Sharjeel Khan

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EDUCATION

GEORGIA INSTITUTE OF TECHNOLOGY **AUG 2018 - PRESENT**
PhD in Computer Science
Advisor: Dr. Santosh Pande

CARNEGIE MELLON UNIVERSITY **AUG 2013 - MAY 2017**
Bachelor of Science in Computer Science
Minor in Mathematical Sciences
University Honors
Dean's List (5 semesters)

RESEARCH

GEORGIA INSTITUTE OF TECHNOLOGY

Detecting and Mitigating Side-Channel Attacks at Runtime

- Detect side-channel attacks by comparing cache misses to

Predicting call chain using sequence to sequence model

- Produced the entire call chain using LLVM
- Created a sequence to sequence model based on the call chain to predict the next function

Sibyl: Predicting intraprocedural program paths using decision trees

- Created the entire path profile using LLVM
- Trained a decision tree classifier using the path profile
- Inserted the classifier backed into the program to predict paths as early as possible
- Detect both control data attacks and non-control data attacks by comparing paths with the predicted paths

CARNEGIE MELLON UNIVERSITY

Meta-CLF2: Automated verification of concurrent, distributed and parallel properties in applications

- Formalized Automated Trading Systems (ATS) in Celf, a concurrent logical framework (CLF)
- Proved financial properties about ATS and provided a CLF formalization of the proof

PUBLICATIONS

WORKSHOP PUBLICATIONS

Formalization of Automated Trading Systems in a Concurrent Linear Framework (CLF)
Iliano Cervesato, Sharjeel Khan, Giselle Reis, and Dragisa Zunic.
Linearity & TLLA @ FLOC'18: 5th International Workshop on Linearity and Trends in Linear Logic and Applications, Oxford, UK, 2018.

WORK EXPERIENCE

GRADUATE RESEARCH ASSISTANT **AUG 2018 – PRESENT**
Georgia Institute of Technology
Atlanta, Georgia

- Working with Santosh Pande on using machine learning and deep learning algorithms for program analysis
- Predicting intraprocedural program paths using decision trees
- Predicting call chain using sequence to sequence model
- Detecting and mitigating side-channel attacks at runtime

RESEARCH ASSISTANT — MAY 2017 – JULY 2018

Carnegie Mellon University
Doha, Qatar

- Worked on Meta-CLF project with Iliano Cervesato and Giselle Reis to develop the meta-theory for the concurrent logical framework (CLF)
- Formalized Automated Trading Systems (ATS) in Celf
- Proved properties about the formalization of ATS like no crossed/locked market

SOFTWARE ENGINEERING INTERN — JAN 2017 – APR 2017

Meddy
Doha, Qatar

- Moved Transaction Emails from Django's personal email system to Mandrill
- Created the dashboard to show Google analytics and Django analytics to clinic managers for them to track their doctors
- Worked on the interface for clinics to send bulk SMS messages to their clients

TEACHING EXPERIENCE

GRADUATE TEACHING ASSISTANT

Georgia Institute of Technology
CS4240: Compilers & Interpreters — Aug 2019 – Dec 2019

- Tutored students about material and concepts taught in the class during my office hours
- Taught during the recitations
- Answered questions on Piazza
- Graded the assignments

UNDERGRADUATE TEACHING ASSISTANT

Carnegie Mellon University
36-217: Probability Theory and Random Processes — Jan 2017 - May 2017
15-210: Parallel and Sequential Data Structures and Algorithms — Jan 2017 - May 2017
21-241: Matrices and Linear Transformations — Aug 2015 - Dec 2015
15-150: Principles of Functional Programming — Aug 2015 - Dec 2015
15-122: Principles of Imperative Programming — Jan 2015 - May 2015

- Tutored students about material and concepts taught in the class during my office hours
- Taught during the recitations
- Answered questions on Piazza
- Graded the assignments
- Created the autograder for the coding courses on Autolab

PROJECTS

DYNAMIC DEPENDENCE GRAPH

- Built a LLVM application to create a graph showing both data dependence and control depndence
- Implemented based on approach 1 and 2 from Hiralal Agrawal and Joseph R. Horg's Dynamic Program Slicing paper
- Instrumented each function to check whether it got executed and piped it into the DG tool to create dependence graphs of only executed functions

RAPID RESPONSE

- Built a web application to provide information and place of attacks in rural countries to rescue workers
- Scraped information about attacks from social media and news websites using Beautiful Soup and Twitter's API
- Implemented using AngularJS and Django for frontend and backend respectively

KESA

- Built a web application to allow users to create and read stories with branching storylines
- Maintained the story as a D3 tree structure
- Created story sessions using PeerJS for authors to collaborate on these stories
- Implemented using AngularJS and Django for frontend and backend respectively

CONCURRENT DISTRIBUTED FILE SYSTEM

- Built a system containing multiple storage servers and the main naming server
- Implemented my own Java's Remote Method Invocation (RMI) library to allow communication between servers

SMART TEXT EDITOR

- Built a text editor web application in pure Javascript with basic functionalities
- Implemented a built-in thesaurus and Google Knowledge Base system into the editor to allow people to get information faster without leaving the editor

AWARDS/HONORS

UNDERGRADUATE TEACHING IN COMPUTER SCIENCE APPRECIATION AWARD

University
May 2017

SENIOR STUDENT LEADERSHIP AWARD

University
May 2017

EAA AWARD FOR HUMANITARIAN TECHNOLOGY

CarnegieApps Hackathon
Jan 2017

UNDERGRADUATE TEACHING IN COMPUTER SCIENCE APPRECIATION AWARD

University
May 2015

BEST TECHNICAL APPLICATION

CarnegieApps Hackathon
Jan 2015

SKILLS

PROGRAMMING LANGUAGES

Python, C++, Javascript, OCaml, SML, Java, C, LaTeX, Processing, SQL

FRAMEWORKS/TOOLS

LLVM, Coq, Twelf, Celf, Django, AngularJS, Foundation, Bootstrap, MySQL, Git

LIBRARIES

jQuery, D3, Scikit-Learn, Pandas, Numpy, Tensorflow, PeerJS