MASUD RAHMAN, PhD Candidate

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◎ CAREER OBJECTIVES

My career objectives are (1) conducting cutting edge research in the area of Software Engineering, and challenging myself everyday with the tough, emerging research problems, (2) developing *novel*, *cost-effective* and *practical* solutions especially for **software debugging**, **code search**, and **code reviews**, (3) honing my research, development and supervision skills through constant learning, active collaborations and deep self-reflections, and (4) using my talents and skills in the making of the research/technology leaders of tomorrow.

🎓 EDUCATION

Doctor of Philosophy, Computer Science/Software Engineering
University of Saskatchewan, Canada
September 2014 – June 2019 (expected)
Course average: **89.00**%
Thesis: Improving Source Code Search with Context-Aware, Analytics-Driven Query
Reformulations. (*tentative*)
Advisor: Prof. Dr. Chanchal K. Roy
Award: **Dr. Keith Geddes Award**

Master of Science, Computer Science/Software Engineering
University of Saskatchewan, Canada
September 2012 – August 2014
Course average: **88.60**%
Thesis: Exploiting Context in Dealing with Programming Errors and Exceptions in the IDE
Supervisor: Prof. Dr. Chanchal K. Roy
Award: **2014 Best Graduate Thesis Award Nomination**

Bachelor of Science, Computer Science and Engineering
Khulna University, Bangladesh
January 2005 – March 2009
CGPA: **3.91/4.00**, 1st class 1st
Thesis: Information Retrieval by Modified Term Weighting Method using Random Walk Model
with Query Term Position Ranking
Supervisor: Prof. Dr. Abu Shamim Mohammad Arif
Award: **Chancellor Gold Medal**

📚 PUBLICATIONS (29)

[2019] (3)

- **M. Masudur Rahman**, *"Supporting Code Search with Context-Aware, Analytics-Driven, Effective Query Reformulation"*, In Proceeding of The 41st ACM/IEEE International Conference on Software Engineering (Companion volume, Doctoral Symposium Track) (**ICSE** 2019), 4 pp., Montreal, Canada, May, 2019 (Acceptance rate: **9/31=29.00**%) (to appear)

- S. Mondal, **M. Masudur Rahman** and C. K. Roy, *"Can Issues Reported at Stack Overflow Questions be Reproduced? An Exploratory Study"*, In Proceeding of The 16th International Conference on Mining Software Repositories (**MSR** 2019), 11 pp., Montreal, Canada, May, 2019 (Acceptance rate: **32/126=25.40%**) (to appear)

- Rodrigo F. G. Da Silva, C. K. Roy, **M. Masudur Rahman**, K. Schneider, K. Paixão and M. Maia, *"Recommending Comprehensive Solutions for Programming Tasks by Mining Crowd Knowledge"*, In Proceeding of The 27th IEEE/ACM International Conference on Program Comprehension (ICPC 2019), 11 pp., Montreal, Canada, May, 2019 (Acceptance rate: **28/93=30.10%**) (to appear)

[2018] (5)

- **M. Masudur Rahman**, C. K. Roy and David Lo, *"Automatic Query Reformulation for Code Search using Crowdsourced Knowledge"*, Empirical Software Engineering Journal (**EMSE**), 56 pp., (Impact Factor=**2.93**)

- **M. Masudur Rahman** and C. K. Roy, *"Improving IR-Based Bug Localization with Context-Aware Query Reformulation"*, In Proceeding of The 26th ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (**ESEC/FSE** 2018), pp. 621–632, Florida, USA, November, 2018 (Acceptance rate: **55/295=19.00**%) (ACM Artifact Badges by peer reviews: **Functional* + Available* + Reusable***)

- **M. Masudur Rahman** and C. K. Roy, *"Effective Reformulation of Query for Code Search using Crowdsourced Knowledge and Extra-Large Data Analytics"*, In Proceeding of The 34th International Conference on Software Maintenance and Evolution (**ICSME** 2018), pp. 516–527, Madrid, Spain, September, 2018 (Acceptance rate: **37/174=21.00**%) (**TCSE Distinguished Paper Award Nomination***)

- **M. Masudur Rahman** and C. K. Roy, *"Poster: Improving Bug Localization with Report Quality Dynamics and Query Reformulation"*, In Proceeding of The 40th International Conference on Software Engineering (**ICSE** 2018), pp. 348–349, Gothenburg, Sweden, May, 2018

- **M. Masudur Rahman** and C. K. Roy, *"NLP2API: Query Reformulation for Code Search using Crowdsourced Knowledge and Extra-Large Data Analytics"*, In Proceeding of The 34th International Conference on Software Maintenance and Evolution (Artifact Track) (**ICSME** 2018), pp. 714, Madrid, Spain, September, 2018 (Artifact **Accepted***)

[2017] (5)

- **M. Masudur Rahman** and C. K. Roy, *"Improved Query Reformulation for Concept Location using CodeRank and Document Structures"*, In Proceeding of The 32nd IEEE/ACM International Conference on Automated Software Engineering (**ASE** 2017), pp. 428-439, Urbana-Champaign, Illinois, USA, October, 2017 (Acceptance rate: **65/314=21.00%**)

- **M. Masudur Rahman** and C. K. Roy and R. G. Kula, *"Predicting Usefulness of Code Review Comments using Textual Features and Developer Experience"*, In Proceeding of The 14th International Conference on Mining Software Repositories (**MSR** 2017), pp. 215–226, Buenos Aires, Argentina, May, 2017 (Acceptance rate: **37/121=30.60**%)

- **M. Masudur Rahman** and C. K. Roy and David Lo, *"RACK: Code Search in the IDE using Crowdsourced Knowledge"*, In Proceeding of The 39th International Conference on Software Engineering (Companion Volume) (**ICSE** 2017), pp. 51–54, Buenos Aires, Argentina, May, 2017 (Acceptance rate: **18/57=31.58**%)

- **M. Masudur Rahman** and C. K. Roy, *"STRICT: Information Retrieval Based Search Term Identification for Concept Location"*, In Proceeding of The 24th IEEE International Conference on Software Analysis, Evolution, and Reengineering (SANER 2017), pp. 79–90, Klagenfurt, Austria, February 2017 (Acceptance rate: **34/140=24.00**%)

- **M. Masudur Rahman** and C. K. Roy, *"Impact of Continuous Integration on Code Reviews"*, In Proceeding of The 14th International Conference on Mining Software Repositories (**MSR** 2017), pp. 499–502, Buenos Aires, Argentina, May, 2017

[2016] (5)

- **M. Masudur Rahman**, C. K. Roy, and Jason Collins, *"CORRECT: Code Reviewer Recommendation in GitHub Based on Cross-Project and Technology Experience"*, In Proceeding of The 38th International Conference on Software Engineering (Companion Volume) (**ICSE** 2016), pp. 222–231, Austin Texas, USA, May 2016 (Acceptance rate: **28/108=26.00**%)

- **M. Masudur Rahman** and C. K. Roy, *"QUICKAR: Automatic Query Reformulation for Concept Location Using Crowdsourced Knowledge"*, In Proceeding of The 31st IEEE/ACM International Conference on Automated Software Engineering (**ASE** 2016) (New Ideas Track), pp. 220–225, Singapore, September 2016

- **M. Masudur Rahman**, C. K. Roy, Jesse Redl, and Jason Collins, *"CORRECT: Code Reviewer Recommendation at GitHub for Vendasta Technologies"*, In Proceeding of The 31st IEEE/ACM International Conference on Automated Software Engineering (**ASE** 2016) (Tool Demo Track), pp. 792–797, Singapore, September 2016

- **M. Masudur Rahman**, C. K. Roy and David Lo, *"RACK: Automatic API Recommendation using Crowdsourced Knowledge"*, In Proceeding of The 23rd IEEE International Conference on Software Analysis, Evolution, and Reengineering (SANER 2016), pp. 349–359, Osaka, Japan, March 2016 (Acceptance rate: **52/140=37.00**%)

- Amit K. Mondal, **M. Masudur Rahman** and C. K. Roy, *"Embedded Emotion-based Classification of Stack Overflow Questions Towards the Question Quality Prediction"*, In Proceeding of The 28th International Conference on Software Engineering & Knowledge Engineering (SEKE 2016), pp. 521–526, San Francisco Bay, California, USA, July 2016

[2015] (4)

- **M. Masudur Rahman**, C. K. Roy and Iman Keivanloo, *"Recommending Insightful Comments for Source Code using Crowdsourced Knowledge"*, In Proceeding of The 15th IEEE International Working Conference on Source Code Analysis and Manipulation (SCAM 2015), pp. 81–90, Bremen, Germany, September 2015 (Acceptance: **24/68=35.00**%)

- **M. Masudur Rahman** and C. K. Roy, *"Recommending Relevant Sections from a Webpage about Programming Errors and Exceptions"*, In Proceeding of The 25th International Conference on Computer Science and Software Engineering (CASCON 2015), pp. 181–190, Markham, Canada, November 2015 (Acceptance rate: **21/71=29.57**%)

- **M. Masudur Rahman** and C. K. Roy, *"An Insight into the Unresolved Questions at Stack Overflow"*, In Proceeding of the 12th Working Conference on Mining Software Repositories (Challenge Track) (**MSR** 2015), pp. 426–429, Florence, Italy, May 2015

- **M. Masudur Rahman** and C. K. Roy, *"TextRank Based Search Term Identification for Software Change Tasks"*, In Proceeding of the 22nd IEEE International Conference on Software Analysis, Evolution, and Reengineering (ERA Track) (SANER 2015), pp. 540–544, Montreal, Canada, March 2015

[2014] (4)

- **M. Masudur Rahman**, S. Yeasmin and C. K. Roy, *"Towards a Context-Aware Meta Search Engine for IDE-Based Recommendation about Programming Errors and Exceptions"*, In Proceeding of the IEEE CSMR-18/WCRE-2 1 (CSMR/WCRE 2014), pp. 194–203, Antwerp, Belgium, February 2014 (Acceptance rate: **27/87=31.00**%)

- **M. Masudur Rahman** and C. K. Roy, *"On the Use of Context in Recommending Exception Handling Code Examples"*, In Proceeding of the 14th IEEE International Working Conference on Source Code Analysis and Manipulation (SCAM 2014), pp. 285–294, Victoria, Canada, September 2014 (Acceptance rate: **26/82=31.70**%)

- **M. Masudur Rahman** and C. K. Roy, *"SurfClipse: Context-Aware Meta Search in the IDE"*, In Proceeding of the 30th International Conference on Software Maintenance and Evolution (Demo Track) (**ICSME** 2014), pp. 617–620, Victoria, Canada, September 2014

- **M. Masudur Rahman** and C. K. Roy, *"An Insight into the Pull Requests of GitHub"*, In Proceeding of the 11th Working Conference on Mining Software Repositories (Challenge Track) (**MSR** 2014), pp. 364–367, Hyderabad, India, May 2014

[2013] (1)

- **M. Masudur Rahman**, S. Yeasmin and C. K. Roy, *"An IDE-Based Context-Aware Meta Search Engine"*, In Proceedings of the 20th Working Conference on Reverse Engineering (ERA Track) (WCRE 2013), pp. 467–471, Koblenz, Germany, October 2013

[2009–2012] (2)

- A. S. Mohammad Arif, **M. Masudur Rahman** and S. Y. Mukta, *"Information Retrieval by Modified Term Weighting Method using Random Walk Model with Query Term Position Ranking"*, In Proceedings of International Conference on Signal Processing Systems (ICSPS 2009), pp. 526–530, Singapore, May 2009 (Acceptance: **170/570=29.82**%)

- H. Rahman, M. M. Rashid and **Masudur Rahman**, *"Heritage Interpretation: Collective Reconstruction of Sompur Mahavihara, Bangladesh"*, In Proceedings of International Conference on Virtual Systems and Multimedia (VSMM 2010), pp. 163–170, Seoul, South Korea, October 2010

🏆 AWARDS (17)

- **[2018] TCSE Distinguished Paper Award Nomination:** Nominated for TCSE Distinguished Paper Award for the **ICSME(A)** 2018 paper – *"Effective Reformulation of Query for Code Search using Crowdsourced Knowledge and Extra-Large Data Analytics"*.

- **[2017] Dr. Keith Geddes Award, Student of the Year**: Awarded to *only one* PhD student by the Department of Computer Science, University of Saskatchewan, for outstanding research and academic performance in the ongoing **PhD** program. Award value: $2,500.

- **[2010] Chancellor Gold Medal**: Awarded by the President, Peoples' Republic of Bangladesh and Chancellor, Khulna University. I scored the highest CGPA **3.91/4.00** in the year 2008 among 200 students from five departments of the School of Science, Engineering and Technology (SET), Khulna University. Award value: $\approx$ $1,000.

- **[2019] ACM SIGSoft CAPS Award**: Awarded by ACM SIGSoft for attending ICSE 2019, to be held at Montreal, Canada, based on research and academic excellence. Award value: $400 CAD.

- **[2017] ACM SIGSoft CAPS Award**: Awarded by ACM SIGSoft for attending ASE 2017, held at University of Illinois Urbana-Champaign, IL, USA, based on research and academic excellence. Award value: $600 USD.

- **[2011] Prime Minister Gold Medal Nomination**: Nominated by School of Science, Engineering and Technology, Khulna University. I scored the highest CGPA 3.91/4.00 in B.Sc in Computer Science and Engineering, Khulna University

- **[2014] Best MSc Thesis Award Nomination**: My MSc thesis was nominated for the Best MSc Thesis Award 2014 by the Department of Computer Science, U of S

- **[2014] Best Graduate Award Nomination**: I was nominated for the Best Graduate Award 2014 from the Department of Computer Science, U of S

- **[2014] Graduate Research Video Contest Winner:** One of three winners of the video contests arranged by the Department of Computer Science, U of S. Award value: $100.

- **[2016] Vanier Graduate Scholarship Nomination:** I was nominated for Vanier Graduate Scholarship by the Department of Computer Science, U of S.

- **[2016] Microsoft PhD Fellowship Nomination:** I was nominated for Microsoft PhD Fellowship by the Department of Computer Science, U of S.

- **[2010] Service Excellence Award**: Awarded by NOCHALLENGE TECHNOLOGY LLC for service excellence as a professional software developer during 2009–2010.

- **[2007–2008] Programming Contest Award Winner** of Khulna University.

- **[2018] Graduate Travel Award**: Awarded by University of Saskatchewan for ICSME 2018 travel to Madrid, Spain. Award value: $550.

- **[2015] Graduate Travel Award**: Awarded by University of Saskatchewan for CASCON 2015 travel to Markham, Canada. Award value: $250.

- **[2014] Graduate Travel Award**: Awarded by GrammaTech for SCAM 2014 travel to Victoria, Canada. Award value: $150.

- **[2013] Graduate Travel Award**: Awarded by University of Saskatchewan for WCRE 2013 travel to Koblenz, Germany. Award value: $550.

💰 SCHOLARSHIPS & GRANTS (9)

- **[2016] NSERC Industry Engage Grant**: Awarded by NSERC for industry collaboration with Vendasta Technologies, Saskatoon, Canada. Grant value: $6,300, $700/month for 9 months. Duration: March 2016–November 2016.

- **[2014–2017] International Dean's Scholarship**: Awarded by University of Saskatchewan for PhD in Computer Science/Software Engineering. Scholarship amount: $22,000/year for 3 years. Duration: September 2014–August 2017.

- **[2017–2018] SK Innovation & Opportunity Scholarship**: Awarded by University of Saskatchewan, for research and academic excellence in the ongoing PhD program. Scholarship amount: $20,000/year for 1 year. Duration: September 2017– August 2018.

- **[2016–2018] Faculty Scholarship:** Awarded by the Department of Computer Science, University of Saskatchewan for the research excellence in the ongoing PhD program as top ups. Scholarship amount: $\approx$ $8,000.

- **[2018–2019] Faculty Scholarship:** Awarded by the Department of Computer Science, University of Saskatchewan for the research excellence in the ongoing PhD program. Scholarship amount: $23,000/year.

- **[2012–2014] Faculty Scholarship & Graduate Teaching Fellowship**: Awarded by the Department of Computer Science, University of Saskatchewan for the Masters program. Scholarship amount: $17,500/year for 2 years.

- **[2006–2009] Dean's Merit List Scholarship**: Awarded by Khulna University during 2006 to 2009. I scored the 1st position in all four academic years of B.Sc in CSE.

- **[2005–2007] Merit List Scholarship**: Awarded by Government Education Board (Jessore) during 2005 to 2007 for excellence in 2003 HSC exam.

- **[2001–2002] Merit List Scholarship**: Awarded by Government Education Board (Jessore) during 2001 to 2002 for excellence in 2001 SSC exam.

💼 EMPLOYMENT HISTORY (3)

[2009–2018] Lecturer, Khulna University: Appointed as a **full-time faculty member** of the Department of Computer Science and Engineering, Khulna University. I was accounted for (1) teaching undergraduate classes, course planning, course evaluation, conducting exams and publishing results, (2) conducting my own research, supervising student theses, (3) conducting academic projects, organizing student contests, leading students in the regional/national level contests, and

(4) conducting administrative affairs such as admission test management, departmental purchase inspection, and various other official decision making.

[2012–2018] Graduate Teaching Assistant, University of Saskatchewan: Appointed as a graduate teaching assistant in the Department of Computer Science since 2012. I was accounted for leading tutorials of *CMPT 370: Intermediate Software Engineering*, and for marking at least three other courses from the undergraduate program.

[2009–2012] Software Developer, NOCHALLENGE TECHNOLOGY LLC: Appointed as a junior software developer, and later promoted as the *lead software developer* due to outstanding development, problem-solving and leadership skills. I was accounted for (1) developing professional E-commerce applications for buying and selling real estates and businesses, (2) handling client communications from overseas, (3) leading/managing multiple mid-level software projects, and (4) hiring and training junior software developers.

💡 RESEARCH

Research Interests: My core research interest is **"software debugging/change automation"**. Software bugs cost about **$312 billion** per year globally. Traditional ad hoc practices of debugging/changing software systems also claim about **60%** of the total budget. I have been developing tools and techniques for a while to make such changes cost-effective and to reduce the cognitive burdens of the developers during code changes. In particular, **I develop novel and cost-effective solutions to automate different steps of a typical software debugging/change process such as (1) localization of the bugs and (2) reviewing of the bug fixing code**. In my research, I make use of Information Retrieval (IR), static code analysis, large-scale data analytics, Machine/Deep Learning (ML/DL) and software repository mining (e.g., Stack Overflow, GitHub) to come up with the solutions. (Please check my **research statement** for further details).

Reviewing Experience

Serving as either a full reviewer or a sub-reviewer of several reputed journals and top tier conferences on Software Engineering for the last six years as follows:

- ACM Transactions on Software Engineering and Methodology (**TOSEM**)
- Journal of Empirical Software Engineering (**EMSE**)
- Journal of Systems and Software (**JSS**)
- Journal of Software: Practice and Experience (**JSPE**)
- Journal: SCIENCE CHINA Information Sciences (SCIS)
- Journal: Foundations of Computing and Decision Sciences (FCDS)
- International Conference on Software Engineering (**ICSE**)
- International Conference on Software Maintenance and Evolution (**ICSME**)
- International Conference on Software Maintenance (**ICSM**)
- International Conference on Software Analysis, Evolution, and Reengineering (SANER)

- International Working Conference on Reverse Engineering (WCRE)
- International Working Conference on Mining Software Repositories (**MSR**)
- International Working Conference on Source Code Analysis and Manipulation (SCAM)
- International Conference on Program Comprehension (ICPC)
- International Conference on Computer Science and Software Engineering (CASCON)

Research Projects

Completed PhD Projects: I have been working on the following research projects for the last four+ years as a part of my PhD course and research work. Papers produced from these projects have been accepted/published at the highly competitive peer-reviewed conferences of Software Engineering such as **ICSE(A*)**, **ESEC/FSE (A*)**, **ASE(A)**, **ICSME(A)** and **MSR(A)**, and at the top ranked journals such as **EMSE**.

- **[2018] BLIZZARD** is an automated technique for improving IR-based bug localization using query reformulation and bug report quality dynamics. *Technology & Concepts:* Report quality dynamics, empirical study, graph-based term weighting, query reformulation, noise filtration, and information retrieval. (one full paper at **ESEC/FSE** 2018 and one poster paper at **ICSE** 2018)

- **[2018] NLP2API** reformulates a natural language query intended for code search using crowdsourced knowledge and extra-large data analytics derived from Stack Overflow Q & A site (one full paper at **ICSME** 2018).

- **[2017] ACER** provides effective reformulations to queries for concept location using CodeRank and source document structures. ACER uses graph-based term weighting (PageRank), query difficulty analysis, machine learning and information retrieval for query reformulation (one full paper at **ASE** 2017).

- **[2017] RevHelper** predicts usefulness of code review comments based on their texts and developers' experience. RevHelper collects features from comment texts and reviewers' experience, and applies Random Forest algorithm to them for the automatic prediction (one full paper at **MSR 2017**).

- **[2016–2017] CORRECT** is a code reviewer recommendation system for pull requests at GitHub. It mines cross-project experience and specialized technology experience of the developers, and suggests appropriate code reviewers for a pull request. The solution is packaged as a Google Chrome plug-in and a web service (one full paper at **ICSE** 2016 and one tool paper at **ASE** 2016).

- **[2017] STRICT** is a technique for appropriate search term identification from software change requests. STRICT uses graph-based term weighting (PageRank), natural language processing and information retrieval for identifying the important search keywords (one full paper at SANER 2017).

- **[2016] RACK** reformulates a natural language query for code search into relevant API names. RACK mines posts from programming Q & A site– Stack Overflow, and employs three co-occurrence based heuristics and natural language processing for the query reformulation (one full paper at SANER 2016 and one tool paper at **ICSE** 2017).

- **[2018] RACK+** is an extended version of our earlier work RACK. It has been recently accepted for publication by **EMSE** journal.

- **[2015] CodeInsight** is an automated technique for generating insightful comments for source code using crowdsourced knowledge from Stack Overflow. CodeInsight uses data mining, topic modelling and heuristics for extracting such insights (one full paper at SCAM 2015).

- **[2016] QUICKAR** is an automated query reformulation technique for concept location using crowdsourced knowledge from Stack Overflow (one paper at **ASE** 2016). *Technology:* Query reformulation, query expansion, word co-occurrence analysis, crowdsourced repository mining, concept location, and Stack Overflow.

Ongoing PhD Projects: Papers from several other projects are under reviews as follows:

- **[2018] BLADER** suggests appropriate search queries from a bug report using large-scale data analytics from Stack Overflow Q & A site when the report does not contain any structured entities (e.g., program entity names). Our paper is under review of **ESEC/FSE** 2019.

- **[2018] STRICT+** is an extended version of our earlier work STRICT. Currently, our paper is under review of **TSE (A*)** journal.

Co-supervised PhD/MSc Projects: The following graduate level research projects were co-supervised by me. My co-supervision included brain-storming the core research ideas and methodologies, regular progress monitoring, advising, and co-authoring the submitted papers.

- **[2019] Issue-Reproducer** investigates whether the issues reported at Stack Overflow questions could be reproduced or not, and provides tool supports for making them reproducible (one full paper at **MSR** 2019) [MSc student supervised: **Saikat Mondal**].

- **[2019] CROKAGE** suggests comprehensive solutions from Stack Overflow for a programming task where each solution contains both relevant code examples and complementary explanations (one full paper at ICPC 2019) [PhD student supervised: **Rodrigo Fernandes**].

- **[2019] BLUAMIR** localizes software bugs not only using lexical similarity between bug report texts and source code documents but also by leveraging their implicit associations derived from bug-fixing history. Our full paper is under review of **ESEC/FSE (A*)** 2019. [PhD student supervised: **Shamima Yeasmin**]

Completed MSc Projects: I completed the following research projects during my Master in Computer Science at the University of Saskatchewan:

- **[2014] SurfClipse:** An IDE-based context-aware meta search engine for programming errors and exceptions (three papers at ICSME 2014, WCRE-CSMR 2014, WCRE 2013)

- **[2014] SurfExample:** An IDE-based context-aware code example recommender for exception handling (one paper at SCAM 2014)

- **[2015] ContentSuggest:** A context-aware web page content recommender in the IDE (one paper at CASCON 2015)

- **[2014] QueryClipse:** A context-aware search query recommender for programming errors and exceptions (one tool paper at ICSME 2014)

- **[2014] ExcClipse:** An integration of all four plugins– SurfClipse, QueryClipse, ContentSuggest and SurfExample

Completed MSR Mining Challenge Projects: I have been taking part in the **MSR** mining challenge competition since 2014. In this competition, researchers from all over the world are challenged with a new dataset every year, and only novel and interesting findings are accepted for publication through a double-blind peer-review process. I succeeded three out of four times, and completed the following mining challenge projects successfully:

- **[2017] MSR Challenge with Travis CI:** Impact of continuous integration (e.g., Travis CI) on code review participation and review quality (one paper at MSR 2017).

- **[2015] MSR Challenge with Stack Overflow:** An insight into the unresolved (i.e., answer not accepted as solution) questions from Stack Overflow (one paper at MSR 2015).

- **[2014] MSR Challenge with GitHub:** An insight into the merge success and merge failure of pull requests from GitHub (one paper at MSR 2014).

Developed Tools & Prototypes

Many of my research projects resulted into either fully functional tools (e.g., IDE plug-ins) or working prototypes. Three of my developed tools and two of my prototypes/replication packages have been accepted for publication and demonstration at the top tier conferences as follows:

- **[2014] SurfClipse:** Tool was accepted and demonstrated at **ICSME** 2014, Victoria, Canada. It also won the graduate research video contest organized by the Department of Computer Science, University of Saskatchewan, back in 2013.

- **[2016] CORRECT:** Tool was accepted and demonstrated at **ASE** 2016, Singapore. It was also demonstrated in front of the professional developers at Vendasta Technologies, Canada.

- **[2017] RACK:** Tool was accepted and demonstrated at **ICSE** 2017, Argentina.

- **[2018] BLIZZARD:** Replication package has been recently accepted by **ESEC/FSE** 2018, FL, USA. It received **"Functional", "Reusable", "Available"** badges of ACM, and also has been *permanently* archived by ACM for smooth reuse and wider dissemination.

- **[2018] NLP2API:** Replication package has been accepted and recently demonstrated at **ICSME** 2018, Madrid, Spain.

More details on my developed tools and prototypes can be found on the **tool page**. I am also greatly enthusiastic about **Open Science**, and many of my completed research projects are publicly available on **GitHub** for replication, reuse and collaboration.

Global Outreach & Research Collaborations

I have been actively collaborating with prominent researchers from three internationally reputed universities and one industrial partner for several of my research projects. While I propose research ideas and **conduct/lead** the main research work, the collaborators review the ideas, papers and experimental findings. I also regularly visited our industry partner to demonstrate my research works in front of the **professional software developers**, and collected high quality feedbacks from them. Such visits shaped my research towards more applicable and practice-oriented solutions.

- **[2016–2018] David Lo, Singapore Management University, Singapore**: We collaborated on RACK project that produced two papers – one at SANER 2016 and one at **ICSE** 2017. Our journal paper has also recently been accepted by **EMSE**.

- **[2017] Raula G. Kula, Osaka University, Japan**: We collaborated on RevHelper project that produced one paper at **MSR** 2017.

- **[2015] Iman Kievanloo, Concordia University, Canada**: We collaborated on CodeInsight project that produced one paper at SCAM 2015.

- **[2016–2018] Vendasta Technologies, Canada**: We collaborated with Vendasta Technologies on CORRECT and RevHelper projects that produced three papers– one at **ICSE** 2016, one at **ASE** 2016, and one at **MSR** 2017.

Research Project/Thesis Supervision

I have been co-supervising several graduate level research projects undertaken by MSc/PhD students from Software Research Lab, University of Saskatchewan for the last few years. Several of them have resulted into high quality publications.

- **[2018] Rodrigo Fernandes:** We are developing a software bot that delivers comprehensive solutions from Stack Overflow Q & A site for a given programming task. We got one full paper accepted at **ICPC** 2019.

- **[2016] Amit Kumar Mondal**: We worked on a research project that deals with sentiments expressed in Stack Overflow questions, and it produced one paper at SEKE 2016.

- **[2018] Saikat Mondal:** We have been working on several interesting projects – (1) quality analysis of Stack Overflow questions, (2) reproducibility of the reported issues on Stack Overflow questions, and (3) code reliability prediction using crowdsourced knowledge. We got one full paper accepted at **MSR** 2019. Another is being prepared for **ICSME** 2019.

- **[2017–2018] Shamima Yeasmin:** We are developing a bug localization technique that employs natural language processing, software repository mining and Information Retrieval. One full paper was submitted at **ESEC/FSE** 2019.

I also co-supervised two undergraduate theses at Khulna University during 2010–2012 as follows:

- Web Services Performance Improvement by Modifying SOAP Security Principles

- Automatic Seed Set Expansion for Anti-trust based Anti-spamming Algorithms

Research Talks/Posters/Demonstrations

I attended **10-15** Software Engineering conferences and workshops held in **six** different countries over the last six years, and delivered multiple research talks on my research topics. Such attendance and talks allowed me (1) to **collaborate** with top researchers from my research area, (2) to **communicate** my ideas with a large audience more effectively, and (3) to **stay up-to-date** with the hot research trends. The following talks were produced from my works:

- M. Masudur Rahman. 2019, *"Supporting Code Search with Context-Aware, Analytics-Driven, Effective Query Reformulation"*, Doctoral Symposium, ICSE 2019, Montreal, Canada (upcoming on May 28, 2019)

- M. Masudur Rahman. 2019, *"Improving Bug Localization with Context-Aware, Analytics-Driven Query Reformulation"*, Tenure-Track Faculty Seminar, York University, Toronto, Ontario, Canada.

- M. Masudur Rahman. 2019, *"Improving Bug Localization with Context-Aware, Analytics-Driven, Effective Query Reformulation"*, Tenure-Track Faculty Seminar, University of Manitoba, Winnipeg, Canada.

- M. Masudur Rahman. 2018, *"Improving IR-Based Bug Localization with Context-Aware Query Reformulation"*, ESEC/FSE, FL, USA.

- M. Masudur Rahman. 2018, *"Partial Reproduction of Bug Localization Results from BugLocator, BLUiR and AmaLgam+"*, ROSE Festival, ESEC/FSE, FL, USA.

- M. Masudur Rahman. 2018, *"Effective Reformulation of Query for Code Search using Crowdsourced Knowledge and Extra-Large Data Analytics"*, ICSME, Madrid, Spain.

- M. Masudur Rahman. 2018, *"NLP2API: Query Reformulation for Code Search using Crowdsourced Knowledge and Extra-Large Data Analytics"* [Artifact], ICSME, Madrid, Spain.

- M. Masudur Rahman and Chanchal K. Roy. 2018, *"Poster: Improving Bug Localization with Report Quality Dynamics and Query Reformulation"*, ICSE, Gothenburg, Sweden.

- M. Masudur Rahman. 2017, *"Improved Query Reformulation for Concept Location using CodeRank and Document Structures"*, ASE, Urbana, IL, USA

- M. Masudur Rahman. 2017, *"Improved Query Reformulation for Concept Location using CodeRank and Document Structures"* [Poster], ResearchFest, University of Saskatchewan.

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- M. Masudur Rahman and Chanchal K. Roy. 2015, *"An Insight into the Unresolved Questions at Stack Overflow"*, MSR, Florence, Italy.

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- M. Masudur Rahman. 2014, *"On the Use of Context in Recommending Exception Handling Code Examples"*, SCAM, Victoria, Canada

- M. Masudur Rahman and Chanchal K. Roy. 2014, *"Towards a Context-Aware Meta Search Engine for IDE-Based Recommendation about Programming Errors and Exceptions"*, CSMR-WCRE, Antwerp, Belgium.

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- M. Masudur Rahman. 2013, *"An IDE-Based Context-Aware Meta Search Engine"*, WCRE, University of Koblenz-Landau, Koblenz, Germany.

- M. Masudur Rahman. 2018, *"Supporting Software Change Tasks using Automated Query Reformulations"*, Guest Lecture, CMPT 470/816: Advanced Software Engineering, University of Saskatchewan, Canada.

- M. Masudur Rahman. 2013, *"Semantic Network Based API Usage Pattern Extraction and Learning"*, Graduate Symposium, University of Saskatchewan, Canada.

Research Tool/Technology Experience

- **Software Development & Maintenance:** Eclipse, PyCharm, Visual Studio, ArgoUML, Doxygen, JUnit, JavaParser, Jsoup, PMD, FindBugs, CheckStyle, Ant, Maven.

- **Software Version Control**: Git, GitHub.

- **Code Reviews & Continuous Integration:** Gerrit, Travis CI, GitHub Pull Request.

- **Big Data Analytics:** Apache Spark 2.2, Hadoop 2.7, Yarn cluster

- **Machine Learning & Data Mining:** Gensim, FastText, Word2Vec, WEKA, R, MATLAB, Decision Trees, RandomForest, CART, Logistic Regression, Naive Bayes, Bayes Net, Non-linear Regression and Linear Regression

- **Deep Learning:** Keras, DeepLearning4J, LSTM, and chatbots

- **Code Search & Information Retrieval:** Lucene, Indri, Lemur, PageRank, and K-Core.

- **Natural Language Processing:** Stanford CoreNLP, Mallet, POS tagging, Sentiment analysis, Term weighting, Text summarization, and Semantic similarity analysis

- **Statistics & Data Modelling:** Probability distributions, Random sampling, Confidence interval, Central tendency, and Data centrality.

- **Reporting & Prototyping:** LaTeX, Pencil.

- **Programming Languages:** Java, Python, C# and C/C++.

- **Research Collaboration:** Overleaf, Slack, GitHub Issues.

📖 ACADEMICS & TEACHING

Graduate Level Courses

I took seven graduate level courses during my Master and PhD in Computer Science at University of Saskatchewan, and scored an average of **88.71**%. Each of these courses generally involves multiple assignments, paper reviews, presentations, a term project and a term paper. Several of my term projects produced publications later, and thus were **included into the MSc and PhD theses** due to their high quality. I scored **90**% in five out of seven courses as follows:

- CMPT 846: Software Maintenance & Evolution (**92**%)
- CMPT 816: Advanced Software Engineering (**93**%)
- CMPT 880: Research Method & Topics (**90**%)
- CMPT 898: Machine Learning (**89**%)
- CMPT 811: Human Computer Interaction (79%)
- CMPT 898: Big Data Analytics in Software Engineering (**92**%)
- CMPT 842: Mobile and Cloud Computing (86%)

The detailed syllabus of the above courses can be found at **University of Saskatchewan website**

Undergraduate Level Courses

A total of **160** credits were completed during the four years of my Bachelor of **Computer Science and Engineering** in Khulna University. I scored the highest CGPA of **3.91/4.00** among 200+ students from five different departments of the School of Science, Engineering and Technology – Computer Science & Engineering, Electrical & Communication Engineering, Mathematics, Architecture, and Urban & Rural Planning. I was awarded **Chancellor Gold Medal**, the highest academic achievement in the undergraduate level from any public universities of Bangladesh.

Courses Taught

I taught several undergraduate level courses at Khulna University during 2009–2012. I was accounted for course syllabus design, teaching classes, designing questionnaires, conducting exams, evaluating exams, and then publishing the results. Besides theoretical classes, I also supervised the software development projects undertaken by the students. While Software Engineering or related courses were of my main interest, I also taught the classes on Microprocessors, Computer Programming and Computer Architectures as follows:

- **Software Engineering** (CSE 3101)
- **Information System Analysis and Design** (CSE 3203)
- **Software Development Projects** I & II (CSE 2200 & CSE 3100)
- Microprocessor and Interfacing (CSE 3111)
- Seminar (CSE 4102)
- Object Oriented Programming (CSE 1201)
- Computer Programming (CSE 12XX)
- Computer Fundamentals (CSE 1100)

The detailed syllabus of these courses can be found at **Khulna University website**.

Tutorial Leader

I led lecture style in-class tutorials for the following course at the University of Saskatchewan where I mentored ≈**100** students. I adopted a *systematic* approach for this tutorial. **First**, different activities of software development and maintenance (e.g., version control, testing, documentation) were discussed using power point presentations. **Second**, the students were introduced to various state-of-the-art tools using live demonstrations followed by a troubleshooting session. **Third**, all tools and associated lecture materials were made publicly available at GitHub for the students.

- CMPT 370: Intermediate Software Engineering (Fall 2017)

Course Evaluation & Marking

I marked the assignments of several undergraduate level courses at the University of Saskatchewan during 2012–2017 as follows:

- CMPT 370: Intermediate Software Engineering (2012, 2013, 2014)
- CMPT 352: An Introduction to Information Security (2015)
- CMPT 215: Introduction to Computer Organization and Architecture (2017)
- CMPT 214: Programming Principles and Practice (2016)
- CMPT 115: Principles of Computer Science (2013, 2014)

The detailed syllabus of the above courses can be found at **University of Saskatchewan website**. (Please check my **teaching statement** for further details on my teaching philosophy and visions).

👤 INDUSTRY EXPERIENCE

I have **three** years of professional development experience in the software industry. I worked in various stages of development process, and gained **first hand experience** in project planning, requirement analysis, client communications, software prototyping, system design, coding, testing, software documentations and application deployment. Although my initial appointment was junior software developer, I was soon promoted as the **Lead software developer** of the company due to excellence in technical problem solving and analytical ability. I was also awarded the **Service Excellence Award 2010**. I have the following programming and technical skills:

Programming & Problem Solving

- **Web Application Programming:** ASP.net, AJAX, MVC, PHP, Coolite, Ext.NET, Javascript, CSS, JQuery, JQueryUI, XHTML, XML.

- **Database Programming:** PL/SQL, Microsoft SQL Server, Oracle 9, MySQL, MS Access, JDBC, ODBC

Professional Software & Technologies

- **Technical Software Skills:** MS Visual Studio.NET, Net Beans, Pencil, JCreator, FileZilla, BugZilla, TortoiseHg, Crystal Report, ULead Studio, PhotoShop, Dreamweaver, WordPress, DotNetNuke, Joomla, and Plesk.

- **Professional Working experience:** JCarousel, Lightbox, JQuery Map, Google Map, Fusion Map, Google Data API, Payment Integration (Paypal), Finance API Integration (Yahoo!), DirectXCapture, Social Web Integration, Email Marketing, SpryAsset, Zoom Map, E-Commerce development and Management, and HTML Scraping

Professional Software Projects Completed

I completed several professional level software projects during my service at NOCHALLENGE TECHNOLOGY LLC (2009–2012). I mostly played the **lead role** in terms of project planning, designing, coding, and troubleshooting in a group of 3-5 members. A few of them are as follows:

- **[2012] PicIssu**: A web-based software issue tracking system that automatically collects screen shots of issue locations from the UI. It provides a flexible dashboard with various features for issue management, and empowers both the clients and the maintenance developers. *Technology*: ASP.net C#, Javascript, JQuery, CSS, DirectXCapture, and MSSQL Server.

- **[2010] BizWhack**: An e-commerce application for buying and selling of business, real estates and franchises online. It allows a seller to create ads for his/her items using site-provided tools, and allows the buyers to look for desired businesses or franchises through an efficient search mechanism. As a full-feature e-commerce application, it supports online payment using Paypal. *Technology*: ASP.net C#, Javascript, JQuery, CSS, Paypal API integration, Google Data APIs, and MSSQL Server.

- **[2011] CrabTree Screener**: A desktop application that scraps Yahoo! finance pages, and mines stock quote information (e.g., Keyword Statistics, Cash Flow and Analyst Estimates) for hundreds of stocks. *Technology*: C#, Socket, JSoup, XML, Finance API, and Excel API.

- **[2010] Interactive Golf Course**: An interactive map application for exploring golf courses at Arizona, USA. It visualizes each par and hole of the field, and helps the golfers with advanced game planning. *Technology*: ASP .net C#, CSS, Javascript, JQuery and XML.

- **[2011] MarketLinkBD:** An accounting software system for managing and automating several tasks of multi-level marketing in Bangladesh. *Technology:* C#, MSSQL, Javascript, Multi-level marketing algorithm.

More details about the completed projects can be found in the company's **portfolio page**.

![] LEADERSHIP & COMMUNITY SERVICES

I served and have been serving several academic, community and professional organizations, and gained experience in **leadership, interpersonal communications, and in executing organizational agendas or goals**. To date, I served at the following leadership positions:

- **[2019] PC Member, ICPC:** I have been serving as a PC member of the **Replication Track** of ICPC 2019 to be held on May 25–May 26 at Montreal, Canada.

- **[2018] Web Chair, ICPC**: I served as the web chair of ICPC 2018, Gothenburg, Sweden. I was accounted for creating and maintaining the conference website, and for posting various announcements, conference program schedules, events, papers, awards, and other details. This position gave me the opportunity to **meet, greet** and **work** with dozens of reputed research leaders and colleagues from all over the world.

- **[2019] Web Chair, SCAM:** I am also serving as the web chair of SCAM 2019, to be held on September 30–October 01, 2019, at Cleveland, OH, USA.

- **[2018–2019] Webmaster, IEEE Canada North Saskatchewan Chapter**: I have been serving as the webmaster for the website of IEEE Canada North Saskatchewan Chapter. I am accounted for maintaining the organization website, and posting announcements, newsletters, IEEE events and their community services. I also attend the monthly executive meeting, take part in discussions and executive decision making. This position not only helped me to learn the internal structures, operational procedures, and noble missions of a world class professional organization but also improved my **professional networking skills**.

- **[2014–2016] Vice President Internal, Computer Science Graduate Course Council**: I served as the VP-Internal for Computer Science Graduate Course Council (CSGCC), University of Saskatchewan, during September 2014 to August 2016. I was accounted for developing and maintaining the council's website, recording meeting minutes, introducing discussion points, conducting occasional meeting, and for organizing various departmental events for the students (e.g., **ResearchFest**).

- **[2010–2012] Student Contest Organizer & Mentor, Khulna University:** I mentored several academic projects undertaken by the students, and organized multiple student contests such as programming contests and gaming contests. In 2010, I led a group of three student projects that won the **third** position among **60+** groups in the prestigious **Innovative Software Contest**.

- **[2010–2012] Lead Application System Engineer, NOCHALLENGE TECHNOLOGY LLC**: I led several dot NET based projects of the company for almost two years. I was accounted for project planning and system design, recruiting and training novice developers, handling client communications, and for making important decisions for these projects as well as the company.

- **[2005–2006] Publication Secretary, CLUSTER, Khulna University**: I served as the publication secretary of CLUSTER, a student organization at Khulna University. I was accounted for **publishing technical periodicals** and maintaining a **notice board** at the Department of Computer Science and Engineering.

- **[2002–2003] House Cultural Prefect, JCC**: I served as the cultural prefect of Hunain House, Jhenidah Cadet College. I **led** the cadets in various inter-house and inter-college cultural contests such as **debating, recitation, music, drama**, and **extempore speech competition**. I was accounted for the training and rehearsal of the cadets. I also worked as the **liaison** between the cadets and the authority in cultural aspects.

- **[2004] Leadership Contest Winner, Bangladesh Army:** I passed the Inter Service Selection Board (ISSB) exam. ISSB exam is the **premier leadership contests** organized by Bangladesh Army for cadet officer recruitment. It comprises of dozens of leadership challenges and crucial/instant decision making, and runs for **four** consecutive days.

- **[2000] Television Debate Winner:** I along with two other classmates represented Jhenidah Cadet College in a national level Television Debating Contest, and won the debate. Our debate session was telecast in the **national television** of Bangladesh.

- **Professional Membership:** IEEE Student Member (2013–2019), and ACM SIGSOFT Member (2017–2019).

✪ PROFESSIONAL REFERENCES

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Version: March 30, 2019