

# Muhammad **Osama** Sakhi

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## Education

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### Georgia Institute of Technology

Atlanta, Georgia

MASTER OF SCIENCE IN COMPUTATIONAL SCIENCE & ENGINEERING

Aug 2017 - Dec 2019

- **GPA:** 3.90
- **Coursework:** Computer Vision, Learning with Limited Supervision, Computational Data Analysis, Numerical Linear Algebra, Machine Learning for Trading, Modeling & Simulation, Algorithms, Computational Chemistry, Quantum Mechanics

### Georgia Institute of Technology

Atlanta, Georgia

BACHELOR OF SCIENCE IN COMPUTER SCIENCE

Aug 2013 - May 2017

- **GPA:** 3.86
- **Concentrations:** Devices & Intelligence
- **Coursework:** Machine Learning, Natural Language Processing, Artificial Intelligence, Design and Analysis of Algorithms, Robotics & Perception, Systems & Networks, Digital Design Lab, Prototyping Intelligent Appliances

## Skills

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<b>Artificial Intelligence</b>	Graph Search Algorithms, Probabilistic Inference, Particle Filtering, Markov Decision Processes
<b>Machine Learning</b>	Deep Learning, Q-Learning, Self-supervised Learning, Object Detection, Image Classification
<b>Programming</b>	Python, C, C++, SQL, Java, Golang, JavaScript, HTML, MATLAB
<b>Frameworks</b>	PyTorch, Scikit-Learn, Pandas, OpenCV, SimPy, Spark
<b>Other</b>	AWS, GCP, Docker, Kubernetes, REST APIs, LaTeX

## Research

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### The REDUCE Project

Dr. Munmun De Choudhury

GT SOCIAL DYNAMICS & WELLBEING LAB

Jul 2019 - Present

- Created language model embeddings for social media data to feed into time-series model to forecast weekly suicide attempts
- Trained regression model using language features from millions of Tweets to serve as one learner in final ensemble approach
- Collaborating with teammates to determine additional time-series streams that may aid in the forecasting problem

### Cross Domain Context Prediction for Sketch-Based Image Retrieval

Research Project

GROUP LEAD

Sep 2019 - Dec 2019

- Extended Carl Doersch's self-supervised context prediction approach to visual representation learning by predicting relative direction of patches from aligned images in two different domains
- Researched related works, defined problem statement, and designed evaluation metrics to compare performance of our models against benchmark results for sketch-based image retrieval
- Implemented Doersch's AlexNet inspired network architecture and performing ablation studies to compare how using varying levels of ImageNet pre-training affects overall model performance on sketch-based image retrieval
- Presented findings and methodology to other graduate students with backgrounds in Deep Learning and Computer Vision

### Facebook SUMO Challenge

Dr. Zhile Ren

RESEARCH ASSISTANT

Sep 2018 - Mar 2019

- Trained a Faster-R-CNN network on 360 Degree RGB-D images to localize bounding boxes in 2D
- Recovered 3D bounding box predictions from 2D object detections using a variety of heuristics for 100+ categories to place 2nd in SUMO Challenge
- Began extension of deformable convolutions for 3D voxel inputs
- Contributed to baseline methods for SUMO dataset paper with collaborators from Stanford and Princeton. Paper is on-hold pending resolution of legal disputes on the curation of the dataset by Facebook

### Computing Betweenness Centrality

Dr. Oded Green

HIGH PERFORMANCE COMPUTING LAB

Aug 2016 - May 2017

- Ported algorithm for computation of betweenness centrality on dynamic graphs onto NVIDIA GPUs using cuStinger framework

## Experience

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## Georgia Institute of Technology

Atlanta, Georgia

HEAD TEACHING ASSISTANT FOR INTRO. TO ARTIFICIAL INTELLIGENCE

Aug 2019 - Dec 2019

- Managed a team of 17 Teaching Assistants responsible for all grading and projects for 450 undergraduate students
- Developed entirely new mass auto-grader system with built-in plagiarism detector to reduce grading time for each TA by 85%
- Created extensive new review guides for all core course concepts: Graph Search Algorithms, Reinforcement Learning, Probabilistic Inference, Neural Networks, and Decision Trees
- Served as guest lecturer on Particle Filtering for a class section with 300 students
- Organized and lead review sessions with co-TAs to better prepare students for exams and projects

## The Home Depot

Smyrna, Georgia

COMPUTER VISION INTERN

May 2019 - Aug 2019

- Fine-tuned 20+ models to extract fine-grained features from furniture images to enable training of a generative model that could produce aesthetically compatible furniture collections
- Developed a reusable framework for quickly aggregating images from the various data sources, performing data cleanup and augmentations, fine-tuning ResNet/VGG models, and evaluating using F1 scores and confusion matrices

## DukeTIP

Houston & Atlanta

INSTRUCTOR

Jun 2018 - Jul 2018

- Taught a total of 40 students for four weeks across two courses: Modern Programming and Artificial Intelligence
- Designed syllabi, conducted parent-teacher conferences and crafted assignments spanning five core topics: Fundamentals of Python Programming, Web Development, Graph Search Algorithms, Machine Learning, and Natural Language Processing

## Pindrop

Atlanta, Georgia

SOFTWARE ENGINEER

Jun 2017 - Jun 2018

- Automated a data collection task that consumes 90 days' worth of data for researchers to create adaptive fraud detection models
- Optimized memory consumption for a new service to use 75% less memory than previous implementations
- Created new framework for continuous deployment of fraud detection models to production systems
- Migrated database records from Postgres to Redis and used custom key-value encoding to optimize lookup times

## Georgia Institute of Technology

Atlanta, Georgia

TA FOR INTRO. TO ARTIFICIAL INTELLIGENCE

Fall 2016, Spring 2019

- Lead review sessions to help students better understand course concepts in preparation for projects and exams
- Graded coursework, proctored exams, held weekly office hours to ensure students understood course material and projects

## Pindrop

Atlanta, Georgia

SOFTWARE ENGINEERING INTERN

May 2016 - Aug 2016

- Designed database performance experiment to help determine which relational database scaled appropriately for the expected load of 1 million requests/day
- Helped re-architect existing monolithic back-end API server with smaller, independent micro-services

## The Home Depot

Atlanta, Georgia

RESEARCH & DEVELOPMENT INTERN

Mar 2015 - Aug 2015

- Designed path planning algorithm for semi-autonomous floor cleaning bot to traverse store aisles
- Utilized Computer Vision and Optical Character Recognition libraries to scrape Driver's License information from images
- Created handwriting recognition Android app to allow for quicker product searches and checkout
- Developed a walkie-talkie Android application that communicates using WebSockets to relay audio messages in real time

## BitPay

Atlanta, Georgia

SOFTWARE ENGINEERING INTERN

May 2014 - Aug 2014

- Integrated analytics system throughout BitPay application to monitor site responsiveness and activity for 35,000 merchants
- Designed database schemas and executable utilities to enable automated daily financial settlements of \$1M to merchants

## Standard Code

Atlanta, Georgia

WEB DEVELOPER INTERN

Oct 2013 - May 2014

- Developed internal project milestone management platform using MySQL and Ruby on Rails

## Projects

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### The Humor Genome Project

Dr. Lew Lefton

DATABASE TEAM LEAD

Aug 2015 - Dec 2015

- Developed web application that crawls Reddit pages for jokes and recommends jokes for users to view and rate
- Created database schemas for jokes and reviews to enable future linguistic exploration of jokes

## Presentations

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## Generative Adversarial Network Paper Discussion

Atlanta, Georgia

DISCUSSION LEAD

Sep 2019

- Reflected on the strengths of the GAN paper by Ian Goodfellow to contrast a colleague who presented on the weaknesses of the paper
- Presented the concept of GANs and the intuitions that went into its development to an audience of 50 graduate students

## TEDxGeorgiaTech Spring Conference

Atlanta, Georgia

FINALIST STUDENT SPEAKER

Apr 2019

- Chosen as the sole GT student to return as a speaker for April 2019 Conference in front of an audience of 400

## TEDxGeorgiaTech Fall Speaker's Salon

Atlanta, Georgia

STUDENT SPEAKER

Nov 2018

- Selected among 70 applicants to deliver a TED talk in front of a crowd of 200 students
- Presented on the importance of mentorship and on inspiring students to find their passions

## Extracurriculars

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### TEDxGeorgiaTech

Atlanta, Georgia

STUDENT SPEAKER, PANEL MODERATOR

Sep 2018 - Nov 2019

- Selected among a crowded field of candidates to delivered TEDx talks twice in front of crowds of over 250 TEDxGeorgiaTech conference attendees
- Served as moderator for a panel of board members representing TEDxAtlanta, TEDxUGA and TEDxEmory discussing the challenges of hosting TEDx events

### Georgia Tech RoboJackets

Atlanta, Georgia

SOFTWARE TEAM

Sep 2015 - Feb 2016

- Utilized Arduino with Lego Bricktronics components to build simple robots that navigate without colliding into obstructions
- Developed firmware to interact with updated hardware for autonomous soccer-playing robots for International RoboCup competition

### Georgia Tech IEEE

Atlanta, Georgia

WEBMASTER

Aug 2014 - Apr 2015

- Developed completely new public site that allowed all officers to post updates using just Markdown

### Georgia Tech Student Government Association

Atlanta, Georgia

SUSTAINABILITY COMMITTEE MEMBER

Sep 2013 - May 2014

- Established sustainability reward system for club events across campus to promote green habits

### Startup Exchange

Atlanta, Georgia

MEMBER

Sep 2013 - May 2014

- Attended weekly meetings and learned about the challenges of running a startup, from ideation to funding to intellectual property to maintaining a user base

## Honors & Awards

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- 2019 **2nd Place**, Facebook SUMO Challenge 3D Object Detection Track
- 2017 **Highest Honors**, Georgia Institute of Technology Spring 2017 Graduation
- 2016 **Recipient**, Faculty Honors
- 2015 **Recipient**, Faculty Honors
- 2014 **Scholarship Recipient**, Asian & Pacific Islander American Scholarship Fund & Wells Fargo Scholarship