

Yash Sharma

Curriculum Vitae

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*ongoing MS in Computer Science at Cornell University;
B.Tech in Computer Science & Engineering from IIT Bombay*

Education

- 2022–2024 **Master of Science in Computer Science**, (*ongoing*), from **Cornell University NY**
GPA: 4/4
- 2017–2021 **Bachelor of Technology in Computer Science & Engineering with Honors**,
Minor in AI & Data Science, from the **Indian Institute of Technology (IIT) Bombay**,
Department Rank 10
CGPA: Major 9.68/10, Honors 10/10, Minor 9.40/10

Work Experience

- Sep 2021–
Aug 2022 **Software Engineer**, *Samsung Electronics*, Suwon, South Korea,
Advanced S/W Lab, Network Business Unit
Part of the **Physical Uplink Shared CHannel** team of Samsung's 5G vRAN Development Lab, working on high performance virtualized physical layer for next-generation wireless communication, working on core-cycle optimization. Utilized intel intrinsic AVX instructions for efficient parallel processing of data. Reduced bottlenecks in uplink signal processing pipeline to achieve upto 20% speedup

Internship Experience

- Summer 2020 **Network Automation & Kubernetes Service Load testing**, *Samsung Electronics*, Korea,
Remote Intern
Involved understanding of **kubernetes** cluster (deployment, pods and services) and load balancing in detail. Built an automated testing framework using **Locust**, supporting various **Layer 4 & Layer 7** protocols to evaluate performance of Samsung's load balancing tools.
- Summer 2019 **WeLineation - Crowdsourcing and Consolidation of Medical Segmentation**,
Technische Universität Braunschweig, Research Intern, **Guide** Prof. Thomas Deserno
Implemented a variant of **STAPLE**, an expectation maximization algorithm, with a custom **Markov Random Field** (MRF) prior to delineate ground-truth like segmentations from crowdsourced data. Performed a controlled study to test the system and rank user performance. Presented WeLineation in the 2020 SPIE Medical Imaging Conference at Houston, TX

Research Projects

- Jan 2023 –
May 2024 **Teaching Robots Through Demonstrations**,
MS Thesis Research, Cornell University, **Guide** Prof. Sanjiban Choudhury
Working at PoRTaL to develop a pipeline allowing robots to learn household chores by watching human demonstrations, through reasoning capabilities of GPT-4 and Deep Vision-Language Models
- Aug 2020 –
June 2021 **Improving code-switched Automatic Speech Recognition**,
Undergraduate Thesis, IIT Bombay & Microsoft, **Guides** Prof. Preethi Jyothi & Basil Abraham
Focused on improving performance of end-to-end ASR models on Gujarati-English speech by conditioning transformer layers on language ID of text in a per-layer supervised method. Proposed two methods of introducing language specific parameters and explainability in the multi-head attention mechanism, and implemented a Temporal Loss that helps maintain continuity in input alignment.

Fall 2020 **GCC Translation Validation**,
RnD Project, IIT Bombay, **Guide** Prof. Amitabha Sanyal

Design of an automated debugger for a GCC plugin that formally detects bugs in or validates the translation of C programs to machine code. We shifted the plugin's support from G++ to GCC, and created a custom Intermediate Representation inspired from GIMPLE to better analyze translation of programs

Dec 2019 – **Improving Low Resource Code-switched ASR using Augmented Code-switched TTS**,

June 2020 *RnD Project*, IIT Bombay & Microsoft, **Guides** Prof. Preethi Jyothi & Basil Abraham

Developed end-to-end based Automatic Speech Recognition models trained on Hindi and English monolingual data. Proposed techniques to leverage code-switched Text to Speech (TTS) to improve performance in low-resource settings. Ideated a new loss function to target underlying distributions of languages in the data. Used augmentation and encoder freezing to avoid over-fitting on synthetic artefacts.

Teaching Experience

Fall 2023, **Head TA**, CS 3410 - *Computer System Organization & Programming*, Cornell University,

Fall 2022 Course Instructor - Prof. Anne Bracy

Involves grading exams, spear-heading assignments, holding office hours and leading lab discussions. Won outstanding TA Certification for answering over a 100 online Ed discussion posts

Summer 2023 **Head TA**, CS 4820 - *Introduction to Analysis of Algorithms*, Cornell University,

Course Instructor - Prof. Ali Erkan

Fast-paced summer session course on algorithms and complexity theory for CS major undergraduates

Spring 2023 **TA**, CS 2770 - *Excursions in Computational Sustainability*, Cornell University,

Course Instructor - Prof. Carla Gomes

Cross-department course in Applied Economics, Information Science and Computer Science

Fall 2020, **Head TA**, CS 251 - *Software Systems Lab*, IIT Bombay,

Fall 2019 Course Instructor - Prof. Amitabha Sanyal

Orchestrating smooth running and preparing assignments for the lab course of "SSL" for second year students of CSE department, a fully online semester in 2020, and a in-person course in 2019. Granted honourable mention in 2019 and **best TA award** in 2020

Fall 2018 **TA**, MA 105 - *Calculus*, IIT Bombay,

Course Instructors- Prof. Shripad Garge, Prof. Sourav Pal, Prof. Saurav Bhaumik

Took weekly sessions of 50 freshmen students from various departments, evaluated exam papers and volunteered to help beyond class hours

Publications

Oct 2020 **Demo2Code: From Summarizing Demonstrations to Synthesizing Code via Extended Chain-of-Thought**, *NeuRIPS 2023*, New Orleans, USA

Huaxiaoyue Wang, Gonzalo Gonzalez-Pumariaga, Yash Sharma, Sanjiban Choudhury

Oct 2020 **Improving Low Resource Code-switched ASR using Augmented Code-switched TTS**, *Interspeech 2020*, Shanghai, China

Yash Sharma, Basil Abraham, Karan Taneja, Preethi Jyothi

Feb 2020 **WeLineation: crowdsourcing delineations for reliable ground truth estimation**, *SPIE 2020*, Houston TX, USA

Saksham Goel¹, Yash Sharma¹, Malte-Levin Jauer, Thomas M. Deserno

Feb 2020 **STAPLE performance assessed on crowdsourced sclera segmentations**, *SPIE 2020*, Houston TX, USA

ML Jauer, S. Goel¹, Y. Sharma¹, T.M. Deserno, M. Gijs, T. Berendshot, C. Bertens, R. Nuijts

Technical Course Projects

Completed at Cornell University

¹ Equal contribution

- Fall 2023 **ChatGPT as a Psychology subject testing Decision Making,**
Research in Risky and Rational Decision Making, Instructor - Prof. Valerie Reyna
- Spring 2023 **Misinformation in hierarchical organizations,**
The Structure of Information Networks , Instructor - Prof. Jon Kleinberg
Modeling the spread of misinformation and corruption in a large hierarchical organization and proposing reinforcement-learning based solutions to combat it
- Fall 2022 **Few-shot Compositional Action Recognition,**
Advanced Topics in ML, Instructor - Prof. Kilian Weinberger
Leveraging decomposition of EPIC-KITCHENS action annotations into nouns and verbs for the few-shot setting
- Fall 2022 **De-mixing techniques for cocktail party problem for bird calls,**
Topics in Computational Sustainability, Instructor - Prof. Carla Gomes
Explored traditional and deep learning systems to de-mix bird-calls in noisy environments
- Completed at IIT Bombay**
- Spring 2021 **Open-Ended Reinforcement Learning,**
Advances in Intelligent and Learning Agents, Instructor - Prof. Shivaram Kalyanakrishnan
Used Uber's POET algorithm to apply **evolutionary strategies** to solve increasingly complex mazes
- Spring 2021 **Analysis of Negative Interference in Multilingual Models,**
Advanced Machine Learning, Instructor - Prof. Sunita Sarawagi
Analysed negative interference and improved performance in various NLP tasks on the GLUECoS dataset using the proposed meta learning approach in [Wang et al, EMNLP 2020]
- Spring 2021 **Low Resource Morphological Inflection,**
Deep Learning in NLP, Instructor - Prof. Pushpak Bhattacharya
Implemented Low-Resource Morphological Inflection model in PyTorch [Anastasopoulos et al, ACL 2019]
- Spring 2021 **n-thread Lamport algorithm on NuSMV,**
Analysis of Concurrent Programs, Instructors - Prof. Ashutosh Gupta & Prof. Krishna S
Implemented the lamport algorithm on NuSMV using wraparound queues. Wrote a python script to generalize this NuSMV program to arbitrary number of threads
- Spring 2021 **Parallel and Concurrent Programming in Haskell,**
Design & Implementation of Functional Languages, Instructor - Prof. Amitabha Sanyal
Understanding the use of Parallel and Concurrent programming monadic interfaces provided in Haskell
- Spring 2020 **Self Load-Balancing Server,**
Virtualization and Cloud Computing, Instructor - Prof. Mythili Vutukuru
Made a server-manager using the libvirt API to manage multiple connections and failure due to timeouts
- Fall 2019 **VQA - Inferring and executing programs,**
AIML, Instructor - Prof. Ganesh Ramakrishnan
Used parallel forward propagation and hard parameter sharing to optimize existing architectures for Visual Question Answering without loss in performance
- Fall 2019 **What's NE(x)T - a content-based music recommendation system,**
Automatic Speech Recognition, Instructor - Prof. Preethi Jyothi
Implemented a recommendation system based on audio, feedback of user likings and bag-of-word lyrics
- Fall 2018 **Secure Personal Cloud,**
Course - Software Systems Lab, Instructor - Prof. Soumen Chakrabarti
Constructed a 'zero-knowledge' cloud server and client with end-to-end encryption using AES, Triple DES and RC4 encryption techniques, following industrial standards, with keys stored locally.

Technical Skills

- ML tools** pyTorch, kaldi, keras, tensorflow
- Languages** C, C++, python, bash, OCaml, Haskell, Racket, HTML/CSS, Javascript, Android, \LaTeX , SQL, Java, Prolog, Answer Set Programming

Softwares Perforce & Swarm, Jira, Jenkins, GNU/Linux, Docker, Git, MATLAB, Android Studio, QTSpim

Courses Undertaken

Computer Science Information Networks, Advanced Programming Languages, Topics in Computational Sustainability, Advanced Topics in ML, Theoretical ML, Automatic Speech Recognition, Concurrent Programming, Functional Programming, Deep Learning for NLP, Operating Systems, Computer Architecture, Computer Networks, Software Systems Lab

Mathematics Discrete Structures, Calculus, Linear Algebra, Differential Equations, Systems and Control

Others Environment Sciences, Psychology, Quantum Physics, Biology, Chemistry, Economics

Language Proficiency

English **Fluent**

Hindi **Fluent/Native**

French **Intermediate**

Korean **Intermediate**

8 years of curriculum learning

Passed TOPIK-I Level 2

Extracurricular

Winter 2018 Qualified for the final round of Microsoft AI Challenge

Spring 2018 Hosted speaker sessions and organized shows as an organizer in E-Summit, a two-day business event conducted by Entrepreneurship Cell, IIT Bombay

2015 Stood first in a Shakespearan themed Inter-School Dramatics competition

Oct 2013 Participated in the first Junior Model United Nations conference in Indus International School