

# Sneha Bhakare

COMPUTER SCIENCE SENIOR YEAR UNDERGRADUATE · IIT BOMBAY

☎ (+91) 9168398368

| ✉ snehabhakare5@gmail.com

| 🏠 snehabhakare.github.io

| 📷 snehabhakare

## Education

### Indian Institute of Technology Bombay

July 2015 - Present

B.TECH. IN COMPUTER SCIENCE AND ENGINEERING

CPI - 7.01/10

- Conferred with Desai Sethi Scholarship rewarded to the Top 5 ranked girls in JEE Advanced

## Undergraduate Thesis

### Coherent Rendering for Augmented Reality

IIT Bombay

GUIDE: PROF. PARAG CHAUDHURI

Jul. 2018 - Present

- Explored probe-less methods to capture the light model of real environment from the RGB input images
- Synthesized a training dataset of known arbitrary object with systematic variation of illumination
- Trained a CNN to learn lighting and thus coherently render the virtual content with captured light model
- Investigating combinations of planes from the environment to use them effectively as a plausible lightprobe
- Integrating this photometric registration pipeline with an AR rendering application to render in a real environment

## Experience

### Automaton

Morgan Stanley

GUIDE: MR. PRAVIN PATIL

Summer 2018

- Designed & implemented an E2E testing framework for an Angular application using Protractor to ease testing
- Developed features to locate elements, perform actions & validate xmlhttprequests generated by the application
- Created a module to mock the responses of http services, micro-services to enable testing in a sandbox environment
- Generated detailed error report to log differences between expected and real attributes to aid debugging

### Monte Carlo Path Tracing Renderer

Web and Coding Club, IIT Bombay

GUIDE: MR. KUMAR AYUSH

Summer 2018

- Implemented a ray tracer able to handle point light sources and objects like sphere, cone and cylinder
- Implemented surface shading and recursive ray tracing algorithm to capture higher order light paths
- Building Monte Carlo path tracing system to achieve effects like soft shadows and color bleeding

### Platform Scope Validation & Config Parameter Audit

Edelweiss Finance and Investment Limited

GUIDE: MR. VINAY ISRANI

Winter 2017

- Developed applications in Java to automate validation process of trade orders and configuration files on daily basis
- Fetched files from multiple servers and validated them using validation algorithms designed by the functional team
- Automated the generation of analysis report and mailing it to intended recipients

### Order Trade Analytic Platform

Edelweiss Finance and Investment Limited

GUIDE: MR. ANAND MOHAN

Summer 2017

- Implemented C++ optimization techniques at design and implementation level to improve the time performance of Breach Report generation for 4 Order Trade Analytic platforms upto 50%
- Used parallel programming, memory mapping, limited exception handling and alternative libraries
- Analyzed efficiency of STL containers and relative costs of common programming operations

## Projects

### Content Based Image Retrieval

Digital Image Processing

GUIDE: PROF. SUYASH AWATE

Autumn 2018

- Generated texture distinctiveness map and thresholded with Otsu's method to extract highly distinctive image parts
- Extracted salient orientation histograms for Modified Harris for Edges and Corners keypoints using improved edge map
- Tested for image retrieval on THUR15000 and COREL10000 databases to achieve an average accuracy of 65% and 73% for top 20 retrieved images respectively

## 3D Graphical Modelling and Animation

Computer Graphics

GUIDE: PROF. PARAG CHAUDHURI

Autumn 2018

- Implemented hierarchical models of 3D characters using C++ OpenGL and texture mapped for surface detail
- Simulated point lights and used shading algorithms for lighting and shadows
- Implemented an interface to create and edit Bezier space curves by clicking control points, used it for camera animation
- Generated a short animation video by recording keyframes and interpolating between them

## Progressive Neural Networks for Multitask Learning

Foundation of Intelligent and Learning Agents

GUIDE: PROF. SHIVARAM KALYANAKRISHNAN

Autumn 2018

- Implemented Asynchronous Advantage Actor Critic network (A3C) on OpenAI Gym environments of Pong and Breakout
- Built Progressive Neural Networks on top of A3C to transfer knowledge gained from one task to another task
- Progressive Neural Networks agent trained first on Pong, then on Breakout achieved better scores than A3C agent for Pong and A3C agent for Breakout

## Flappy Bird AI

Machine Learning

GUIDE: PROF. AMIT SETHI

Spring 2018

- Trained an environment agnostic bot using simple Q-learning & DQN approaches to achieve superhuman results
- Ensured faster convergence for Q-learning by implementing  $\epsilon$ -greedy policy & experience replay strategy
- Implemented convolutional neural network (CNN) using Keras to model the deep Q-learning bot

## Intelligent Pacman Agent

Artificial Intelligence

GUIDE: PROF. SHIVARAM KALYANAKRISHNAN

Spring 2018

- Developed search agents in Pacman using A\* search for finding treats, used Expectimax and Minimax algorithms with alpha-beta pruning for hunting ghosts
- Implemented Particle Filters and Belief networks to infer ghost positions from noisy estimates

## Compiler for Subset of C

Programming Languages

PROF. UDAY KHEDKAR

Spring 2018

- Developed a compiler for a C-like language in python, for MIPS instruction set architecture
- Supported major functionalities like function calls with recursion, if-else statements, loops and arithmetic expressions
- Enhanced the compiler design to generate abstract syntax trees, control flow graphs, symbol tables, assembly code

## FoodEx App

DBMS

GUIDE: PROF. S.SUDARSHAN

Autumn 2017

- Developed an android application for students and canteen/food hub owners to order and deliver food
- Designed an Entity-Relationship model to represent the temporal data of online food order system
- Implemented servlets using JDBC API and PostgreSQL database to support features like registering a food hub, displaying menu, placing order, tracking order status, giving ratings and feedback to dishes, generating bills

## Chat Simulator

Computer Networks

GUIDE: PROF. VARSHA APTE

Spring 2016

- Developed a client-server based multi-threaded chat application using socket programming in C & posix threads
- Created a platform to support authentication and store the authenticated user in mutex locked text file
- Provided a terminal based chat interface with features like login, logout, displaying list of friends online and offline, checking last seen, sending and accepting friend request, creating groups, online as well as offline messaging etc.

## Achievements

- 2015** Secured All India Girls Rank **3** and All India Rank **115** in JEE Advanced out of **150,000** candidates
- 2015** Scored **99.9** percentile in JEE Main B.Tech out of **1.3** million candidates
- 2011** Received the prestigious **NTSE** (National Talent Search Examination) Scholarship conducted by NCERT

## Skills

- Comfortable** C/C++, Python, Java, Android, HTML, CSS, JavaScript, Protractor
- Familiar** Django, Bash, MySQL, SQLite, VHDL, Angular
- Software/Tools** PyTorch, MATLAB, Octave, OpenGL, Git,  $\text{\LaTeX}$ , Inkscape

## Positions of Responsibility

---

### Institute Photography and Fine Arts Secretary

*IIT Bombay*

ELECTED REPRESENTATIVE OF 10K+ STUDENTS

*Apr. 2017 - Mar. 2018*

- Led a 2 tier-team of 7 conveners, 25 hostel secretaries, 17 councillors and micro-managed a budget of 0.15M
- Revamped the structure of an intra-hostel General Championship to promote creativity and originality
- Expanded the photography coverage team to ensure quality coverage of major events in institute
- Ideated and finalised the curriculum of NSO Fine Arts, a part of Undergraduate freshmen academics
- Introduced the culture of speed painting, string art and promoted 3D installations and event photography

### Teaching Assistant

*Computer Programming and Utilization*

COURSE INSTRUCTOR: PROF. OM DAMANI

*Autumn 2018*

- Responsible for assisting students to understand concepts of programming via weekly help sessions on C++
- Involved in creating programming lab assignments and formulating theoretical examination questions