

Shambhavi Singh

2nd Year Graduate Student
Department of Computer Science
University of British Columbia, Okanagan

E-mail: shambhavi.singh@alumni.ubc.ca
Contact: +1-7785837089

EDUCATION

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| University of British Columbia, Okanagan <i>M.Sc in Computer Science</i> <ul style="list-style-type: none">Average of 95.6% | 2019 (expected) |
| Indian Institute of Technology, Kanpur <i>B.S. in Mathematics & Scientific Computing minor in English Lit.</i> <ul style="list-style-type: none">Cumulative Performance Index (CPI) of 8.9 (on a scale of 10) | 2017 |
| Gyan Bharati School, Saket <i>All India Senior Secondary Certificate Examination (AISSCE)</i> <ul style="list-style-type: none">Scored 93.6% marks in AISSCE | 2013 |
| <i>All India Senior Certificate Examination (AISCE)</i> <ul style="list-style-type: none">Scored a CGPA of 9 (on a scale of 10) in AISCE | 2011 |

MAJOR SCHOLASTIC ACHIEVEMENTS

- Recipient of **MITACS Graduate Scholarship** for pursuing graduate studies in Canada
- Selected by **MITACS** from among 10000 students for a Research Internship in Canada
- Selected for an 8-week **Research Internship** at ISI, Bangalore by the Indian Academy of Sciences in 2015
- Awarded **Bhagwan Das Sanghi Memorial Scholarship** to sophomore girl with highest GPA in Mathematics
- Received **Academic Excellence Award** for distinctive performance in the term 2013-14 awarded to **top 7%** students in the institute
- Awarded **Outstanding Freshman** of 2013 by the Student Gymkhana, IIT Kanpur for all-round performance
- Awarded the **Inspire Scholarship** for securing rank under 10000 in JEE
- Secure **All India Rank 1995** amongst 126,749 students in **JEE Advanced** 2013
- Amongst **top 1%** out of 1.4 million students who appeared for **JEE Mains** 2013
- Awarded **Outstanding All Round Performance Award** for the years 2002, '03, '04 & '07 in Gyan Bharati School

RESEARCH INTERESTS

Convex Optimization, Convex Analysis

KEY ACADEMIC PROJECTS

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| SYMBOLIC FENCHEL CONJUGATION Supervisor: Yves Lucet, University of British Columbia, Okanagan <ul style="list-style-type: none"><Details> | Sep '18- Nov '18 |
| UNIFORM SIMPLEXES IN \mathbb{R}^n Instructor: Warren Hare, University of British Columbia, Okanagan <ul style="list-style-type: none"><Details> | Sep '18- Oct '18 |
| SYMBOLIC FENCHEL CONJUGATION Supervisor: Yves Lucet, University of British Columbia, Okanagan <ul style="list-style-type: none"><Details> | May '18- Jul '18 |
| COMPUTER AIDED CONVEX ANALYSIS Mentor: Yves Lucet, University of British Columbia, Okanagan <ul style="list-style-type: none">Worked on the Computational Convex Analysis Toolbox of SciLab, in an attempt to expand the functionsUsed the pre-existing functions on the piecewise linear quadratic functions (PLQ) to create a user interface | May '16- Jul '16 |

- Designed User Interface to help eased graphical input of a PLQ function in one variable along with a brief overview of the different envelopes and duals of the function, such as Moreau Envelope, Legendre Fenchel Transform
- Incorporated Data Structure suggested in a previous thesis for storing Piecewise Linear Quadratic functions in 2 variables to attempt construction of a similar user interface in 2D

ANALYTICAL APPROACH TO NUMBER THEORY

Jan '16- Apr '16

Mentor: Somnath Jha, Indian Institute of Technology, Kanpur

- Reviewed literature on Analytical Number Theory by Tom M Apostol
- Studied elementary analytic functions and the proof of the divergence of the sum of $1/p$ where p is a prime
- Covered Dirichlet's Theorem on Primes in an Arithmetic Progression using Dirichlet characters and L series near 1
- Discovered consequences of the same- such as the uniform distribution of primes in the classes of mod n
- Studied properties of the Riemann Zeta functions and Dirichlet L series to prove the prime number theorem

SIMULTANEOUS TRIANGULARIZATION

Jul '15- Nov '15

Mentor: Dr. Sasmita Patnaik, Indian Institute of Technology, Kanpur

- Conducted Literature Review on Simultaneously Triangularizable Operators
- Dealt with criteria a set of operators would satisfy so as to be triangularizable, gradually making the set specific
- Proof of Burnside's Theorem, which deals with triangularizability on satisfaction of a given property was discussed
- Consequences on Algebras and Radicals were studied by thoroughly going through several Lemmas and Theorems

RESEARCH ON OPERATOR THEORY

May '15- Jul '15

Mentor: Professor B.V Rajarama Bhat, Indian Statistical Institute, Bangalore

- Applied Spectral Theorem and Jordan Canonical Transformations to come up with an expression for the n^{th} term of a recurrence relation. Covered cases in 2 and 3 term relations (for different eigenvalue cases)
- Generalized same-eigenvalue case for r term recurrence relation
- Discovered alternate ways to compute power of matrices (inverse of $(I-tA)$ method)
- Reviewed literature on Integrators of matrices and proved nilpotency of an operator
- Attempted finding invariant subspaces of the given space for the operator

RELEVANT COURSES

GRADUATE

Convex Optimization
Numerical Optimization
Derivative Free Optimization

Advanced Algorithms
Introduction to Statistics Using R
Introduction to Machine Learning

UNDERGRADUATE

Linear Algebra and Differential calculus
Abstract Algebra
Algebra-II (Galois Theory)

Topology
Algebraic Topology

Introduction to Mathematical Analysis
Real Analysis
Complex Analysis
Analysis-II (Measure Theory)
Functional Analysis
Operator Theory
Several Variable Calculus
Several Complex Variables
Introduction to Fourier Series

Fluid Mechanics
Differential Geometry
Mathematical Modelling
Probability and Statistics
Ordinary Differential Equations
Partial Differential Equations
Principles of Numerical Computations

Introduction to Computing
Data Structures and Algorithms
Mathematical Logic
Theory of Computation

TECHNICAL SKILLS

- **Programming Languages:** C, C++, Java, Python
- **Other Tools:** LaTeX, SciLab, Matlab, Maple

EXTRA-CURRICULAR ACTIVITIES

Sports

- Achievements
 - Won **Gold Medal with a new record** in 4*100m relay in Inter IIT Sports Meet 2014
 - Won **Silver medal** in 4*400m relay in Inter IIT Sports Meet 2014
 - Won **Bronze Medal** in 800m in Udghosh 2014, the inter-college sports festival of IIT Kanpur
 - Won **Gold Medals** in 4*100m relay and 4*400m relay in Udghosh 2014 as well as Udghosh 2015
 - Secured **First position in Duathlon** in 2014
- Contributor to the **IIT Kanpur Sports Blog**

Active member of the Music Club:

- **1st Runners-up** in '**Junoon**' during Antaragni '16- a competition held among eastern music bands of the country
- Participated and helped in conduction 6 **Musical Extravaganzas** and 2 **Acoustic Nights**- events organized by the Music Club every year
- Performed songs along with other club members during **Orientation Programme** of the 2014 and 2015 batch, **Founder's day**, 35th Reunion (Class of 1980) and National Holidays (Republic Day and Independence Day)
- Represented IIT Kanpur in '**Unplugged**' during Antaragni '14 & '15- an acoustic music competition among colleges
- Used software like Massive and Ableton to synthesize sounds on the computer

Technical Events

- Competed in **IOPC** during Tekhkriti '14 against international teams & secured a position in the **top 200**
- Designed a **Windows 8 app** in **Code.Fun.Do** '14 organized by Microsoft. Awarded a **certificate of appreciation**

POSITIONS OF RESPONSIBILITY

Vice-Captain, Girl's Athletics Team

2014-16

- Responsible for managing a team of 40+ members
- Assisted the organization of Athletics events in Udghosh '13 & '14- the inter college sports festival of IIT Kanpur
- Won overall championship (Men) and (Women) in Udghosh '13 & '14 and Inter-IIT '13 & '14

Coordinator, Music Club

2015-16

- Responsible for managing the finances of the club and assisting smooth functioning of club
- Helped organize workshops for beginners to learn music
- Conducted Musical Extravaganzas and helped smooth conduction of Music Events in Antaragni

Academic Mentor (Introduction to Computing)

2014-15

- Assigned the responsibility of tutoring academically deficient students by the Counselling Service, IIT Kanpur
- Organized sessions for students to clear their doubts in the assigned subject (Fundamentals of computing)
- Ensured access to study material for students by regularly providing sources and previous years' material