Akond Rahman

2941 Ligon Street Apartment D23, Raleigh, North Carolina, USA
akond.rahman.buet@gmail.com
`https://akondrahman.github.io/`

Research Interests

Software engineering focused in the area of DevOps, Applied Software Analytics, and Software Security

Education

- **Doctor of Philosophy (Ph.D.) in Computer Science**   Aug 2014 - May 2019
    - Dissertation title: "Anti-patterns in Infrastructure as Code"
    - North Carolina State University, Raleigh, NC, USA
    - Adviser: Dr. Laurie Williams

- **Master of Science (M.Sc.) in Computer Science and Engineering**   Jan 2012 - May 2014
    - University of Connecticut, Storrs, CT, USA

- **Bachelor of Science (B.Sc.) in Computer Science and Engineering**   Dec 2004 - Sep 2009
    - Bangladesh University of Engineering and Technology, Dhaka, Bangladesh

Awards & Honors

- **ACM SIGSOFT Doctoral Symposium Award**
  Dissertation proposal related to DevOps and Infrastructure as Code won the ACM SIGSOFT Best Doctoral
  Symposium Award at ICSE 2018, Gothenburg, Sweden.

- **Microsoft Open Source Challenge**
  Won the **Grand Prize** of the 2016 Microsoft Open Source Challenge. Used Microsoft Research's Deep
  Semantic Similarity Model (DSSM) tool to quantify the semantic similarity of software repositories. Details
  are available here `http://tiny.cc/unp1by`.

- **University Scholarship for Merit**
  Received this award for maintaining decent academic progress for four semesters from 2007 to 2009 during
  the Bachelors program in Bangladesh University of Engineering and Technology.

- **Dean's List Award**
  Received this award for achieving academic excellence for two semesters in the year of 2008 during the
  Bachelors program in Bangladesh University of Engineering and Technology.

Professional Experience

- **Research Intern**   May 2018 - Aug 2018
    - IBM Research, IBM TJ Watson Research Center, Yorktown Heights, NY, USA
    - Integrating AI Marketplace protocol with Hyperledger Composer and Hyperledger Fabric.

- **Data Science Intern**   May 2017 - Aug 2017
    - IBM, Research Triangle Park (RTP), NC, USA
    - Mining open source and industry software repositories to assess the merits of continuous integration,
      identify temporal patterns in defects, and analyze the effect of team size on software project success.

- **Systems Infrastructure Intern**   May 2016 - Aug 2016
    - Redhat Inc., Raleigh, NC, USA
    - Developed monitoring facilities for the OpenShift infrastructure to facilitate continuous deployment of internal Redhat applications.
    - Facilitated Integration of in-house Redhat application into the OpenShift infrastructure.

- **Software Research Intern**   May 2015 - Aug 2015
    - ABB Corporate Research, Raleigh, NC, USA
    - Designed, and developed a software framework to detect similar software applications in ABB using SrcML.NET and Natural Language Toolkit (NLTK).

- **Research Assistant**   Jan 2016 - May 2016
    - Science of Security Lablet, National Security Agency (NSA), USA
    - Investigated attack surface modeling to find vulnerabilities.
    - Studied research methods for science of security.

ANALYTICAL SKILLS

Natural Language Processing: Bag-of-Words (BOW), Term Frequency Inverse Document Frequency (TF-IDF), Deep Structured Semantic Model (DSSM), Topic Model (LDA)

Optimization: Differential Evolution (DE), MaxWalkSat, Simulated Annealing

Qualitative Analysis: Grounded theory, Survey analysis and design

Regression: Linear and Logistic Regression

Sampling: Oversampling, Stratified Sampling, Synthetic Minority Over-sampling Technique (SMOTE), Undersampling

Statistics: ANOVA, Association Rule Mining, Chi-square Test, Correlation Analysis, Effect Size, Inter-rater Reliability, Non-parametric and Parametric Hypothesis Tests, Principal Component Analysis (PCA)

Supervised Learning: Artificial Neural Network, Decision Tree, kNN Classifier, Maximum Likelihood Classifier, Naive Bayes Classifier, Random Forest, Support Vector Machine

Unsupervised Learning: DBScan, Hierarchical Clustering, K-Means Clustering

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LANGUAGES AND TOOLS

Programming Languages: Bash, C, C#, CSS, HTML, Java, PHP, Python, R, SQL

Data Analysis: Apache Spark with Python, Natural Language Toolkit (NLTK), R Studio, Scikit-learn

Database: Microsoft SQL Server (v. 2005, 2008), MySQL (v. 5.0, 5.5)

DevOps: Amazon Web Services (EC2, Code Deploy), Ansible, Docker, Git, Jenkins, Puppet, Vagrant

Security: Findbugs, Fortify, IBM BlueMix Static Analyzer, Microsoft Threat Modeling Tool (MSTMT)

Blockchain: Hyperledger Composer, Hyperledger Fabric

PEER REVIEWED PUBLICATIONS

- **Akond Rahman**, Chris Parnin, and Laurie Williams, "*The Seven Sins*: Security Smells in Infrastructure as Code Scripts", in the International Conference on Software Engineering (ICSE) 2019, *To appear. Pre-print*

- **Akond Rahman** and Laurie Williams, "Source Code Properties of Defective Infrastructure as Code Scripts", in the Information and Software Technology Journal, *under review. Pre-print*

- **Akond Rahman**, Rezvan Mahdavi-Hezaveh, and Laurie Williams, "A Systematic Mapping Study of Infrastructure as Code Research", in the Information and Software Technology Journal, *Pre-print*

- **Akond Rahman**, Amritanshu Agrawal, Rahul Krishna, and Alexander Sobran, "Characterizing The Influence of Continuous Integration: Empirical Results from 250+ Open Source and Proprietary Projects", in 4th International Workshop on Software Analytics (SWAN 2018), co-located with European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE) 2018, *to appear. Pre-print*

- **Akond Rahman**, Jonathan Stallings, and Laurie Williams "Poster: Defect Prediction Metrics for Infrastructure as Code Scripts in DevOps", in Companion Proceedings of the 40th International Conference on Software Engineering (ICSE '18), 2018, *Pre-print*

- **Akond Rahman**, Asif Partho, Pat Morrison, and Laurie Williams "What Questions Do Programmers Ask About Configuration As Code?", in Proceedings of the 4th International Workshop on Rapid Continuous Software Engineering (RCoSE '18), co-located with International Conference for Software Engineering (ICSE) 2018, Gothenburg, Sweden, May, 2018, *Pre-print*

- **Akond Rahman**, "Comprehension Effort and Programming Activities: Related? Or Not Related?", in International Conference of Mining Software Repositories (MSR) 2018, Gothenburg, Sweden, May 2018., *Pre-print*

- **Akond Rahman**, "Anti-patterns in Infrastructure as Code", in International Conference of Software Testing, Validation, and Verification (ICST-PhD Symposium) 2018, Vasteras, Sweden, April 2018, *Pre-print*

- **Akond Rahman**, "Characteristics of Defective Infrastructure as Code Scripts in DevOps", in Companion Proceedings of the 40th International Conference on Software Engineering (ICSE '18), 2018, *Pre-print*

- Rahul Krishna, Amritanshu Agrawal, **Akond Rahman**, Alexander Sobran and Tim Menzies, "What is the Connection Between Issues, Bugs, and Enhancements? (Lessons Learned from 800+ Software Projects)", in Companion Proceedings of the 40th International Conference on Software Engineering (ICSE '18), 2018, *Pre-print*

- Amritanshu Agrawal, **Akond Rahman**, Rahul Krishna, Alexander Sobran and Tim Menzies, "We Don't Need Another Hero? The Impact of "Heroes" on Software Development", in Companion Proceedings of the 40th International Conference on Software Engineering (ICSE '18), 2018, *Pre-print*

- **Akond Rahman**, and Laurie Williams, "Characterizing Defective Configuration Scripts Used for Continuous Deployment", in 11th International Conference on Software Testing, Validation, and Verification (ICST '18), 2018, *Pre-print*

- **Akond Rahman**, Priysha Pradhan, Asif Partho, and Laurie Williams, "Predicting Android Application Security and Privacy Risk with Static Code Metrics", in 4th International Conference on Mobile Software Engineering and Systems (MOBILESoft '17), 2017, pages: 149-153.

- **Akond Rahman**, Asif Partho, David Meder, and Laurie Williams, "Which Factors Influence Practitioners' Usage of Build Automation Tools?", in 3rd International Workshop on Rapid Continuous Software Engineering (RCoSE '17), 2017, pages: 20-26.

- Morgan Burcham, Mahran Al-Zyoud, Jeffrey Carver, Mohammed Alsaleh, Hongying Du, Fida Gilani, Jun Jiang, **Akond** Rahman, Ozgur Kafali, Ehab Al-Shaer, and Laurie Williams, "Characterizing Scientific Reporting in Security Literature: An analysis of ACM CCS and IEEE S&P Paper", in Symposium and Bootcamp on the Science of Security (HotSoS'17) 2017, pages: 13-23.

- **Akond Ashfaque Ur Rahman**, "Code Metrics For Predicting Risk Levels of Android Applications", in Proceedings of 2016 KSU Conference on Cybersecurity Education, Research and Practice (CCERP' 2016), October, 2016.

- **Akond Ashfaque Ur Rahman** and Laurie Williams, "Software Security in DevOps: Synthesizing Practitioners' Perceptions and Practices", in Proceedings of International Workshop on Continuous Software Evolution and Delivery (CSED), May, 2016, Austin, TX, USA.

- **Akond Ashfaque Ur Rahman**, Eric Helms, Laurie Williams, and Chris Parnin, "Synthesizing Continuous Deployment Practices in Software Development", in Proceedings of 13th Agile Conference, pages 1-10, Washington D.C., USA, August, 2015.

- **Akond Ashfaque Ur Rahman**, Md. Atiqul Islam Mollah, and Mahmuda Naznin, "Multiple Targets Tracking Using Kinematics in Wireless Sensor Networks" in Wireless Sensor Network, pages 263-274, August, 2011.

- **Akond Ashfaque Ur Rahman**, Mahmuda Naznin, and Md. Atiqul Islam Mollah, "Energy Efficient Multiple Targets Tracking Using Target Kinematics in Wireless Sensor Networks" in Proceedings of 4th International Conference on Sensor Technologies and Applications (SensorComm), pages 275-280, Venice, Italy, July, 2010.

- **Akond Ashfaque Ur Rahman**, Mahmuda Naznin, and Md. Atiqul Islam Mollah, "Service Priority Based Target Tracking Framework in a Wireless Sensor Network" in Proceedings of 3rd IEEE International Conference on Computer Science and Information Technology (ICCSIT), pages 389-392, Chengdu, China, July, 2010.

- M.M.Shahiduzzaman, Mahmuda Naznin, and **Akond Ashfaque Ur Rahman**, "Portable and Secure Multimedia Data Transfer in Mobile Phones Using Record Management Store (RMS)" in Proceedings of 3rd IEEE International Conference on Computer Science and Information Technology (ICCSIT), pages 364-367, Chengdu, China, July, 2010.

PRESENTATIONS

- "What Questions Do Programmers Ask About Configuration As Code?", in 4th International Workshop on Rapid Continuous Software Engineering (RCoSE'18) URL

- "Comprehension Effort and Programming Activities: Related? Or Not Related?", in International Conference of Mining Software Repositories 2018 (MSR'18) URL

- "Characteristics of Defective Infrastructure as Code Scripts in DevOps", in International Conference on Software Engineering 2018 (ICSE'18) URL

- "Characterizing Defective Configuration Scripts Used for Continuous Deployment", in 11th International Conference on Software Testing, Validation, and Verification 2018(ICST'18) URL

- "Predicting Android Application Security and Privacy Risk with Static Code Metrics", in 4th International Conference on Mobile Software Engineering and Systems 2017(MOBILESoft'17) URL

- "Which Factors Influence Practitioners' Usage of Build Automation Tools?", in 3rd International Workshop on Rapid Continuous Software Engineering 2017(RCoSE '17) URL

- "Software Security in DevOps: Synthesizing Practitioners' Perceptions and Practice", in First International Workshop on Continuous Software Evolution and Delivery 2016(CSED) URL

- "Synthesizing Continuous Deployment Practices in Software Development", in 13th Agile Conference 2015 (Agile2015) URL