

KAMRUL ISLAM, PhD

(CURRICULUM VITAE)

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OBJECTIVE I am a postdoctoral researcher at the School of Computing in Queen's University, Canada. I have been selected for both NSERC postdoctoral IRDF Fellowship and NSERC Visiting Fellowship. My interest lies in the area of distributed and local algorithms, wireless sensor networks and applications of computational geometric and graph theoretic techniques/results to the numerous problems in networks. Currently my research focuses on designing, developing and analyzing energy-efficient algorithms for specific problems related with routing, monitoring, broadcasting, and clustering in wireless sensor networks. As energy is of paramount importance in wireless sensors networks, I aim to find energy-efficient distributed solutions for these problems so that the energy consumption in the network is minimized.

As research in wireless sensor networks combines techniques, methods, and results from various disciplines of Computer Science and Mathematics, I am also interested in related fields such as computational geometry, graph theory, distributed and localized computing, computational complexity, adhoc/sensor network routing (modeling, simulation), probability and statistics and other areas of applied mathematics. I am also very enthusiastic in collaborative projects to explore the algorithmic and system aspects between the intersection of sensor networks and other disciplines of Computer Science such as medical, bioinformatics, robotics, and so on.

EDUCATION

- 2010, Apr** **Ph.D in Computer Science, Queen's University, Canada, 2005-2010.**
Thesis: "Energy-aware techniques for certain problems in Wireless Sensor Networks"
Supervisor: Profs. Selim G. Akl and Henk Meijer
- 2005, May** **M.Sc. in Computer Science, Queen's University, Canada, 2003-2005.**
Thesis: "Bounds on Some Geometric Transforms"
Supervisor: Profs. Selim G. Akl and Henk Meijer
- 1996, Sep** **B.Sc. in Computer Science and Engineering, 1992-1996**
Khulna University, Khulna, Bangladesh.
Division/Class: First class.

RESEARCH INTERESTS

Wireless Sensor Networks
Distributed and Localized Algorithms
Computational Geometry
Graph Theory
Approximation Algorithms
Combinatorial Optimization

ACADEMIC AWARDS

- 2010-** NSERC IRDF Fellowship, (Pre-selected) (60,000 CAD over two years)
NSERC Visiting Fellowship, VF (Pre-selected) (46,000 CAD/year for 3 years)
- 2008-09** Ontario Government Scholarship, Science and Technology (OGSST),
Ontario Government (15,000 CAD/year)
- 2007-08** Queen's Discretionary Conference Award, Queen's University
Queen's Graduate Awards (QGA), Queen's University (15,000 CAD/year)
- 2006-07** Nortel Fellowship, Nortel Canada (10,000 CAD/year)
Queen's Discretionary Conference Award, Queen's University
Queen's Graduate Awards (QGA), Queen's University (15,000 CAD/year)
- 2003-06** Queen's Tuition Bursary, Queen's University (6,000 CAD/year)
Queen's General Bursary, Queen's University (2,700 CAD/year)

PUBLICATION LIST

JOURNAL PAPERS

1. **Kamrul Islam**, and Selim G. Akl, "A Local Algorithm to Compute Multiple Connected Dominating Sets in Wireless Sensor Networks", Submitted.
2. **Kamrul Islam**, and Selim G. Akl, "Target Monitoring in Wireless Sensor Networks: A Localized Approach", *International Journal of Ad Hoc and Sensor Wireless Networks*, Vol. 9 No. 3(4), pp. 223-237, 2010.
3. Selim Akl, **Kamrul Islam**, and Henk Meijer, "Planar Tree Transformation: Positive Results and Counterexample", *Information Processing Letter (IPL)*, Vol. 109, No. 1, December 2008, pp. 61 - 67, Elsevier. (authors names sorted alphabetically)

4. E.Arkin, S.P.Fekete, **K.Islam**, H.Meijer, J.S.B.Mitchell, Y.Nunez, V. Polishchuk, D.Rappaport, H.Xiao, “Not Being (Super)Thin or Solid is Hard: A Study of Grid Hamiltonicity“, *Computational Geometry: Theory and Applications (CGTA)*, Vol. 42, No. 6-7, pp. 582-605, August 2009. (authors names sorted alphabetically)
5. **Kamrul Islam**, “An Improved Architecture for Cooperative and Comparative Neurons (CCNs) in Neural Network”, *International Journal of Computing*, Vol. 8, Issue 1, pp. 8-15, 2009 (**Special Issue**).
6. Selim G. Akl, **Kamrul Islam**, and Henk Meijer, “On Planar Path Transformation”, *Journal of Information Processing Letters (IPL)*, Vol. 104, No. 2, October 2007, pp. 59 - 64, Elsevier. (authors names sorted alphabetically)
7. Md. Mehedi Masud, Khandaker Shahidul Islam, and **Kamrul Islam**, “Development of Dialogue-Based Object Oriented Application”, *International Journal of the Computer, The Internet, and Management, IJCIM* Vol:11(3) (September-December, 2003), Thailand.
8. Md. Anisur Rahman, Khandaker Shahidul Islam, S.M. Rafizul Haque, and **Kamrul Islam** “An Enhancement of Cohen-Sutherland Algorithm for Line Clipping by Reducing Needless Clipping”, *Khulna University Studies* 3(2), December 2001, pp. 509-512.
9. **Kamrul Islam** and Md Sakhawat Hossain “Benefits of using Component-based Approach over Conventional one of Developing Large-scale and Complex Software System”, *Khulna University Studies* 3(2), December 2001, pp. 513-519.

CONFERENCE PAPERS

10. Salimur Choudhury, **Kamrul Islam**, and Selim G. Akl, “A Primal-dual Approximation Algorithm for the Minimum Cost Stashing Problem in Wireless Sensor Networks”, Submitted.
11. **Kamrul Islam**, Selim G. Akl, and Henk Meijer, “Maximizing the Lifetime of a Sensor Network through Domatic Partition”, *In Proceedings of the 34th IEEE Conference on Local Computer Networks (LCN)*, Zurich, Switzerland, 2009.
12. **Kamrul Islam**, and Selim G. Akl, “A Localized Algorithm for Target Monitoring in Wireless Sensor Networks”, *In Proceedings of the 8th International Conference on Ad Hoc Networks and Wireless (Ad Hoc Now)*, Murcia, Spain, 2009.
13. **Kamrul Islam**, Selim G. Akl, and Henk Meijer, “Distributed Generation of a Family of Connected Dominating Sets in Wireless Sensor Networks”, *In Proceedings of the Fifth IEEE/ACM Intl. Conf. on Distributed Computing in Sensor Systems (DCOSS '09)*, Marina Del Rey, California, June 2009.
14. **Kamrul Islam**, Selim G. Akl, “A Distributed Constant Factor Self-Protection Algorithm for Wireless Sensor Networks”, *In the 3rd Workshop LOCALGOS*,

in conjunction with Proceedings of the Fifth IEEE/ACM Intl. Conf. on Distributed Computing in Sensor Systems (DCOSS '09), Marina Del Rey, California, June 2009.

15. **Kamrul Islam**, Henk Meijer, and Selim G. Akl, "A Simple Distributed Algorithm for Computing Small Connected Dominating Sets in Wireless Sensor Networks", *In the 14th IEEE Intl. Conf. on Parallel and Distributed Systems (ICPADS'08)* Melbourne, December 8-10, 2008, Australia.
16. Yurai Nez Rodriguez, Henry Xiao, **Kamrul Islam**, and Waleed Al-Saleh, "A Distributed Algorithm for Computing Voronoi Diagram in the Unit Disk Graph Model", *In the 20th Canadian Conf. on Computational Geometry (CCCG '08)*, Montreal, Canada, August 13-15, 2008.
17. Selim G. Akl, **Kamrul Islam**, and Henk Meijer, "Direct Planar Tree Transformation and Counterexample", *In the Proceedings 20th Canadian Conf. on Computational Geometry (CCCG '08)*, Montreal, Canada, August 13-15, 2008. (authors names sorted alphabetically)
18. **Kamrul Islam** and Selim G. Akl, "Localized Topology Control Algorithm with no Geometric Information for Ad hoc Sensor Networks", *In the Second Intl. Conf. on Sensor Technologies and Applications (SENSORCOMM '08)*, August 25-31, 2008 - Cap Esterel, France.
19. Waleed Al-Saleh, **Kamrul Islam**, Yurai Nez Rodriguez, and Henry Xiao, "Distributed Construction of Voronoi Diagram in Sensor Networks", *In the ACM Symposium for Parallel Algorithms and Architecture (SPAA'08)* as poster paper, June 14-16, 2008, Munich, Germany. (authors names sorted alphabetically)
20. **Kamrul Islam**, Henk Meijer, Yurai Nunez Rodriguez, David Rappaport and Henry Xiao, "Hamilton Circuits in Hexagonal Grid Graphs", *Proceedings of 19th Canadian Conf. of Computational Geometry (CCCG'07)*, Ottawa, Ontario, August 20-22, 2007.
21. **Kamrul Islam**, "An Improved Architecture for Cooperative and Comparative Neurons (CCNs) in Neural Network", *International Workshop on Artificial Neural Networks and Intelligent Information Processing (ANNIIP'07)*, Angers, France, May 9-12, 2007. (**special journal issue as one of the selected best papers**)
22. **Kamrul Islam** and SM Rafizul Hoque, "Planar Tree Transformation through Flips", *Proceedings of Intl. Conf. on Information and Communication Technology (ICICT'07)*, Dhaka, March 8-10, 2007.
23. Selim G. Akl, **Kamrul Islam** and Henk Meijer, "On Planar Path Transformation", *Proceedings of 18th Canadian Conf. of Computational Geometry (CCCG'06)*, Kingston, Canada, August 14-16, 2006. (authors names sorted alphabetically)
24. Mahbub Murshed, S.M. Saifur Rahman, K.M. Hasan Ali Noor, **Kamrul Islam**, "Handwritten Signature Verification System using Artificial Intelligence", *Proceedings of Intl. Conf. on Computer and Information Technology (ICCIT'03)* December 2003, Dhaka, pp. 7-12.

25. Md. Aminur Rashid, Ahmed Wasif Reza, S.M. Rafiqul Islam, and **Kamrul Islam**, “Huffman Compression with Digram”, *Proceedings of Intl. Conf. on Computer and Information Technology (ICCIT’02)*, December 2002, Dhaka, pp. 10-15.
26. Arshad Parvez, Sk. Abu Ayub Azad, Md. Aziz Hasan, and **Kamrul Islam**, “An efficient technique in sequential decoding of convolution codes”, *Proceedings of Intl. Conf. on Computer and Information Technology (ICCIT’02)*, December 2002, Dhaka, pp. 416-420.

THESIS and REPORTS

27. **Kamrul Islam**, “Energy-efficient techniques for certain problems in Wireless Sensor Networks”, *PhD Thesis, April 2010*, School of Computing, Queen’s University, supervised by Profs. Selim G. Akl and Henk Meijer.
28. **Kamrul Islam**, “Computational aspects of sensor networks”, *Depth Paper required for Ph.D program*, School of Computing, Queen’s University, April 2007, supervised by Profs. Selim G. Akl and Henk Meijer.
29. **Kamrul Islam**, “Bounds on Some Geometric Transforms”, *Master’s Thesis, May 2005*, supervised by Prof. Selim G. Akl and Prof. Henk Meijer, School of Computing, Queen’s University, Kingston, Canada.

COURSES TAKEN

The following are the courses I have taken during my graduate studies at Queen’s University:

CISC 872 “Parallel Algorithms”
 CISC 876 “Computational Complexity”
 CISC 868 “Computational Geometry”
 CISC 832 “Database Management Systems”
 CISC 837 “Computer Networks”
 CISC 857 “Image Processing”
 CISC 874 “Foundations of Neural Networks”

ACADEMIC APPOINTMENTS

2003-09

Teaching and Research Assistant
 School of Computing, Queen’s University

1997-2003

Lecturer (Full Time Faculty), 6 Years of Experience
 Computer Science and Engineering Discipline, Khulna University
 Bangladesh (one of the high-ranked public universities in Bangladesh)

1999-2003

Part-time Faculty Member

Bangladesh Open University, (A national institute)
Khulna University Branch, Bangladesh

2002

Part-time Faculty Member

Khulna University of Engineering and Technology (KUET), Bangladesh
(One of the best public technological institutes in Bangladesh)

2000-2001

Part-time Faculty Member

Aptech Computer Education Khulna, (A private organization) Bangladesh

**TEACHING
EXPERIENCE**

(6 YEARS)

1997-2003

Khulna University I was a lecturer in Computer Science and Engineering Discipline, Khulna University Bangladesh for about six years and taught a number of theory and practical courses, and supervised various software development projects to the undergraduate students. Below is a list of the courses I taught to the undergraduate computer science students in Khulna University. As I was responsible to conduct all the courses, my responsibilities included preparing complete lecture notes, giving 50-minute lectures, making questions, quizzes, grading exam papers, proctoring, and preparing the results. For labs and projects I provided supervision, direction, and guidance to the students to the completion of their projects and labs. The medium of instruction of the undergraduate courses was English. The approximate enrolment of each of the courses is at least 30.

CSE-2111: Switching and Finite Automata Theory (3 hrs/week) (**Theory**)

CSE-2112: Switching and Finite Automata Lab (0.75 hrs/week) (**Lab**)

CSE-2200: Software Project I (3 hrs/week) (**Lab**)

CSE-2203: Computer Architecture (3hrs/week) (**Theory**)

CSE-2206: Assembly Language Programing Lab (3 hrs/week) (**Lab**)

CSE-3100: Software Development Project II (3 hrs/week) (**Lab**)

CSE-3102: Database Systems Project (3 hrs/week) (**Lab**)

ECE-3251: Data Communication (3 hrs/week) (**Theory**)

CSE-3221: Simulation and Modeling (3 hrs/week) (**Theory**)

CSE-3221: Simulation and Modeling Lab (3 hrs/week) (**Lab**)

CSE-4111: Computer Networks (3 hrs/week) (**Theory**)

CSE-4112: Computer Networks Lab (3 hrs/week) (**Lab**)

CSE-4123: Parallel and Distributed Processing (3 hrs/week) (**Theory**)

PGDIT DB : Database Design and Programming (3 hrs/week) (**Theory**)

PGDIT DBL : Database Design and Programming Lab (4 hrs/week) (**Projects**)

PGDIT OS : Operating Systems (3 hrs/week) (**Theory**)

PGDIT OSL : Operating Systems Lab (4 hrs/week) (**Lab**)

1999-2002

Bangladesh Open University Bangladesh Open University is a national and public university in Bangladesh which promotes computer education to the people of Bangladesh. Courses for the Diploma in Computer Science Application (DCSA) degree of Bangladesh Open University are conducted and coordinated by Computer Science and Engineering Discipline of Khulna University. I was responsible to conduct the following courses with the full responsibility of preparing and giving lectures, marking and project supervision for the computer science students of Bangladesh Open University. The approximate enrolment of each of the courses is at least 40.

DCSA OS: Operating Systems (1.5 hrs/week) (**Theory**)

DCSA OS: Operating Systems Lab (1.5 hrs/week) (**Lab**)

DCSA DP: Database Systems and Programming (1.5 hrs/week) (**Theory**)

DCSA DP: Database Systems and Programming Lab (1.5 hrs/week) (**Lab**)

DCSA VB: Visual Basic Programming Lab (1.5 hrs/week) (**Lab**)

2001-2002

Aptech Computer Education Bangladesh I was part-time faculty member of Aptech Computer Education Bangladesh for around two years where I instructed three courses. My responsibilities included lecturing, lab supervision, grading, proctoring exams etc.

SAD(Class X3): Systems Analysis and Design (3 hrs/week) (**Theory**)

IP(Class X2): Internet Programming (3 hrs/week) (**Theory**)

IP(Class X2): Internet Programming Lab (3 hrs/week) (**Lab**)

OOP (Class X5): Object Oriented Programming (3 hrs/week) (**Theory**)

2002

Khulna University and Engineering Technology (KUET) I was invited to teach a course on **Probability and Queuing Theory**. KUET is one of the best public technological and engineering institutes in Bangladesh.

COURSES (TAed)

2003-2008

During my graduate studies, I TAed the following courses to the undergraduate students at **School of Computing, Queen's University, Canada**. My responsibilities included tutoring, grading papers, holding regular office hours.

CISC-121: Introduction to Computer Science I

(Tutoring, Grading, Lab Supervision, Office Hours)

CISC-124: Introduction to Computer Science II

(Tutoring, Grading, Lab Supervision, Office Hours)

CISC-203: Discrete Mathematics for Computing Science

(Grading, Office Hours)

CISC-324: Operating Systems for Computing Science

(Grading, Office Hours, Lab Supervision)

CISC-365: Algorithms I for Computing Science

(Grading, Office Hours)

CISC-466: Algorithms II for Computing Science

(Tutoring, Grading, Lab Supervision, Office Hours)

INDUSTRIAL APPOINTMENTS

- 1999-2002** **Systems Analyst, Designer and Programmer I** analyzed, designed and developed a number of customized database-software for the **The Crescent Jute Mills** which is the second largest Jute Mills in Bangladesh, from 1999-2002. Specifically I was involved in developing payment systems that included Time Rate Payments, Piece Rate Payments, Yearly Bonus and Ledger Systems, Salary Systems, and a number of customized tools for about **11,000** employee of the Jute Mill. Since then these softwares have been used successfully.
- 2002-2003** **Systems Analyst and Programmer I** analyzed, designed and developed a complete and customized system for computing salary, gratuity and bonus for the staff of **The Crescent Jute Mills**. The software has been successfully used to produce a number of monthly and yearly customized reports for the staff of the company.

PROFESSIONAL ACTIVITIES

- 2009** IEEE Student Member
- 2008-09** **Reviewer**, Information Processing Letters (IPL' 2008-09)
- 2008-09** **Reviewer**, IEEE Globecom, Ad Hoc, Sensor and Mesh Networking Symposium (GlobeCom' 2008-09)
- 2008** **Reviewer**, International Journal of Computer Mathematics (IJCM' 2008)
- 2008** **Reviewer**, Sensor Technologies and Applications (SENSORCOMM' 2008)
- 2007** Member of the **Organizing Committee**, 6th Unconventional Computation Conference (UCC' 2007), held in Kingston, Canada

2006 Member of the **Organizing Committee**, 18th Canadian Conference on Computational Geometry (CCCG' 2006), held in Kingston, Canada

**SERVICE
KHULNA-
UNIVERSITY**

1999-2002 Co-supervised, Four Undergraduate Projects/Theses, Khulna University

1997-2002 Member of Different Administrative Committees (Designing Curriculum and Syllabus, Undergraduate Admission Results Publication), Khulna University

2000-2003 Member of Moderaton Committee for internal Examinations, Khulna University

1999-2001 Member of university LAN design, Khulna University.

**OTHER
SERVICES**

2009-2010 **President**
Queen's Bangladeshi Student Association (QBSA)
Queen's University

2008-2009 Student Member of the Institute of Electrical and Electronics Engineers (IEEE)

2001-2009 Member of Engineers Institute of Bangladesh (IEB)

CONFERENCE

- PRESENTATIONS**
1. **Kamrul Islam**, "Energy-aware techniques for certain problems in Wireless Sensor Networks" **Invited talk** at the *Singapore University of Technology and Design*, Singapore, April 2010.
 2. **Kamrul Islam**, Selim G. Akl, and Henk Meijer, "Distributed Generation of a Family of Connected Dominating Sets in Wireless Sensor Networks", *In Proceedings of the Fifth IEEE/ACM Intl. Conf. on Distributed Computing in Sensor Systems (DCOSS '09)*, Marina Del Rey, California, June 2009.
 3. **Kamrul Islam**, Selim G. Akl, "A Distributed Constant Factor Self-Protection Algorithm for Wireless Sensor Networks", *In the 3rd Workshop LOCALGOS, in conjunction with Proceedings of the Fifth IEEE/ACM Intl. Conf. on Distributed Computing in Sensor Systems (DCOSS '09)*, Marina Del Rey, California, June 2009.

4. Selim G. Akl, **Kamrul Islam**, and Henk Meijer, “Direct Planar Tree Transformation and Counterexample”, *In the Proceedings 20th Canadian Conf. on Computational Geometry (CCCG '08)*, Montreal, Canada, August 13-15, 2008.
5. **Kamrul Islam** and Selim G. Akl, “Localized Topology Control Algorithm with no Geometric Information for Ad hoc Sensor Networks”, *In the Second Intl. Conf. on Sensor Technologies and Applications (SENSORCOMM '08)*, August 25-31, 2008 - Cap Esterel, France.
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7. Selim G. Akl, **Kamrul Islam** and Henk Meijer, “On Planar Path Transformation”, *Proceedings of 18th Canadian Conf. of Computational Geometry (CCCG'06)*, Kingston, Canada, August 14-16, 2006.

LANGUAGES English (Fluent in speaking, reading and writing)
 Bengali (Native)
 Hindi (Speaking)

COMPUTER LANGUAGES Java, C/C++, Assembly Language, Visual Basic, SQL, JavaScript, FoxPro, HTML, Pascal.

OPERATING SYSTEMS LINUX, MS-DOS, MS-Windows 95/98/NT/2000/XP/Vista.

REFERENCES

Referees

Prof. Selim G. Akl

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Prof. Kai Salomaa

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Prof. Mohammad Zulkernine, P.Eng.

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