

Akash Garg

CONTACT INFORMATION

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PUBLICATIONS

Akash Garg and Anshuman Shukla, New Space Vector Modulation Approach For Multilevel Converters. 2014 IEEE International Conference on Power Electronics, Drives and Energy Systems (PEDES).

RESEARCH INTERESTS

Distributed Systems, Cloud Computing, Operating Systems, Virtualization, Networks in Systems

WORK EXPERIENCE

Samsung Electronics, Suwon, South Korea **September, 2017 - present**
At Samsung, I have been involved in all stages of development of a product from ideation to release of final product. I developed a secure hosted service integration model for our IOT ecosystem. It is a highly decentralized system which allows leveraging third party cloud providers for providing services and automations to IOT customers. I have also worked on automating and synchronizing the device integration service for third party devices.

EDUCATION

Indian Institute of Technology Bombay, Mumbai, India **2017**

- Bachelor of Technology in Computer Science with Honors and minor in Management
- Cumulative Performance Index (CPI) : **9.59 on a scale of 10**
- Department **Rank 5** out of 96 students

De'Saint Public School, Shamli, U.P India **2013**

- Intermediate/+2 with **92.2%**

S.G.R.R Public School, Dehradun, Uttarakhand India **2011**

- Matriculation with **CGPA 10.0 on a scale of 10**

ACHIEVEMENTS AND AWARDS

- Awarded the **Undergraduate Research Award** for R & D project by Dean Academic Programmes, IIT Bombay and was the only freshman to receive the same in 2013-14
- All India Rank **97 (Zone Rank 5)** among 0.15 million participants in *JEE-Advanced 2013*
- Scored **99.98 percentile** in *JEE Mains 2013* among 1.2 million participants
- Secured **10.0/10.0** GPA in 6th and 8th semester
- Awarded **Advance Performer (AP)** Grade (awarded to at most **1%** of the class for exceptional performance) in Operating Systems and System Security courses

RESEARCH EXPERIENCE

Thesis: Automated Security Analysis of Java Libraries **Autumn 2016**

Guide: Prof. Amey Karkare, Prof. Amitabh Sanyal

The aim of the project was to develop scalable and automated solution for detecting security loop-holes in java libraries. I studied the existing models of taint analysis and confidentiality analysis. I also studied about shape analysis of heap directed pointers. Finally we proposed new rules for context insensitive flow sensitive heap analysis and function summary generation which could scale to large programs. We implemented the rules in datalog. The framework can be used for both taint analysis and confidentiality.

SVM for multi-level converter **Spring 2014**

Guide: Prof. A. Shukla

In this project I studied the state of the art SVM algorithms for controlling pulse width modulation

in multilevel converter. I designed a new SVM based algorithm for multilevel converters reducing runtime calculation load and simulated the behaviour of converter with the new algorithm in Matlab. Our work was **presented at IEEE PEDES 2014 conference**.

INTERNSHIP
EXPERIENCE

Modeling E-voting Protocols **Summer 2015**

Guide: Dr. Steve Kremer, Inria, France

The aim of the project was to model and formally verify Helios and Civitas e-voting protocols in Fstar. Initially I studied Fstar and its typing system and refinement types. Then I studied the Helios and Civitas e-voting protocols in full detail and modeled them in Fstar.

In the process we discovered that the runtime complexity of the implementation model for Civitas was impractical for large scale elections. I designed a new method of implementation with changes in encryption mechanism and Zero Knowledge Proofs which **improved runtime complexity from $O(n^2)$ to $O(n \log n)$** .

OCF rule engine and Service Integration **Summer 2016**

Guide: Mr. Sampath Kumar, Samsung Electronics, South Korea

During this internship I studied about communication ecosystem in IOT domain, device representation and execution model. I designed a new learning based rule execution model and implemented it on Tizen. I also developed a service framework and plugin for runtime integration of service apps into Tizen IOT system.

Global Alpha Researcher **Summer 2017**

Trexquant Investment LLP

The aim of the project was to develop new trading algorithms using machine learning. I studied several alphas and their effects on trading strategy and developed a strategy which had 4 times better correlation than standard result obtained from those alphas.

TEST SCORES

- GRE:- Quantitative: 170/170, Verbal: 160/170, Writing: 4.0/6.0
- TOEFL:- Reading: 28/30, Listening: 29/30, Speaking 27/30, Writing 27/30

KEY ACADEMIC
PROJECTS

Distributed Database Management System **Spring 2017**

Guide: Prof. Umesh Bellur

In this project I studied about distributed databases and designed & implemented a distributed key-value store scalable to millions of machines. It was implemented with several features like dynamic key re-distribution, fault tolerance and load balancing with strict consistency.

Compiler for C-Like Language **Spring 2016**

Guide: Prof. Amitabh Sanyal

The goal of the project was to understand the entire process of compilation of a program from parsing to final assembly code generation. I developed a compiler for a C-Like language from scratch which first does lexical analysis of the program and then does syntax checking and generates Abstract Syntax Tree in a pictorial format. Finally it generates assembly code for MIPS architecture with optimizations like short circuit evaluation.

Gotweet **Autumn 2015**

Guide: Prof. N. L. Sarda

I implemented a prototype of twitter with features like tweeting, following/unfollowing people, personal messages, likes, comments etc. I studied about the issues faced while handling millions of users and several implementation models.

Parametric Reshaping of Human Body **Spring 2017**

Guide: Prof. Siddhartha Chaudhari

I developed a machine learning model which learned the effects of weight and height on human body shape. The model could generate possible triangulated mesh of the person on changing weight, height etc.

Django Web Application

Autumn 2014

Guide: Prof. S. Chandran

I developed a portal where students can fill their preferences for seats in colleges. The frontend webserver was implemented in django and backend was implemented in java for allocating seats using Gale-Shapely algorithm.

POSITIONS OF RESPONSIBILITY

Teaching Assistant for CS207 Discrete Structures

Autumn 2015

Tutor for 2nd Year undergraduates. Duties included solving theory doubts, conducting tutorials and grading examination papers.

Teaching Assistant for CS101x Computer Programming & Utilization

Autumn 2014

Tutor for online offering of the course. Duties included answering doubts, making tutorial sheets and lecture slides.

SKILLS

- C++, Python, Java, Javascript, HTML5, GO, SQL
- Tensorflow, Shell scripting, Fstar, Prolog

REFERENCES

- **Dr. JooHwan Kim**(Supervisor)
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- **Prof. Amey Karkare**(Thesis Guide)
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- **Dr. Steve Kremer**(Summer Internship Mentor)
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- **Prof. Siddhartha Chaudhari**(Course Instructor)
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