

CURRICULUM VITAE

DR. BINU BABY NARAKATHU

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EDUCATION

- Ph.D.** Electrical and Computer Engineering, Western Michigan University, USA (2014)
Dissertation title: “*Integration of Conventional Lithography and Printing Processes as a Key Enabling Technology for Printed and Flexible Sensing Systems*”
- M.Sc.** Computer Engineering, Western Michigan University, USA (2009)
Thesis title: “*Impedance Based Electrochemical Biosensors*”
- B.E.** Electronics and Communication Engineering, Visvesvaraya Technological University, India (2006)

WORK EXPERIENCE

- ❖ **Jan 2015 - Present** *Post Doctoral Research Fellow,
Center for Advanced Smart Sensors and Structures (CASSS)
ECE Department, WMU*
- Undertake research and prepare publications arising from sensor projects under the supervision of **Dr. Massood Zandi Atashbar**.
- ❖ **Sep 2012 - Dec 2014** *Graduate Teaching Assistant, ECE Department, WMU*
- Teaching and supervising lab experiments, and grading assignments and papers for an Electrical Engineering based **Circuit Analysis** class of 60 students under the supervision of **Dr. Randall Fisher**.
 - Teaching and supervising lab experiments, and grading assignments and papers for an Electrical Engineering based **Circuit Analysis** class of 60 students under the supervision of **Dr. Damon Miller**.
 - Teaching and supervising lab experiments, and grading assignments and papers for a Computer Engineering based **Digital Logic** class of 20 students under the supervision of **Dr. Dean Johnson**.
- ❖ **Jan 2010 – May 2011** *Research Associate, Sensors Technology Laboratory, ECE Department, WMU*
- Undertake research and prepare publications arising from sensor projects under the supervision of **Dr. Massood Zandi Atashbar**.
- ❖ **Jun 2008 - Dec 2009** *Research Assistant, Sensors Technology Laboratory, ECE Department, WMU*
- Undertake research and prepare publications arising from sensor projects under the supervision of **Dr. Massood Zandi Atashbar**.
- ❖ **Jun 2008 - Dec 2009** *Teaching Assistant, ECE Department, WMU*
- Graded assignments and papers for an Electrical Engineering based **Circuit Analysis** class of 40 students under the supervision of **Dr. Ralph Tanner**.
 - Graded assignments and papers for Computer Engineering based **Introduction to Microprocessors** class of 25 students under the supervision of **Dr. Massood Zandi Atashbar**.
 - Graded assignments and papers for a Computer Engineering based **Micro Electro Mechanical (MEMS)** class of 15 students under the supervision of **Dr. Massood Zandi Atashbar**.

PROFESSIONAL RECOGNITION

INVENTIONS:

1. M.Z. Atashbar and **B.B. Narakathu**, “Flow Cell with Integrated Microfluidic Flow Channel and Electrical Probes” Western Michigan University, Intellectual Property Disclosure, WMU CASE# 2011-002.
2. M.Z. Atashbar and **B.B. Narakathu**, “Novel Method of Fabricating a Flexible Capacitive Pressure Sensing System Using Traditional Printing Techniques” Western Michigan University, Intellectual Property Disclosure, WMU CASE# 2012-011.
3. M.Z. Atashbar and **B.B. Narakathu**, “Development of a Flexible Microfluidic Sensing Device by Integrating Printed Electrodes with Microfluidic Channels Fabricated Using Conventional Printed Circuit Board (PCB) Technology” Western Michigan University, Intellectual Property Disclosure, WMU CASE# 2013-005.
4. M.Z. Atashbar and **B.B. Narakathu**, “Development of a Novel Flow Cell for Opto-Electrochemical Based Dual Detection of Biochemical Compounds” Western Michigan University, Intellectual Property Disclosure, WMU CASE# 2013-012.
5. M.Z. Atashbar and **B.B. Narakathu**, “Microfluidic Systems with Microchannels and a Method of Making the Same” U.S. Patent Application 61,876,820, filed September 2013. (*Patent Pending*).
6. M.Z. Atashbar, M.K. Joyce, **B.B. Narakathu**, A.S.G. Reddy, A. Eshkeiti and M. Joyce, “Smartphone based Fully Printed and Flexible Impact Sensing System” Western Michigan University, Intellectual Property Disclosure, WMU CASE# 2014-012.
7. M.Z. Atashbar, M.K. Joyce, **B.B. Narakathu**, A.S.G. Reddy, A. Eshkeiti and M. Joyce, “Helmet Impact Monitoring System” U.S. Patent Application 62,039,042, filed October 2014. (*Patent Pending*).

HONORS AND AWARDS:

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| 2015 | Technology Transfer Talent Network (T3N) Post-Doctoral Fellowship, Michigan Economic Development Corporation (MEDC), State of Michigan (\$50,000) |
| 2014-2015 | Doctoral Graduate Teaching Assistantship, ECE Department, WMU (\$11,546) |
| June 2014 | Gwen Frostic Doctoral Fellowship, WMU (\$4,000) |
| March 2014 | Michigan Collegiate Innovation Prize (Top Finalist) |
| 2013-2014 | Doctoral Graduate Teaching Assistantship, ECE Department, WMU (\$11,546) |
| October 2013 | Graduate Student Travel Grant, WMU (\$600) |
| September 2013 | Bioelectronics Travel Grant, IEEE NSF (\$650) |
| April 2013 | Graduate Student Travel Grant, WMU (\$1,300) |
| 2012-2013 | All-University Graduate Research and Creative Scholar, WMU |
| 2012-2013 | Doctoral Graduate Teaching Assistantship, ECE Department, WMU (\$11,546) |
| October 2012 | CAPE Travel Scholarship, WMU (\$1,000) |

COMMITTEES:

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| 2015 | Session Chair Session I: Chemical Sensors Session II: Electrochemical Sensors IEEE Sensors Conference, Busan, South Korea, Nov. 2-4 |
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REVIEWERSHIP:

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| 2015-Present | Journal of Materials and Design |
| 2015-Present | Journal of Nanomaterials |

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| 2015 | IEEE Sensors Conference, Busan, South Korea |
| 2015 | National Science Foundation (NSF) Small Business Innovation Research (SBIR) Review Panel Committee |
| 2014 | IEEE Sensors Conference, Valencia, Spain |
| 2010-Present | IEEE Sensors Journal |
| 2010-Present | Journal of Sensors and Actuators B: Chemical |
| 2010-Present | International Journal of Modeling and Simulation |

AFFILIATIONS:

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|--------------|---|
| 2014-Present | Member of IEEE Signal Processing Society |
| 2014-Present | Member of IEEE Communications Society |
| 2012-Present | Member of Academic Integrity Committee Panel, WMU |
| 2011-Present | Eta Kappa Nu (Electrical and Computer Engineering Honor Society) |
| 2011-Present | Member of IEEE Electron Devices Society (EDS) |
| 2010-Present | Member of IEEE (Institute of Electrical and Electronic Engineers) |

GRANTS:

Grants Pending:

1. **B.B. Narakathu** and M.Z. Atashbar, “A smart helmet impact sensing system for real-time monitoring of concussion risk in athletes”, National Science Foundation (NSF) Small Business Innovation Research (SBIR) Phase I, 01/01/2016-30/06/2016, Total: **\$150,000**.

Grants Not Funded:

1. **B.B. Narakathu** and M.Z. Atashbar, “A smart helmet impact sensing system for real-time monitoring of concussion risk in athletes”, National Institutes of Health (NIH) Small Business Innovation Research (SBIR) Phase I, 12/01/2015-03/01/2016, Total: **\$150,000**.

PUBLICATIONS

Journal Papers:

1. A.S.G. Reddy, J.T. Wabeke, **B.B. Narakathu**, B.J. Bazuin, M.K. Joyce, S.O. Obare, M.Z. Atashbar, “A screen printed flexible electrochemical sensor for selective detection of toxic lead ions”, Sensors and Actuators B: Chemical, (*Submitted*).
2. **B.B. Narakathu**, A.S.G. Reddy, A. Eshkeiti, S. Emamian, M.Z. Atashbar, “Development of a microfluidic sensing platform by integrating PCB technology and inkjet printing process”, IEEE Sensors Journal, vol. 15(11), pp. 6374 - 6380, 2014.
3. Z. Ramshani, A.S.G. Reddy, **B.B. Narakathu**, M.Z. Atashbar, “SH-SAW sensor based microfluidic system for the detection of heavy metal compounds in liquid environments”, Sensors and Actuators B: Chemical, vol. 217(1), pp. 72-77, 2014.
4. S. Emamian, A. Eshkeiti, A.S.G. Reddy, **B.B. Narakathu**, M.Z. Atashbar, “Gravure printed flexible surface enhanced Raman spectroscopy (SERS) substrate for detection of 2,4-dinitrotoluene (DNT) vapor”, Sensors and Actuators B: Chemical, vol. 217(1), pp. 129-135, 2014.
5. A. Eshkeiti, A.S.G. Reddy, S. Emamian, **B.B. Narakathu**, M. Joyce, M.K. Joyce, P.D. Fleming, B.J. Bazuin, M.Z. Atashbar, “Screen printing of multi-layered hybrid printed circuit boards (PCB) on different substrates”, IEEE Transactions on Device and Materials Reliability, vol. 5(3), pp. 415-421, 2015.

6. H. Zhu, **B.B. Narakathu**, Z. Fang, A.T. Aijazi, M.K. Joyce, M.Z. Atashbar, L. Hu, "Gravure printed antenna on shape-stable transparent nanopaper, Nanoscale", vol. 6, pp. 9110-9115 2014.
7. **B.B. Narakathu**, M.S. Devadas, A.S.G. Reddy, A. Eshkeiti, A. Moorthi, I.R. Fernando, B. Miller, G. Ramakrishna, E. Sinn, M.K. Joyce, M. Rebros, E. Rebrosova, G. Mezei, M.Z. Atashbar, "Novel fully screen printed flexible electrochemical sensor for the investigation of electron transfer between thiol functionalized viologen and gold clusters", Sensors and Actuators B: Chemical, vol. 176, pp. 768-774, 2013.
8. A. Eshkeiti, **B.B. Narakathu**, A.S.G. Reddy, A. Moorthi, M.Z. Atashbar, "Detection of toxic heavy metals using A novel inkjet printed surface enhanced Raman spectroscopy (SERS) substrate", Sensors and Actuators B: Chemical, vol. 171-172, pp. 705-711, 2012.
9. **B.B. Narakathu**, W. Guo, S.O. Obare, M.Z. Atashbar, "Novel approach for detection of toxic organophosphorus compounds", Sensors and Actuators B: Chemical, vol. 158, pp. 69-74, 2011.
10. **B.B. Narakathu**, B.E. Bejcek, M.Z. Atashbar, "Pico mole level detection of toxic biochemical species using impedance based electrochemical biosensors", Sensor Letters, vol. 9, pp. 872-875, 2011.
11. **B.B. Narakathu**, W. Guo, S.O. Obare, M.Z. Atashbar, "Detection of picomolar levels of toxic organophosphorus compounds by electrochemical and fluorescence spectroscopy", Sensor Letters, vol. 9, pp. 907-909, 2011.
12. A.S.G. Reddy, **B.B. Narakathu**, M.Z. Atashbar, M. Rebros, E. Hrehorova, B.J. Bazuin, M.K. Joyce, P.D. Fleming, A. Pekarovicova, "Printed capacitive based humidity sensors on flexible substrates", Sensor Letters, vol. 9, pp. 869-871, 2011.
13. **B.B. Narakathu**, B.E. Bejcek, M.Z. Atashbar, "Improved detection limits of toxic biochemical species based on impedance measurements in electrochemical biosensors", Biosensors and Bioelectronics, vol. 26, pp. 923-928, 2010.

Conference Papers:

14. **B.B. Narakathu**, A.S.G. Reddy, D. Maddipatla, S. Emamian, A. Eshkeiti, A.A. Chlaihawi, B.J. Bazuin, M.Z. Atashbar, "Rapid prototyping of a flexible microfluidic sensing system using inkjet and screen printing processes", 14th IEEE Sensors Conference, November 1-4, Busan, South Korea, 2015 (*Accepted*).
15. S.G.R. Avuthu, J.T. Wabeke, **B.B. Narakathu**, D. Maddipatla, S. Emamian, A. Eshkeiti, A.A. Chlaihawi, M.K. Joyce, S.O. Obare, M.Z. Atashbar, "Development of screen printed electrochemical sensors for selective detection of heavy metals", 14th IEEE Sensors Conference, November 1-4, Busan, South Korea, 2015 (*Accepted*).
16. A.A. Chlaihawi, **B.B. Narakathu**, S. Emamian, A. Eshkeiti, S.G.R. Avuthu, B.J. Bazuin, M.Z. Atashbar, "Development of flexible dry ECG electrodes based on MWCNT/PDMS composite", 14th IEEE Sensors Conference, November 1-4, Busan, South Korea, 2015 (*Accepted*).
17. S.G.R. Avuthu, J.T. Wabeke, **B.B. Narakathu**, D. Maddipatla, S. Emamian, A. Eshkeiti, A.A. Chlaihawi, B.J. Bazuin, S.O. Obare, M.Z. Atashbar, "Detection of heavy metal ions using screen printed wireless LC sensor", 14th IEEE Sensors Conference, November 1-4, Busan, South Korea, 2015 (*Accepted*).
18. D. Maddipatla, **B.B. Narakathu**, S.G.R. Avuthu, S. Emamian, A. Eshkeiti, A.A. Chlaihawi, B.J. Bazuin, M.K. Joyce, C.W. Barrett, M.Z. Atashbar, "A novel flexographic printed strain gauge on paper platform", 14th IEEE Sensors Conference, November 1-4, Busan, South Korea, 2015 (*Accepted*).
19. S. Emamian, S.G.R. Avuthu, **B.B. Narakathu**, A. Eshkeiti, A.A. Chlaihawi, B.J. Bazuin, M.Z. Atashbar, "Fully printed and flexible piezoelectric based touch sensitive skin", 14th IEEE Sensors Conference, November 1-4, Busan, South Korea, 2015 (*Accepted*).
20. A. Eshkeiti, Z. Ramshani, S. Emamian, **B.B. Narakathu**, A.S.G. Reddy, M.M. Ali, A. Chlaihawi, M.K. Joyce, D.P. Fleming, B.J. Bazuin, M.Z. Atashbar, "A stretchable and wearable printed sensor for human

body motion monitoring”, 14th IEEE Sensors Conference, November 1-4, Busan, South Korea, 2015 (*Accepted*).

21. A.A. Chlaihawi, **B.B. Narakathu**, A. Eshkeiti, S. Emamian, A.S.G. Reddy, M.Z. Atashbar, “Screen printed MWCNT/PDMS based dry electrode sensor for electrocardiogram (ECG) measurements”, IEEE International Conference on Electro/Information Technology (EIT), May 21-23, Dekalb, Illinois, USA, 2015 (*Accepted*).
22. Z. Ramshani, **B.B. Narakathu**, A.S.G. Reddy, S. Obare, M.Z. Atashbar, “SH-SAW sensor based heavy metal detection”, Joint Conference of the IEEE International Frequency Control Symposium & European Frequency and Time Forum (IFCS-EFTF), April 12-16, Denver, Colorado, USA, pp. 224, 2015.
23. S. Emamian, A. Eshkeiti, **B.B. Narakathu**, A.S.G. Reddy, M.Z. Atashbar, “Detection of 2,4-dinitrotoluene (DNT) using gravure printed surface enhancement Raman spectroscopy (SERS) flexible substrate”, Flexible and Printed Electronics Conference (FlexTech), February 23-26, Monterey, California, USA, pp. 1, 2015.
24. **B.B. Narakathu**, A.S.G. Reddy, A. Eshkeiti, S. Emamian, M.Z. Atashbar, “Development of a novel printed flexible microfluidic sensing platform based on PCB technology”, 13th IEEE Sensors Conference, November 2-5, Valencia, Spain, pp. 665-668, 2014.
25. A. Eshkeiti, **B.B. Narakathu**, A.S.G. Reddy, S. Emamian, M.K. Joyce, B.J. Bazuin, M.Z. Atashbar, “Screen printed flexible capacitive pressure sensor”, 13th IEEE Sensors Conference, November 2-5, Valencia, Spain, pp. 1192-1195, 2014.
26. A. Eshkeiti, M. Joyce, **B.B. Narakathu**, A.S.G. Reddy, S. Emamian, M.K. Joyce, M.Z. Atashbar, “A novel self-supported printed flexible strain sensor for monitoring body movement”, 13th IEEE Sensors Conference, November 2-5, Valencia, Spain, pp. 1615-1618, 2014.
27. S. Emamian, A. Eshkeiti, **B.B. Narakathu**, A.S.G. Reddy, M.Z. Atashbar, “Gravure printed flexible SERS substrate for rapid and sensitive detection of 2,4-dinitrotoluene (DNT)”, 13th IEEE Sensors Conference, November 2-5, Valencia, Spain, pp. 1069-1072, 2014.
28. A.S.G. Reddy, **B.B. Narakathu**, A. Eshkeiti, S. Emamian, B.J. Bazuin, M. Joyce, M.Z. Atashbar, “Detection of heavy metal compounds using fully printed three electrode electrochemical sensor”, 13th IEEE Sensors Conference, November 2-5, Valencia, Spain, pp. 669-672, 2014.
29. **B.B. Narakathu**, A.S.G. Reddy, A. Eshkeiti, S. Emamian, M.Z. Atashbar, “A novel flexible microfluidic platform: Integration of conventional printed circuit board technology and inkjet printing”, 24th Anniversary World Congress on Biosensors (BIOSENSORS), May 27-30, Melbourne, Australia, pp. 120-121, 2014.
30. **B.B. Narakathu**, A.S.G. Reddy, A. Eshkeiti, B.J. Bazuin, M.Z. Atashbar, “A novel flow cell for opto-electrochemical based dual sensing of heavy metal compounds”, 15th International Meeting on Chemical Sensors (IMCS), March 16-19, Buenos Aires, Argentina, pp. 48, 2014.
31. A.S.G. Reddy, **B.B. Narakathu**, S. Emamian, A. Eshkeiti, B.J. Bazuin, M.K. Joyce, M.Z. Atashbar, “All printed pentacene organic thin film transistors for humidity sensing”, 15th International Meeting on Chemical Sensors (IMCS), March 16-19, Buenos Aires, Argentina, pp. 107, 2014.
32. A.S.G. Reddy, **B.B. Narakathu**, A. Eshkeiti, S. Emamian, B.J. Bazuin, M.K. Joyce, M.Z. Atashbar, “All screen printed circular electrodes as electrochemical sensors”, 15th International Meeting on Chemical Sensors (IMCS), March 16-19, Buenos Aires, Argentina, pp. 98, 2014.
33. S. Emamian, A. Eshkeiti, **B.B. Narakathu**, M.Z. Atashbar, “Detection of 2,4-dinitrotoluene (DNT) using gravure printed surface enhanced Raman spectroscopy (SERS) flexible substrate”, 15th International Meeting on Chemical Sensors (IMCS), March 16-19, Buenos Aires, Argentina, pp. 86, 2014.
34. Z. Ramshani, **B.B. Narakathu**, A.S.G. Reddy, M.Z. Atashbar, “Heavy metal detection using shear horizontal surface acoustic wave (SH-SAW) sensors”, 15th International Meeting on Chemical Sensors (IMCS), March 16-19, Buenos Aires, Argentina, pp. 88, 2014.

35. M. Rezaei, A. Eshkeiti, P. Aminayi, **B.B. Narakathu**, M.Z. Atashbar, "Detection of heavy metal compounds using a novel inkjet printed surface enhanced Raman spectroscopy (SERS) substrate based on metallic triangular nano structures", 15th International Meeting on Chemical Sensors (IMCS), March 16-19, Beunos Aires, Argentina, pp. 86, 2014.
36. M. Rezaei, A. Eshkeiti, P. Aminayi, Z. Ramshani, **B.B. Narakathu**, M. Z. Atashbar, "A novel inkjet printed surface enhanced Raman spectroscopy (SERS) substrate based on Marangoni effect for the detection of heavy metal compounds", 15th International Meeting on Chemical Sensors (IMCS), March 16-19, Beunos Aires, Argentina, pp. 120, 2014.
37. **B.B. Narakathu**, A. Eshkeiti, A.S.G. Reddy, S. Emamian, M.K. Joyce, P.D. Fleming, B.J. Bazuin, M.Z. Atashbar, "PDMS based flexible capacitive pressure sensor fabricated using printing technology", Flexible and Printed Electronics Conference (FlexTech), February 4-6, Phoenix, Arizona, USA, pp. 47, 2014.
38. **B.B. Narakathu**, M.S. Devadas, A.S.G. Reddy, A. Eshkeiti, G. Ramakrishna, E. Sinn, M.K. Joyce, G. Mezei, M.Z. Atashbar, "Investigation of electron transfer between gold clusters and (pseudo) rotaxanes using a novel screen printed flexible electrochemical sensor", Flexible and Printed Electronics Conference (FlexTech), February 4-6, Phoenix, Arizona, USA, pp. 46, 2014.
39. A.S.G. Reddy, **B.B. Narakathu**, A. Eshkeiti, S. Emamian, B.J. Bazuin, M.K. Joyce, M.Z. Atashbar, "All screen printed circular electrodes as electrochemical sensors", Flexible and Printed Electronics Conference (FlexTech), February 4-6, Phoenix, Arizona, USA, pp. 45, 2014.
40. A.S.G. Reddy, **B.B. Narakathu**, S. Emamian, A. Eshkeiti, M.K. Joyce, B.J. Bazuin, M.Z. Atashbar, "Fully printed electrochemical sensor on flexible substrates", Flexible and Printed Electronics Conference (FlexTech), February 4-6, Phoenix, Arizona, USA, pp. 45, 2014.
41. A. Eshkeiti, A.S.G. Reddy, **B.B. Narakathu**, S. Emamian, M. Rezaei, M.K. Joyce, P.D. Fleming, B.J. Bazuin, M.Z. Atashbar, "Screen printed capacitive pressure sensor", Flexible and Printed Electronics Conference (FlexTech), February 4-6, Phoenix, Arizona, USA, pp. 45, 2014.
42. **B.B. Narakathu**, A.S.G. Reddy, A. Eshkeiti, B.J. Bazuin, M.Z. Atashbar, "Opto-electrochemical based dual detection of heavy metal compounds using a novel flow cell", 12th IEEE Sensors Conference, November 3-6, Baltimore, Maryland, USA, pp. 1-4, 2013.
43. Z. Ramshani, **B.B. Narakathu**, A.S.G. Reddy, M.Z. Atashbar, "Investigation of SH-SAW sensors for toxic heavy metal detection", 12th IEEE Sensors Conference, November 3-6, Baltimore, Maryland, USA, pp. 1-4, 2013.
44. A. Eshkeiti, M. Rezaei, **B.B. Narakathu**, A.S.G. Reddy, M.Z. Atashbar, "Gravure printed paper based substrate for detection of heavy metals using surface enhanced Raman spectroscopy (SERS)", 12th IEEE Sensors Conference, November 3-6, Baltimore, Maryland, USA, pp. 1-4, 2013.
45. A.S.G. Reddy, A. Eshkeiti, **B.B. Narakathu**, B. J. Bazuin, M.K. Joyce, M.Z. Atashbar, "Fully printed OTFT based flexible humidity sensors", 12th IEEE Sensors Conference, November 3-6, Baltimore, Maryland, USA, pp. 1-4, 2013.
46. Z. Ramshani, **B.B. Narakathu**, M.Z. Atashbar, K. Ro, J.C. Song, D. Lee, C.H. Lee, "Design of a novel 3D localization and identification system using surface acoustic (SAW) devices", IEEE International Conference on Electro/Information Technology (EIT), May 9-11, Rapid City, South Dakota, USA, pp. 1-4, 2013.
47. **B.B. Narakathu**, A.S.G. Reddy, A. Eshkeiti, B.J. Bazuin, M.K. Joyce, M.Z. Atashbar, "Detection of biochemicals using a gravure printed flexible electrochemical sensor", Flexible and Printed Electronics Conference (FlexTech), January 29-February 1, Phoenix, Arizona, USA, pp. 18, 2013.

48. M. Joyce, H. Bohra, **B.B. Narakathu**, M.K. Joyce, D. Fleming, "Influence of Ink-Substrate Interactions on Ink-jet Printed Nano-Ag Print Quality", Flexible and Printed Electronics Conference (FlexTech), January 29-February 1, Phoenix, Arizona, USA, pp. 18, 2013.
49. A.S.G. Reddy, **B.B. Narakathu**, A. Eshkeiti, M.K. Joyce, B. J. Bazuin, M.Z. Atashbar, "Heavy metal detection using a flexible wireless printed LC sensor", Flexible and Printed Electronics Conference (FlexTech), January 29-February 1, Phoenix, Arizona, USA, pp. 17, 2013.
50. A. Eshkeiti, A.S.G. Reddy, **B.B. Narakathu**, M.K. Joyce, B.J. Bazuin, M.Z. Atashbar, "Detection of toxic heavy metals using a flexible printed surface enhanced Raman spectroscopy (SERS) substrate", Flexible and Printed Electronics Conference (FlexTech), January 29-February 1, Phoenix, Arizona, USA, pp. 17-18, 2013.
51. A. Moorthi, **B.B. Narakathu**, A.S.G. Reddy, A. Eshkeiti, M.Z. Atashbar, "A novel flexible strain gauge sensor fabricated using screen printing", 6th International Conference on Sensing Technology: ICST 2012, December 18-21, Kolkata, India, pp. 765-768, 2012.
52. A. Eshkeiti, **B.B. Narakathu**, A.S.G. Reddy, A. Moorthi, M.Z. Atashbar, E. Rebrosova, M. Rebro, M.K. Joyce, "Detection of toxic heavy metals using a novel flexible gravure printed surface enhanced Raman spectroscopy (SERS) based substrate" 6th Asia-Pacific Conference on Transducers and Micro/Nano Technologies (APCOT), July 8-11, Nanjing, China, 2012.
53. **B.B. Narakathu**, A. Eshkeiti, A.S.G. Reddy, A. Moorthi, M.Z. Atashbar, "A novel fully printed and flexible capacitive pressure sensor", 11th IEEE Sensors Conference, October 28-31, Taipei, Taiwan, pp. 1935-1938, 2012.
54. A. Eshkeiti, **B.B. Narakathu**, A.S.G. Reddy, A. Moorthi, M.Z. Atashbar, "Gravure printed surface enhanced Raman spectroscopy (SERS) substrate for detection of toxic heavy metals", 11th IEEE Sensors Conference, October 28-31, Taipei, Taiwan, pp. 434-437, 2012.
55. **B.B. Narakathu**, F.A. Abebe, C.S. Eribal, M.Z. Atashbar, E. Sinn, "Detection of Zn²⁺ ions using a novel chemosensor based on coumarin Schiff-base derivatives by electrochemical and fluorescence spectroscopy", 14th International Meeting on Chemical Sensors (IMCS), May 20-23, Nuremberg, Germany, pp. 690-693, 2012.
56. A.S.G. Reddy, A. Eshkeiti, **B.B. Narakathu**, A. Moorthi, M. Z. Atashbar, M. Rebro, E. Rebrosova, M.K. Joyce, "Fully printed wireless LC sensor for toxic heavy metal detection", 14th International Meeting on Chemical Sensors (IMCS), May 20-23, Nuremberg, Germany, pp. 1191-1194, 2012.
57. A. Eshkeiti, **B.B. Narakathu**, A.S.G. Reddy, A. Moorthi, M.Z. Atashbar, E. Rebrosova, M. Rebro, M.K. Joyce, "A novel flexible gravure printed surface enhanced Raman spectroscopy (SERS) sensor for the detection of toxic heavy metals", 14th International Meeting on Chemical Sensors (IMCS), May 20-23, Nuremberg, Germany, pp. 1479-1482, 2012.
58. A.S.G. Reddy, **B.B. Narakathu**, M.Z. Atashbar, M. Rebro, E. Rebrosova, M.K. Joyce, "Gravure printed electrochemical biosensors", 25th Eurosensors Conference, September 4-7, Athens, Greece, vol. 25, pp. 956-959, 2011.
59. A.S.G. Reddy, **B.B. Narakathu**, M.Z. Atashbar, M. Rebro, E. Rebrosova, M.K. Joyce, "Fully printed flexible humidity sensor", 25th Eurosensors Conference, September 4-7, Athens, Greece, vol. 25, pp. 120-123, 2011.
60. A. Eshkeiti, **B.B. Narakathu**, A.S.G. Reddy, A. Moorthi, M.Z. Atashbar, "A novel inkjet printed surface enhanced Raman spectroscopy (SERS) substrate for the detection of toxic heavy metals", 25th Eurosensors Conference, September 4-7, Athens, Greece, vol. 25, pp. 338-341, 2011.
61. **B.B. Narakathu**, A.S.G. Reddy, M.Z. Atashbar, M.K. Joyce, "A novel gravure printed impedance based flexible electrochemical sensor", 10th IEEE Sensors Conference, October 28-31, Limerick, Ireland, pp. 577-580, 2011.

62. A.S.G. Reddy, **B.B. Narakathu**, M.Z. Atashbar, M. Rebros, E. Hrehorova, M.K. Joyce, "Flexible electrochemical biosensor using Rotogravure printing", 10th Annual Flexible Electronics and Displays Conference, February 7-10, Phoenix, Arizona, USA, pp. 37, 2011.
63. A.S.G. Reddy, **B.B. Narakathu**, M.Z. Atashbar, M. Rebros, E. Hrehorova, M.K. Joyce, "Printed wireless humidity sensors on flexible substrates", 10th Annual Flexible Electronics and Displays Conference, February 7-10, Phoenix, Arizona, USA, pp. 37, 2011.
64. **B.B. Narakathu**, W. Guo, S.O. Obare, M.Z. Atashbar, "Electrochemical impedance spectroscopy sensing of toxic organophosphorus compounds", 9th IEEE Sensors Conference, November 1-4, Waikoloa, Hawaii, USA, pp. 1518-1521, 2010.
65. A.S.G. Reddy, **B.B. Narakathu**, M.Z. Atashbar, M. Rebros, E. Hrehorova, M.K. Joyce, "Printed electrochemical based biosensors on flexible substrates", 9th IEEE Sensors Conference, November 1-4, Waikoloa, Hawaii, USA, pp. 1596-1600, 2010.
66. **B.B. Narakathu**, M.Z. Atashbar, B. Bejcek, "Pico-mole level detection of toxic biochemical species using impedance based electrochemical biosensors", 13th International Meeting on Chemical Sensors (IMCS), July 11-14, Perth, Australia, pp. 313, 2010.
67. S.G.R. Avuthu, **B.B. Narakathu**, M.Z. Atashbar, M. Rebros, E. Hrehorova, B. Bazuin, D. Fleming, M.K. Joyce, "Printed capacitive based humidity sensors on flexible substrates", 13th International Meeting on Chemical Sensors (IMCS), July 11-14, Perth, Australia, pp. 124, 2010.
68. **B.B. Narakathu**, B.E. Bejcek, M.Z. Atashbar, "Impedance based electro-chemical biosensors", 8th IEEE Sensors Conference, October 25-28, Christchurch, New Zealand, pp. 1212-1216, 2009.

PRESENTATIONS:

1. Technology Transfer Talent Network (T3N) Printed Electronics Networking Event, Western Michigan University, Kalamazoo, Michigan, USA, "Printed and Flexible Sensing Systems", June 27, 2014.
2. The GAAmericas 4th Printed Electronics, Functional Printing & Intelligent Packaging Symposium, Clemson University, North Carolina, USA, "New Printed Electronics, Sensors and Cyber Physical Systems: A Flexible Printed Impact Sensing System", June 23-24, 2014.
3. The 13th IEEE Sensors Conference, Valencia, Spain, "Development of a novel printed flexible microfluidic sensing platform based on PCB technology", November 2-5, 2014.
4. The 15th International Meeting on Chemical Sensors (IMCS), Buenos Aires, Argentina, "A Novel Flow Cell for Opto-Electrochemical Based Dual Sensing of Heavy Metal Compounds", March 16-19, 2014.
5. The Flexible and Printed Electronics Conference (FlexTech), Phoenix, Arizona, USA, "PDMS Based Flexible Capacitive Pressure Sensor Fabricated Using Printing Technology", February 4-6, 2014.
6. The Flexible and Printed Electronics Conference (FlexTech), Phoenix, Arizona, USA, "Investigation of Electron Transfer between Gold Clusters and (Pseudo) Rotaxanes Using a Novel Screen Printed Flexible Electrochemical Sensor", February 4-6, 2014.
7. The 12th IEEE Sensors Conference, Baltimore, Maryland, USA, "Opto-Electrochemical Based Dual Detection of Heavy Metal Compounds Using a Novel Flow Cell", November 3-6, 2013.
8. The Flexible and Printed Electronics Conference (FlexTech), Phoenix, Arizona, USA, "Detection of biochemicals using a gravure printed flexible electrochemical sensor", January 29-February 1, 2013.
9. The 11th IEEE Sensors Conference, Taipei, Taiwan, "A Novel Fully Printed and Flexible Capacitive Pressure Sensor", October 28-31, 2012.
10. The 14th International Meeting on Chemical Sensors, Nuremberg, Germany, "Detection of Zn²⁺ ions using a novel chemosensor based on coumarin Schiff-base derivatives by electrochemical and fluorescence spectroscopy", May 20-23, 2012.

11. The 10th IEEE Sensors Conference, Limerick, Ireland, “A Novel Gravure Printed Impedance Based Flexible Electrochemical Sensor”, October 28-31, 2011.
12. The 9th IEEE Sensors Conference, Hawaii, USA, “Electrochemical impedance and fluorescence spectroscopy sensing of toxic organophosphorus compound”, November 1-4, 2010.
13. The 13th International Meeting on Chemical sensors, Perth, Australia, “Pico mole level detection of toxic biochemical species using impedance based electrochemical biosensors”, July 11-14, 2010.
14. The 13th International Meeting on Chemical sensors, Perth, Australia, “Detection of picomolar levels of toxic organophosphorus compounds by electrochemical and fluorescence spectroscopy”, July 11-14, 2010.
15. The 8th IEEE Sensors Conference, Christchurch, New Zealand, “Impedance based electrochemical biosensors”, October 25-28, 2009.
16. MichBio Expo Conference, Michigan, USA “Impedance based electrochemical biosensors”, November 3-4, 2009.
17. Center for Advancement of Printed Electronics (CAPE) Consortium, Western Michigan University, Michigan, USA “Impedance based electrochemical biosensors”, July 3-5, 2009.

WORKSHOPS:

1. M.K. Joyce, P. D. Fleming, M.Z. Atashbar, B. Bazuin, **B.B. Narakathu**, “Mastering Printed Electronics Principles”, Center for Advancement of Printed Electronics (CAPE), Western Michigan University, Kalamazoo, Michigan, August 6-7, 2013.
2. M.K. Joyce, M.L. Ricks, J. Parker, R. Rustin, J. Fraser, K. Manes, P. D. Fleming, E. Hrehorova, M.Z. Atashbar, B. Bazuin, **B.B. Narakathu**, “Mastering Printed Electronics Principles”, Center for Advancement of Printed Electronics (CAPE), Western Michigan University, Kalamazoo, Michigan, May 10-11, 2012.
3. M.K. Joyce, J. Parker, R. Rustin, G. Deka, J. Foster, E. Hrehorova, R. Robres, M.Z. Atashbar, B. Bazuin, **B.B. Narakathu**, “Mastering Printed Electronics Principles”, Center for Advancement of Printed Electronics (CAPE), Western Michigan University, Kalamazoo, Michigan, May 9-10, 2011.
4. M.K. Joyce, D. Gamota, J. Parker, R. Rustin, G. Deka, J. Foster, E. Hrehorova, R. Robres, M.Z. Atashbar, B. Bazuin, **B.B. Narakathu**, “Mastering Printed Electronics Principles”, Center for Advancement of Printed Electronics (CAPE), Western Michigan University, Kalamazoo, Michigan, October 13-14, 2010.
5. M.K. Joyce, R. Tulis, J. Parker, R. Robres, M.Z. Atashbar, L. Panico, B. Bazuin, E. Serenius, **B.B. Narakathu**, “Mastering Printed Electronics Principles”, Center for Advancement of Printed Electronics (CAPE), Western Michigan University, Kalamazoo, Michigan, June 9-10, 2010.

ACADEMIC PROJECTS

- Design, fabrication and testing of a dual axis accelerometer micro electro mechanical system (MEMS) using Silicon-On-Glass (SOG) technology and related capacitance to voltage convertor circuit using EDNMOS technology.
- Development of IC Design (including layout), simulation and analysis of a 4-Bit ALU, a carry-save multiplier (CSMUL) for 4-bit binary unsigned operands and a dual 4X4-bit register bank (DRB) module based on NMOS and PMOS transistors using Mentor Graphics.
- Design and simulation of Cuomo`s Chaotic Communication circuit, numerical integration techniques, second order circuits, Linear congruential generator (LCG), random processes and their statistics, ActiveX components, hyperbolic boundary value problems and Laplace`s equation in Visual Basic 6.0.
- Design and development of a PC based device controller and a pressure monitoring system using embedded C programming.

- Study on IBM Blue Gene Watson (Blue Gene/L) based on its hardware architecture, software system and application.
- Simulation of a finite steady state machine using VHDL.

SKILL SET

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| Development Boards | Motorola™ HCS12 microcontrollers, Assembly level programming (Microprocessors) |
| Languages | C, C++, J2EE, VB 6.0, VB .NET, VHDL, MATLAB, Lab VIEW |
| Simulation Applications | CoventorWare 3D, Mentor Graphics, Sonnet, ANSYS, PSPICE, LTspice |