EDUCATION

2023 IIT Kanpur, CPI - 9.66/10
- MS(R), Cognitive Science

2021 IIT Bombay, CPI - 8.57/10
- BTech, Computer Science

2017 Anglo Urdu Boy's High School, 89.85%
- Class 12th, Maharashtra HSC

Name: Shubhamkar Bajrang Ayare
Gender: Male
DOB: 09 MAY 1999

Github: 49 followers, 75 repositories
stackoverflow: 546 reputation
AskUbuntu: 171 reputation

KEY PROJECTs

Computational Modeling of Multiple Object Tracking in humans 2022-ongoing

Prof. Nisheeth Srivastava *MS Thesis*

Work to be presented in CogSci Conference (2023) in Sydney, Australia

- Used **Python** and **Common Lisp** to implement a computational model of Multiple Object Tracking in humans
- Accounted for previously known patterns of tracking performance in literature without making an apriori commitment to ID performance, and provided **an in-principle answer to an open question since 2004**
- Developed a **heuristic for ID performance** and obtained the empirical pattern of tracking vs ID performance

Numerical Computing Library: dense-numericals Spring 2021

Prof. Shivasubramanian Gopalakrishnan (Course Project) *High Performance Scientific Computing*

- Implemented **C** functions to efficiently operate on **strided representations of vectors** using **SIMD operations including transcendental functions** like sin, cos, tan provided by **sleef** and **intel intrinsics**
- Used foreign function interface to access these from Common Lisp to operate on multidimensional strided arrays
- Obtained **performance comparable to numpy** and **torch** using **lparallel** for comparing with torch

Star 24 **py4cl2-cffi – python libraries for common lisp** June 2019 – present

- Used **Python C-API** to provide a foreign function interface to call python functions from common lisp
- Handled **reference counting** in conjunction with **finalizers** to eliminate memory leaks
- Enabled **asynchronous output** through a combination of **multithreading, named pipes** and **locks**

BodhiTree Django Migration (under Prof. Kameswari Chebrolu) Spring 2020

- Worked on an ongoing effort towards migrating a **40k LoC codebase** from **Django** 1 to 2, and python 2 to 3, qualifying url names by namespaces, removing deprecated functions, and managing the semantic change of strings
- Used **magit, grep** and **find** to aid code merges that arose with the parallel development of the main branch

Star 45 **polymorphic-functions – type-based dispatch functions** September 2020 – present

- Provided **polymorphic-functions** and **polymorphs** for dispatching on specialized array types in Common Lisp
- Made available **adhoc** and **subtype** with support for optional and keyword argument dispatch
- Implemented zero-runtime-cost **static** and **inline** dispatch possible portably using **cl-form-types**
- Used **compiler-macros** to provide relevant user-oriented messages for **compile time optimization help**

Analysis of Bakery Algorithm using nuSMV Spring 2021

Prof. Ashutosh Gupta *Analysis of Concurrent Programs*

- Implemented **n-threaded** Lamport's Bakery Protocol in nuSMV to study simultaneous access of critical section
- Checked **safety** & **liveness** for 2, 3 and 4 threads; studied various sections of the algorithm by introducing bugs

OTHER PROJECTS

KnowTNet – a collection of best useful links from the internet December 2019

- Used hunchentoot, parenscript, clsql (ORM), cl-markup to implement the **full stack**
- Used **argon2** to hash passwords in a **GPU & ASIC resistant manner**; provided abilities for **persistent login**
- Also implemented a reduced feature version of the website using **JAMStack** using **local storage** and **React**

Tangram Solver using CSP Spring 2021

Prof. Shivaram Kalyanakrishnan *RnD Project Course*

- Collaborated in a **team of two** to formulate Tangram Solving as a **Constraint Satisfaction Problem**
- Used **opencv** to obtain contours from noisy grayscale tangram images for use in further stages of processing
- Solved **77% of the 78 trangrams in at most 1 second** by employing **heuristics** in the split-search procedure

Secure Personal Cloud Autumn 2018

Prof. Soumen Chakrabarti (course project) *Software Systems Lab*

- Developed an encrypted cloud storage with client-only keys stayed to provide true data privacy using **Django**
- Used **node.js**, and **browserify** to implement decryption on the webclient using **CryptoJS** library.
- Used the bash tools – **curl, inotifywait** to create a linux-client, with **single-client livesync** capabilities

Adversarial Attacks on Graphs Autumn 2020

Prof. Abir De (Course Project) *Learning with Graphs*

- Compared link-prediction algorithms such as **Adamic Adar, Katz** against adversarial attacks like **Closed Triad Removal, Open Triad Creation** using common evaluation metric like **mean average precision (MAP)**
- **Identified a recurring problem** in attack algorithms wherein targeting the similarity score not affecting MAP

Conditional Random Field for Named Entity Recognition Spring 2020

Prof. Soumen Chakrabarti (Course Project) *Organization of Web Information*

- Implemented **inferencing** to obtain the best label sequences corresponding to the **named entities**
- Using **softmax**, attempted to improve **macro averaged F1 score** by introducing an auxiliary loss term

3D Tic Tac Toe Spring 2018

Prof. Amitabha Sanyal (course project) *Abstractions and Paradigms of Programming*

- **Encapsulated** and **abstracted the board** using **object oriented programming**
- Used **higher ordered functions** to implement a function to determine whether the current state is a win.
- Implemented **minimax algorithm** as the AI agent in the game.

Contention Resolution and Switching Spring 2019

Prof. Ashwin Gumaste (course project) *Digital Logic Design*

- Implemented Contention Resolution and Switching module of a router in VHDL using Xilinx ISE
- Created and implemented state diagrams for reading and writing data to FIFO based **Virtual Output Queues**
- Used Separate Virtual Output Queues for each input port to avoid head of line blocking
- Implemented **round-robin** based state diagrams for **Arbiter** for scheduling while accounting for **express ports**

Android Development Summer 2019

- Added a **tablet mode** to the android app **bVNC** (a VNC viewer application), using **onTouchEvent**, to provide simultaneous support for **single finger scroll**, **long tap and drag** to select and **long tap** to right click
- Added **unicode math symbols** and **del** key to the open source android app **Hacker's Keyboard**

ACADEMIC ACHIEVEMENTS

- Within national **top 1%** in **Cognitive Science Joint Entrance Test (COGJET)** (2021)
- Selected for **Chennai Mathematical Institute**'s B. Sc. (Honours) Mathematics Course (2017)
- Secured AIR 700 amongst 2 lakh candidates in JEE (Advanced) (2017)
- Secured AIR 1120 amongst 1.2 million candidates in JEE (Mains) (2017)
- Within national **top 1%** in **National Standard Examination in Physics** (2017)
- Selected for the award of scholarship in **National Talent Search Examination** (2015)
- Selected for the award of scholarship in **Kishore Vaigyanik Protsahan Yojana** (2015)

KEY COURSES

System & Softwares	Software Systems Lab, Design & Analysis of Algorithms, Analysis of Concurrent Programs, Operating Systems, Foundations of Network Security & Cryptography, Computer Architecture
Machine Learning	Data Analysis & Interpretation, Learning with Graphs, Organization of Web Information, Artificial Intelligence & Machine Learning, Foundations of Intelligent & Learning Agents

OTHERS

- Teaching Assistant for a Programming Course at the Cognitive Science Department (2022)
- Flashed my android with RAM Manager for Magisk to **fix aggressive app killing** (2019)
- Created a repository of free **JEE Advanced Unsolved papers** – solved are available everywhere (2017-19)
- Under National Social Service scheme: (2017-18)
  - **taught underprivileged kids** at an NGO (LCCWA)
  - **recorded hindi news audio books** as part of IIT Bombay's Voice for Purpose
- Studied **myopia** to understand its cause and methods of prevention / cure (2017)