

Munawar Hafiz

Assistant Professor	Phone: +1.334.844.6348
Computer Science and Software Engineering	Cell: +1.217.721.1711
Auburn University	Fax: +1.334.844.6329
3101P Shelby Center	munawar@auburn.edu
Auburn, AL 36849	http://munawarhafiz.com/

Research Interests

Software Engineering, Program Transformations, Application Security, Program Analysis, Empirical Studies, Machine Learning, Software Architecture, Security Patterns, RESTful Web Services.

Education

Ph.D. in Computer Science, Dec 2010
University of Illinois at Urbana-Champaign
Specialization in Software Architecture, Security, Program Transformations, Program Analysis, Design Patterns and Refactoring Frameworks
Thesis Title: "Security on Demand"
Advisor - Professor Ralph Johnson, Dept of CS, UIUC

M.S. in Computer Science, Aug 2005
University of Illinois at Urbana-Champaign
Thesis Title: "Security Architecture of Mail Transfer Agents"
Advisor - Professor Ralph Johnson, Dept of CS, UIUC

B.Sc. (Engg.) in Computer Science and Engineering, May 2002
Bangladesh University of Engineering and Technology (BUET), Dhaka, Bangladesh

Employment

Assistant Professor	Auburn University
AL, USA	August 2011–
Assistant Professor at Auburn University, Alabama, USA.	

Postdoctoral Research Associate	UIUC
IL, USA	August 2010–August 2011
Postdoctoral Research Associate at University of Illinois at Urbana-Champaign (UIUC), USA.	

Graduate Research Assistant	UIUC
IL, USA	January 2004–August 2010
Teaching/Research Assistant at University of Illinois at Urbana-Champaign (UIUC), USA.	

Lecturer	BUET
Dhaka, Bangladesh	Summer 2002–Summer 2003
Lecturer at Bangladesh University of Engineering and Technology (BUET), Dhaka. Employed by the government of Bangladesh.	

Lecturer	Military Institute of Science and Technology
Dhaka, Bangladesh	Fall 2002–Spring 2003
Part time lecturer at Military Institute of Science and Technology (MIST), Dhaka.	

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Research

OpenRefactory/C (www.openrefactory.org) Fall 2011–
Auburn University
Postdoc: J. Overbey

Student: F. Behrang, S. Hasan, N. Sultana
C, in spite of its popularity, has IDEs with a limited portfolio of program transformations, with limited scalability and limited applicability to real-world programs. OpenRefactory/C is an infrastructure for building refactorings and other source-level program transformations for C. It will have full support for the C preprocessor, support for static analyses, and an API and environment that makes it easy for new developers to contribute new refactorings. **The project is funded by NSF.**

Fixing Security Problems of C Programs Fall 2011–
Auburn University
Student: Z. Coker, S. Hasan, A. Shaw, D. Doggett

C makes it easy to misuse integer types. We have been working on three program transformations that fix integer problems. These transformations fixed all variants of integer problems featured in all 7,147 programs of NIST's SAMATE reference dataset, making the changes automatically on over 15 million lines of code. **This project won the first prize in the ACM Student Research Competition Grand Finals (undergraduate category) in 2012-2013 and the ACM Student Research Competition at SPLASH 2012.**

Another program transformation based approach fixes buffer overflows originating from unsafe library functions and bad pointer operations. The program transformations fixed all buffer overflows featured in all 4,505 programs of NIST's SAMATE reference dataset (2.3 million lines of C code).

Refactoring Go Code Fall 2013–
Auburn University
Postdoc: J. Overbey

Student: V. Reddy, S. Ganaprakasha, R. Allman
Go is an open source programming environment developed with concurrency in mind to get the most out of multicore and networked machines. We have been developing an open source refactoring platform for Go that provides program analysis and program transformation support for traditional as well as Go-specific refactorings (e.g., Extract Goroutine, Introduce Channel Communication, etc.). **This project is supported by a Google Faculty Research Award.**

Understanding Security Engineering Spring 2013–
Auburn University
Student: M. Fang, R. Stephenson

The most difficult hurdle of designing and implementing secure systems is the lack of understanding about the security engineering process, especially the understanding about the best practices. We are conducting several exploratory and explanatory studies on reporters of vulnerabilities (buffer overflow, XSS, SQL injection) to understand the methods they follow and the tools they use. **Our paper won the Best Paper Award at ESEM 2014.**

Javascript: The Used Parts Spring 2012–
Auburn University
Student: S. Gude

Collaborator: Allen Wirfs-Brock, Mozilla
Advances in JavaScript have not been backed by large-scale empirical studies on how people use JS features and how people react to the changes in JavaScript standards. We are working with collaborators in Mozilla and ECMA Standard Committee on an empirical study to understand what features of Javascript are used in the wild.

Testing Refactorings with Real Code Summer 2012–Summer 2013
Auburn University
Student: F. Behrang, Z. Coker

Collaborator: Darko Marinov, UIUC
An end-to-end approach for testing refactoring engines and estimating their reliability by (1) systematically applying refactorings at a large number of places in open-source programs and collecting

failures during refactoring or while trying to compile the refactored programs, (2) clustering failures into a few failure groups, and (3) inspecting failures to identify non-duplicate bugs.

Generating Bug Fixes from Bug Reports

Fall 2011–Spring 2013

Collaborator: Lin Tan, Univ of Waterloo, Canada

Auburn University

A general approach, R2Fix, to automatically generate bug-fixing patches from free-form bug reports. R2Fix combines past fix patterns, machine learning techniques, and semantic patch generation techniques to fix bugs automatically.

Growing a Pattern Language (for Security)

Spring 2004–

with Paul Adamczyk, Ralph Johnson

University of Illinois

We collaborated with Microsoft's Patterns and Practices group and the security pattern community to organize all security patterns described in the last 15 years. We describe the mechanism of growing a pattern language. Ours is the first pattern language that covers patterns of an entire problem domain; to our best knowledge, it is also the largest in software.

Pattern Catalog: <http://munawarhafiz.com/securitypatterncatalog/index.php>

Security On Demand

Spring 2007–Fall 2011

with Ralph Johnson

University of Illinois

Security requirements change. Many legacy systems fail to cope with the changing requirements because it is infeasible to redesign these systems. We show that protection can be added to an existing system by program transformations, making it possible to retrofit security to a system.

Preventing Web-Request Forgery Attacks

Spring 2009–Spring 2011

with K. Jayaraman, Syracuse University

The goal of a web-request forgery attacker is to manipulate the intended workflow of a web application. Applications that fail to enforce the designer-intended interactions are vulnerable to this type of attack. Our work proposes a systematic methodology for designing web applications to strictly enforce the designer-intended interactions.

Web Services In Theory And In Practice

Fall 2006–Fall 2008

with Paul Adamczyk, Ralph Johnson

University of Illinois

There is a tension between the technology used by successful providers of Web services, such as Google and Amazon, and the technology that companies such as Microsoft and IBM say the developers should use. Our research reflects on the disparity between the focus of research and new standardization efforts, and the state of practice.

Adaptive Messaging Policy

Spring 2005–Fall 2006

with Carl Gunter, R. Afandi, J. Zhang

University of Illinois

AMPol (Adaptive Messaging Policy) is a Web service middleware that enables Web services with diverse policies to communicate with each other. This is a collaborative work with Illinois Security Laboratory headed by Professor Carl Gunter.

Conformance Test for OpenMax Standard

Fall 2005

with Sarita Adve

University of Illinois

OpenMax is a multimedia library portability standard proposed by the Khronos group. OpenMax IL 1.0 and OpenMax DL 1.0 were released in early 2006. We collaborated with Texas Instruments to write components and applications that provide conformance tests for the standard.

Mail Transfer Agent Security Architecture

Fall 2003–Summer 2005

with Ralph Johnson

University of Illinois

We have studied the architecture of four mail transfer agents (MTA), sendmail, qmail, Postfix and sendmail X, to understand the influence of security on the evolution of MTA architecture.

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Mutation testing

with Darko Marinov

Spring 2005

University of Illinois

We have developed a mutation testing execution engine for Java. The mutation test engine is an extension of Professor Jeff Offutt's work at George Mason University. Professor Offutt's mutation engine introduces variations in a program; our tool runs the test cases on the variants.

Access control for Gaia

with Naldurg Prasad, Roy Campbell

Spring 2004

University of Illinois

Gaia is an operating system for ubiquitous computing. We implemented a proof-of-concept access control component for Gaia's Context File System (CFS).

Web usage mining

Chowdhury Mafizur Rahman

Fall,2001–Spring,2002

BUET, Dhaka, Bangladesh

Extension of the Hypertext Probabilistic Grammar algorithm for Web usage mining. Implementation of an efficient miner for Web logs.

Software Projects

OpenRefactory/C

Open Source

Fall 2011–

Auburn University

An infrastructure that allows developers to build correct and complex program transformations for C programs. The infrastructure is developed in a platform independent manner and supports various front ends: an OpenRefactory Eclipse plug-in, a Vim plug-in, a Notepad++ plugin, a command line user interface, and a Web demo at the project website. OpenRefactory/C supports several sophisticated static analyses, e.g., name binding analysis, type analysis, control flow analysis, alias analysis, data flow analysis, and dependence analysis. The infrastructure currently hosts 7 refactorings and 5 behavior-enhancing, security-oriented program transformations.

Accessible from: <http://www.openrefactory.org>

Technology - Java

Go Doctor

Open Source (To Be Released)

Fall 2013–

Auburn University

A suite of general purpose and Go-specific refactorings and static analyses to support the refactorings. It is developed in collaboration with Google developers, who actually participate in the project.

Technology - Go

Security-oriented Program

Transformations

Open Source

Fall 2011–

Auburn University

Three program transformations (Add Integer Cast, Change Integer Type, and Remove Arithmetic Operator) that fix problems of C integers and two program transformations (Safe Library Replacement, Safe Type Replacement) that fix buffer overflows. Developed using OpenRefactory/C.

Accessible from: <http://www.openrefactory.org>

Technology - Java

Aquifer Pumping Test Application

Client: Albert J. Valocchi

Summer 2007

Associate Head, Civil Engg. Dept., UIUC

A Java applet and application for non-leaky(Theis) and leaky(Hantush-Jacob) aquifer pumping test. Prof. Valocchi and his students use this software instead of performing the tests manually.

Accessible from: http://hydrolab.illinois.edu/gw_applets/

Technology - Java

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BUETLIB

Client: BUET Central Library

May 2002–Aug 2003

BUET, Dhaka, Bangladesh

BUETLIB is the library management software for BUET main library. About 500 KLOC in size, the software automates the task of all the sections of the main library.

Technology - Visual Basic and Oracle 9i, ASP

POW and PICAR

Client: Afinion AG, Germany

Oct 2002–Jun 2003

IECB Ltd., Dhaka, Bangladesh

POW (Project on Web) and PICAR (Picture Archive) are two software outsourcing projects developed for Afinion AG, Germany. POW is a web based project management tool, while PICAR is a web based picture archive tool (similar to Picasa).

Technology - J2EE

Pro-Bank

Client: Sonali Bank, Bangladesh

Jul 2002–Aug 2003

IECB Ltd., Dhaka, Bangladesh

Pro-Bank is the banking solution for Sonali Bank, the largest state-run bank of Bangladesh.

Technology - Visual C++

Ishkuul

Entry at National Software Competition

Mar 1999–May 1999

Dhaka, Bangladesh

Ishkuul (Bangla; *English Translation* - School) is a multimedia software for children.

Technology - Lingo (Macromedia Director Script), Visual Basic and Visual C++

Teaching Experience

Auburn University, AL, USA

Instructor, COMP 3700 - Software Modeling and Design, Fall 2014, Fall 2013, Fall 2012, Fall 2011

Instructor, COMP 7970 - Program Analysis and Transformations for Security, Spring 2014, Spring 2013, Spring 2012

Instructor, COMP 7700 - Software Architecture, Spring 2014

University of Illinois at Urbana Champaign, IL, USA

Instructor, CS421–Programming Languages and Compilers, CS, UIUC, Summer 2010

Teaching Assistant, CS492/493–Senior Project, CS, UIUC, Fall 2007–Spring 2010

Teaching Assistant, CS421–Prog. Languages and Compilers, CS, UIUC, Spring 2007

Teaching Assistant, CS598CAG–Advanced Topics on Security, CS, UIUC, Spring 2006

Bangladesh University of Engineering and Technology, Bangladesh

Instructor, CSE 319–Information System Design (Fall 2002, Spring 2003)

Instructor, CSE 320–Information System Design Laboratory (Fall 2002, Spring 2003)

Instructor, CSE 316–Microprocessors and Microcontrollers Lab(Fall 2002, Spring 2003)

Instructor, CSE 206–Digital Logic Design Laboratory (Fall 2002, Spring 2003)

Instructor, CSE 106–Object Oriented Programming Language Laboratory (Spring 2003)

Instructor, CSE 102–Structured Programming Language Laboratory (Spring 2003)

Military Institute of Science and Technology, Bangladesh

Instructor, Theory of Computation (Fall 2002, Spring 2003)

Instructor, Operating Systems Laboratory (Spring 2003)

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Selected Journal Publications and Book Chapters

4 journal papers and 1 book chapter.

- J. Overbey, R. Johnson and **M. Hafiz**. Differential Precondition Checking: A Language-Independent, Reusable Analysis for Refactoring Engines. *Automated Software Engineering*.
- **M. Hafiz**. A Pattern Language for building Privacy Enhancement Technologies. *Software—Practice and Experience*, 43(7):769-787, Jul 2013.
- P. Adamczyk, P. Smith, R. Johnson, and **M. Hafiz**. REST and Web Services: In theory and in practice. Book chapter in *REST: From Research to Practice*, Springer, 2011.
- **M. Hafiz** and R. Johnson. Evolution of Mail Transfer Agent architecture: The impact of security. *Software—Practice and Experience*, 38(15):1569-1599, Dec 2008.
- **M. Hafiz**, P. Adamczyk and R. Johnson. Towards an organization of security patterns. *IEEE Software Special issue on Software Patterns*, Jul/Aug 2007.

Selected Conference and Workshop Publications

19 conference and 6 workshop publications.

- J. Overbey, F. Behrang and **M. Hafiz**. A Foundation for Refactoring C with Macros. In *Proceedings of the 22nd ACM SIGSOFT International Symposium on the Foundations of Software Engineering (FSE'14)*, Nov 2014. [**Acceptance Rate: 61/273 (22%)**]
- A. Bosu, J. Carver, **M. Hafiz**, P. Hilley and D. Janni. Identifying the characteristics of vulnerable code changes: An empirical study. In *Proceedings of the 22nd ACM SIGSOFT International Symposium on the Foundations of Software Engineering (FSE'14)*, Nov 2014. [**Acceptance Rate: 61/273 (22%)**]
- J. Overbey, **M. Hafiz**, A. Sorrells, G. Arnold and X. Li. Toward a refactoring tool for accelerator directives. In *Proceedings of the 1st Workshop on accelerator programming using directives (WACCPD), Co-located with SC 2014*, Nov 2014.
- M. Fang and **M. Hafiz**. Discovering buffer overflow vulnerabilities in the wild: An empirical study. In *Proceedings of the 8th ACM/IEEE International Symposium on Empirical Software Engineering and Measurement (ESEM'14)*, Sep 2014. [**Best Paper Award**] [**Acceptance Rate: 23/123 (18.7%)**]
- S. Gude, **M. Hafiz** and A. Wirfs-Brock. JavaScript: The used parts. In *Proceedings of the IEEE 38th Annual International Computers, Software & Applications Conference (COMPSAC'14)*, Jul 2014. [**Acceptance Rate: 22%**]
- A. Shaw, D. Doggett and **M. Hafiz**. Automatically fixing C buffer overflows using program transformations. In *Proceedings of the 44th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN'14)*, Jun 2014. [**Acceptance Rate: 56/242 (23.1%)**]
- **M. Hafiz**, J. Overbey, F. Behrang and J. Hall. OpenRefactory/C: An infrastructure for building correct and complex C transformations. In *the 6th Workshop on Refactoring Tools, Co-located with OOPSLA 2013. Indianapolis, Indiana, Oct 2013*.
- M. Gligoric, F. Behrang, Y. Li, J. Overbey, **M. Hafiz** and D. Marinov. Systematic testing of refactoring engines on real software projects. In *Proceedings of the 27th European Conference on Object-Oriented Programming (ECOOP'13)*, Jul 2013. [**Acceptance Rate: 29/116 (25%)**]
- Z. Coker and **M. Hafiz**. Program transformations to fix C integers. In *Proceedings of the 35th International Conference on Software Engineering (ICSE'13)*, May 2013. [**Acceptance Rate: 85/461 (18.5%)**]
- C. Liu, J. Yang, L. Tan and **M. Hafiz**. R2Fix: Automatically generating bug fixes from bug reports. In *Proceedings of the 6th IEEE International Conference on Software Testing, Verification and Validation (ICST'13)*, March 2013. [**Acceptance Rate: 38/152 (25%)**]

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- **M. Hafiz**, P. Adamczyk and R. Johnson. Growing a pattern language (for security). In *Proceedings of the 27th Object-Oriented Programming, Systems, Languages and Applications (OOPSLA'12)*, Oct 2012. [**Acceptance Rate: 11/43 (26%)**]
- **M. Hafiz**, P. Adamczyk and R. Johnson. Patterns transform architectures. In *Proceedings of the 9th Working IEEE/IFIP Conference on Software Architecture, WICSA 2011*, Jun 2011.
- P. Adamczyk and **M. Hafiz**. The tower of Babel did not fail. In *Proceedings of the 25th Object-Oriented Programming, Systems, Languages and Applications (OOPSLA'10)*, Oct 2010. [**Acceptance Rate: 3/14 (21%)**]
- K. Jayaraman, P. Talaga, G. Lewandowski, S. Chapin, and **M. Hafiz**. Modeling user interactions for (fun and) profit: Preventing request forgery attacks on web applications. In *Proceedings of the 16th Pattern Languages of Programs (PLoP'09)*, Oct 2009.
- **M. Hafiz** and R. Johnson. Improving perimeter security with security-oriented program transformations. In *Proceedings of the 5th International Workshop on Software Engineering for Secure Systems (SESS'09)*, May 2009.
- **M. Hafiz**, P. Adamczyk and R. Johnson. Systematically eradicating data injection attacks using security-oriented program transformations. In *Proceedings of Symposium on Engineering Secure Software and Systems (ESSoS'09)*, Feb 2009. [**Acceptance Rate: 9/52 (17%)**]
- **M. Hafiz** and R. Johnson. A security oriented program transformation to “add on” policies to prevent injection attacks. In *Proceedings of the 2nd Workshop on Refactoring Tools, held in conjunction with OOPSLA 2008*, Oct 2008.
- P. Adamczyk, F. Balaguer and **M. Hafiz**. Network congestion control at the application layer. In *Proceedings of the 14th Pattern Languages of Programs (PLoP'07)*, Sep 2007.
- R. Afandi, J. Zhang, **M. Hafiz** and C. A. Gunter. AMPol: Adaptive messaging policy. In *Proceedings of the 4th IEEE European Conference on Web Services (ECOWS'06)*, Dec 2006. [**Acceptance Rate: 24/115 (20%)**]
- **M. Hafiz**. A collection of privacy design patterns. In *Proceedings of the 13th Pattern Languages of Programs (PLoP'06)*, Oct 2006.
- R. Afandi, J. Zhang, **M. Hafiz** and C. A. Gunter. AMPol: Adaptive messaging policy. In *IEEE Workshop on Web Services Security, held in conjunction with SSP 2006*, May 2006.
- Z. Anwar, W. Yurcik, R. Johnson, **M. Hafiz**, and R. H. Campbell. Multiple design patterns for Voice over IP (VoIP) security. In *Workshop on Information Assurance (WIA), held in conjunction with IPCCC'06*, Apr 2006.
- **M. Hafiz**. Secure pre-forking: A pattern for security and performance. In *Proceedings of the 12th Pattern Languages of Programs (PLoP'05)*, Sep 2005.
- **M. Hafiz**. Unique atomic chunks: A pattern for security and reliability. In *Proceedings of the 11th Pattern Languages of Programs (PLoP'04)*, Sep 2004.
- **M. Hafiz**, R. Johnson and R. Afandi. Security architecture of gmail. In *Proceedings of the 11th Pattern Languages of Programs (PLoP'04)*, Sep 2004.

Formal Demonstrations

- OpenRefactory/C: An Infrastructure for Developing Program Transformations for C Programs. *Demo at OOPSLA'12*, Tucson, AZ, Oct 23, 24, 2012.
- An ‘Explicit Type Enforcement’ Program Transformation Tool to Prevent Integer Vulnerabilities. *Demo at OOPSLA'11*, Portland, OR, Oct 25, 26, 27, 2011.

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Poster Presentations

- A. Bosu, J. Carver, **M. Hafiz**, P. Hilley and D. Janni. When Are OSS Developers More Likely to Introduce Vulnerable Code Changes? A Case Study. *Poster at the 10th International Conference on Open Source Systems (OSS'14)*, May 2014.
- F. Behrang and **M. Hafiz**. Systematic Testing of C Refactoring Engines on Real Software Projects. *Poster at the Auburn CSSE Research Expo*, Apr 2013.
- S. Gude and **M. Hafiz**. JavaScript: The Used Parts. *Poster at the Auburn CSSE Research Expo*, Apr 2013.
- **M. Hafiz** and P. Adamczyk. The Nature of Order: From Security Patterns to a Pattern Language. *Poster at the 27th Object-Oriented Programming, Systems, Languages and Applications (OOPSLA'12)*, Oct 2012.
- **M. Hafiz** and R. Johnson. Security-oriented program transformations (Or how to add security on demand). *Poster at the 23rd Object-Oriented Programming, Systems, Languages and Applications (OOPSLA'08)*, Oct 2008.
- **M. Hafiz** and R. Johnson. Program transformation to 'add on' protection against buffer overflow attacks. *Poster at the 4th ITI Workshop on Dependability and Security*, Nov 2007.
- P. Adamczyk, **M. Hafiz** and R. Johnson. HTTP methods for Web services. *Poster at the 4th IEEE European Conference on Web Services (ECOWS'06)*, Dec 2006.
- **M. Hafiz**. Security patterns and evolution of MTA architecture. *Poster at the 20th Object-Oriented Programming, Systems, Languages and Applications (OOPSLA'05)*, Oct 2005.

Tutorial Presentations

- **M. Hafiz**. Security: Philosophy, Patterns and Practices. *Tutorial in International Conference on Software Engineering (ICSE'09)*, May 2009.
- **M. Hafiz**. Security: Philosophy, Patterns and Practices. *Tutorial in International Symposium on Engineering Secure Software and Systems (ESSoS'09)*, Feb 2009.
- **M. Hafiz**. Security: Philosophy, Patterns and Practices. *Tutorial 16 in the 23rd Object-Oriented Programming, Systems, Languages and Applications (OOPSLA'08)*, Oct 2008.
- **M. Hafiz**. Security patterns and secure software architecture. *Tutorial 14 in the 22nd Object-Oriented Programming, Systems, Languages and Applications (OOPSLA'07)*, Oct 2007.
- **M. Hafiz**. Security patterns and secure software architecture. *Tutorial 51 in the 21st Object-Oriented Programming, Systems, Languages and Applications (OOPSLA'06)*, Oct 2006.

Technical Reports

- Z. Coker, S. Hasan, J. Overbey, **M. Hafiz** and C. Kästner. Integers in C: An open invitation to security attacks? *Report No. CSSE14-01, Auburn, AL: College of Engineering, Auburn University*. Feb 2014.
- **M. Hafiz** and R. Johnson. A catalog of security-oriented program transformations. *Report No. UIUCDCS-R-2009-3031*. Feb 2009.
- P. Adamczyk, **M. Hafiz** and R. Johnson. Non-compliant and proud: A case study of HTTP compliance. *Report No. UIUCDCS-R-2008-2935*. Jan 2008.
- **M. Hafiz** and R. Johnson. Security patterns and their classification schemes. *Technical Report for Microsoft's Patterns and Practices Group*. Sep 2006.

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Presentations and Invited Talks

(Not including the presentations made at conferences and workshops)

- Discovering buffer overflow vulnerabilities in the wild: An empirical study. *CSSE Seminar Series*, Auburn University, Auburn, AL, Sep 10, 2014.
- Good Code, Bad Code, and Vulnerable Code. *EECS Colloquium*, Oregon State University, Corvallis, OR, Mar 17, 2014.
- —. *Invited Talk*, Google, Mountain View, CA, Jan 23, 2014.
- —. *Software Engineering Seminar*, University of Illinois at Urbana-Champaign, Urbana, IL, Oct 16, 2013.
- Tales From The Trenches: How Do People Discover Buffer Overflow Vulnerabilities. *CSSE Seminar Series*, Auburn University, Auburn, AL, Sep 25, 2013.
- Good Code, Bad Code, and Vulnerable Code. *Seminar Series, Wireless Engineering Research and Education Center*, Auburn University, Auburn, AL, Sep 16, 2013.
- —. *Computer Science Colloquium*, University of Texas at Dallas, Dallas, TX, Apr 8, 2013.
- On Appreciating Beautiful Software. *CSSE Seminar Series*, Auburn University, Auburn, AL, Mar 6, 2013.
- Program Transformations to Fix C Integers. *Invited Talk*, Computer Science and Engineering, Bangladesh University of Engineering and Technology, Dhaka, Bangladesh, Jan 12, 2013.
- —. *Computer Science Colloquium*, University of Alabama at Tuscaloosa, Tuscaloosa, AL, Nov 7, 2012.
- —. *CSSE Seminar Series*, Auburn University, Auburn, AL, Sep 5, 2012.
- A Tale of Four Research Ideas. *Seminar at Auburn University*, Auburn, AL, Oct 25, 2011.
- Security On Demand. *Computer Science Colloquium*, Rochester Institute of Technology, Rochester, NY, Mar 21, 2011.
- —. *Computer Science Colloquium*, Texas State University, San Marcos, TX, Mar 8, 2011.
- —. *Computer Science and Software Engineering Colloquium*, Auburn University, Auburn, AL, Mar 1, 2011.
- Program Transformations for Security. *Invited Talk. ACM Chicago Chapter*, Chicago, IL, Feb 16, 2011.
- —. *Invited Talk. IBM Research*, Hawthorne, NY, Nov 24, 2009.
- Security On Demand. *PACAJOT Seminar*, University of Illinois at Urbana-Champaign, Champaign, IL, Mar 18, 2009.
- —. *Computer Science Colloquium*, University of North Carolina, Charlotte, NC, Mar 3, 2009.
- Security-oriented Program Transformations. *Software Engineering Seminar*, University of Illinois at Urbana-Champaign, Champaign, IL, Feb 27, 2009.
- Beyond Behavior Preservation. *Lightning Talk, OOPSLA 2008*. Orlando, FL, Oct 23, 2008.
- A collection of Security-oriented Program Transformations. *ACM Student Research Competition*, Orlando, FL, Oct 22, 2008.
- Security for Web Services. *Presentation in Birds of a Feather Session, OOPSLA 2005*. San Diego, CA, Oct 19, 2005.
- Classification of Security Patterns. *Presentation before Patterns and Practices Group, Microsoft*. Redmond, WA, 2004.

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Professional Service

Member

Program Committee

IEEE Conference on Computer Software and Applications (COMPSAC), 2012, 2013.
Intl. Workshop on Software Engineering for Secure Systems (SESS), 2010–2012.

Demonstrations Committee

IEEE Conference on Software Engineering (ICSE), 2014.

Posters and Student Research Competition Committee

OO Programming, Systems, Languages & Applications (OOPSLA/SPLASH), 2013,
2012, 2011.

Editorial Review Board

International Journal on Secure Software Engineering (IJSSE), 2009-2011.
Fellowship, Assistantship, and Admissions (FAA) Committee. UIUC, 2008-2009

Panelist

National Science Foundation, 2011, 2014
Kentucky Science and Engineering Foundation (KSEF), 2011

Reviewer

Empirical Software Engineering, Springer, 2014
Software—Practice and Experience, Wiley, 2011, 2012, 2014
Journal of Systems and Software, Elsevier, 2011, 2012, 2013
IEEE Software, 2011
IEEE Transactions on Services Computing (TSC), 2009-2010
Computers & Security (CoSe), 2009
LNCS Transactions on Pattern Languages of Programming (TPLoP), 2008
Communications of the ACM (CACM), 2008

Shepherd

European Conference on Pattern Languages of Programs (EuroPLoP), 2006-2008
Pattern Languages of Programs (PLoP'06), 2005-2007, 2009
13th European Conference on Pattern Languages of Programs (EuroPLoP'08), 2008
14th Pattern Languages of Programs (PLoP'07), 2007

Ph.D. Thesis Committee Member

Devin Cook, Auburn University, Ph.D. Expected 2014
Amiangshu Bosu, University of Alabama, Ph.D. Expected 2015

M.S. Thesis Committee Member

Kavyashree Krishnappa, Auburn University, M.S. Expected 2014
Venkatesh Burgula, Auburn University, M.S. Expected 2015
Steffi Gnanaprakasa, Auburn University, M.S. Expected 2015

Department Service

Started CSSE Department Seminar Series at Auburn University.
Organizing CSSE Department Seminar Series for two years.
Member, Graduate Committee, CSSE Department, Auburn University.

Mentor

Promoting Undergraduate Research in Engineering (PURE), UIUC, 2009-2011

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Book Reviewer

- A. Miller. *Parallel Programming with Microsoft Visual C++*. Microsoft Press, 2011.
- C. Campbell, R. Johnson, A. Miller and S. Toub.
Parallel Programming with Microsoft .NET. Microsoft Press, 2010.
- T. Erl. *SOA Design Patterns*. Prentice Hall PTR, 2009.
- R. Hanmer. *Patterns for Fault Tolerant Software*. Wiley, 2008.
- G. Meszaros. *xUnit Test Patterns: Refactoring Test Code*. Addison-Wesley, 2007.
- M. Mahemoff. *AJAX Design Patterns*. O'Reilly Media Inc., 2006.
- J. Tidwell. *Designing Interfaces*. O'Reilly Media Inc., 2005.
- J. Hogg. *Web Service Security: Scenarios, Patterns, and Implementation Guidance for Web Services Enhancements (WSE) 3.0*. Microsoft Press, 2006.
- M. Schumacher, E. Fernandez-Buglioni, D. Hybertson, F. Buschmann and P. Somerladd.
Security Patterns: Integrating Security and Systems Engineering. Wiley, 2006.
- C. Steel, R. Nagappan and R. Lai. *Core Security Patterns*. Prentice Hall PTR, 2005.
- J. Greenfield, K. Short, S. Cook and S. Kent. *Software Factories: Assembling Applications with Patterns, Models, Frameworks, and Tools*. Wiley, 2004.

Research Group

Leads Software Analysis, Transformation, and Security (SATS) Research Group.

3 Ph.D. students, 2 M.S. students, and 10 undergraduate students

Current Students: Xuechao Li, Ph.D. Expected 2015

Samir Hasan, Ph.D. Expected 2018

Nawrin Sultana, Ph.D. Expected 2019

Ming Fang, M.S. Expected 2014

Benjamin Fogel, M.S. Expected 2015

Undergraduate Students: William Frazier, Robert Horn, Zachary King,

Carlos Lemus, Matthew Mathis, Mathew Meriwether, Justin Middleton,

Calvin Montgomery, Austin Sorells, Rebekah Stephenson

Graduate Student Alumni: Farnaz Behrang, M.S., 2014 (Ph.D. Student: Now at GaTech)

Sarah Weeks, M.S., 2014 (Now at US Army Research Lab)

Sharath Gude, M.S., 2013 (Now at VMWare)

Dusten Doggett, M.S., 2013 (Now at ADTRAN)

Adam Payne, M.S., 2013 (Now at DHS)

Funding

09/2012-08/2014. "SHF: Small: A Practical Program Transformation Infrastructure for C in the Presence of Multiple Configurations", PI: Munawar Hafiz; *National Science Foundation*, CCF-1217271, \$395,646

05/2013-04/2014. "Two REU Supplements for SHF: Small: A Practical Program Transformation Infrastructure for C in the Presence of Multiple Configurations", PI: Munawar Hafiz; *National Science Foundation*, CCF-1217271, \$14,200

08/2013-08/2014. "A Refactoring Tool for Go", PIs: Jeffrey Overbey and Munawar Hafiz; *Google Faculty Research Award*, \$43,200

05/2014-04/2015. "Two REU Supplements for SHF: Small: A Practical Program Transformation Infrastructure for C in the Presence of Multiple Configurations", PI: Munawar Hafiz; *National Science Foundation*, CCF-1217271, \$14,200

07/2014-07/2014. "Support for travel: COMPSAC 2014", PI: Munawar Hafiz; *Mozilla*, \$2,300

08/2014-07/2017. "Security-oriented Program Transformations for Fixing Notorious C Vulnerabilities", PI: Munawar Hafiz; *Department of Homeland Security (DHS)*, BAA 12-07-CSD.08-0003-I, \$685,088 [Approved but not been awarded yet]

Munawar Hafiz

Students' Awards

Alex Shaw, 2nd Place in ACM SIGPLAN Student Research Competition (Undergraduate Category), ICSE'14, Jun 2014.

Alex Shaw, ACM SIGSOFT Travel Award, May 2014.

Zack Coker, 1st Place in ACM Student Research Competition Grand Finals 2013 (Undergraduate Category). Jun 2013.

Farnaz Behrang, CRA-W Graduate Cohort Workshop Travel Award, Feb 2013.

Zack Coker, 1st Place in ACM SIGPLAN Student Research Competition (Undergraduate Category), OOPSLA'12, Oct 2012.

Awards and Honors

Best Paper Award (with Ming Fang, Graduate Student), The 8th ACM/IEEE International Symposium on Empirical Software Engineering and Measurement (ESEM'14), Sep 2014.

Paper: "*Discovering buffer overflow vulnerabilities in the wild: An empirical study*".

ACM SIGPLAN Student Research Competition Finalist, OOPSLA'08, Oct 2008.

Best Shepherd Award, Awarded by Hillside Group at the 13th Pattern Languages of Programs (PLoP'06), Oct 2006.

Dean's List, BUET, Dhaka, Bangladesh, 1997-98, 2000-01, 2001-02

2nd prize in National Software Project Competition organized by Association of Computer and Electrical Students, BUET for the "Ishkuul" software

Scholarship of Education Board of Bangladesh Government, 1993-2003

Synergic Activities

Member, ACM

Member, Hillside Group, <http://hillside.net/>

Member, Software Architecture Group, UIUC

Founder and Moderator, BUET Design Group, BUET, Dhaka, Bangladesh, 2003

Director, BUET Debating Club, BUET, Dhaka, Bangladesh, 2000-2002

Vice President and Life Member, Notre Dame Science Club(NDSC), Notre Dame College, Dhaka, Bangladesh, 1994-1996

Outreach Activities

Judge, South's BEST Regional Robotics Championship at Auburn University, 2011, 2012, 2013, 2014

Judge, UIUC-First Lego League Regional Tournament, 2009

Professional Training

Workshop on Teaching Management and Teaching Learning Process, Jun 2002

Directorate of Continuing Education

Bangladesh University of Engineering and Technology (BUET), Dhaka, Bangladesh

Referees

Available upon Request.