

# William J. Tomlinson, Jr.

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## OBJECTIVE

To obtain research oriented work experience with an emphasis in developing hardware and software systems for wireless communication, with a special interest in: Intra-Body Communication/Networks, Wearable Devices, Structural Health Monitoring and the Internet of Things.

## EDUCATION

- *Ph.D., Computer Engineering*, Cumulative GPA 3.70, Expected May 2018, Northeastern University, Boston, MA
- *M.S., Electrical Engineering*, Cumulative GPA 3.71, Michigan State University, East Lansing, MI
- *B.S., Electrical Engineering*, Cumulative GPA 3.83, Summa Cum Laude, North Carolina A&T State University, Greensboro, NC

## RESEARCH EXPERIENCE

- GEM-Draper Lab Fellow*                      *Northeastern University*                      *Boston, MA*                      *Aug 13 – Present*
- Evaluating the feasibility of using weak electrical current for communication among networked medically implantable devices
  - Conducting the design and development of low power, physical layer, intra-body communication systems using weak electrical current for data transmission
  - Developing a wearable implementation demonstrating intra-body communication for applications in mobile/personal device authentication
- Graduate Research Assistant*                      *Michigan State University*                      *East Lansing, MI*                      *Aug 12 – August 13*
- Assisted in the development of a pulse based ultrasonic communication systems to perform multi-hop networking and other necessary MAC-Routing operations for application in the area of low-information networking and energy-constrained event monitoring
  - Developed a Serial to Bluetooth interface to allow a Cricket node to enable communication with an Android smartphone, for the purpose of improving a distributed monitoring system, with the functionality of measuring human social interaction
- Communications Intelligence Intern*                      *Air Force Research Laboratory*                      *Rome, NY*                      *June 11 – Aug 11*
- Investigated how advanced software-defined radio (SDR) concepts such as virtualization of the baseband processor, network protocol stacks, real-time operating system (RTOS) and system-on-a-chip (SoC) architecture will have application or potential impact in the realm of digital communications signal processing as it relates to Communications Intelligence
  - Researched, developed prototype code as necessary, and prepared a comprehensive survey of findings on the state-of-the-art tools/techniques and emerging trends in automation, cloud computing, security and virtualization

## WORK EXPERIENCE

- Research Engineer Intern*                      *Samsung Research America*                      *Mountain View, CA*                      *May 17 – Aug 17*
- Member of the Think Tank Team, within Samsung Research America, where disruptive concepts are transformed into products with large scale impact
  - Designed and developed a prototype Transmitter and Receiver for application in Intra-Body Communication by means of an embedded system with supporting analog front end hardware
  - Designed and developed a printed circuit board to support a wearable implementation of the Intra-Body Communication Transmitter and Receiver architecture
  - Researched potential design modifications to an existing Samsung product to enable Intra-Body Communication
- Wireless Communications Research Intern*                      *Intel Corporation*                      *Santa Clara, CA*                      *May 16 – Sep 16*
- Member of the Emerging Connectivity Solutions Team, under Wireless Communications Research within Intel Labs
  - Contributed to the development and design of a Low Power Wake-Up Receiver (LP-WUR) by researching solutions and developing simulation code to study and evaluate areas of possible performance improvement
  - Researched the design and development of next generation of Wi-Fi and other connectivity solutions
- Systems Integration Engineer Intern*                      *General Dynamics*                      *Sterling Hts, MI*                      *May 10 – Aug 10*
- Interpreted and analyzed various forms of data to assess the results of vehicle diagnostic tests for the M1 A2 Abrams Tank
  - Designed a systematic approach for LRU management and placement within systems integration lab (SIL), per customer request
  - Organized, updated and recorded accurate information from vehicle simulation and test results
- Systems Engineer Intern*                      *General Dynamics*                      *Sterling Hts, MI*                      *June 09 – Aug 09*
- Reviewed Joint Light Tactical Vehicle (JLTV) SOW and PD 20 Requirements
  - Populated CORE with the interface characteristics associated with power, fluids and signals used within the JLTV
  - Allocated components of the JLTV to their proper subsystems using CORE
  - Composed draft Interface Control Documents in preparation for JLTV review

## SKILLS/ABILITIES

C++	MATLAB	C	Assembly	LabVIEW	System Design
PSpice	CORE	PCB Design	MAC Protocol Design	R	System Integration

## PUBLICATIONS

- **W.J. Tomlinson**, K. R. Chowdhury, and C. Yu, *Galvanic Coupling Intra-Body Communication Link for Real-Time Channel Assessment*, In Proceedings of IEEE INFOCOM Posters and Demos, San Francisco, CA. April. 2016.
- **W. J. Tomlinson**, F. Arbaca, K. R. Chowdhury, M. Stojanovic and C. Yu, *Experimental Assessment of Human-Body-Like Tissue as a Communication Channel using Galvanic Coupling*, In Proceedings of 12th International Conference on Wearable and Implantable Body Sensor Networks, Cambridge, MA. June. 2015.
- **W. J. Tomlinson**, K. R. Chowdhury and C. Yu, *A Multi-Cast Communication Scheme Using Weak Electrical Current for Intra-Body Networks*, In Proceedings of 9th International Conference on Body Area Networks, London UK, Sept. 2014.
- **W. J. Tomlinson**, B. Dong, S. Lorenz, and S. Biswas, *Node Localization via Analyzing Multi-path Signals in Ultrasound Sensor Networks*, In Proceedings of SPIE Defense, Security, and Sensing Symposium (Sensing, Localization, and Processing IX), Baltimore, MD, May 2014.
- S. Lorenz, B. Dong, **W. J. Tomlinson**, and S. Biswas, *Pulse-based Sensor Networking using Mechanical Waves through Metal Substrates*, In Proceedings of SPIE Defense, Security, and Sensing Symposium, Baltimore, MD. April 2013.
- S. Baard, B. Dong, M. Pearce, C. Kermond, H. Xie, S. Lorenz, **W. J. Tomlinson**, S. Golden, S. Biswas, D. Chang, and W. Kozlowski, *An Innovative Wearable Sensing Methodology for Monitoring Team Effectiveness*, 2013 NASA Human Research Program Workshop, Galveston, TX, February 2013.

## PROJECTS

### *MS Thesis: Node Localization via Analyzing Multi-path Signals in Ultrasonic Sensor Networks*

- Developed a theoretical and run-time system capable of achieving source node localization on an aluminum medium, using ultrasonic waves as the method of communication. In contrast to traditional localization techniques (e.g., triangulation and trilateration), this thesis was implemented with a single source node and reference node. Using the multipath reflected signals in conjunction with pattern classification techniques, cell based localization is performed with achievable accuracy greater than 95%. Applications of such a system exist in the realm of structural health monitoring, where the location of structural faults and defects need to be determined.

### *Advanced Computer Networking*

- Evaluated the usefulness, accuracy and robustness of currently existing distance ranging algorithms in the presence of localization of an unknown android mobile phone by implementing self-recording, two-way-sensing and sample counting in conjunction with traditional Time of Flight (TOF) information.

### *Pattern Recognition*

- Accurately classified the 60,000+ examples of hand written numeric digits, which comprised the MNIST database by applying methodologies for pre-processing, feature extraction and classification in an attempt to discover which combination would yield the most precise classification results.

## EXTRA-CURRICULAR

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|--|------------------|---|
| • Student Research Engagement Committee            | May 15 – Present | <i>2017-2018 Lead Research Consultant</i>                           |
| • National Society of Black Engineers              | Mar 08 – Present | <i>2015-2016 Collegiate Initiative Chair (Boston Professionals)</i> |
| • Alpha Phi Alpha Fraternity, Inc.                 | Mar 12 – Present | <i>2015-2016 March of Dimes Chair (Boston Alumni Chapter)</i>       |
| • Institute of Electrical and Electronic Engineers | Dec 08 – Present | <i>2010-2011 President (NC A&amp;T State Univ. Chapter)</i>         |
| • March of Dimes Board of Directors                | Mar 12 – Dec 14  | <i>General Member (Lansing, MI)</i>                                 |

## COMMUNITY SERVICE

### *STEM Education Day – (Northeastern University)*

- Facilitated interactive experiments to middle school-aged children that teach the concepts of wireless communication and networking

### *Boston Science Engineering Technology (S.E.T.) in the City – (Boston, MA)*

- Created hands-on experiments to spark the interest of young women's participation in Science, Technology, Engineering and Mathematics (STEM)

### *First Tech Challenge (FTC) programming workshop – (North Carolina A&T State University)*

- Mentored high school participants involved in the FTC with programming difficulties encountered throughout their design process

### *Alumni Interaction Day – (Robichaud High School Alumni)*

- Instructed a test review session for high school Physics and Chemistry students and answered various questions regarding life and expectations as a college student