

EDUCATION	
2023 IIT Kanpur, CPI - 9.66/10 <ul style="list-style-type: none">MS(R), Cognitive Science	Name: Shubhamkar Bajrang Ayare Gender: Male DOB: 09 MAY 1999
2021 IIT Bombay, CPI - 8.57/10 <ul style="list-style-type: none">BTech, Computer Science	
2017 Anglo Urdu Boy's High School, 89.85% <ul style="list-style-type: none">Class 12th, Maharashtra HSC	

RESEARCH EXPERIENCE	
Non-indexed based Computational Model of Multiple Object Tracking in humans <i>Prof. Nisheeth Srivastava</i> <i>Work presented as a 15-minute talk in Cognitive Science Conference (2023) in Sydney, Australia</i> <ul style="list-style-type: none">Developed an index-less model of Multiple Object Tracking by using two retinotopic mapsAccounted for previously known patterns of tracking performance in literature without making an apriori commitment to ID performance, and provided an in-principle answer to a question open since 2004Developed a heuristic for ID performance and obtained the empirical pattern of tracking vs ID performance	2022-ongoing <i>MS Thesis</i>
Investigating the disruption of Same-Object Advantage <i>Prof. Devpriya Kumar (self-study course project)</i> <ul style="list-style-type: none">Performed a power analysis and designed an experiment to tease apart whether the disappearance of same-object advantage was due to a disruption of object-representations or due to competing reaction times.Conducted a pilot study to check the effectiveness of the design	Spring 2022
Tangram Solver using CSP <i>Prof. Shivaram Kalyanakrishnan</i> <ul style="list-style-type: none">Worked in a team of two to formulate Tangram Solving as a Constraint Satisfaction ProblemUsed opencv to obtain contours from noisy grayscale tangram images for use in further stages of processingSolved 77% of the 78 contours in at most 1 second by employing heuristics in the split-search procedure	Spring 2021 <i>RnD Project Course</i>

KEY PROJECTs	
Adversarial Attacks on Graphs <i>Prof. Abir De (Course Project)</i> <ul style="list-style-type: none">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	Autumn 2020 <i>Learning with Graphs</i>
Analysis of Bakery Algorithm using nuSMV <i>Prof. Ashutosh Gupta</i> <ul style="list-style-type: none">Implemented n-threaded Lamport's Bakery Protocol in nuSMV to study simultaneous access of critical sectionChecked safety & liveness for 2, 3 and 4 threads; studied various sections of the algorithm by introducing bugs	Spring 2021 <i>Analysis of Concurrent Programs</i>
Satellite to non-Satellite Image Conversion using cGANs <i>Prof. Ganesh Ramakrishnan (Course Project)</i> <ul style="list-style-type: none">Trained a cGAN comprising of a patchGAN discriminator and a U-net generator to achieve the conversionUsing Inception Score as the metric to compare & analyze the performance of different variants of the model	Autumn 2019 <i>Foundations of Artificial Intelligence and Machine Learning</i>
Conditional Random Field for Named Entity Recognition <i>Prof. Soumen Chakrabarti (Course Project)</i> <ul style="list-style-type: none">Implemented inferencing to obtain the best label sequences corresponding to the named entitiesUsing softmax, attempted to improve macro averaged F1 score by introducing an auxiliary loss term	Spring 2020 <i>Organization of Web Information</i>
py4cl2-cffi – python libraries for common lisp <ul style="list-style-type: none">Used Python C-API to provide a foreign function interface to call python functions from common lispHandled reference counting in conjunction with finalizers to eliminate memory leaksEnabled asynchronous output through a combination of multithreading, named pipes and locks	June 2019 – present

Numerical Computing Library for common lisp: dense-numericals	Spring 2021
<i>Prof. Shivasubramanian Gopalakrishnan</i> (Course Project)	<i>High Performance Scientific Computing</i>
<ul style="list-style-type: none"> 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 	
BodhiTree Django Migration (under Prof. Kameswari Chebrolu)	Spring 2020
<ul style="list-style-type: none"> 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 	
Secure Personal Cloud	Autumn 2018
<i>Prof. Soumen Chakrabarti</i> (course project)	<i>Software Systems Lab</i>
<ul style="list-style-type: none"> 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 livenessync capabilities 	
Contention Resolution and Switching	Spring 2019
<i>Prof. Ashwin Gumaste</i> (course project)	<i>Digital Logic Design</i>
<ul style="list-style-type: none"> 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 	
Sentiment Prediction from Movie Reviews	Summer 2019
<ul style="list-style-type: none"> Used word embeddings to obtain user sentiments from movie reviews using keras and numpy Obtained 88% accuracy on IMDB movie review dataset using a multi-layer perceptron 	

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)
• 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

Cognitive Science	Introduction to Psychology, Human Cognitive Processes, Cognitive Psychology, Cognitive Neuroscience, Neuroscience of Learning & Memory, Computational Cognitive Science, Topics in Visual Perception, Philosophical Investigations (Philosophy of Mind)
Machine Learning	Data Analysis & Interpretation, Learning with Graphs, Organization of Web Information, Artificial Intelligence & Machine Learning, Foundations of Intelligent & Learning Agents, Introduction to Computer Vision*, Natural Language Processing with Deep Learning*
System & Softwares	Software Systems Lab, Design & Analysis of Algorithms, Analysis of Concurrent Programs, Operating Systems, Foundations of Network Security & Cryptography, Computer Architecture

*These courses were pursued through MOOCs (online)

OTHERS

• Poster Presentation on Multiple Object Tracking without Indexes at the ACCS-10 conference	(2022)
• Teaching Assistant for a Programming Course at the Cognitive Science Department: conducted tutorial sessions and evaluated assignments while accounting for students with diverse technical and non-technical background	(2022)
• Discovered RAM Manager for Magisk to fix aggressive app killing on android	(2019)
• 1200+ Karma on r/lisp; 466 reputation on Stackoverflow; 171 reputation on AskUbuntu	(2017-ongoing)
• Created a repository of free JEE Advanced Unsolved papers – solved are available everywhere	(2017-19)
• Studied myopia to understand its cause and methods of prevention / cure	(2017)