Afroza Sultana

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Education

McGill University, Montreal, QC, Canada
> PhD Student in the School of Information Studies
> Research Area: **Human-Computer Interaction**
> Thesis Supervisor: Dr. Karyn Moffatt
> Starting Date: Fall 2013

University of Manitoba, Winnipeg, MB, Canada
> Master of Science (MSc.) in Computer Science
> MSc. Thesis title: **Concurrent B-trees with Lock-free Techniques**
> Thesis Supervisors: Dr. Helen Cameron and Dr. Peter C. J. Graham
> Graduated in November, 2007

North South University, Dhaka, Bangladesh
> Bachelor of Science (BSc.) in Computer Science with minor in Management Information Systems (MIS)
> BSc. Thesis title: **Performance of the QOS factors of ISPs in Bangladesh and its Enhancement**
> Thesis Supervisors: Dr. M. Rokonuzzaman
> Graduated in August, 2001 (Graduated as Magna Cum Laude)

Research Interests

- Accessible Technology for Older Adults
- Human Computer Interaction
- Data Mining
- Machine Learning
- Parallel and Distributed Data Structures and Algorithms
- Bioinformatics

Awards and Grants

- Graphics, Animation and New Media (GRAND) Scholar Award July 2014 – June 2017.
- Fonds de Recherche du Quebec – Nature et Technologies (FRQNT) – Doctoral Research Scholarship, September 2013 – December 2014.
- McGill University Graduate Excellence Award, September 2013 – August 2014.
- Concordia University Engineering and Computer Science Graduate Student Support, January 2011 – May 2013.
- Concordia University Engineering and Computer Science Conference Support Grant, June 2012.

Research Experience

Research Assistant: Accessible Computing Technology (ACT) Research Group, School of Information Studies (SIS), McGill University, January 2013 – to present.

Research Supervisor: Dr. Karyn Moffatt.

- Working on designing accessible touch-based user interfaces for older adult users.
- Working on performance evaluation metrics for target selection tasks on touch-screens.
- Applying Supervised Machine Learning techniques to model pen-based and touch-based data for selection error detection.

Research Assistant: Software Behaviour Analysis (SBA) Research Lab, Department of Electrical and Computer Engineering, Concordia University (affiliated with Defense R&D Canada (DRDC), and Ericsson, Canada), January 2011 – May 2013.

Research Supervisor: Dr. Abdelwahab Hamou-Lhadj

- Developed system behavior models to identify anomalies from system call arguments.
- Developed an efficient Hidden Markov Model based Host-based Intrusion Detection Systems (HIDS) named I-HMM, applying a variant of frequent pattern detection algorithm.
- Conducted comparison analysis of Decision Trees, Bayesian Networks, Neural Networks, Support Vector Machines and Hidden Markov Model based HIDS based on user space traces that are extracted from several Linux applications.
- Developed system call sequence based anomaly detection models for Mozilla Firefox 3.5.
- Developed system call argument based behavioral models for Mozilla Firefox 3.5.

Research Assistant: Parallel and Distributed Systems Lab (PDSL), Department of Computer Science, University of Manitoba, February 2004 – October 2007.

Research Supervisors: Dr. Helen A. Cameron and Dr. Peter C. J. Graham

- Designed a novel lock-free concurrent B-list tree data structure that is a variant of concurrent B-trees.
- Implemented B-list trees for the Sun Fire x4600 shared memory machines (Uniform Memory Access - UMA), provided by the Parallel and Distributed Systems Lab (PDSL), University of Manitoba and the SGI origin 3000 SMP machines (Non Uniform Memory Access - NUMA), provided by WestGrid, Canada.
- Compared the performances of B-link tree, a lock-based variant of B-trees and the B-list trees for both UMA and NUMA parallel machines.

Undergraduate Honors Research: Department of Computer Science, North South University, Dhaka, Bangladesh, April 2001 – August 2001.

Undergraduate Thesis Supervisor: Dr. M. Rokonuzzaman

- Studied and identified the major problems that are responsible for poor QoS of the ISPs of Bangladesh.
- Implemented a prototype of a national cache to improve the QoS factors of the ISP's of Bangladesh.

Peer-Reviewed Publications

- _Afroza Sultana_, Abdelwahab Hamou-Lhadj, and Mario Couture, "_An Improved Hidden Markov Model for Anomaly Detection Using Frequent Common Patterns_", in the Proceedings of the IEEE International Conference on Communications (ICC 2012) - The Communication and Information Systems Security Symposium (CISS), June 10 – 15, 2012, Ottawa, Canada, pp. 916 – 920, (acceptance rate: 36%).

- Shariyar Murtaza, _Afroza Sultana_, Abdelwahab Hamou-Lhadj and Mario Couture, "_On the Comparison of User Space and Kernel Space Traces in Identification of Software Anomalies_", in the Proceedings of 16th European Conference on Software Maintenance and Reengineering (CSMR '12), March 27 – 30, 2012, Szeged, Hungary, pp. 127 – 136 (acceptance rate: 27%).

- _Afroza Sultana_, Rumana Rahman and Sadia Hamid Kazi, "_An XML-Based Platform Independent Integrated e-Learning System (IELS) for the Rural and Remote Areas of Developing Countries_", in the Proceedings of 2010 International Conference on Education Technology and Computer (ICETC 2010), June 22 – 24, 2010, Shanghai, China, Volume: 3, pp. 464 – 468.

- *Afroza Sultana* and Ishrat Sultana, "*E-School: A Web-Service Oriented Resource Based E-learning System***",** *,"*, in the Proceedings of 2010 International Conference on Networking and Information Technology (ICNIT 2010), June 11 – 13, 2010, Manila, Philippines, pp. 415 – 419.

- Rafa Absar, *Afroza Sultana*, M. M. Alam, and M. Rokonuzzaman, "*Performance of the QoS Factors of ISPs in Bangladesh and Its Enhancement*". The Proceedings of the International Conference on Computer and Information Technology (ICCIT), Dhaka, Bangladesh, December 28 – 29, 2001, pp. 30 – 35.

Other Publications

- *Afroza Sultana*, "*Touch-Based Interaction for Older Adults*", Paper in the Doctoral Consortium of the 16th International ACM SIGACCESS Conference on Computers and Accessibility (ASSETS) 2014, October 20 – 22, 2014, Rochester, NY, USA.

- *Afroza Sultana* and Karyn Moffatt, "*Pen-based Error Detection with Supervised Machine Learning Algorithms*", Poster in Graphics Interface (GI) 2014 Conference, May 7 – 9, 2014, Montreal, Canada.

- *Afroza Sultana* and Karyn Moffatt, "*Automatic Error Detection from Pointing Device Input Data*", Poster in Association for Information Science and Technology (ASIS&T) Annual Meeting 2013, November 2 – 6, 2013, Montreal, Canada.

- *Afroza Sultana*, Helen Cameron and Peter C. J. Graham, "*Concurrent B-trees with Lock-free Techniques*", Technical Report, Department of Computer Science, University of Manitoba, 2011.

Presentations

- Presented a poster "*Performance Evaluation Measures for Touch-Based Devices to Enhance the Accessibility of Older Adults*" in the 16th International ACM SIGACCESS Conference on Computers and Accessibility (ASSETS) 2014, held on October 20 – 22, 2014, Rochester, NY, USA.

- Presented "*System Call Argument Based Anomaly Detection Algorithms*" in the *Seminar on Host-based Anomaly Detection Techniques* that was organized by Software Behaviour Analysis (SBA) Research Lab, Concordia University, Montreal, Canada on April 11, 2013.

- Co-Presented *"Scalable Detection Infrastructure – Harmonized Anomaly Detection Techniques"* in the *Progress Report Meeting of the Advance Host Level Surveillance (AHLS) Research Group* that was co-organized by Ecole Polytechnique de Montreal and Defence Research and Development Canada (DRDC) on December 5 – 7, 2012.

- Co-Presented "*Scalable Detection Infrastructure – Harmonized Anomaly Detection Techniques*" in the *Kickoff Meeting of the Advance Host Level Surveillance (AHLS) Research Group*, co-organized by Ecole Polytechnique de Montreal and Defence Research and Development Canada (DRDC) on May 24 – 25, 2012.

- Presented "*Improving Host Based Anomaly Detection*" in the *Progress Report Meeting of Advance Host Level Surveillance (AHLS) Research Group*, co-organized by Ecole Polytechnique de Montreal and Defence Research and Development Canada (DRDC) on December 9 – 11 , 2011.

- Presented "*I-HMM: System Call Frequent Pattern Based Anomaly Detection Algorithms*" in the *Seminar on Host-based Anomaly Detection Techniques* that was organized by the Software Behaviour Analysis (SBA) Research Lab, Concordia University, Montreal, Canada on November 16, 2011.

Submitted Articles

- Shariyar Murtaza, *Afroza Sultana*, Abdelwahab Hamou-Lhadj and Mario Couture, *"A New Dataset for Host-based Anomaly Detection Research"*. Submitted in International Journal of Information Security (IJIS).

Articles in Preparation

- *Afroza Sultana* and Karyn Moffatt, "*Performance Evaluation of Older Adults for Very Small Targets on Touch-Screen Interfaces*".

- *Afroza Sultana*, Shariyar Murtaza, Abdelwahab Hamou-Lhadj, and Mario Couture, "*System Call Argument Model: An Efficient Light-weight Anomaly Detection Algorithm for Complex Systems*".

Service to the Research Community

- Research Note Area Chair in the Graphics, Animation and New Media (GRAND) 2014 Conference that was held in Ottawa, Canada from May 13 – 16, 2014.

- Technical Program Committee Member:
    - IEEE 4rd International Conference on Advances in Computing, Communication & Informatics 2015 (ICACCI-2015).
    - Third International Symposium on Women in Computing and Informatics 2015 (WCI-2015).
    - International Conference on Research in Computational intelligence and Communication Networks (ICRCICN 2015).
    - IEEE International Conference on Signal Processing, Informatics, Communication and Energy Systems (IEEE SPICES 2015).

- o Recent & Emerging Trends in Computer & Computational Science 2015 (Retcomp'15).
  - o IEEE 3rd International Conference on Advances in Computing, Communication & Informatics 2014 (ICACCI-2014).
  - o Second International Symposium on Women in Computing and Informatics 2014 (WCI-2014).

- Journal Paper Reviewer:

  - o International Journal of Engineering and Technology (IJET), 2011.
  - o International Journal of Computer and Electrical Engineering (IJCEE), 2010.

- Guest Reviewer:
  - o 17th International ACM SIGACCESS Conference on Computers and Accessibility (ASSETS) 2015.

- Webmaster:
  - o Graphics Interface (GI) 2016 conference website.

Work Experience

Teaching Experience:

Senior Lecturer: Department of Computer Science and Engineering, BRAC University, Dhaka, Bangladesh, June 2010 – October 2010.

- Designed course materials; conducted Lectures and Lab classes; designed and graded final and midterm exams, quizzes, assignments, labs, reports, projects, etc.; evaluated undergraduate thesis presentations; interviewed and advised new students, invigilated exams, etc.

- Coursers taught: Numerical Methods, Discrete Mathematics, Data Structures (Lab), and Programming Language II (Lab).

Lecturer II: Department of Computer Science and Engineering, BRAC University, Dhaka, Bangladesh, June 2009 – May 2010.

- Designed course materials; conducted Lectures and Lab classes; designed and graded final and midterm exams, quizzes, assignments, labs, reports, projects, etc.; evaluated undergraduate thesis presentations; interviewed and advised new students, invigilated exams, etc.

- Coursers taught: Numerical Methods, Discrete Mathematics, Data Structures (Lab), and Programming Language II (Lab).

Lecturer: Department of Computer Science and Engineering, BRAC University, Dhaka, Bangladesh, December 2007 – May 2009.

- Designed course materials; conducted Lectures and Lab classes; designed and graded final and midterm exams, quizzes, assignments, labs, reports, projects, etc.; evaluated undergraduate thesis presentations; interviewed and advised new students, invigilated exams, etc.
- Courses taught: Software Engineering, Numerical Methods, Discrete Mathematics, Programming Language I, Data Structures (Lab), Algorithms (Lab), Programming Language II (Lab), Programming Language I (Lab), and Visual Basic for Business (Lab).

Lecturer: Department of Computer Science and Engineering, BRAC University, Dhaka, Bangladesh, September 2002 – April 2003.

- Conducted Lectures and Lab classes; designed and grading final and midterm exams, quizzes, assignments, labs, reports, projects, etc.; invigilated exams, etc.
- Courses taught: Introduction to Computers, Programming Language I.

TA/Grader-Marker Experience:

Teaching Assistant: School of Information Studies, McGill University, Montreal, Canada, September 2013-April 2014, September 2014-December 2014, and September 2015-December 2015.

- Conducted Lab classes; organized tutorial classes; graded quizzes, assignments, labs, reports, and final exams, etc.
- Courses taught: Information System Design, Information Agency Management.

Grader/Marker: Department of Computer Science, University of Manitoba, Winnipeg, MB, Canada, May 2005 – October 2007.

- Evaluated assignments, invigilated exams, etc.
- Courses taught: Data Structures, Algorithms, Analysis of Algorithms and Data Structures.

Teaching Assistant (Full Time): Department of Computer Science, North South University, Dhaka, Bangladesh, September 2001 – August 2002.

- Conducted Lab classes; graded quizzes, assignments, labs, reports, projects, etc.; invigilated exams.
- Courses taught: Software Engineering, Artificial Intelligence, Microcomputer Systems, Programming Language Principles, and Discrete Mathematics.

Other Experiences

Faculty Advisor: Department of Computer Science and Engineering, BRAC University, Dhaka, Bangladesh, September 2002 – April 2003 and December 2007 – October 2010.

- Worked as a student advisor for undergraduate students to help them with course selection and major selection.
- Organized and conducted study tours for undergraduate computer science and engineering students.

Editorial Committee Member: BRAC University, Dhaka, Bangladesh, January 2009 – October 2010.

- Prepared and reviewed annual reports, monthly newsletters, and other relevant documents for BRAC University.

  o BRAC University Undergraduate Prospectus 2010 – Member of the Editorial Board.
  o BRAC University Graduate Prospectus 2010 – Member of the Editorial Board.
  o BRAC University 2010 Convocation Brochures – Member of the Editorial Board.
  o BRAC University Annual Report 2009 – Member of the Editorial Board.
  o BRAC University Annual Report 2008 – Member of the Editorial Board.

Volunteering Experiences:

- Student Facilitator: Academic Integrity Day, organized by Teaching and Learning Services, McGill University.

- Student Volunteer:

  o ACM CHI Conference on Human Factors in Computing Systems (CHI) 2014 that was held in Toronto, Canada from April 26 – May 1, 2014.
  o International Conference on Computer and Information Technology (ICCIT) 2000 that was held in Dhaka, Bangladesh from December 25 – 26, 2000.

Student Member:

- HQP of Graphics, Animation and New Media (GRAND) Network, 2013 – to present.
- Association for Information Science and Technology (ASIS&T), 2013 – to present.
- Institute of Electrical and Electronics Engineers (IEEE), 2012 – to present.
- Post Graduate Student Society (PGSS), McGill University, 2013 – to present.
- Engineering and Computer Science Graduate Student Association (ECSGA), Concordia University, 2011 – 2013.
- Graduate Student Association (GSA), Concordia University, 2011 – 2013.

- University of Manitoba Student Union (UMSU), University of Manitoba, 2003 – 2007.
- North South University Computer Club (NSUCC), North South University, 1999 – 2001.

Responsibilities Taken as a Student Member:
- Volunteered, organized and participated in conferences, seminars, programming contests, software exhibitions, tours, fund raising programs, elections, etc.
- Prepared and reviewed brochures, magazines, presentations etc. for various programs.
- Worked as a polling agent in the University of Manitoba Student Union (UMSU) elections 2005, 2006 and 2007.

Programming Skills:

- Proficiency in C, C++, JAVA, Android Studio.
- Worked with Data Modeling Software like Rapidminer, Weka, and R.
- Worked with Visual Basic, Prolog, HTML, ASP, MATLAB, POSIX Threads, LaTeX, XML, UML, Object Constraint Language (OCL), Object Action Language (OAL), SVN, and more.

Language Skills:

- Very good communication skill in English and Bengali.
- Completed French Conversation Level 2, offered by GradProSkills, Concordia University, May 2013.
- Completed French Conversation Level 1, offered by GradProSkills, Concordia University, July 2012.
- Completed Basic French, offered by Centre for Languages, BRAC University, January – April 2010