

Abdul Ali Bangash

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PhD Thesis: <http://abdulali.ca/papers/Thesis.pdf>

Website: <https://abdulali.ca> Publications: <https://pubs.abdulali.ca>

PHD STUDENT . UNIVERSITY OF ALBERTA

RESEARCH INTERESTS

I am passionate about improving software development tools and practices through mining software repositories and static analysis. Area-wise, my interests lie in Mining Software Repositories, Empirical Evaluations, Software Testing, Applied Machine Learning, Static Analysis and Energy Efficient Computing.

EDUCATION

PhD in Computer Science

University of Alberta

September 2018 - May 2023 (expected)

Edmonton, AB

- Advisors: Dr. Abram Hindle and Dr. Karim Ali
- Courses:

CMPUT680 Machine Learning in Optimizing Compilers with Dr. Jose Nelson Amaral

CMPUT500 Foundations of Program Analysis with Dr. Karim Ali

CMPUT663 Machine Learning Applied: Software Engineering with Dr. Abram Hindle

Masters in Software Engineering

FAST National University

July 2017

Islamabad, Pakistan

- Advisor: Dr. Mirza Omer Beg
- Thesis: A Methodology to Relate Energy Consumption with Program Execution Structure

Bachelors in Computer Science

FAST National University

May 2014

Islamabad, Pakistan

TEACHING EXPERIENCE

During my tenure at the University of Alberta, I supervised 36 Mobile Application projects. Each team had 6 students who completed their project. My responsibility was to make sure that the teams follow agile software processes and employ the state-of-the-art devops tools during their project development. The teams were supposed to follow test-driven-development, proper object-oriented methodologies, kanban boards, and they were supposed to integrate their test cases with Continuous Integration systems, such as Github Actions and Travis CI. Moreover, earlier during my tenure at NUCES, I supervised two undergraduate final-year capstone projects related to energy-efficient software practices.

CMPUT 301 **Introduction to Software Engineering**, UofA, Canada

Fall'20, Winter'21, Fall'21
Winter'22, Fall'22, Winter'23

CMPUT 229 **Computer Organization and Architecture I**, UofA, Canada

Winter'20

CMPUT 301 **Introduction to Software Engineering**, UofA, Canada

Fall'18, Winter'19 & Fall'19

ECE 720 **Social Network Analysis**, UofA, Canada
EE218 **Assembly Language**, NUCES, Pakistan
EE204 **Computer Architecture**, NUCES, Pakistan
CS310 **Management Information Systems**, NUCES, Pakistan
CS102 **Introduction to Programming**, NUCES, Pakistan

Fall'19
Spring'18
Spring'17
Fall'16 & Fall'17
Summer'15

RESEARCH EXPERIENCE

Graduate Research Assistant, Maple Lab

September 2018 - current

University of Alberta, Canada

- Performed a conclusion stability study on Defect Prediction approaches with respect to time.
- Analyzed Stackoverflow data to find out what developers discuss about Machine Learning.
- Analyzed Android APK byte-code transformation effect on energy consumption
- Developed a prediction model to predict the effect of code structural change on energy consumption
- Developing Energy measurement framework for IOS and Android

Graduate Research Assistant, AIM Lab

August 2016 - August 2018

FAST National University, Pakistan

- Proposed a static analysis methodology to relate software energy consumption with software metrics considering test cases execution structure.
- Designed a tool to generate execution path of test case executions of an Android application.
- Conducted a survey on current smartphone battery optimization software techniques.

Graduate Research Assistant, Quest Lab

July 2015 - May 2016

FAST National University, Pakistan

- Developed a validation system for Pivot based implementation of QVTo (Query/View/Transformation) Language.
- Conducted a survey on available Model-based test case selection and prioritization techniques.

ACADEMIC SERVICE

Program Committee member - Demonstration Track
Publicity co-chair
Research Seminars Coordinator
Reviewer
Student volunteer

ICSE conf, 2023
ECOOP conf, 2023
PL/SE seminars, 2019-2020
IEEE TGCN journal, 2020
ECOOP conf, 2019

INDUSTRIAL EXPERIENCE

Java Developer, Development Team

October 2014 - June 2015

Global Rescue LLC, Boston based in Pakistan

- Responsible for front-end and back-end development of Grid system, an enterprise application system built on Java EE.
- Skills and tools: JSF, JBOSS, MySql, EJB, Hibernate, Maven, Ant, JIRA, Mantis, JMS, Restful, JSON, Git, PuTTY, JQuery, CSS.

Java Developer, Development Team

June 2014 - September 2014

Spantic Technologies, Pakistan

- Designed developed and deployed two modules of skip hire management system in Java EE.
- Skills and tools: JSF, EJB, SVN, PostgreSQL, JBOSS.

PUBLICATIONS

REFEREED CONFERENCE PUBLICATIONS

- Abdul A. Bangash, Karim Ali, and Abram Hindle. "Energy Consumption Estimation of API-usage in Smartphone Apps via Static Analysis". 20th International Conference on Mining Software Repositories, 2023. MSR'23 Technical Track
- Anisha Islam, Nipuni Tharushika, Abdul A. Bangash, and Abram Hindle. "Evolution of the Practice of Software Testing in Java Projects". 20th International Conference on Mining Software Repositories, 2023. MSR '23 Short Paper
- Weijie Sun, Samuel Iwuchukwu, Abdul A. Bangash, and Abram Hindle. "An Empirical Study to Investigate Collaboration Among Developers in Open Source Software (OSS)". 20th International Conference on Mining Software Repositories, 2023. MSR '23 Short Paper
- Abdul A. Bangash. "Cost-effective Strategies for Building Energy Efficient Mobile Applications". ICSE'23 Doctoral Symp.
- Abdul A. Bangash, Karim Ali, and Abram Hindle. "A Black Box Technique to Reduce Energy Consumption of Android Apps". In New Ideas and Emerging Results, 2022. ICSE-NIER'22 Short Paper
- Abdul A. Bangash, Hareem Sahar, Abram Hindle, Karim Ali. "On the Time-Based Conclusion Stability of Cross-Project Defect Prediction Models". 43rd International Conference in Software Engineering, Journal-First Track, 2021. ICSE '21 Journal First
- Abdul A. Bangash, Daniil Tiganov, Abram Hindle, and Karim Ali. "Energy Efficient Guidelines for iOS Core Location Framework". 37th International Conference on Software Maintenance and Evolution, 2021. ICSME'21 Technical Track
- Abdul A. Bangash, Hareem Sahar, S Chowdhury, A William Wong, Abram Hindle, and Karim Ali. "What do developers know about machine learning: a study of ML discussions on StackOverflow". 16th International Conference on Mining Software Repositories, pp. 260-264, 2019. MSR '19 Short Paper
- Abdul A. Bangash, Hareem Sahar, and Mirza O. Beg. "A Methodology for Relating Software Structure with Energy Consumption". IEEE International Working Conference on Source Code Analysis and Manipulation, pp. 111-120, 2017. SCAM '17 Technical Track
- Hamza M. Alvi, Hareem Sahar, Abdul A. Bangash, and Mirza O. Beg, "EnSights: A tool for energy aware software development", 13th International Conference on Emerging Technologies, pp. 1-6, 2017. ICET '17 Tool paper

REFEREED JOURNAL PUBLICATIONS

- Abdul A. Bangash, Hareem Sahar, Abram Hindle, Karim Ali. "On the Time-Based Conclusion Stability of Cross-Project Defect Prediction Models". Accepted in the Journal of Empirical Software Engineering, 2020 EMSE '20
- Hareem Sahar, Abdul A. Bangash, and Mirza O. Beg. "Towards energy aware object-oriented development of android applications". Journal of Sustainable Computing: Informatics and Systems, v.21, pp. 28-46, 2019 SUSCOM '19

PROJECTS

Swift Analysis Framework

2020

Worked on the build system of Swift Taint Analysis Framework (SWAN). My task was to improve the overall build system of the application. Currently, working on automating the process of dumping SIL files from multiple iOS applications.

iOS Energy Measurement Framework

2020

Developed and deployed a hardware energy measurement framework for accurate energy measurement of iOS applications. Currently, working on automating the process of energy measurement for multiple iOS applications.

Validation of Software Defect Prediction Techniques

2019

Evaluated the conclusion validity of available Software defect prediction techniques, re-training the machine learning models in a time aware manner.

Hot or Not? Predict energy consumption with Static Analysis

2019

Statically analyzed Android code to build machine learning models for energy regression testing.

Profiling Energy of Android Bytecode Transformations

2018

The purpose of this project was to examine the effect of ReDex - bytecode level transformations on energy consumption of Android applications. There are about 17 transformations that are offered by ReDex. The key challenge was to measure the behavior of all combinations of these transformations i.e. 17!. For this purpose, a search-based approach was used.

PakTracer

2017

This tool was developed as part of thesis to generate execution path of test case executions of an Android application. Purpose was to track these executions at class, method and package granularity level.

Testing QVTo Implementation

2015

The purpose of this project was to validate pivot based implementation of QVTo – a model transformation engine. Rules were developed using visitor pattern which mapped QVT language's pivot based elements back to QVT traditional elements.

UML to Behavioral Code Generation

2014

Developed this tool to generate executable Java code from UML (Unified Modeling Language) model's structural and ALF's (Action Language for Foundational UML) behavioral information.

GRANTS AND ACHIEVEMENTS

Alberta Graduate Excellence Scholarship

\$12,000

FGSR, University of Alberta, Canada, 2022

Graduate Completion Scholarship

\$5,000

FGSR, University of Alberta, Canada, 2022

Computing Graduate Award for Parents

\$5,000

Computing Science Department, University of Alberta, Canada, 2021

Alberta Graduate Excellence Scholarship

\$12,000

FGSR, University of Alberta, Canada, 2021

PhD Early Achievement Award

Certificate

FGSR, University of Alberta, Canada, 2021

Alberta Graduate Excellence Scholarship

\$12,000

FGSR, University of Alberta, Canada, 2021

ACM Travel Grant for ACM-ICSE conference

\$500

Association for Computing Machinery, 2019

Higher Education Commission's Travel Grant for Canada

\$1,000

HEC Pakistan, 2019

Doctoral Recruitment Scholarship

\$10,000

Computing Science Department, University of Alberta, Canada, 2018

Silver Medal in Masters - Second position in Class of 2015*Medal*

FAST National University, Pakistan, 2017

Higher Education Commission's Travel Grant for ICSME-SCAM*\$2,000*

HEC Pakistan, 2017

VOLUNTEERING

Moodle and AWS Cloud Administrator*2020*

Al-Burhan (free education center)

Customized Learning Management System Moodle*2018*

Al-Burhan (free education center)

Conducted staff trainings on Learning Management System*2018*

Al-Burhan (free education center)

KEY SKILLS

- **Programming Languages:** Java, Python, R, Swift, C++, C#, HTML, Javascript
- **Skills:** JSF, Servlets, JDBC, JSP, XML, SCM, EJB, JUnit Testing, Selenium, Java Debug, UML Modelling, EMF, Program Analysis, Socket Programming, MuJava, Windows Phone, Android, JavaScript, CSS, HTML, Javascript
- **Tools:** Eclipse, Latex, Android Studio, R studio, SCM (Git), RSA , Matlab, MySql, PostgreSQL, SQL Lite, PuTTY , JIRA, Mantis.
- **O/S:** Linux, Windows, MacOS