Gehan Mustafa Kamel Selim

Personal Information	
Address	Apt. 1006, 175 Hunter Street West, Hamilton, Ontario, Canada, L8P1R4
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Citizenship	Canadian Citizen

Education

Queen's University, School of Computing, Kingston, ON, Canada	▪ September 2009 – June 2015 **Ph.D.** Degree in Computing Thesis Title: "Formal Verification of Graph-Based Model Transformations" ▪ Ph.D. research funded by NSERC, as part of the NECSIS Automotive Partnership with General Motors, IBM Canada, and Malina Software Corp. ▪ Courses and Grades: - CISC880: Mining Software Engineering Data – 93% - ELEC876: Software Reengineering - 90% - CISC879: Natural Computing – 98% - CISC836: Models in Software Development: Methods, techniques and tools - 92% - EE585/CISC846: Real-Time Software Design and Implementation - 93 % - CISC865: Introduction to Programming Language Theory - 83% - CISC860: The Structure and Design of Programming Languages (Audit)
Cairo University, Faculty of Computers & Information, Information Technology Department, Cairo, Egypt	▪ September 2005 – September 2008 **M.Sc.** Degree in Speech Processing Thesis Title: "Cocktail-Party Speech Segregation Problem" ▪ September 2004 - May 2005 **Pre-masters** Courses; Grade: **Excellent**. ▪ September 2000 - May 2004 **B.Sc.** Degree in Computer Science Grade: **Excellent with Honors**; Rank: **Fourth** Graduation Project: A system for assisting blind people, composed of: A. An English Optical Character Recognition (OCR) system B. A speech system containing an Audible User Interface, a Wizard that teaches Braille, a Braille test, a text-to-speech component that reads the OCR's output, and an application that trains the blind user on the keyboard

	C. A STAR printer altered to print Braille letters on paper
Al-Nahda National Schools, Abu Dhabi, United Arab Emirates	▪ September 1987 - June 2000 **IGCSE Diploma**; Average Grade: **A**

Academic Work Experience	
Post-Doctoral Fellow	September 2016 – Present McMaster University, Department of Computing and Software, Hamilton, ON, Canada

Main Responsibilities & Duties (as a Post-Doctoral Fellow):

- Working on the Leadership in Automotive Powertrain (LEAP 1 and LEAP 2) project, which is funded by the Automotive Partnership Canada (APC). The project is a collaboration between McMaster University and Fiat Chrysler Automobiles (FCA US LLC). Aims of the project include developing tools in Matlab that facilitate vehicle software development in the automotive industry. For example, some of the tools under development are aimed to help engineers to model, simulate, visualize, and verify automotive software. Additionally, the LEAP project aims to assist FCA in adopting new trends such as conforming to the AUTOSAR (AUTomotive Open System ARchitecture) standard and migrating to centralized or domain-oriented E/E architectures while guaranteeing several properties such as functional safety (as per ISO26262).
- Periodically visiting FCA US LLC (Auburn Hills, MI) to report on the LEAP'S project progress.
- Supervising undergraduate interns and graduate students working on the LEAP project.
- Publishing papers in journals, conferences, and workshops to report on conducted research.
- Reviewing conference and workshop papers.

Post-Doctoral Fellow and Instructor	September 2015 – August 2016 Queen's University, School of Computing, Kingston, ON, Canada

Main Responsibilities & Duties (as a Post-Doctoral Fellow):

- Conducting research with international collaborators in various topics related to Model Driven Development (MDD) and verification of model transformations. Specific topics of interest include verification of semantics preservation for model transformations, and the verification of imperative model transformations by converting them to intermediate representations.
- Reviewing conference and workshop papers.

Main Responsibilities & Duties (as an Instructor):

- Teaching the graduate course CISC883 "Introduction to Ultra-Large Scale Software Systems (ULSS)" for the fall of 2015 (http://www.cs.queensu.ca/students/graduate/courses/). The curriculum of CISC883 includes:
  - Basics of Ultra-Large Scale Software Systems (ULSSs), including their characteristics, challenges, and design principles.
  - Research methods, including writing technical papers (i.e., conference/journal/workshop papers, thesis, paper reviews, and project proposals), guidelines for giving presentations, strategies for finding relevant research papers, and creating Google Scholar profiles.
- Preparing and marking weekly assignments of CISC883. The assignments are designed to reflect the students' knowledge in the various concepts and research methods taught.

Teaching Assistant and Research Assistant	September 2009 – June 2015 Queen's University, School of Computing, Kingston, ON, Canada

Main Responsibilities & Duties (as a Teaching Assistant):

- Conducting lab sessions to assist students in learning programming languages and tools for the introductory computer course "CISC P81-Computers: Applications and Implications".

Main Responsibilities & Duties (as a Research Assistant):

- Conducting research in various software engineering topics related to Model Driven Development (MDD), including model transformations, static and dynamic analysis of model transformations, formal verification of model transformations, languages for the specification of transformation properties, translating transformations into a logical satisfiability problem to verify transformation properties, black-box and white-box testing of model transformations, mutation analysis of model transformations, classification of model transformations with respect to several dimensions (e.g., suitable verification techniques for various transformation properties, formalization of transformations, transformation intents), and model transformations for software product lines. I have also investigated topics related to ultra-large scale software systems, including software clone detection, studying the impact of software cloning on software defects, and studying the evolution of software and software clones.
- Sub-reviewing conference and workshop papers.

March 2009 – August 2009 **Lecturer Assistant**, September 2004 – February 2009 **Teaching Assistant**	Cairo University, Faculty of Computers & Information, Information Technology Department, Cairo, Egypt

Main Responsibilities & Duties:

- Assisting in teaching different courses, including Networks, Data Communication, Signal Processing, Speech Processing, and Machine Learning.
- Preparing and marking weekly assignments of the courses taught.
- Coordinating lab sessions, which includes teaching different tools/technologies, asking students to deliver projects with specific requirements, assisting students in solving technical problems.
- Preparing course and program specifications for the Information Technology Department.
- Developing the Speech Processing online course for UNESCO's Avicenna Virtual Campus (AVC) project (Egypt). The aim of the AVC project is to promote e-learning and the sharing of knowledge and resources between participants of AKC, which include Cairo University.

Industrial Work Experience

Summer Intern	May 2011 – August 2011 General Motors (GM) Global Research and Development, Warren, Michigan, USA

Main Responsibilities and Duties:

- Exploring commercial Model Driven Development tools, including IBM Rational Asset Manager, RulesComposer in IBM Rational Rhapsody, and MDWorkbench.
- Understanding a GM-specific modelling language and the AUTOSAR automotive standard, both of which are used to model aspects in vehicle control software.
- Deducing a mapping between the GM modelling language and the AUTOSAR standard, and developing an ATL transformation that implements the deduced mapping.
- Verifying and testing the implemented ATL Transformation.
- Providing a final report and a presentation of the work achieved throughout the internship.

Data Mining Researcher	June 2008 – July 2009 Informateks International, Inc., Cairo, Egypt

Main Responsibilities & Duties:

- Understanding the general workflow in the Oil and Gas Industry.
- Developing and experimenting with various data mining techniques.
- Testing these data mining techniques on data from the Oil and Gas Industry.
- Using Microsoft Excel Visual Basic for Applications (VBA) to develop the graphical user interface of a custom-made Matlab toolbox aimed for the Oil and Gas Industry.
- Developing the Principal Component Analysis (PCA) and the Clustering modules of this toolbox.

Junior Java Developer	July 2006 – January 2007 The Egyptian Company for Networks (EgyNet), Cairo, Egypt

Main Responsibilities & Duties:

- Reimplementing a system that generates monthly invoices (previously developed using C#.NET) into a Java-version of the same system.

Junior Software Developer	August 2004 - July 2005 Imaginet Software; Cairo, Egypt

Main Responsibilities & Duties:

- Developing the Line/Horizontal Segmentation module of an Arabic Optical Character Recognition (OCR) mobile application using C#.NET.

Publications

Journal Publications:

- *M. Amrani, B. Combemale, L. Lucio, G. M. K. Selim, J. Dingel, Y. Le Traon, H. Vangheluwe, J. R. Cordy,* "Formal Verification Techniques for Model Transformations: a Tridimensional Classification", Journal of Object Technology (JOT), 14, 3, pp. 1-43, August 2015.
- *G. M. K. Selim, S. Wang, J. R. Cordy, J. Dingel,* "Model Transformations for Migrating Legacy Deployment Models in the Automotive Industry", Software and Systems Modelling (SoSym) Journal, 14, 1, pp. 365-381, February 2015.
- *L. Lúcio, M. Amrani, J. Dingel, L. Lambers, R. Salay, G. M. K. Selim, E. Syriani, M. Wimmer,* "Model Transformation Intents and their Properties", Software and Systems Modelling (SoSym) Journal, pp. 1-38, 2014.

Conference Publications:

- *G. M. K. Selim, J.R. Cordy, J. Dingel,* "How is ATL Really Used? Language Feature Use in the ATL Zoo", Proc. of the 20th International Conference on Model Driven Engineering Languages and Systems (MODELS), Austin TX, USA, pp. 34-44, September 2017. **(Best paper award)**
- *M. Famelis, L. Lúcio, G. M. K. Selim, A. Di Sandro, R. Salay, M. Chechik, J. R. Cordy, J. Dingel, H. Vangheluwe, Ramesh S*, "Migrating Automotive Product Lines: a Case Study", Proc. of the 8th International Conference on Model Transformation (ICMT), L'Aquila, Italy, pp. 82-97, July 2015. **(Best Paper Award)**.
- *G. M. K. Selim, L. Lucio, J. R. Cordy, J. Dingel, B. J. Oakes,* "Specification and Verification of Graph-Based Model Transformation Properties", Proc. of the 7th International Conference on Graph Transformation (ICGT), York, United Kingdom, Lecture Notes in Computer Science 8571, pp. 113-129, July 2014.
- *G. M. K. Selim, F. Büttner, J. R. Cordy, J. Dingel, S. Wang,* "Automated Verification of Model Transformations in the Automotive Industry". Proc. of the 16th International Conference on Model Driven Engineering Languages and Systems (MODELS). Miami, Florida, USA, pp. 690-706, September 2013. **(Nominated for Best Paper Award)**.
- *G. M. K. Selim, S. Wang, J. R. Cordy, J. Dingel*, "Model Transformations for Migrating Legacy Models: An Industrial Case Study", Proc. of the 8th European Conference on Modelling Foundations and Applications (ECMFA), Kgs. Lyngby, Denmark, Lecture Notes in Computer Science 7349 pp. 90-101, July 2012. **(Best Industrial Paper Award)**.
- *G. M. K. Selim, L. Barbour, W. Shang, B. Adams, A. Hassan, Y. Zou,* "Studying the Impact of Clones

on Software Defects", Proc. of the 17th Working Conference on Reverse Engineering (WCRE), Boston's North Shore, Beverly, Massachusetts, USA, pp. 13-21, October 2010.
- *G. M. K. Selim, K. C. Foo, Y. Zou,* "Enhancing Source-Based Clone Detection Using Intermediate Representation", Proc. of the 17th Working Conference on Reverse Engineering (WCRE), Boston's North Shore, Beverly, Massachusetts, USA, pp. 227-236, October 2010.

Workshop Publications:
- *G. M. K. Selim, J. R. Cordy, J. Dingel, L. Lúcio B. J. Oakes*, "Finding and Fixing Bugs in Model Transformations: An Experience Report", Proc. of the 4th MODELS Workshop on the Analysis of Model Transformations (AMT), Ottawa, Canada, pp. 26-35, September 2015.
- *G. M. K. Selim, J. R. Cordy, J. Dingel,* "Model Transformation Testing: The State of the Art", Proc. of the 1st MODELS International Workshop on the Analysis of Model Transformations (AMT), Innsbruck, Austria, pp. 21-26, October 2012.
- *M. Amrani, J. Dingel, L. Lambers, L. Lucio, R. Salay, G. M. K. Selim, E. Syriani, M. Wimmer,* "Towards a Model Transformation Intent Catalog", Proc. of the 1st MODELS International Workshop on the Analysis of Model Transformations (AMT), Innsbruck, Austria, pp. 3-8, October 2012.
- *M. Amrani, L. Lúcio, G. M. K. Selim, B. Combemale, J. Dingel, H. Vangheluwe, Y. Le Traon, J. R. Cordy,* "A Tridimensional Approach for Studying the Formal Verification of Model Transformations", Proc. of the 1st ICST Workshop on the Verification and Validation of Model Transformations (VOLT), Montreal, Canada, pp. 915-922, April 2012.

Tools Papers:
- *A. Schaap, G. Marks, V. Pantelic, M. Lawford, G. M. K. Selim, A. Wassyng, L. Patcas, "Documenting Simulink designs of embedded systems",* Proc. of the 21st International Conference on Model Driven Engineering Languages and Systems (MODELS), Copenhagen, Denmark, pp. 47-51, 2018.
- *L. Lúcio, B. J. Oakes, C. Gomes, G. M. K. Selim, J. Dingel, J. R. Cordy, H. Vangheluwe,* "SyVOLT: Full Model Transformation Verification Using Contracts", Proc. of the 18th International Conference on Model Driven Engineering Languages and Systems (MODELS), Ottawa, Canada, pp. 24-27, September 2015.

Thesis:
- *G. M. K. Selim,* "Formal Verification of Graph-Based Model Transformations", Ph.D. Thesis, Queen's University, June 2015.
- *G. M. K. Selim,* "Cocktail-Party Speech Segregation Problem", M.Sc. Thesis, Cairo University, September 2008 (not available online).

Non-Refereed Publications:
- *G. M. K. Selim, L. Lucio, J. R. Cordy, J. Dingel, "Symbolic Model* Transformation Property Prover for DSLTrans", Technical Report 2013-616, School of Computing, Queen's University, December 2013.
- *G. M. K. Selim, J. R. Cordy, J. Dingel,* "Analysis of Model Transformations", Technical Report 2012-592, School of Computing, Queen's University, August 2012.
- *G. M. K. Selim, S. Wang,* "Using Model Transformations to Migrate Legacy Models to Autosar Models", Internal Research Report (not available online), General Motors (GM) Global Research and Development, Warren, Michigan, USA, August 2011.

Scholarships and Awards

- **Best Paper Award** for the paper: *G. M. K. Selim, J.R. Cordy, J. Dingel,* "How is ATL Really Used? Language Feature Use in the ATL Zoo", Proc. Of the ACM / IEEE 20th International Conference on Model Driven Engineering Languages and Systems (MODELS), Austin TX, USA, pp. 34-44, September 2017.
- **Research Award for 2016.** This award is given by the School of Computing (Queen's University, Canada) to post-graduate students or post-doctoral fellows who have conducted outstanding research in their field, established collaborations, and published papers in reputable venues.
- **Best Paper Award** for the paper: *M. Famelis, L. Lúcio, G. M. K. Selim, A. Di Sandro, R. Salay, M. Chechik, J. R. Cordy, J. Dingel, H. Vangheluwe, Ramesh S,* "Migrating Automotive Product Lines: a

Case Study", ICMT, L'Aquila, Italy, July 2015, pp. 82-97.

- **Best Industrial Paper Award** for the paper: *G. M. K. Selim, S. Wang, J. R. Cordy, J. Dingel,* "Model Transformations for Migrating Legacy Models: An Industrial Case Study", ECMFA, Kgs. Lyngby, Denmark, July 2012, pp. 90-101.
- **The IBM CAS Fellowship for the years 2011-2015**. The fellowship is awarded to CAS Research sponsored graduate student projects supervised by CAS Research faculty members.
- **The 2010-2011 and the 2011-2012 Duncan and Urlla Carmichael Fellowship**, in the amount of $10,000 from Queen's University (Canada). The fellowship is awarded to masters and doctoral students in any field who have first class standing.
- **International Tuition Award (ITA) for 2009 and 2010, and Queen's Graduate Award (QGA) for 2009.** Both awards are granted to graduate students who are in good academic standing, based on a recommendation from the School of Computing (Queen's University, Canada) and as part of the funding package. Only international Ph.D. students are eligible to receive ITAs.
- **Best M.Sc. Thesis Award** for the Faculty of Computers and Information, Cairo University, Egypt, 2008.
- **Teaching Assistant Honorary Certificates for the years 2006 and 2007** in the Faculty of Computers and Information, Cairo University, Egypt.

Technical Skills

- Excellent knowledge of the AUTOSAR (AUTomotive Open System ARchitecture) standard, including its architecture, templates, and methodology.
- High experience with several Model Driven Development tools, including IBM Rational Rose RealTime, IBM Rational Rose, and IBM Rational Rhapsody, and Simulink and Stateflow (Matlab).
- Proficient in programming with Java, Matlab, Python, and C#.NET.
- Proficient in programming with several model transformation languages, including ATL, Kermeta, and DSLTrans.
- Very good experience in programming with R, Visual C++, ADO.NET, Microsoft Excel Visual Basic for Applications (VBA), and the SDK platform for Speech programming.
- High experience with HTML, Java Script, and XML.
- Excellent knowledge of Database concepts and tools, including Microsoft Access and SQL.
- Excellent knowledge of several computer science topics (as detailed in my education and work experience). Topics previously investigated range from image and speech processing to diverse topics in model driven development (MDD), including industrial applications, model transformations, validation and verification of MDD artefacts, tool development, and product line software development.

Participation in Conferences and Workshops

Talks Given:

- The 4th MODELS Workshop on the Analysis of Model Transformations (AMT), 27 September-2 October 2015. Presented my paper entitled:
  G. M. K. Selim, J. R. Cordy, J. Dingel, L. Lúcio B. J. Oakes, "Finding and Fixing Bugs in Model Transformations: An Experience Report", AMT, 2015.
- The 7th International Conference on Graph Transformation; ICGT (York, United Kingdom), collocated with Software Technologies: Applications and Foundations (STAF), July 2014. Presented my paper entitled:
  G. M. K. Selim, L. Lucio, J. R. Cordy, J. Dingel, B. J. Oakes. "Specification and Verification of Graph-Based Model Transformation Properties", ICGT, 2014.
- Network for the Engineering of Complex Software-Intensive Systems for Automotive Systems Workshop; NECSIS (Kitchener, ON, Canada), June 2014. Title of talk:
  "Specification and Verification of Graph-Based Model Transformation Properties".
- 8th European Conference on Modelling Foundations and Applications; ECMFA (Kgs. Lyngby, Denmark), July 2012. Presented my paper entitled:
  G. M. K. Selim, S. Wang, J. R. Cordy, J. Dingel. "Model Transformations for Migrating Legacy Models: An Industrial Case Study", ECMFA, 2012.
- 1st ICST Workshop on the Verification and Validation of Model Transformations; VOLT (Montreal, QC, Canada), April 2012. Presented my paper entitled:
  M. Amrani, L. Lúcio, G. M. K. Selim, B. Combemale, J. Dingel, H. Vangheluwe, Y. Le Traon, J. R. Cordy. "A Tridimensional Approach for Studying the Formal Verification of Model Transformations", VOLT, 2012.
- Gave a talk at General Motors (GM) Global Research and Development (Warren, Michigan, USA), August 2011. Title of talk:
  "Using Model Transformations to Migrate Legacy Models to Autosar Models".

Poster Demonstrations:

- Network for the Engineering of Complex Software-Intensive Systems for Automotive Systems Workshop; NECSIS (Kitchener, ON, Canada), June 2014. Poster title:
  G. M. K. Selim, L. Lucio, J. R. Cordy, J. Dingel, B. J. Oakes. "Verification of Translation Model Transformations: Methodology, Property Language, and Case Study".
- Network for the Engineering of Complex Software-Intensive Systems for Automotive Systems Workshop; NECSIS (Gatineau, QC, Canada), June 2012. Poster title:
  G. M. K. Selim, S. Wang, J. R. Cordy, J. Dingel. "Model Transformations for Migrating Legacy Models: An Industrial Case Study".
- Presented a poster in the Network for the Engineering of Complex Software-Intensive Systems for Automotive Systems Launch Event/ Workshop; NECSIS: Scaling model-driven engineering for software intensive systems (Hamilton, ON, Canada), June 2011.
- Presented a poster in the Mining Summer School (Kingston, ON, Canada), June 2010.
- Consortium for Software Engineering Research; CSER (Markham, ON, Canada), November 2009. Poster Title:
  G. M. K. Selim, K.C. Foo, Y. Zou. "Enhancing Clone Detection Using "Jimple" Code Representation".

Attendance:

- Queen's Graduate Computing Society Conference; QGCSC (Kingston, ON, Canada), May 2014.
- Queen's Graduate Computing Society Conference; QGCSC (Kingston, ON, Canada), May 2013.
- The 19th Working Conference on Reverse Engineering; WCRE (Kingston, ON, Canada), October 2012. Attendee and Volunteer in the conference organization.
- Queen's Graduate Computing Society Conference; QGCSC (Kingston, ON, Canada), May 2012.
- Queen's Graduate Computing Society Conference; QGCSC (Kingston, ON, Canada), March 2011.
- Queen's Graduate Computing Society Conference; QGCSC (Kingston, ON, Canada), May 2010.
- Consortium for Software Engineering Research; CSER (Markham, ON, Canada), November 2010.
- Centre for Advanced Studies Conference; CASCON (Markham, ON, Canada), November 2009.

Extra-Curricular Services

- 2017: Chair & PC member of the 14th MODELS Workshop on Model Driven Engineering, Verification and Validation (MoDeVVa), Austin, Texas, USA.
- 2016: Chair & PC member of the 13th MODELS Workshop on Model Driven Engineering, Verification and Validation (MoDeVVa), Saint-Malo, France.
- 2015: Chair & PC member of the 12th MODELS Workshop on Model Driven Engineering, Verification and Validation (MoDeVVa), Ottawa, ON, Canada.
- 2015: PC Member of the 4th MODELS Workshop on the Analysis of Model Transformations (AMT), Ottawa, ON, Canada.
- 2011/2012: Secretary and VP Social of the Egyptian Student Association in North America (ESANA), Kingston Chapter, ON, Canada.
- 2011/2012: Graduate Committee Officer (Ph.D.) in the Graduate Computing Society (GCS) of the School of Computing at Queen's University (Canada).
- 2010/2011: Graduate Committee Officer (Ph.D.) in the Graduate Computing Society (GCS) of the School of Computing at Queen's University (Canada).
- 2009/2010: Promotion, Renewal, and Tenure/Appointments Officer in the Graduate Computing Society (GCS) of the School of Computing at Queen's University (Canada). As a GCS member, I was one of the initiators of the first Queen's Graduate Computing Society Conference (QGCSC'10).
- 2009/2010, 2010/2011, 2011/2012: I was an organizer and the head of the Publicity and Communications Committee of the Queen's Graduate Computing Society Conference for three years (QGCSC'10, QGCSC'11, and QGCSC'12).

Volunteer Work

ICK Children Summer Camp, Kingston, ON, Canada	5 – 9 July 2010

- Mentoring children (6-14 years old) and engaging them in activities, sports, and discussions.
- Maintaining the schedule of the day to make sure all activities finish on their planned time.

Soft Skills

- Excellent presentation and communication skills.
- Strong negotiation and interpersonal skills.
- Very well able to work under pressure.
- Capable of handling individual work and team work.

References:

- **Professor Mark Lawford**
  Mailing Address: Department of Computing and Software, McMaster University,
  1280 Main Street West, Information Technology Building, Room 160,
  Hamilton, Ontario, Canada, L8S 4K1
  Phone: (+1) 9055259140 (Ext. 24911)
  Email Address: lawford@mcmaster.ca
- **Professor James R. Cordy**
  Mailing Address: School of Computing, Queen's University,
  25 Union St., Goodwin Hall, Room 557
  Kingston, Ontario, Canada, K7L 2N8
  Phone: (+1) 6135336054,
  Email Address: cordy@cs.queensu.ca

- **Professor Juergen Dingel**
  Mailing Address: School of Computing, Queen's University,
  25 Union St., Goodwin Hall, Room 557
  Kingston, Ontario, Canada, K7L 2N8
  Phone: (+1) 6135333071,
  Email Address: dingel@cs.queensu.ca
- **Professor Selim Akl**
  Mailing Address: School of Computing, Queen's University,
  25 Union St., Goodwin Hall, Room 557
  Kingston, Ontario, Canada, K7L 2N8
  Phone: (+1) 6135333184,
  Email Address: akl@cs.queensu.ca
- **Professor Marsha Chechik**
  Mailing Address: Department of Computer Science, University of Toronto
  10 King's College Road, Toronto, Ontario, Canada, M5S 3G4
  Phone: (+1) 4169783820,
  Email Address: chechik@cs.toronto.edu