Atif Gul Hashmi

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PROFESSIONAL SUMMARY

Atif Gul Hashmi has hands-on experience designing, analyzing, and reverse-engineering hardware and software. He also has extensive expertise in the fields of machine learning and Internet-of-Things. Dr. Hashmi is the founder of a high-tech startup and is the named inventor on several patents. He has written a number of papers for peer-reviewed journals and conferences. He is certified in the use of CodeSuite®. He holds a B.S. in Computer Engineering from Lahore University of Management Sciences, and an M.S. and Ph.D. in Electrical and Computer Engineering from the University of Wisconsin.

EXPERIENCE

07/2016 – present: Zeidman Consulting

- Research Engineer
- Runs CodeSuite® and analyzes results for software IP litigation
- Writes expert reports for software IP litigation
- Performs research on patents and trade secrets
- Writes claim charts for patent infringement analysis
- Develops software analysis tools

2013 – present: Thalchemy Corporation

- Co-founder and Chief Technology Officer
- Developing neuromorphic hardware substrate and software algorithms to enable ultralow power analysis of sensory data in real time
- Developing software development kit to interface the continuous sensing hardware with general purpose computational processing units
- Optimizing “always-on” sensing algorithms to run on ARM M0 and M4 based sensor hubs for low memory and small memory footprint
- Developing motion and audio sensing algorithms to enable context aware sensing
- Developing Kalman Filter based models for fusing 6-axis motion sensor data for real-time device orientation updates
- Investigating the market opportunity and partnerships for the developed technology
- Principal Investigator for NSF SBIR Phase I/II grants awarded to Thalchemy Corporation
- Exploring various funding avenues (Angels, VCs, SBIR, STTR, etc.)

2012 – 2013: NSF Innovation Corps Team

- Entrepreneurial Lead
- Investigated the commercial landscape surrounding a neurally inspired technology
- Co-founded a tech startup company to commercialize the continuous sensing technology
- Explored various funding avenues (SBIR, STTR, etc.)

2011 – 2012: Wisconsin Psychiatric Research Institute, University of Wisconsin

- Post-Doctoral Associate
- Worked on the IBM/DARPA SyNAPSE project

- Developed detailed software models of different regions of the mammalian brain using scripting languages including Perl, Python, and Matlab
- Developed software tools in C/C++ and Java to automate the deployment of complex biological networks on a Neurosynaptic Chip
- Designed functional templates for various cortical regions for their easy and efficient deployment on an Neurosynaptic Chip
- Developed placement schemes for complex biological networks to optimize the overall interconnect dynamic power

2006 – 2007: Intel Corporation

- Graduate Intern (Technical), Performance Validation Team
- Worked on Intel's graphic processor tool-chain including the functional simulation model and the cycle accurate simulator for Intel's graphic processing core
- Analyzed various 3D graphics workloads and conducted performance studies using hardware counters and simulation tools on Intel's next generation graphics processing unit
- Designed experiments to identify performance bottlenecks within the GPU pipeline
- Initiated a weekly meeting to discuss published academic research papers

LEGAL EXPERIENCE

9/2016 – present: CSS v. Christopher Herrington, Gene Yoho and Compiled Technologies

Law Firm: Robinson & McElwee
Client: Christopher Herrington, Gene Yoho and Compiled Technologies
Court: U.S. District Court, Southern District of West Virginia, Charleston Division
Case: Civil Action 2:16-cv-01762

- Alleged copyright infringement of client-server software
- Alleged trade secret misappropriation of client-server software
- Examined software source code

RESEARCH EXPERIENCE

2007 – 2011: Department of ECE, University of Wisconsin

- Graduate Research Assistant,
- Investigated various structural and functional aspects of the cortical hierarchy
- Developed processing models and algorithms inspired by biological cortical columns
- Studied the role of feed-forward and feedback processing paths in robust development of invariant object representations
- Proposed a novel learning scheme based on biological spontaneous activations
- Implemented biologically inspired computational models that are inherently tolerant to transient and permanent hardware faults and errors
- Introduced the concept of a Neuromorphic Instruction Set Architecture (NISA) to address the semantic challenges introduced by the contemporary neuromorphic architectures
- Collaborated with researchers from ECE, Psychology, Neuroscience, and CS

2006 – 2007: Department of ECE, University of Wisconsin

- Graduate Research Assistant
- Worked on modeling and studying a Ternary Content Addressable Memory (TCAM) based functional unit to improve the performance of search and recognition (SR) applications.
- Proposed ISA for optimizing the S/R process using the proposed TCAM functional unit
- Implemented several SR applications using the TCAM ISA extensions
- Developed a detailed functional simulator to run the SR applications using the TCAM ISA extensions and investigated the performance benefits of using TCAM functional unit

2005 – 2006: Department of BME, University of Wisconsin

- Graduate Research Assistant
- Developed WiscScan, a software system used to control various features of a laser- scanning and micro beam microscopes
- Designed analog and digital circuits that ensure safety of laser and micro beam microscopes against current variations
- Interfaced fire wire camera for image acquisition from the microscopes to observe development in biological specimens

2003 – 2004: Department of CmpE, Lahore Univ. of Management Sciences, Pakistan

- Research Assistant
- Developed an embedded Ethernet system (CMAN) for controlling and monitoring electrical appliances via Local Area Network
- Developed hardware for multi-channel data acquisition using computer's joystick port and implemented a software interface to control the hardware and acquire data on a UNIX based system

TEACHING EXPERIENCE

2009 – 2011: PEOPLE Program, University of Wisconsin, Madison

- Lead Instructor
- Structured, designed, and taught advanced mathematics courses to underrepresented and underprivileged high school students
- Designed problem sets and assignments to promote outside classroom learning
- Taught calculus and its applications to real life problems
- Taught trigonometric concepts and their applications
- Taught algebraic concepts and matrix operations

2008 – 2009: Department of ECE, University of Wisconsin, Madison

- Teaching Assistant
- Assisted in designing and teaching an introductory freshman level course in computer engineering with an emphasis to promote students interest in engineering
- Designed and graded problem sets, exams, homework, and assignments
- Organized regular discussion sessions with students

2003 – 2005: Department of CmpE, Lahore Univ. of Management Sciences, Pakistan

- Teaching Assistant
- Assisted in designing and teaching courses in the areas of circuit design, computer architecture, and signal and image processing.
- Designed and graded assignments, projects, exams, and homework
- Assisted in teaching a graduate level image processing course during senior year

OUTREACH & MENTORING

2009 – 2011: PEOPLE Program, University of Wisconsin, Madison

- Worked with underrepresented and underprivileged high school students from Wisconsin
- Introduced these students to the undergraduate student lifestyle and expectations
- Motivated them to pursue a career in engineering at the University of Wisconsin

2010 – 2011: Department of ECE, University of Wisconsin, Madison

- Mentored two undergraduate students during independent research studies
- Helped developing an xml-based scheme to represent complex neural network
- Helped developing a complex spiking neuron model for generating music sequences
- This project resulted in one conference and one workshop paper

FUNDRAISING/COAUTHORED RESEARCH GRANTS

2015 - SBIR Advance Matching Funds, $75,000
2014 - Seed Investment Round for Startup Company, $650,000
2014- -NSF Small Business, Innovation, and Research (SBIR-II) Grant, (PI), $610,000
2013 - NSF Small Business, Innovation, and Research (SBIR-I) Grant, (PI), $150,000
2013 - Technology Innovation Fund (TIF) Grant, $50,000
2013 - Innovation and Economic Development Research (IEDR) Grant, $50,000
2012 - NSF Innovation Corps (iCorps) Grant, $50,000

HONORS, AWARDS, AND DISTINCTIONS

- Principal Investigator for National Science Foundation SBIR Phase II Award, June 2013
- Principal Investigator for National Science Foundation SBIR Phase I Award, Oct 2012
- National Science Foundation Innovation Corps Award, Dec 2014
- Valedictorian Wisconsin Entrepreneurial Bootcamp, July 2012
- Best paper award, IEEE International Parallel & Distributed Processing Symposium (IPDPS), May 2011
- President, South Asian Forum (SAF), University of Wisconsin, Madison, 2007–2009
- Recipient of NMF Gold Medal for securing 1st position in the B.S. class of 2005, Dec 2005
- Recipient of Excellence Gold Medal for being the best student of B.S. class of 2005, Dec 2005
- Recipient of Dean's Honor Shield for graduating with distinction, Dec 2005
- Class Valedictorian, B.S. class of 2005, Dec 2005
- Founding Member, Lahore University of Management Sciences Embedded System Society, 2003–2005
- Placed on Dean's Honor List for academic achievements, 2002 – 2005
- Recipient of LUMS Merit Scholarship for exceptional academic performance, 2002 – 2005
- Vice-Captain, Lahore University of Management Sciences soccer team, 2002 – 2005
- Undergraduate Research Assistant, 2002 – 2004
- Best project award, IEEE International Electronics Design Contest for Students (IEDCS), Sep 2004
- Recipient of Award of Academic Excellence from the President of Pakistan, Aug 2003
- Recipient of President's Gold Medal for securing 1st position out of 30,000 students, Aug 2002
- Senior Prefect, Abbottabad Public School and College, 1999 – 2001

SPECIAL KNOWLEDGE AND SKILLS

- Embedded Software – Embedded C and assembly for sensor data analysis and machine learning
- Embedded Hardware – Verilog HDL design of neural systems, pre/post synthesis validation, FPGA prototyping Smart Devices – Internet of things, Sensor fusion, "Always-on" sensing, OS kernel hacking
- Neuromorphic Systems – Brain inspired complex neural hardware/software system design
- Software – C/C++, Java, Javascript, Perl, Python, Matlab, HTML, Android applications
- Grant/Proposal Writing – NSF Small Business, Innovation, and Research (SBIR) Phase I & II

EDUCATION

Ph.D. in Electrical and Computer Engineering, 2011, University of Wisconsin
M.S. in Electrical and Computer Engineering, 2007, University of Wisconsin
B.S. in Computer Engineering, 2005, Lahore University of Management Sciences

CONFERENCE PUBLICATIONS

1. Andrew Nere, Atif Hashmi, Mikko Lipasti, Giulio Tonini, "Bridging the Semantic Gap: Emulating Biological Neuronal Behaviors with Simple Digital Neurons, International Symposium on High Performance Computer Architecture," Shenzhen, China, Feb 2013

2. Atif Hashmi, Mikko Lipasti, et. al., “BenchNN: On the Broad Potential Application Scope of Hardware Neural Network Accelerators, International Symposium on Workload Characterization,” San Diego, CA, Nov 2012
3. Atif Hashmi, Hugues Berry, Olivier Temam, and Mikko H. Lipasti, “Automatic Abstraction and Fault Tolerance in Cortical Microarchitectures, International Symposium on Computer Architecture,” San Jose, CA, June 2011
4. Atif Hashmi, Andrew Nere, and Mikko H. Lipasti, “Learning through Spatially Localized and Temporally Correlated Spontaneous Activations, International Conference on Cognitive and Neural Systems,” Boston, MA, May 2011
5. Andrew Nere, Atif Hashmi, and Mikko H. Lipasti, “Profiling Heterogeneous Multi-GPU Systems to Accelerate Cortically Inspired Learning Algorithms, International Parallel and Distributed Processing Symposium,” Anchorage, AL, May 2011
6. Atif Hashmi, Andrew Nere, James Thomas, and Mikko H. Lipasti, “A Case for Neuromorphic Instruction Set Architectures, International Conference on Architectural Support for Programming Languages and Operating Systems,” Newport Beach, CA, March 2011
7. Atif Hashmi and Mikko Lipasti, “Discovering Cortical Algorithms, International Conference on Neural Computation,” Valencia, Spain, October 2010
8. Atif Hashmi and Mikko Lipasti, “Cortical Columns: Building Blocks for Intelligent Systems, IEEE Symposium on Computational Intelligence for Multimedia Signal and Vision Processing,” Nashville, TN, March 2009
9. Atif Hashmi and Mikko Lipasti, “Accelerating Search and Recognition with a TCAM Functional Unit, International Conference on Computer Design,” Lake Tahoe, NV, October, 2008
10. Atif Hashmi, Haroon Malik, Aman Pervaiz, and Mohammad Younas, “Cost Effective and Efficient Approach to Control and Monitor Area Network (CMAN), International Conference on Microelectronics,” Tunis, Tunisia, December, 2004
11. Atif Hashmi and Mohammad Akmal Butt, “Multi-channel Data Acquisition for Implementation of Real Time Signal Processing Algorithms,” IEEE International Multi-Topic Conference, Lahore, Pakistan, 2004

JOURNAL PUBLICATIONS

1. Atif Hashmi, Andrew Nere, and Giulio Tononi, *Sleep-dependent synaptic down-selection (II): single-neuron level benefits for matching, selectivity, and specificity*, Frontiers in Neurology, volume 4, DOI: 10.3389/fneur.2013.00148, 2013
2. Andrew Nere, Atif Hashmi, Chiara Cirelli, and Giulio Tononi, *Sleep-dependent synaptic down-selection (I): modeling the benefits of sleep on memory consolidation and integration*, Frontiers in Neurology, volume 4, DOI: 10.3389/fneur.2013.00143, 2013
3. Andrew Nere, Sean Franey, Atif Hashmi, and Mikko Lipasti, *Simulating Cortical Networks on Heterogeneous Multi-GPU Systems*, Journal of Parallel and Distributed Computing, volume 73, issue 7, pages 953-971, 2012
4. Atif Hashmi and Mikko Lipasti, *A Cortically Inspired Learning Model, Studies in Computational Intelligence*, volume 399, pages 373-388, 2012

WORKSHOP PUBLICATIONS

1. Atif Hashmi, Hugues Berry, Olivier Temam, and Mikko Lipasti, *Leveraging Progress in Neurobiology for Computing Systems*, Workshop on New Directions in Computer Architecture/International Symposium on Microarchitecture, New York, NY, December, 2009

TECHNICAL/INVITED TALKS

1. "Integrating Multiple Modalities Via Reentrant Hierarchical Attractor Networks," The Brain Corporation, San Diego, CA, June 2011
2. "Addressing the Semantic Gap in Neuromorphic Systems," Asilomar Microcomputer Workshop, Pacific Grove, CA, April 2011
3. "A Case of Abstract Yet Accurate Cortical Models," University of Minnesota, Minneapolis, MN, Feb 2011
4. "Automatic Abstraction and Fault Tolerance in Cortical Microarchitectures," International Symposium on Computer Architecture, San Jose, CA, June 2011
5. "Learning through Spatially Localized and Temporally Correlated Spontaneous Activations," International Conference on Cognitive and Neural Systems, Boston, MA, May 2011
6. "Cortical Architectures: From Learning to Creativity," Google Technical Talk, Madison, WI, December 2010
7. "Discovering Cortical Algorithms, International Conference on Neural Computation (ICNC)," Valencia, Spain, October 2010
8. "Cortical Microarchitectures: Computing by Abstractions," UW - Computer Architecture Affiliates, Madison, WI, October 2010
9. "Discovering Cortical Algorithms, International Conference on Cognitive and Neural Systems (ICCNS)," Boston, MA, May 2010
10. "Leveraging Progress in Neurobiology for Computing Systems,' Workshop on New Directions in Computer Architecture/International Symposium on Microarchitecture, New York, NY, December 2009
11. "PHARM Brain v 2.0: Lateral Communication Paths and Feedback," UW - Computer Architecture Affiliates, Madison, WI, December 2009
12. "Cortical Columns: Building Blocks for Intelligent Systems," Symposium on Computational Intelligence for Multimedia Signal and Vision Processing (CIMSVP), Nashville, TN, March 2009
13. "Accelerating Search and Recognition with a TCAM Functional Unit," International Conference on Computer Design (ICCD), Lake Tahoe, NV, October 2008

PATENTS

I am a named inventor on following patents and patent applications:

1. Mikko Lipasti, Atif Hashmi, Andrew Nere, and Giulio Tononi, "Sensory Stream Analysis via Configurable Trigger Signature Detection," US 13/749,854 (Pending)
2. Andrew Nere, Mikko Lipasti, Atif Hashmi, and John Wakerly, "Learn-by-example systems and methods," US 14/640424 (Pending)
3. Mikko Lipasti, Andrew Nere, Atif Hashmi, and John Wakerly, "Efficient and scalable neural systems for calculating network connectivity for neural algorithms in an event-driven way to reduce storage of data relating to connectivity," US 62/058565 (Pending)
4. Andrew Nere, Atif Hashmi, Michael Eyal, Mikko Lipasti, and John Wakerly, "Neural Sensor Hub System," US 62/161,717 (Pending)

PROFESSIONAL ACTIVITIES

Institute of Electrical and Electronics Engineers (IEEE), 2008 – 2011
IEEE Computational Intelligence Society, 2008 – 2011
Association for Computing Machinery (ACM), 2009 – 2011
Lahore University of Management Sciences Embedded Systems Society, 2003 – 2005