Sankalp Gambhir
sgambhir@iitb.ac.in
Indian Institute of Technology Bombay

academics

Examination	University	Institute	Year	CPI/%
Graduation	IIT Bombay	IIT Bombay	2022	9.21
Intermediate/+2	CBSE	Remal Public School, Delhi	2018	96.40
Matriculation	CBSE	Indraprastha World School, Delhi	2016	10.0

Majoring in Engineering Physics, pursuing minor degrees in Computer Science and Mathematics.

key projects

Ardio - Model for realtime audio processing on low power embedded systems — Fall 2020

Advisor: Prof. Pradeep Sarin, Department of Physics, IIT Bombay

Course Project, `https://github.com/sankalpgambhir/ardio`

- Developed an optimized Fourier Transform algorithm capable of working on low power devices such as an Arduino whilst retaining reasonable accuracy.
- Demonstrated frequency finding on live audio samples in near real-time on an Arduino Uno with less than 2KB RAM.

Petris - An FPGA based Tetris clone — Spring 2020

Advisor: Prof. Pradeep Sarin, Department of Physics, IIT Bombay

Course Project, `https://github.com/sankalpgambhir/petris`

- Designed and simulated the game of Tetris on an FPGA simulator. Used Verilog to make a state machine and created a C++ wrapper using SDL and OpenGL to handle display and I/O.
- Developed a VGA simulator using SDL2 to write the serial 'electronic' VGA output from the FPGA simulations into a low-level frame buffer.
- Developed an interface to pass keyboard presses on the computer to the FPGA via simulated electronic connections to allow for real-time input.

Logarithmic Order Long Binary Multiplication on TTL circuits — Spring 2019

Advisor: Prof. Mahesh B. Patil, Department of Electrical Engineering, IIT Bombay

Course Project

- Led a team of 3 to devise a shift-and-add cascade for efficient digital multiplication on TTL circuits.
- Utilised asynchronous modules to achieve logarithmic time performance.
- Achieved a scalable plug and play design to extend to larger systems.

seminars held

Eigenfunctions of Dirichlet Laplacians and Nodal Domains over Graphs — Fall 2019

Department of Mathematics, IIT Bombay

Advisor: Prof. Gopala K Srinivasan, Department of Mathematics, IIT Bombay

- Discussed spectral features of the Laplacian operator and the distribution of nodes relative to the spectrum, via variational principles and via optimisation of Rayleigh quotients over H^2 space.
- Discussed the multidimensional extension of Sturm's Oscillation and its application to discretized domains using graph Laplacians.

key courses

Computer Science	Logic for Computer Science, Automated Reasoning *, Concepts, Tools and Algorithms for Model Checking *
Mathematics	Coxeter Theory ‡*, Semigroup Theory *, Topics in Algebra 2 (Representation and Category Theory)*, Complex Analysis*, Ordinary Differential Equations*, Partial Differential Equations, Linear Algebra
Physics	Quantum Information and Computing ‡, Condensed Matter Physics ‡, Statistical Physics ‡, Quantum Mechanics 1 & 2, Photonics, Electromagnetism, Special Theory of Relativity, Classical Mechanics
Others	Analog Electronics, Analog Electronics Lab, Digital Electronics Lab, Microprocessor Lab, Data Analysis and Interpretation

‡. To be completed by May 2021 ∗. Graduate level course

technical skills

Languages	English (native), Hindi (native)
Programming	C++, C, Python, Bash/POSIX tools, Verilog
Packages	LaTeX, Z3, LLVM, Mathematica, AutoCAD, Solidworks

academic achievements

2018	Ranked in the *99.98th percentile* in JEE Main 2018 amongst over 1 million candidates.
2018	Ranked in the *99.7th percentile* in JEE Advanced 2018 amongst 200,000 candidates.
2018	Awarded *National Top 1%* certification in National Standard Examination in Physics.
2018	Awarded *National Top 1%* certification in National Standard Examination in Chemistry.
2016	Qualified for KVPY Fellowship from the Department of Science and Technology, India.

extracurricular involvement

Teaching Activities

- Teaching Assistant for 'CS228 - Logic in Computer Science' to a class of 147 students, under Prof. Ashutosh Gupta and Prof. Krishna Shankaranarayanan. Spring 2021

Social Involvement

- Recorded audiobooks for the blind as part of Voice of Purpose – NSS, IIT Bombay. Fall 2018
- Held classes in Physics for the JEE for underprivileged children; prepared study material and tests for the same, as a part of the Aarohan Winter Internship Program – NSS, IIT Delhi. Winter 2018
- Held basic English and computer classes, as part of the Computer Literacy Program – NSS, IIT Bombay. Spring 2019

Fine Arts

- Had four pieces of digital art on display at Vision 2019 – Design weekend of IIT Bombay.
- Had two pieces of digital art on display at Vision 2020 – Design weekend of IIT Bombay.