Aftab Hussain

PhD Candidate
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Research Interests

Programming Languages, Static Program Analysis Scalability, Security. NOTE. add a couple of sentences about research motivations.

Education

2015 - present — PhD Candidate in Computer Science,
University of California, Irvine (UCI), United States
Focus: "Programming Languages and Systems" | Advisor: Prof. Anton Burtsev
Gpa: 3.81/4

2013 - 2015 — M.Sc. in Software Engineering,
University of California, Irvine, United States
Gpa: 3.74/4

2010 - 2012 — M.Sc. Engg. in Computer Science and Engineering,
Bangladesh University of Engineering and Technology (BUET), Dhaka, Bangladesh
Thesis: "Software Restructuring using Hierarchical Clustering"
Advisor: Prof. Md. Saidur Rahman
Gpa: 3.83/4

2005 - 2009 — B.Tech. in Computer Science and Engineering,
Institute of Engineering and Management (IEM), Kolkata, India
Thesis: "Steganography" | Advisor: Prof. Himadri Nath Saha
Gpa: 8.01/10

Experience

Research

Graduate Researcher at Department of Computer Science, University of California, Irvine — Mar 2015 to *present*
Areas: Scalable static program analysis, graph processing, cyber security
Labs: Mars Systems Research Group, PLSys Group

Graduate Researcher at Department of Informatics, University of California, Irvine — Sep 2013 to Mar *2015*
Areas: Big data analytics, software repository mining
Lab: Big Data Mondego Lab

Research Associate at Department of Computer Science, Bangladesh University of Engineering and Technology — Dec 2012 to Aug 2013
Areas: Graph clustering, software visualization
Labs: Graph Drawing and Info Visualization Lab, Samsung Innovation Lab

Research Assistant at Department of Computer Science, Bangladesh University of Engineering and Technology — Sep 2010 to Jun 2011
Areas: Planar graph drawing, wireless sensor networks
Lab: Graph Drawing and Info Visualization Lab

Teaching	**Teaching Assistant** at Bren School of Information and Computer Sciences, University of California, Irvine	Jan 2014 to *present*
	Reader at Bren School of Information and Computer Sciences, University of California, Irvine	Sep 2013 to Dec 2013
Industry	**Software Engineering Intern** at NextTel Communication, Dhaka, Bangladesh *Project:* GUI design of pharmaceutical mobile application	Mar 2010 to Apr 2010
	Software Engineering Trainee at CMC Kolkata, (A TATA Enterprise), Kolkata, India *Project:* Design of hospital database management system	Jul 2008

Selected Projects

IDL Generation for Linux Kernel Security

2017-*present*

Analyzing Linux kernel using Data Structure Analysis (DSA) based on LLVM to automatically generate interface definition language code for isolating kernel modules for enhancing security.

Graspan: Parallel Graphs System for Big Code Analysis

2015-2017

We built a disk-based parallel graph system, Graspan, that uses a novel edge-pair centric computation model to compute dynamic transitive closures on very large program graphs. We implement context-sensitive pointer/alias and dataflow analyses on Graspan. An evaluation of these analyses on large codebases such as Linux shows that their Graspan implementations scale to millions of lines of code and are much simpler than their original implementations. These analyses were used to augment the existing checkers; these augmented checkers uncovered 132 new NULL pointer bugs and 1308 unnecessary NULL tests in Linux 4.4.0-rc5, PostgreSQL 8.3.9, and Apache httpd 2.2.18.

NOTE. add was accepted in asplos and other accolades.

NOTE. add stackoverflow and visual code refactoring projects

Publications

Conference Publications

C.4. K. Wang, A. Hussain, Z. Zuo, G. Xu, and A. A. Sani. Graspan: A single-machine disk-based graph system for interprocedural static analyses of large-scale systems code. In *22nd ACM International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS '17)*, Xi'an, China, 2017 (paper)

C.3. D. Yang, A. Hussain, and C. V. Lopes. From query to usable code: An analysis of stack overflow code snippets. In *13th International Conference on Mining Software Repositories (MSR '16, Co-located with ICSE '16)*, Austin, Texas, US, 2016 (paper)

C.2. I. Hossain, S. Sultana, A. Hussain, N. N. Moon, and M. S. Rahman. L-shaped drawings of series-parallel graphs. In *International Mathematics Conference*, Dhaka, Bangladesh, 2013 (paper)

C.1. A. Hussain and M. S. Rahman. A new hierarchical clustering technique for restructuring software at the function level. In *6th India Software Engineering Conference (ISEC '13)*, New Delhi, India, 2013 (paper)

Workshop Publications

W.2 A. Hussain. Graspan: A single-machine disk-based graph system for interprocedural static analyses of large-scale systems code. In *17th Southern California Workshop on Programming Languages and Systems (SoCal PLS '16)*, Irvine, California, US, 2016

W.1 A. Hussain and M. S. Rahman. A new clustering technique using (k,w)-core decomposition for restructuring software functions. In *Workshop on Graph Drawing and Graph Algorithms (GDGA '13)*, Dhaka, Bangladesh, 2013

Posters

P.3 K. Wang, A. Hussain, Z. Zuo, G. Xu, and A. A. Sani. Graspan: A single-machine disk-based graph system for interprocedural static analyses of large-scale systems code. In *22nd ACM International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS '17)*, Xi'an, China, 2017 (poster)

P.2 A. Hussain. Graspan: A single-machine disk-based graph system for interprocedural static analyses of large-scale systems code. In *Student Research Competition, 37th ACM SIGPLAN conference on Programming Language Design and Implementation (PLDI '16)*, Santa Barbara, California, US, 2016

P.1 A. Hussain. Graspan: A single-machine disk-based graph system for interprocedural static analyses of large-scale systems code. In *Computer Science Research Showcase, University of California, Irvine*, Irvine, California, US, 2016

Technical Reports

T.6 A. Hussain, V. Narayanan, and A. Burtsev. An implementation overview of an idl generation framework based on dsa. Technical report, Department of Computer Science, University of California, Irvine, 2018

T.5 H. Xu, Z. Zuo, K. Wang, A. Hussain, and K. Nguyen. Systemized program analyses: A big data perspective on scaling large-scale code analyses. Technical report, Department of Computer Science, University of California, Irvine, 2017 (report)

T.4 A. Hussain and I. Scherson. A study on memory consistency approaches in distributed shared memory systems. Technical report, Department of Computer Science, University of California, Irvine, 2016

T.3 A. Hussain and G. Xu. Graphdtc: A graph processing system for scalable and precise program analysis. Technical report, Department of Computer Science, University of California, Irvine, 2015 (report)

T.2 A. Hussain, O. Asadi, and D. Richardson. A holistic look at requirements engineering practices in the gaming industry. Technical report, Department of Informatics, University of California, Irvine, 2015 (report)

T.1 D. Yang, A. Hussain, and C. V. Lopes. Effect of follow and watch relationships in pull requests (in github). Technical report, Department of Informatics, University of California, Irvine, 2014 (report)

Under Preparation

U.1 A. Hussain and A. Burtsev. Common vulnerabilities and exposures in the cloud (under preparation). Technical report, Department of Computer Science, University of California, Irvine, 2018

Presentations

P.5 Graspan: A Single-machine Disk-based Graph System for Interprocedural Static Analyses of Large-scale Systems Code, SoCalPLS, November 2016, Irvine, California, US

P.4 Graspan: A Single-machine Disk-based Graph System for Interprocedural Static Analyses of Large-scale Systems Code, PLDI SRC, (poster), June 2016, Santa Barbara, California, US

P.3 Graspan: A Single-machine Disk-based Graph System for Interprocedural Static Analyses of Large-scale Systems Code, UCI CS Research Showcase, (poster), June 2016, Irvine, California, US

P.2 A New Hierarchical Clustering Technique for Restructuring Software at the Function level, ISEC, February 2013, New Delhi, India

P.1 A New Clustering Technique using (k,w)-Core Decomposition for Restructuring Software Functions, GDGA, January 2013, Dhaka, Bangladesh

Teaching

Courses	*Teaching Assistant (TA), University of California, Irvine:*	
	Operating Systems (CS 238P), graduate	Fall 2018
	Concepts in Programming Languages (CS 141), undergraduate	Summer 2018
	Principles of System Design (ICS 53), undergraduate	Spring 2018
	Compilers and Interpreters (CS 142), undergraduate	Winter 2018
	Concepts in Programming Languages (CS 141), undergraduate	Fall 2017
	Compilers and Interpreters (CS 142), undergraduate	Winter 2017
	Introduction to Programming (ICS 31), undergraduate	Winter 2014
	Requirements Analysis and Engineering (INF 113), undergraduate	Winter 2014
	Reader, University of California, Irvine:	
	Introduction to Software Engineering (INF 43), undergraduate	Fall 2013
Lectures given as TA	*Teaching Assistant, University of California, Irvine:*	
	LR(0) and LR(1) Parsing (slides), CS 142	Winter 2018
	LL(1) Parsing, Handles, CS 142	Winter 2018
	Global Optimization, CS 142	Winter 2017
Study Material	*University of California, Irvine:*	
	Memory layout of struct and union in C, CS 141	Fall 2017
Tools	*University of California, Irvine:*	
	Crux Compiler Project Autograder, CS 142	Winter 2018

Mentoring

Projects

University of California, Irvine:

4.	Efficient Software Infrastructure for Non-Uniform Memory Machines	Aug 2018 - *present*
3.	Graspan Migration from Java to C++	Jun 2016 - Dec 2016
2.	Automatic Comment Generator for Java Code	Sep 2015 - Dec 2015

Bangladesh University of Engineering and Technology:

1.	Improving Code Testing Environments	Dec 2012 - Aug 2013

Students

I-Surf Fellows at University of California, Irvine:	[Project]
Jeonghoon Lee, Undergraduate, Hanyang University, Seoul	4
Jiwon Jeon, Undergraduate, Ajou University, Suwon	4
Minjun Cha, Undergraduate, Kookmin University, Seoul	4
Yealynn Kim, Undergraduate, Kookmin University, Seoul	4
Sungsoo Son, Undergraduate, Kookmin University, Seoul	3
Hansem Jeon, Undergraduate, Kookmin University, Seoul	3
Soyeong Park, Undergraduate, Kookmin University, Seoul	2
John Vincent Thorpe, Undergraduate, UCI	3
Md. Khaled Hussain, Graduate, BUET	1

Service

ISSTA 2018 Amsterdam, Netherlands	Artifact Evaluation Committee Member International Symposium on Software Testing and Analysis
ISSTA 2017 Santa Barbara, California, US	Artifact Evaluation Committee Member International Symposium on Software Testing and Analysis
WADM 2013 Dhaka, Bangladesh	Reviewer Workshop on Advances in Data Management
BWTCSE 2013 Dhaka, Bangladesh	Organizing Committee Member Brain Storming Workshop on Theoretical Computer Science and Engineering
GDGA 2013 Dhaka, Bangladesh	Organizing Committee Member Workshop on Graph Drawing and Graph Algorithms
WALCOM 2012 Dhaka, Bangladesh	Organizing Committee Member and Reviewer Workshop on Algorithms and Computation

Honors

Grants

Mar 2017 **ACM Professional Activities Grant**
For paper presentation in 22nd ACM International Conference on Architectural Support for Programming Languages and Operating Systems, (ASPLOS '17).

May 2016 **ACM Travel Award**
For poster presentation in Student Research Competition at Programming Languages Design and Implementation Conference (PLDI '16)

Feb 2013 **Chair's Award**
Department of Informatics, University of California, Irvine

Dec 2012 **CodeCrafters-Investor Tools Research Grant**
For paper presentation in ACM Indian Software Engineering Conference (ISEC '12)

Sep 2010 **Research Assistantship Grant**
Committee of Advanced Studies and Research,
Bangladesh University of Engineering and Technology

Offers

Mar 2017 **Invited to present tutorial on "Systemized Program Analyses - A Big Data Perspective on Static Analysis Scalability" at ASPLOS '17**

Apr 2013 **Graduate Admission Offer**
Department of Computer Science, University of California, Davis

Feb 2013 **PhD Admission Offer with Full Scholarship**
School of Computing, Queen's University, Canada

Jul 2009 **Associate System Engineer Position Offer**
IBM-India

Certifications

May 2008 **DELF A2 Diploma in French Language**
Alliance Française, Ministrè de l'Éducation Nationale, Republique Française

Nov 2007 **DELF A1 Diploma in French Language**
Alliance Française, Ministrè de l'Éducation Nationale, Republique Française

Others

Feb 2010 **Selection in National ICT Internship Program**
Bangladesh Computer Council,
Ministry of Science and ICT, Dhaka, Bangladesh

Oct 2009 **Top 22 of 152 test takers**
Master's Program Admission Test, Bangladesh University of Engineering and Technology