

# 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

CARNEGIE MELLON UNIVERSITY  
Doha, Qatar

MAY 2017 – JULY 2018

- 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

MEDDY  
Doha, Qatar

JAN 2017 – APR 2017

- 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  
15-210: Parallel and Sequential Data Structures and Algorithms  
21-241: Matrices and Linear Transformations  
15-150: Principles of Functional Programming  
15-122: Principles of Imperative Programming

Jan 2017 - May 2017  
Jan 2017 - May 2017  
Aug 2015 - Dec 2015  
Aug 2015 - Dec 2015  
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 dependence
- 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 BeautifulSoup 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