4/29/96 - 6/1/97. Purpose: investigate approaches for cost-effective mm-wave proximity sensing and demonstrate a prototype sensor at X-band.

106. Design and Fabrication of a Micromachined Bandpass Filter, P.I. Thomas M. Weller, Granting Agency: **USF Division of Sponsored Research** (940-RO), Amount: $7,500, Period: 4/4/96 - 4/3/97. Purpose: investigate design and fabrication techniques for micromachined microwave filters.

107. Multi-Chip Hybrid/MMIC Packaging with High Testability, P.I.: Lawrence P. Dunleavy, co-P.I.: Thomas M. Weller, Granting Agency: **E-Systems, ECI Division** (234-LO), Amount: $25,000, Period: 3/29/96 - 12/20/96. Purpose: investigate package design strategies that provide microwave test capability at all stages of integration.

108. Miniature RF Circuits, P.I.: Lawrence P. Dunleavy, co-P.I.: Thomas M. Weller, Granting Agency: **Honeywell** (222-LO), Amount: $41,000, Period: 8/5/95 - 12/31/97. Purpose: investigate modeling techniques for miniature RFIC passives.

109. MMIC Active/Passive Device Modeling, P.I.: Lawrence P. Dunleavy, co-P.I.: Thomas M. Weller, Granting Agency: **Raytheon E-Systems, ECI Division** (205-LO), Amount: $122,519, Period: 2/24/94-12/20/97. Purpose: investigate modeling techniques for FETs and passive MMIC components.