



Guru Subramanyam
Professor
ELECTRICAL & COMPUTER ENGINEERING DEPARTMENT
UNIVERSITY OF DAYTON

1. Educational Background and Work Experience:

Education:

PhD in Electrical Engineering, 1993, University of Cincinnati, Dept. of Electrical & Computer Engineering.

M.S. in Electrical Engineering, 1988, University of Cincinnati, Dept. of Electrical & Computer Engineering.

B.E. in Electrical & Electronics Engineering, 1986, University of Madras, India. Passed with First Class and Distinction.

Employment Record:

August 2008-Current: Professor, University of Dayton

August 2002- 2008: Associate Professor, University of Dayton.

August 1998- August 2002: Assistant Professor, University of Dayton.

August 1993- May 1998: Assistant Professor, University of Northern Iowa.

Work Experience:

Teaching:

At the University of Dayton (1998-current): Has taught courses in Electronic Devices, Electronic Devices Laboratory, Microelectronic System Design, and Applied Electromagnetics at the undergraduate level, and Microelectronic Devices, Digital Communications II and Microwave engineering at the graduate level. Also involved in undergraduate and graduate research supervision. **Currently serving as an advisor to 1 PhD student, and 4 MS students. 11 MS students completed their theses under my research supervision since I joined UD. Four PhD students have completed their Ph.D. dissertation at UD. Served in more than 15 MS and PhD thesis committees since joining UD.**

Research:

Recent Research on frequency/phase agile microwave electronics, as well as biopolymers for electronics, photonics, and sensors: Has been a PI in projects funded by DARPA, AFRL, AFOSR, NASA, NSF, and Ohio Board of Regents Research Challenge Grants. Also worked on funded projects with Rockwell Collins, Pole-Zero and Analog Bridge Inc. companies. Total funding as a PI exceeds \$1,250,000 to date. Set up a class 1000 modular clean room at the University of Dayton. The clean room currently houses a large area pulsed laser deposition system for Barium Strontium Titanate ($Ba_xSr_{1-x}TiO_3$) thin films. **Also, the BST varactor technology developed by Professor Subramanyam has been licensed by a company (Inventis Corporation) and resulted in a new start-up company (Analog Bridge Incorporated). Analog Bridge Inc. is currently in the process of commercializing the BST varactors for wireless and microwave industry.**

NRC/AFOSR Summer Faculty Fellowship: Summers of 2001, 2002, and 2003. Performed research in RF/Microwave components in the Sensors Directorate, Air Force Research Laboratory (AFRL), Dayton, OH. Highlight of my summer work was in 2002 when we demonstrated an Autonomous Receiver Interference Suppression System (ARISS) at the AFRL Sensors Directorate.

NASA/OAI Summer Faculty fellowship: Summers of 1997, 98, 99 and 2000. Performed research in ferroelectric tunable microwave components in the Communication Technology Division, NASA Glenn Research Center, Cleveland, OH. Highlight of my work with NASA is the cryogenic tunable filter which was selected by NASA as a new technology item, and a NASA Tech Brief Award.

Service, at the University of Dayton:

2008-Current: Member of the Faculty Awards Committee for selection of Alumni Awards for Teaching and Research.

2004-Current: Member of advisory committee for Nano Engineering Science and Technology (NEST)

2005-2007: Member and co-ordinator of the Electrical Engineering Undergraduate Curriculum Committee.

2005-2007: Member of the sub-committee for criteria 4, the North Central Accreditation.

2005-2007: Member of the Innovation Center Planning Committee, School of Engineering.

2002- 2005: Member of the UD Research Council. Reviewed Faculty and graduate student proposals for Summer Faculty Fellowships and Research Council Seed grants.

2000-2003: Chair of the Graduate Program Committee/Graduate Co-ordinator: Graduate Applications, program changes, course schedule, new brochures, etc.

2002-03: Member of the Undergraduate Program Committee. Undergraduate curriculum revisions.

2002-2004: Member of the Engineering Dean's Freshmen advising Team. Advised Freshmen ~ 2hrs a week.

2000-Current: Advisor to the IEEE Student Branch and Indian Students Association, University of Dayton.

1999-2004: Taught the PE review course in Electronics each year.

Other Service:

Reviewing Manuscripts for IEEE Microwave Theory and Techniques, IEEE Microwave and Wireless Component Letters, Applied Physics Letters, Journal of Electronic Materials, Integrated Ferroelectrics Journal, etc.

Served as a Panelist, NSF Sensors Program (2004), NSF Nanoscale Multidisciplinary Research Team Proposals (2001, 2002).

Reviewed a Textbook, Fundamentals of Electronic Circuit Design, Comar and Comar, John Wiley and Sons, NY, 2001.

Organizing Conference Sessions on Voltage Tunable Dielectrics for Microwave Applications in Asia Pacific Microwave Conference (2000), International Symposia on Integrated Ferroelectrics (2006, 2007, and 2009). Also organized Full-day Workshop Sessions in Voltage Tunable Dielectrics in the European Microwave Symposium (2003), and IEEE International Microwave Symposium (2004).

Administrative:

September 2000-2003: Chair: ECE Graduate Program Committee: Introduced Grad Program Concentrations, new brochure development, survey tools, proposed and implemented a new 5 year accelerated B.S.+M.S. degree program, prepared the Graduate Program Review report in the 2002-03 academic year. Also worked with the Associated Vice President for Graduate Studies and Research to implement a Graduate Student Exchange Program with Technical University of Dresden.

August 2005-2007: Chair: ELE curricular committee. Reviewed ABET assessment plans, submitted a report with recommended changes for AY06-07 based on AY05-06 course assessments.

Professional Affiliations:

Senior Member of IEEE (2000), Member of IEEE since 1981. Member of American Physical Society (APS) (1994-current), Member of American Society for Engineering Education (ASEE) (1995-current), Member of Materials Research Society (2000- current), Member of Sigma-Xi (2004- current).

2. Awards and Honors:

1. Alumni Award for Excellence in Scholarship, University of Dayton, April 2008.
2. IEEE Dayton Section's Noble Award for Contributions in Electronic Devices, April 2007.
3. Sigma Xi's Noland Award for Excellence in Research, UD Sigma Xi Chapter, April 2008.
4. Faculty of the Year Award, IEEE UD Student Chapter, April 2007.
5. National Research Council (NRC)/AFOSR Summer Faculty Fellow, AirForce Research Laboratory, Sensors Directorate, WPAFB, Dayton, OH, Summers of 2001, 2002, and 2003.
6. NASA/OAI Faculty Summer Research Fellowship, NASA Glenn Research Center, Cleveland, Ohio, Summers of 1997, 1998, 1999 and 2000. 10 Weeks Fellowship each summer working in the Tunable components for K-band project, Communication Technology Division.
7. NASA Tech Brief Award for the manuscript by G. Subramanyam, F.W.Van Keuls, and F.A. Miranda, "A Novel K-band Tunable Microstrip Bandpass filter using a HTS/Ferroelectric/Dielectric multilayer configuration", IEEE International Microwave Symposium Digest, vol.2, pp. 1011-1014, 1998. Also published as a NASA Technical Memorandum, #207940.
8. Elevated to the IEEE Senior Member, December 1999.

3. Selected Recent Publications (From a Total exceeding 100):

1. P. Varanasi, K. Leedy, D. Tomich, **G. Subramanyam**, "Large area BST thin films for microwave applications deposited by pulsed laser ablation", *Thin Solid Films*, vol. 517, no.9, pp. 2878-81, 2009.
2. Q. Sun, **G. Subramanyam**, L. Dai, M. Check, A. Campbell, R. Naik, J. Grote, and Y. Wong, "Highly efficient quantum-dot light emitting diodes with DNA-CTMA as combined hole transporting and electron-blocking layer", *ACS Nano*, vol.3, no.3, pp. 737-743, 2009.
3. A.L. Campbell, R.R. Biggers, **G. Subramanyam**, G. Kozlowski, R.A. Kleismit, H.N. Zate, S.C. Hopkins, B.A. Glowacki, B.D. Riehl, T.L. Peterson, "Microwave characterization of nanostructured ferroelectric $\text{Ba}_{0.6}\text{Sr}_{0.4}\text{TiO}_3$ thin films fabricated by pulsed laser deposition", *Nanotechnology* vol. 19, no. 48 pp.485704-17, 2008.
4. Huadong Li, **G. Subramanyam**, Jiadong Wang, "Performance of thin film ferroelectrics with dopant-ion charges", *Integrated Ferroelectrics* v 97, no.1, pp.69-83, 2008.
5. Huadong Li, **G. Subramanyam**, S. K. Dey, "Influence of space-charge on hysteresis loop characteristics of ferroelectric thin films", *IEEE Transactions on Ultrasonics, Ferroelectrics and Frequency Control* v 55 n 2 pp.286-92, 2008.
6. Huadong Li, and **G. Subramanyam**, "Performance of Thin-film Ferroelectric Capacitors for EMC Decoupling", *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control* v 55, no. 12, 2008, pp. 2552-58.
7. **G. Subramanyam**, K. Leedy, C. Varanasi, R. Neidhard, K. Stamper, and M. Calcaterra, "A Low Voltage Tunable Analog Phase Shifter Utilizing Ferroelectric Varactors", *Integrated Ferroelectrics*, vol. 100, no. 1, 2008, pp. 156 – 164, 2008.
8. G. Ahmad, M. B. Dickerson, Y. Cai, S.E. Jones, E. Ernst, J. P. Vernon, M. S. Haluska, Y. Fang, J. Wang,

- G. Subramanyam**, R. R. Naik, and K. H. Sandhage, , “Bio-enabled Formation of BaTiO₃ at Room Temperature from an Aqueous Salt Solution at Near Neutral pH”, *J. American Chemical Society*, vol. 130, pp. 4-5, 2008.
9. C. Bartsch, **G. Subramanyam**, J. Grote, F. Hopkins, L. Brott, and R. Naik, “A new capacitive test structure for microwave characterization of biopolymers”, *Microwave and Optical Technology Letters*, vol. 49, no.6, pp. 1261-65, 2007.
 10. S.K. Dey, C.G.Wang, W. Cao, S. Bhaskar, J. Li and **G. Subramanyam**, “Epitaxial PST thin-films on sapphire by MOCVD: nanostructure and microwave properties”, *Invited Paper, Journal of Materials Science, Special Issue on Frontiers of Ferroelectricity*, vol. 41, Feb 2006.
 11. U. Khan, **G. Subramanyam**, S. Gevorgian, and A. Vorobiev, “Ferroelectric thin-film based two-dimensional electromagnetic structures”, *Integrated Ferroelectrics Journal*, vol. 86, pp. 67-76, 2006.
 12. **G. Subramanyam**, E. Heckman, J. Grote, and K. Hopkins, “Characterization of DNA based polymers for microwave photonics applications”, *IEEE Microwave and Wireless Technology Letters*, vol. 15, no.4, pp.232-234, 2005.
 13. **G. Subramanyam**, F. Ahamed, R. Biggers, A. Campbell, R. Neidhard, E. Nykiel, K. Stamper, R. Cortez, and M. Calcaterra, “A new varactor shunt switch for microwave and millimeterwave reconfigurable circuits”, published in the Special Issue on Reconfigurable components and circuits, *Frequenz Journal*, pp.37-40, 2005.
 14. **G. Subramanyam**, E. Heckman, J. Grote, K. Hopkins, et al., “Marine DNA derived polymers for microwave photonics applications”, *Microwave and Optical Technology Letters*, vol.46, no.3, pp. 278-282, August 2005.
 15. Z. Yuan,C.L. Chen, **G. Subramanyam**, et al., “Large Dielectric Tunability in Mn doped BST thin-films”, *Applied Physics Letters*, vol. 87, 152901-03, October 5, 2005. (Cited 26 times thru April 09)
 16. **G. Subramanyam**, F. Ahamed, R. Biggers, “Si MMIC compatible ferroelectric varactor shunt switches”, *IEEE Microwave and Wireless Component Letters*, pp. 739-741, November 2005. (Cited 11 times thru April 09)
 17. **G. Subramanyam**, F. Ahamed, R. Biggers, et al., “RF Performance evaluation of ferroelectric varactor shunt switches”, *Microwave and Optical Technology Letters*, vol. 47, no.4, pp. 370-374, November 2005. (Cited 6 times thru April 09)
 18. **G. Subramanyam**, S.K. Dey and C.L. Chen, “Microwave characterization of Mn:BST and PST thin-films”, *Integrated Ferroelectrics*, vol. 77, pp. 189-197, 2005.
 19. **G. Subramanyam**, F. Ahamed, R. Biggers, and A. Campbell, “Design Considerations for a Si MMIC compatible Ferroelectric Varactor Shunt Switch”, *Integrated Ferroelectrics*, vol. 77, pp. 207-216, 2005.
 20. S.Kanagala, F. Ahamed, U. Nath, S. Wakade, and **G. Subramanyam**, “Electrical Modeling of Ferroelectric Tunable Microwave Components and Circuits”, *Ferroelectrics*, vol.329, pp. 917-925, 2005.
 21. **G. Subramanyam**, B. Riehl, F. Ahamed, R. Biggers, A. Campbell, and S. Gevorgian, “New directions in high k tunable microwave dielectrics”, *Invited Paper, International Symposium on Integrated ferroelectrics (ISIF2004)*, Gyeongju, Korea. Published in a special issue of *Integrated Ferroelectrics Journal*, vol.66, pp.139-151, 2004.
 22. B. Riehl, **G. Subramanyam**, R. Biggers, A. Campbell, F.W. Van Keuls, F.A.Miranda, D.Tomlin, 2003, “Synthesis and characterization of nanostructured BSTO thin-films for microwave applications”, *Integrated Ferroelectrics*, vol.55, pp. 825-837. 2003. (Cited 17 times thru April 09).
 23. D.Kuylenstierna, **G. Subramanyam**, A. Vorobiev, and S. Gevorgian, “Tunable electromagnetic bandgap performance of coplanar waveguides periodically loaded by ferroelectric varactors”, *Microwave and Optical Technology Letters*, vol. 39, no.2, pp.81-86, 2003. (Cited 14 times thru April 09)

24. **G.Subramanyam**, F.W. Van Keuls, F.A. Miranda, R.R.Romanofsky, and J.D. Warner, "Design and development of ferroelectric tunable HTS microstrip filters for Ku and K-band applications", *Materials Chemistry and Physics*, vol. 17, pp.147-150, 2003. (Cited 7 times thru April 09)
25. **G.Subramanyam**, N.Mohsina, A. Zaman, F.W.Van Keuls, F.A.Miranda, R.R.Romanofsky, J.D. Warner, C.L.Chen, "Design and Development of ferroelectric tunable coplanar for Ku and K band applications", *Integrated Ferroelectrics*, vol.42, no.1-4, pp. 151-163, 2002.
26. F.A. Miranda, F.W. Van Keuls, R.R.Romanofsky, C.H.Mueller, S.Alterovitz, and **G.Subramanyam**, "Ferroelectric thin-film based technology for frequency and phase agile microwave communication applications", *Integrated Ferroelectrics*, vol.42, no.1-4, pp. 131-149, 2002. (Cited 12 times thru April 09)
27. F.A. Miranda, F.W. Van Keuls, C.H.Mueller, **G.Subramanyam**, and S. Vignesparamoorthy, "Performance enhancement of tunable bandpass filters using selective etched ferroelectric thin-films", *Integrated Ferroelectrics*, vol.50, pp.121-131, 2002.
28. **G. Subramanyam**, A. Zaman, N. Mohsina, F.W. Van Keuls, F.A. Miranda, R.Romanofsky, J.D. Warner, and P. Boolchand, "Ferroelectric tunable coplanar waveguide components for Ku- and K-band Applications", *Integrated Ferroelectrics*, vol.34, pp. 197-206, 2001.
29. E. Saentz, **G.Subramanyam**, F.W. Van Keuls, Chonglin Chen, and F.A. Miranda, "Fixed frequency and frequency agile HTS microstrip bandstop filters for L-band applications", *IEEE Transactions on Applied Superconductivity*, vol.11 , pp. 395-398, 2001.
30. F.A. Miranda, **G.Subramanyam**, F.W. Van Keuls, R.Romanofsky, J.D. Warner, C.H. Mueller, "Design and Development of Ferroelectric tunable microwave components for Ku- and K-band satellite communication systems", **Special issue on "Microwave and Communications Applications at Low Temperatures"** in the *IEEE Transactions on Microwave Theory and Techniques*, vol. 48, no.7, pp 1181-89, July 2000. (cited 63 times thru April 09)
31. **G.Subramanyam**, F. Van Keuls, F.A. Miranda, R.Romanofsky, C.Canedy, S. Aggarwal, T.Venkatesan, and R. Ramesh, "Performance of a K-band voltage controlled Lange coupler using a ferroelectric tunable microstrip configuration", *IEEE Microwave and Guided wave Letters*, vol.10, no.4, April 2000.
32. **G.Subramanyam**, F. Van Keuls and F.A. Miranda, "A K-band frequency agile microstrip bandpass filter using a thin-film HTS/ferroelectric/dielectric multilayer configuration", *IEEE Trans. On Microwave Theory and Techniques*, vol. 48, no.4, pp 525-530, April 2000. (Cited 13 times thru April 09)
33. **G. Subramanyam**, F. Van Keuls, and F.A. Miranda, "Effect of DC Biasing on YBCO/STO/LAO Tunable microstrip filters", *Integrated Ferroelectrics*, vol. 28, pp. 81-93, 2000.
34. **G.Subramanyam**, F. Van Keuls, F.A. Miranda, R.Romanofsky, C.Canedy, S. Aggarwal, T.Venkatesan, and R. Ramesh, "Correlation of Electric field and critical design parameters for ferroelectric tunable microwave filters", *Integrated Ferroelectrics*, vol.24, no.1, pp 273-285, 1999. (Cited 11 times thru April 09)
35. F.A. Miranda, F.W. Van Keuls, **G.Subramanyam**, C.H. Mueller, R.Romanofsky, and G.Rosado, "Correlation between material properties of ferroelectric thin-films and design parameters for microwave device applications: Modeling examples and experimental verification", *Integrated Ferroelectrics*, vol.24, pp 195-214, 1999. Also published as a NASA Technical Memorandum 2000-208876.
36. F.A. Miranda, **G.Subramanyam**, F.Van Keuls, and R.Romanofsky, "A K-band (HTS,Gold)/Ferroelectric thin film/Dielectric Diplexer for a discriminator locked tunable oscillator", *IEEE Trans. Applied Superconductivity*, vol.9, no.2, pp 3581-84, June 1999.

37. **G.Subramanyam**, F. Van Keuls, and F.A. Miranda, "A K-band Tunable Microstrip Bandpass Filter using a Thin film Conductor/Ferroelectric/Dielectric Multilayer Configuration", *IEEE Microwave and Guidedwave Letters*, vol. 8, no.2, pp 78-80, February 1998. (Cited 42 times thru April 09)
38. K. Groves, **G. Subramanyam**, T. Quach, R. Neidhard, M. Casto, P. Orlando, A. Matamana, "Design of a frequency agile X-band LNA using BST varactor based voltage tunable impedance matching networks", **2008 IEEE Antennas and Propagation Society International Symposium and USNC/URSI National Radio Science Meeting** pp.1-4, 2008.
39. M.A. Patterson, **G. Subramanyam**, P. Wheat, "A new wafer treatment cell for control of solution based thin film processing for applications in microelectronics", 2008 51st **IEEE International Midwest Symposium on Circuits and Systems (MWSCAS)**, pp.666-669, 2008.
40. G. Subramanyam, R. Neidhard, K. Stamper, J. Weideman, and M. Calcaterra, "Experimental verification of RF power sensitivity in Varactor Shunt Switches", **IEEE International Symposium on Antennas and Propagation, Honolulu, HI**, pp. 293-296, 2007.
41. D. Stevens, G. Subramanyam, et al., "A periodically perturbed coplanar waveguide transmission line leaky wave antenna", **IEEE International Symposium on Antennas and Propagation, Honolulu, HI, June 2007**, pp. 465-468, 2007.
42. **Guru Subramanyam** et al., "Improved rf performance of cascaded varactor shunt switches", Proceedings of the **IEEE International Symposium on Applications of Ferroelectrics (ISAF2006)**, Sunset Beach, NC, July 2006, pp. 352-355, 2006.
43. **G. Subramanyam**, and F. Ahamed, "RF Performance Characteristics of Novel ferroelectric varactor shunt switches", **Proceedings of the IEEE Midwest Symposium on Circuits and Systems**, pp. 619-622, vol.1, August 2005.
44. **G. Subramanyam**, et al., "Design and experimental verification of Passive components and circuits in 0.18 um FDSOI technology", **Proceedings of the European Microwave Symposium, Paris, France, October 2005**, pp. 1-4, 2005.
45. F. Ahamed and **G. Subramanyam**, "Design of a Si MMIC compatible ferroelectric varactor shunt switch for microwave applications", **Published in the Proceedings of the IEEE Ultrasonics, Ferroelectrics and Frequency Control2004**, Montreal, Canada. pp. 285-288, 2004.
46. S. Kanagala, P. Mathala, and **G. Subramanyam**, "Microwave Characterization of Ferroelectric thin-films", **Invited Paper, Published in the Proceedings of the Asia Pacific Microwave Conference (CD format)**, New Delhi, India, December 2004.
47. D. Kuylenstierna, A. Vorobiev, **G. Subramanyam**, S. Gevorgian, "Tunable Electromagnetic Bandgap Structures based on Ferroelectric thin films", **IEEE Antennas and Propagation Society International Symposium, June 22-25, 2003, Columbus, OH**. Article published in the proceedings of the Symposium, vol.4, pp.879-882, 2003.
48. D. Kuylenstierna, A. Vorobiev, **G. Subramanyam**, S. Gevorgian, "Tunable Electromagnetic Bandgap Structures based on Ba_{0.25}Sr_{0.75}TiO₃ parallel plate varactors on silicon coplanar waveguides", **European Microwave Symposium, Munich, Germany, October 6-10, 2003**. Article published in the Proceedings of the Symposium, pp.1111-1114, 2003.
49. **G. Subramanyam**, N. Mohsina, A.Al Zaman, F.A. Miranda, F.W.Van Keuls, R.R. Romanofsky, J.D. Warner, "Ferroelectric thin-film based electrically tunable Ku-band coplanar waveguide components", **2001 IEEE MTT-S International Microwave Symposium Digest (Cat. No.01CH37157)**, pt. 1, p 471-474 vol.1, 2001.

50. **G. Subramanyam**, F.A. Miranda, R.R. Romanofsky, F.W. Van Keuls, C.L. Canedy, S. Aggarval, T. Venkatesan, R. Ramesh, "A ferroelectric tunable microstrip Lange coupler for K-band applications", **2000 IEEE MTT-S International Microwave Symposium Digest (Cat. No.00CH37017)**, pp 1363-6 vol.3, 2000.

Selected Recent Research Funding Awarded:

1. Development of Biopolymer Based Sensors and Nanoelectronic Devices, Air Force Research Laboratory(AFRL) Materials and Manufacturing Directorate Biotech Program, \$55K, Award Date: March 2009.
2. Enhancement of Electromagnetic Properties in DNA based biopolymers using dopants, Air Force Office of Scientific Research, \$100 K (with Professor Liming Dai), November 2008.
3. Cryogenic Varactor Development for DARPA SURF Program, DARPA Strategic Technology Office (STO), \$67K, October 2008 (through AFRL Sensors Directorate).
4. Ferroelectric Varactor Technology Development Using Large Area Pulsed Laser Deposition, Analog Bridge and Institute for Development and Commercialization of Advanced Sensor Technologies (IDCAST), \$70K, May 2008.
5. Diamond nanotubes for mobility enhancement of DNA based biopolymers, AFOSR, \$100 K (with Professor Liming Dai), June 2007.
6. Large Area Pulsed Laser Deposition Equipment, Institute for Development and Commercialization of Advanced Sensor Technologies (IDCAST) Third Frontier Capital Equipment Funding, \$360K, December 2006.
7. Varactor Shunt Switches for Phase Control and Leakywave Antennas, AFRL Sensors Directorate, \$60K, November 2006.
8. Biopolymers for Electronics, Photonics and Sensors, DARPA Defense Sciences Office, \$125K, May 2006.
9. BST Varactor Based Phase Control Circuits, AFRL Sensors Directorate, \$30K, July 2005.
10. WIZE: Wireless Zero-Power Anti-tamper Sensors, SBIR Phase I with Systran Corporation, Office of Secretary of Defense, \$100 K.
11. Parallel Plate Varactor Development, Rockwell-Collins, \$28.5 K, June 2005.
12. High Voltage Ferroelectric Varactor Development, Pole-Zero Corporation, \$28K, December 2004.
13. Ferroelectric Varactor Technology Development, AFRL Sensors Directorate, \$55 K, August 2004.
14. Collaboratory Research Activity with Sweden, National Science Foundation, \$15K, February 2004.
15. New Technologies for Autonomous Receiver Interference Suppression (ARISS), NRC/AFOSR Summer Faculty Fellowship, \$14.5 K, June 2003.
16. Nanostructured BST thin films for microwave applications, Ohio Board of Regents Research Challenge Grant, \$26.6K, May 2003.
17. Nanocluster and Nanostructure synthesis in BST thin films by Pulsed Laser Deposition, AFRL Materials and Manufacturing Directorate, \$71K, equipment funding, with Rand Biggers, June 2002.
18. Design of Frequency Agile Microwave Components, NASA Glenn Research Center, \$22.6K, March 2001.
19. Ferroelectric Filter/LNA hybrid circuit, NASA Glenn Research Center, \$30K, Jan 2000.
20. Tunable CPW components for Ku and K-band, Ohio Board of Regents Research Challenge Grant, \$23.6K, June 1999.
21. K-band frequency agile down-converter, NASA Glenn Research Center, \$11K, November 1999.
22. Development of Ferroelectric thin films for room temperature applications, \$15K, August 1998.
23. Microelectronics Laboratory at UD, UDRI/UD, \$46.5 K, August 1998.

Patents Awarded:

1. Tunable Electromagnetic Bandgap Structures Based on High resistivity Si Substrates, Patent Number 7,030,463. Date issued: 04/18/2006. Inventors: Guru Subramanyam, and Spartak Gevorgian.

Patents Pending:

1. Ferroelectric Varactors on high resistivity Si, Patent Serial Number: 60/512631, Filed: 10/31/2005, Inventors: Guru Subramanyam, Spartak Gevorgian, and Andrei Vorobiev.
2. Ferroelectric Varactors Suitable for Capacitive Shunt Switching and Wireless Sensors, Serial Number: 11/543,654. Filed: 10/05/2006. Inventors: Guru Subramanyam, Spartak Gevorgian, and Andrei Vorobiev.
3. A novel characterization technique for dielectric properties of polymers, Serial Number: 60/665,725. Filed: 03/25/2005. Inventor: Guru Subramanyam.
4. A Novel Resonant Biochemical Sensor Capable of Wireless Interrogation, Serial Number: 12/172,330, Filed: 07/14/2008. Inventor: Guru Subramanyam.
5. Large dielectric tunability in Nanostructured BST Thin-film Varactors on Sapphire Substrates, Serial Number: 12/254,256. Filed: 10/20/2008. Inventor: Guru Subramanyam.

Graduate Research Supervision as the Principal Advisor at the University of Dayton:

1. Huadong Li, "Modeling and Experimental Evaluation of Ferroelectric Thin Films for Applications in Electromagnetic Compatibility", **Ph.D. Dissertation, Completed May 2008.**
2. Jiadong Wang, "Characterization of Ferroelectric Material for Advanced RF Circuit Design", **MS Thesis, May 2008.**
3. Pompei Leonard Orlando III, "Digitally Controllable Variable Gain and Variable Slope High Performance X-band Amplifier", **MS Thesis, May 2008.**
4. Kari Groves, "Frequency Agile Low-Noise Amplifier Using Barium Strontium Titanate (BST) Thin Film Capacitors", **MS Thesis, December 2007.**
5. Carrie Bartsch, "Development of a Field-Effect Transistor Using DNA Biopolymer As the Semiconductor Layer", **PhD Dissertation, August 2007.**
6. Faruque Ahamed, "Varactor Based Capacitive Shunt Switch Using Barium Strontium Titanate (BST) Thinfilms for Microwave Applications", **PhD Dissertation, December 2006.**
7. Umair Khan, "Tunable Frequency Selective Surface and High-Impedance Ground Plane Using Ferroelectric Thin Films", **MS Thesis, December 2005.**
8. Siddharth Rao, "1D and 2D Ferroelectric Tunable Electromagnetic Bandgap Structures on CPW and Microstrip Lines", **MS Thesis, August 2004.**
9. Bonnie Riehl, "Synthesis and Characterization of Nanostructured BSTO Thin films for Microwave Applications", **PhD Dissertation, May 2004.**
10. Urmila Nath, "Design and Development of Ferroelectric Thin-film Based RF MEMS switches for Microwave Applications", **MS Thesis, May 2004.**
11. Edward Brandon Nykiel, "X-band Balanced Low-Noise Amplifier", **MS Thesis, August 2003.**
12. Prasanna Matala, "Microwave Characterization of Ferroelectric Thin-films and Nonlinear Electro-optic Polymers Using Coplanar Waveguide Components", **MS Thesis, August 2003.**
13. Sivaruban Vignesparamoorthy, "Effect of Selectively Etched Ferroelectric Thin-film Layer on the Performance of Tunable Microwave Components", **MS Thesis, August 2002.**
14. Abdullah Al Zaman, "Ferroelectric Tunable Coplanar Waveguide Components for Ku and K-band Microwave Device Applications", **MS Thesis, December 2000.**