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## Md Omar Faruque Sarker

### EDUCATION

*Ph.D. Technology (Robotics)*, University of Wales, Newport, UK, (expected to finish 10/2010)  
Thesis: *Self-regulated Multi-robot Task Allocation*

*M.Eng. HCI & Robotics*, Korea Institute of Science & Technology,  
University of Science & Technology, South Korea, 2007

Thesis: *A Knowledge-Based Service Approach for Human-Centered Robots*

Graduate courses: *Human Machine Interaction, Intelligent Control, Mobile Robotics, Computer Vision, Advanced Symbolic AI Techniques and Information Security*. CGPA: 4.18/4.5

*B.Sc. Mechanical Engineering*, Bangladesh University of Engineering and Technology, 2005

Final-year elective courses: *Mechatronics and Bio-Engineering*

### EMPLOYMENT

10/2007 - present *PhD Student/ Research Assistant*

Cognitive Robotics Research Centre, University of Wales, Newport, UK.

08/2005 - 07/2007 *Postgraduate Research Assistant/ Visiting Research Scientist*

Center for Cognitive Robotics, Korea Institute of Science & Technology, S. Korea

03/2005 - 07/2005 *Lecturer and Coordinator (Industrial Training Program)*

Dept. of CSE, International Islamic University of Chittagong, Dhaka campus, Bangladesh

10/2004 - 05/2005 *Network Engineer*

Institute of Info & Communication Tech., Bangladesh University of Engineering & Technology

05/2004 - 09/2004 *Systems Engineer (Part-Time)*

Ektoo Limited, Dhaka, Bangladesh

11/2002 - 04/2004 *Associate Editor (Part-Time)*

Technology Today Ltd., Dhaka, Bangladesh.

04/2002–06/2004 *Tutor (Part-time)*

Institute of Info & Communication Tech., Bangladesh University of Engineering & Technology

### AWARDS

10/2010 - Present *University of Wales, Newport, UK Research Support Grant*

10/2007 - 09/2010 *EPSRC, UK PhD Studentship (Grant ref. EP/E061982/1)*

05/2010 - 08/2010 *Google Summer of Code Open-source Software Development Sponsorship for Tahoe-LAFS*

05/2009 - 08/2009 *Google Summer of Code Open-source Software Development Sponsorship for Bluez*

09/2005 - 08/2007 *Korea Institute of Science & Technology - Int'l R & D Academy Postgraduate Scholarship*

07/2000 - 06/2004 *Bangladesh University of Engineering & Technology Technical Scholarship*

1997 *District Commissioner's Gold Medal Honour for the Best Student of the Year*

1996 *Prime Minister's Award for Merit List Position in SSC Examination*

1995 *International Friendship Award, Scouts Invitation Program, Boy Scouts of Nippon, Japan*

## RESEARCH INTERESTS

**AI and Robotics:** *Bio-inspired decentralized control of multi-robot systems and application in search and rescue.*

**Networking & communication systems:** *Scalable distributed processing for complex networks and clouds.*

**Computer vision and image processing:** *Multi-agent tracking and real-time image processing.*

## TEACHING INTERESTS

Computer Networks, Information Security, Network Programming, Artificial Intelligence, Mobile Robotics, Intelligent Control, Applied Computer Vision and Multi-agent Systems.

## TECHNICAL SKILLS/TOOLS

**Proficient Programming Languages:** *C/C++, Python, Unix shell scripts, Prolog, LaTeX.*

**Tools:** *Git and Darcs revision control system, OpenCV computer vision library, SwisTrack multi-robot tracker, Epuck, Myro and Player/Stage robot control frameworks, NetLogo multi-agent simulator, Xenomai Linux based real-time OS, popular Unix/Linux network servers (e.g. Apache, MySQL), Linux Netfilter IPTables security package, CORAL, XSB, FuzzyCLIPS deductive databases and logic programming knowledge-based systems.*

**Familiar:** *Java, MATLAB, Tcl/Tk, HTML/XML, CSS, PHP, Bluez Bluetooth stack, Tahoe-LAFS, Drupal (CMS).*

## PUBLICATIONS

### Book Chapters

- [1] Sarker M. O. F. and Dahl T. S. A Robotic Validation of the Attractive Field Model: An Inter-disciplinary Model of Self-regulatory Social Systems. *Swarm Intelligence, Lecture Notes in Computer Science*, 6234:24–35, 2010.
- [2] Sarker M. O. F. Kim C. Sadi M. G. and You. B-J. Developing Knowledge-Based Security-Sense of Networked Intelligent Robots. *Lecture Notes in Computer Science*, 4251:874–881, 2006.

### Conference Papers

- [3] Sarker, M. O. F. and Dahl, T. S. Flexible Communication in Multi-robotic Control System Using HEAD: Hybrid Event-driven Architecture on D-Bus. In *Proc. of the UKACC International Conference on Control, CONTROL 2010, Coventry, UK*, pages 926–931, September 7-10, 2010.
- [4] Sarker M. O. F. and Dahl T. S. Communication strategies for self-regulated division of labour in robot society. In *Proceedings of the 2009 European Conference on Complex Systems (ECCS'09), Warwick, UK*, pages 157–158, September 21-25, 2009.
- [5] Sarker M. O. F. Park, J-M. Kim C. and You. B-J. A Knowledge-Based Service Approach for Human-Centered Robots. In *In Proc of the 16th IEEE International Symposium on Robot and Human interactive Communication, 2007. RO-MAN 2007*, pages 582–587, 2007.
- [6] Sarker M. O. F. Kim C. Baek S. and You. B-J. An IEEE-1394 Based Real-time Robot Control System for Efficient Controlling of Humanoids. In *In Proc of the 2006 IEEE/RSJ International Conference on Intelligent Robots and Systems IROS 2006*, pages 1416–1421, 2006.
- [7] Sarker M. O. F. Kim C. Cho J-S. and You. B-J. Development of a Network-based Real-Time Robot Control System over IEEE 1394: Using Open Source Software Platform. In *In Proc of the IEEE International Conference on Mechatronics, ICM 2006*, pages 563–568, 2006.

### Technical Report and Thesis

- [8] Sarker, Md Omar Faruque. Emergent Self-regulation in Social Robotic Systems. Technical report, University of Wales, Newport, UK, November 2008. *Submitted as PhD Transfer Report.*
- [9] Sarker, Md Omar Faruque. A Knowledge-Based Service Approach for Human-Centered Robots. Technical report, University of Science and Technology, South Korea, August 2007.

### Submitted/Accepted for Publication

- [10] Sarker M. O. F. and Dahl T. S. Bio-inspired Communication for Self-regulated Multi-robot Systems. Accepted for publication in *Multi-Robot Systems, Trends and Development*, ISBN 978-953-7619-X-X, 2010.
- [11] Sarker M. O. F. and Dahl T. S. Self-regulated Multi-robot Task Allocation: A Taxonomy and Comparison of Centralized and Local Communication Strategies. In submission to *Elsevier Robotics and Autonomous System*, 2010.

## COMPLETED SOFTWARE DEVELOPMENT PROJECTS

**PhD Research Projects** (source code available from <http://github.com/roboshepherd>)

**[1] Project title: *E-puck Robot's Centralized and Distributed Controller Development***

Tools/Skills: Python, C/C++, DBus, Git (version control system)

Achievements: Developed the task achieving behaviours of the e-puck robot (navigation, obstacle avoidance and homing) and integrated with SwisTrack tracker.

**[2] Project title: *SwisTrack Multi-robot Tracker's Prosilica GigE Camera Driver and DBus Wrapper Development***

Tools/Skills: C++, Python, Git, OpenCV (computer vision library)

Achievements: Developed GigE camera driver using Prosilica's Linux-SDK and OpenCV. Implemented SwisTrack's DBus server component for broadcasting position information to robot controllers.

**Google Summer-of-Code Projects (<http://socghop.appspot.com>)**

**[1] 2010 Project title: *A Publish/Subscribe Style Decentralized Introduction***

Organization: Tahoe-LAFS (<http://tahoe-lafs.org/trac/tahoe-lafs/ticket/68>)

Tools/Skills: Python, Twisted/Nevow (web framework), Mock (code testing), Darcs (version control system)

Achievements: Designed, developed, tested and documented the community demanded fault-tolerant multiple-introducer scheme (ticket #68).

**[2] 2009 Project title: *A One-Step Bluetooth Device Setup Wizard Using 2D Data-matrix symbol***

Organization: BlueZ (<http://www.bluez.org>)

Tools/Skills: C, Bluetooth specification version 2.1 EDR, 2D DataMatrix library (libdmtx), Git

Achievements: Tested the feasibility developing a user-friendly one-step setup wizard and integrating short-range wireless NFC technology with BlueZ's Linux-Bluetooth-stack.

**Masters Research Projects (<http://humanoid.kist.re.kr/new/eng/>)**

**[1] Project title: *Application Development for Human-Centered Service Robots***

Tools/Skills: C++/Java, Prolog, and XML, Java-Player client library, XSB deductive database, XML-RPC, Evolution Robotics SDK, Wxwidget Library, Boost C++ Multi-thread library

Achievements: Designed and developed Knowledge-based services and implemented two scenarios in an office and a hospital environment in Player/Stage mobile robot simulator.

**[2] Project title: *Intelligent Network Security System for Robots***

Tools/Skills: Unix BASH shell, SQL, CORAL, CLIPS, C, Linux Netfilter IPTables, CORAL deductive database, Fuzzy inference system, MySQL

Achievements: A knowledge-based security architecture was implemented and simulated.

**[3] Project title: *Real-Time Robot Control***

Tools/Skills: C, Linux/Xenomai RTOS, UML, Source-code-navigator

Achievements: Customized real-time IEEE 1394 device-driver in Linux for humanoid robot control.

**Masters Course Projects**

**[1] Project title: *Image Feature Extraction and Mobile Robot Path Planning***

Tools/Skills: MATLAB, Least square techniques, Hough transform, Gradient method

Achievements: Applied weighted and non-weighted least-square techniques, Hough transform for efficient line extraction. Implemented the gradient method for mobile robot path planning with wave-front propagation algorithm.

**[2] Project title: *Application Development for Intelligent LEGO Home***

Tools/Skills: Java, Knowledge-engineering tool Protege, CLIPS inference engine, and Intel UPnP authoring tools.

Achievements: Developed the inference engine, a Java client to Protege and several UPnP devices.

**[3] Project title: *Human Face Recognition***

Tools/Skills: C/C++, Tcl/Tk, Statistical histogram algorithm

Achievements: Developed an algorithm for converting colour info from RGB to HSV colour space that made the face detection more robust in varying illuminations.

**[4] Project title: *Fourier 2D Transform tool***

Tools/Skills: C, Tcl/Tk, Fourier transform algorithm

Achievements: Developed a tool that can transform a 64x64 image.