

# Sharjeel Khan

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## 🎓 EDUCATION

### GEORGIA INSTITUTE OF TECHNOLOGY

AUG 2018 - PRESENT

PHD IN COMPUTER SCIENCE

Advisor: Dr. Santosh Pande

GPA: 4.0

### CARNEGIE MELLON UNIVERSITY

AUG 2013 - MAY 2017

BACHELOR OF SCIENCE IN COMPUTER SCIENCE

Minor in Mathematical Sciences

University Honors

Dean's List (5 semesters)

GPA: 3.57

## 📄 PUBLICATIONS

### CONFERENCE PUBLICATIONS

BEACONS: A END-TO-END COMPILER FRAMEWORK FOR PREDICTING AND UTILIZING DYNAMIC LOOP CHARACTERISTICS

Girish Mururu\*, Sharjeel Khan\*, Bodhisatwa Chatterjee\*, Chao Chen, Chris Porter, Ada Gavrilovska, and Santosh Pande.

(\* Authors contributed equally)

OOPSLA'23: ACM Object-Oriented Programming, Systems, Languages and Applications, Cascais, Portugal, 2023.

[\[Paper\]](#) [\[Code\]](#)

A HIGH PERFORMANCE COMPUTING ARCHITECTURE FOR REAL-TIME DIGITAL EMULATION OF RF INTERACTIONS  
Mandovi Mukherjee\*, Nael Mizanur Rahman\*, Coleman DeLude\*, Joseph Driscoll\*, Uday Kamal, Jongseok Woo, Jamin Seo, Sudarshan Sharma, Xiangyu Mao, Payman Behnam, Sharjeel Khan, Daehyun Kim, Jianming Tong, Prachi Sinha, Santosh Pande, Tushar Krishna, Justin Romberg, Madhavan Swaminathan, and Saibal Mukhopadhyay.

(\* Authors contributed equally)

RadarConf'23: IEEE Radar Conference, San Antonio, Texas, 2023.

[\[Paper\]](#)

DECKER: ATTACK SURFACE REDUCTION VIA ON-DEMAND CODE MAPPING

Chris Porter, Sharjeel Khan, and Santosh Pande.

ASPLOS'23: ACM International Conference on Architectural Support for Programming Languages and Operating Systems, Vancouver, Canada, 2023.

[\[Paper\]](#) [\[Code\]](#) [\[Slides\]](#)

COM-CAS: EFFECTIVE CACHE APPORTIONING UNDER COMPILER GUIDANCE

Bodhisatwa Chatterjee, Sharjeel Khan, and Santosh Pande.

PACT'22: International Conference on Parallel Architectures and Compilation Techniques, Chicago, IL, 2022.

[\[Paper\]](#) [\[Slides\]](#)

VICO : DEMAND-DRIVEN VERIFICATION FOR IMPROVING COMPILER OPTIMIZATIONS

Sharjeel Khan, Bodhisatwa Chatterjee, and Santosh Pande.

ICS'22: ACM International Conference on Supercomputing, Virtual, 2022.

[\[Paper\]](#) [\[Slides\]](#)

## 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: International Workshop on Linearity and Trends in Linear Logic and Applications, Oxford, UK, 2018.

[\[Paper\]](#) [\[Code\]](#) [\[Slides\]](#)

## ARXIV

PRACTICAL COMPILATION OF FEXPRS USING PARTIAL EVALUATION

Nathan Braswell, [Sharjeel Khan](#), and Santosh Pande.

[\[Paper\]](#)

BISCUIT: A COMPILER ASSISTED SCHEDULER FOR DETECTING AND MITIGATING CACHE-BASED SIDE CHANNEL ATTACKS

[Sharjeel Khan](#), Girish Mururu, and Santosh Pande.

[\[Paper\]](#)

## WORK EXPERIENCE

### GRADUATE RESEARCH ASSISTANT

**AUG 2018 – PRESENT**

GEORGIA INSTITUTE OF TECHNOLOGY

Atlanta, Georgia

- Working with Santosh Pande on using program analysis to improve software verification techniques or solve security issues within codebases.

### SOFTWARE ENGINEER INTERN

**MAY 2023 – AUG 2023**

GOOGLE

Mountain View, California

- Worked on Android LLVM team to add order file functionality to Android Open Source Project (AOSP) and the Native Development Kit (NDK)
- Created a soong build property for order files which can be used to recompile any binary or shared library in AOSP with order files
- Wrote scripts to create order files from profiles and validate them based on certain criteria
- Tested order file optimizations on libart and saw an average startup improvement of 0.59% in 11 Android applications with 2.19% startup improvement in Chrome
- Created an order file sample and an Android developer guide to explain the process for order files in external Android apps
- Created a merging algorithm for order files based on a graph representation

### PHD SOFTWARE ENGINEER INTERN

**MAY 2022 – AUG 2022**

META

Menlo Park, California

- Worked on the PoGo Stick team to improve profile-guided basic block optimizations
- Implemented four basic block hit count schemes into Meta's Android Bytecode Optimizer, Redex
- Added basic block hit count profiles into PoGo Stick's pipeline to better optimize basic blocks for performance

### 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 ENGINEER 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  
CS8803-008: Compilers - Theory and Practice  
CS6241: Compiler Design and Optimizations  
CS4240: Compilers & Interpreters

Aug 2023 - Dec 2023  
Jan 2020 - May 2020  
Aug 2019 - Dec 2019

### 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

## PROFESSIONAL ACTIVITIES

### INSTITUTIONAL ACTIVITIES

GEORGIA INSTITUTE OF TECHNOLOGY  
SCS Graduate Student Association President  
SCS Graduate Student Association Treasurer  
Grad Group Leader  
SCS PhD Visit Day Volunteer  
HackGT Mentor

May 2022 - Apr 2023  
Jan 2021 - Apr 2022  
Aug 2019 - Dec 2023  
Feb 2019 - Present  
Nov 2018, Nov 2019

CARNEGIE MELLON UNIVERSITY  
Head Orientation Counselor  
Orientation Counselor  
Student Academic Committee

Mar 2016 - Aug 2016  
Aug 2014, Aug 2015  
Jan 2016 - May 2016

## AWARDS/HONORS

### INTERNAL AWARDS

CARNEGIE MELLON UNIVERSITY  
Undergraduate Teaching in Computer Science Appreciation Award  
Senior Student Leadership Award

May 2015, May 2017  
May 2017

### EXTERNAL AWARDS

CARNEGIEAPPS HACKATHON  
EAA Award for Humanitarian Technology  
Best Technical Application

Jan 2017  
Jan 2015

## 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



## REFERENCES

### SANTOSH PANDE (ADVISOR)

PROFESSOR, GEORGIA INSTITUTE OF TECHNOLOGY  
santosh.pande@cc.gatech.edu

### ADITIYA KUMAR

SOFTWARE ENGINEER, GOOGLE  
appujee@google.com

### ANDREAS GAMPE

SOFTWARE ENGINEER, META  
agampe@fb.com

### GISELLE REIS

ASSISTANT TEACHING PROFESSOR, CARNEGIE MELLON UNIVERSITY  
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### ILIANO CERVESATO

TEACHING PROFESSOR, CARNEGIE MELLON UNIVERSITY  
iliano@cmu.edu