

Zarrin Langari

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Research Interests

- Model-based Software Engineering
- Formal methods and analysis for verification of safety-critical software systems such as real-time embedded systems
- Formal modelling and verification of communication protocols
- Certification of software systems in medical and automotive domains

Education

University of Waterloo.

Ph.D., Cheriton School of Computer Science, October 2010.

Thesis: "Modelling and Analysis using Graph Transformation Systems"

Advisor: Professor Richard Trefler.

University of Waterloo.

MMath, Cheriton School of Computer Science, August 2001.

Thesis: "Subject Classification in the Oxford English Dictionary."

Advisor: Professor Frank Wm. Tompa.

Iran University of Science & Technology.

B.Sc., Software Engineering, February 1992.

Research Experience

11/2010–present **Postdoctoral Fellow**, McMaster University.
Department of Computing and Software.

- Developing methods on how to produce safety-critical real-time embedded software that can be certified, and on how existing software may be certified.
- Working with medical and automotive software industries on the verification and certification of their software systems.
- Improvement of the practice of software engineering methodologies applied to safety-critical software systems. As a software engineering approach, Model Driven Development (MDE) must make time, timing, and timing tolerances an integral aspect of its development methodology. The focus of is on specification of timing properties in UML/MARTE, AADL, and AutoSAR for automotive domain. We intend to conduct empirical studies with MDE and the above approaches to study the effects on development effort of incorporating timing.

09/2003–10/2010 **Research Assistant**, University of Waterloo.
Cheriton School of Computer Science.

-The focus of my research has been in providing operational semantics for telecommunication protocols and investigating software analysis methods for verification of these protocols. In this direction, I have collaborated with AT&T Research on formal modelling of its next-generation IP-based telecommunication protocol. As a result, I have obtained valuable engineering insight on the software design, analysis, modelling, and verification of communication protocols.

- I proposed a verification approach for proving graphical encoding of safety properties of models described in GTS. I also introduced abstraction methods for GTSs based on symmetry reduction to be used for reasoning about these systems. In this regard, I have presented an algorithm for on-the-fly generation of an architecturally symmetry-reduced quotient of a GTS model.

01/1999–08/2001 **Research Assistant**, University of Waterloo.
Cheriton School of Computer Science.

- Researched and implemented text mining algorithms to classify the Oxford English Dictionary entries by their subjects and I gained the expertise needed for data mining, and classification of very large corpuses. I tackled a real-world problem with the scale much beyond small experimental examples. Therefore, with the goal of solving an important problem for the Oxford English Dictionary (OED), I was encouraged to bring my research to the level of practicality, thus I applied the subject classification to all the Oxford English Dictionary data.

Professional Experience

06/2005–11/2006 **Software/Database Developer**
PeerGroup Inc., Kitchener, Ontario.

- Administered a very large MS SQL Server database. This database has been developed for a client which is a major leading software organization in the world, and the volume of database has been ranked among the top 20 largest databases known so far. The database is a distributed database and replicates in three levels.

- Developed database scripts and stored procedures as a team member for deployment of a software tool using C# and MS SQL Server.

- Provided database support as an application support team member.

09/2002–12/2002 **Software Developer**
Sybase Inc., Waterloo, Ontario.

Developed Java software with Sybase EAServer development team to release new version of Enterprise Application Server.

03/1992–12/1997 **Software System Developer**

SE Data Processing Inc. Kerman, Iran.

- Designed and developed tools and software application systems using C on UNIX and Windows.

- Instructed successful object oriented programming course as part of a certificate program

Teaching Experience

01/2010–05/2010 **Instructor**, University of Waterloo.
Cheriton School of Computer Science.

Teaching Management Information Systems (CS330), class size: 120
The course is an introduction to information systems and their strategic role in business. Topics include types of information systems, organizational requirements, systems development strategies, decision support systems, data and information management, and information systems management, control and implementation.

01/2008–12/2010 **Certificate in University Teaching (CUT)**, University of Waterloo.
Centre for Teaching Excellence.

The CUT program provides a comprehensive teacher-development experience. (see http://www.cte.uwaterloo.ca/graduate_programs/CUT/index.html for more information.)

11/2009 **Organizer and presenter of a workshop in teaching**, University of Waterloo.

Due to my passion for teaching and as part of the CUT program, I proposed and organized a workshop on “Challenges in Teaching Software Engineering Courses”. As a session in the workshop, I presented about the incorporation of formal methods in software engineering courses.

05/2009–08/2009 **Instructor**, University of Waterloo.
Electrical and Computer Engineering Department
Software Engineering Technical Presentation Milestone (TPM), class size: 10
TPM is a required course in Software Engineering discipline. In this course students develop their technical presentation skills and deliver an oral presentation.

09/2003–04/2009 **Teaching Assistant/Tutor**, University of Waterloo.
Cheriton School of Computer Science.

My duties included presenting tutorial sessions, providing marking schemes and assignments solutions, marking assignments, organizing other TAs duties, holding office hours, and answering students questions in discussion forums for the following courses:

Software Testing and Quality Assurance (CS447), Software Abstraction and Specification (CS246), Logic and Computation (CS245), Software Requirements Specification (CS445), Object Oriented Programming (CS132), Data

Structures and Data Management (CS240), Application Software Engineering (CS430), Computer Applications in Business (CS338), and Management Information Systems (CS330).

01/1999-10/2001 **Teaching Assistant/Tutor**, University of Waterloo.
Cheriton School of Computer Science.

My duties included presenting tutorial sessions, marking assignments, holding office hours, and answering students questions in discussion forums for the following courses:
Software Abstraction and Specification (CS246), Database Management (CS348), and Data Structures (CS240).

01/1998-04/1998 **Lecturer**, Tinat Sanat Inc., Kerman, Iran.
Instructed Windows 98 for customer's engineering department.

Awards

11/2010–11/2011 MITACS Accelerate Fellowship.

01/2008–01/2009 Cheriton Graduate Scholarship in Computer Science.

01/2007–04/2007 Ontario Graduate Scholarship in Science and Technology (OGSST).

01/2007–04/2007 Math Faculty Graduate Scholarship.

Publications

Z. Langari and R. Trefler, Symmetry Reduction for Dynamic systems. NASA Formal Methods Symposium 2011 (NFM), Lectures Notes in Computer Science 6617, pp 252-266.

Z. Langari and R. Trefler, Application of Graph Transformation in Verification of Dynamic Systems. Integrated Formal Methods 2009 (IFM'09). Lectures Notes in Computer Science 5423, pp 261–276.

Z. Langari and R. Trefler, Formal Modeling of Communication Protocols by Graph Transformation. Formal Methods 2006 (FM'06). Lecture Notes in Computer Science 4085, pp 348–363.

Z. Langari and A. B. Pidduck, Quality, Cleanroom and Formal Methods. ACM SIGSOFT Software Engineering Notes, Volume 30, Issue 4, 2005.

Z. Langari and F.W.Tompa, Subject Classification in the Oxford English Dictionary. Proceedings of IEEE International Conference on Data Mining. (ICDM'01). pp 329–336.

Z. Langari, Subject Classification in the Oxford English Dictionary, MMath Thesis, Cheriton School of Computer Science, University of Waterloo, Aug. 2001.

Reviewing

I have reviewed submissions for FMCAD 2006 and FMCAD 2007.

Citizenship Female Canadian

Service

09/2009–12/2009 Graduate Recruiting Committee (GREC) member.

05/2008–09/2008 Women In Computer Science (WICS) committee member.

10/2007 Volunteer and organizer for CS4U event, that introduces high school students to CS.

06/2007 Volunteer in seminar for high school girls in Canada to try to spark their interest in CS.