SOUNDARYA KRISHNAN

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EDUCATION

Birla Institute of Technology and Science (BITS), Pilani, India

- B.E. Computer Science: **Major GPA: 9.81** — *Expected: June 2021*

- M.Sc. Physics: **Major GPA: 9.80** — *Expected: June 2021*

Overall GPA: 9.42
Department Rank 1, Recipient of the Institute Merit Scholarship (fee waiver) for consistent excellent performance in academics (Top 1% in cohort)

PUBLICATIONS AND TALKS

FASCIA: An Open-Source Real-Time Interpretable Sleep Staging Tool for Researchers
Soundarya Krishnan, Varghese Mannampalli, Guillermo Bernal, Pattie Maes
Working Paper — [Code]

Constructing and Evaluating an Explainable Model for COVID-19 Diagnosis from Chest X-rays
Rishab Khincha, Soundarya Krishnan, Krishnan Guru-Murthy, Tirtharaj Dash, Lovekesh Vig, Ashwin Srinivasan
Preprint — [Paper]

CovidDiagnosis: Deep Diagnosis of COVID-19 Patients Using Chest X-Rays
Kushagra Mahajan, Monika Sharma, Lovekesh Vig, Rishab Khincha, Soundarya Krishnan, Adithya Niranjan, Tirtharaj Dash, Ashwin Srinivasan, Gautam Shroff
2nd TIA Workshop, MICCAI 2020. Springer LNCS —[Paper]

A Case Study of Transfer of Lesion-Knowledge
Soundarya Krishnan, Rishab Khincha, Lovekesh Vig, Tirtharaj Dash, Ashwin Srinivasan
2nd MIL3D Workshop, MICCAI 2020. Springer LNCS —[Paper] [Talk] [Slides]

Network Community Analysis Based Enhancement of Online Discussion Forums
Soundarya Krishnan, Rishab Khincha, Neena Goveas
ACM-W India Celebration of Women in Computing 2020 Student Poster Competition- Won 1st Place — [Links]
Young Researchers' Symposium, CODS-COMAD 2021 — [Demo] [Code]

ECG Signal Analysis on an Embedded Device for Sleep Apnea Detection
Rishab Khincha, Soundarya Krishnan, Rizwan Parveen, Neena Goveas
9th International Conference on Image and Signal Processing- Paper published — [Paper] [Code]
2nd International Conference on Image, Video and Signal Processing- Abstract accepted for oral presentation

Phase Polynomials and Lempel's algorithm
Soundarya Krishnan, Neil Julien Ross
Working Paper — [Paper]

EXPERIENCE

MIT Media Lab: Fluid Interfaces [Thesis] — Aug 2020 - Dec 2020
Research Intern — Advised by Prof. Pattie Maes — *Cambridge, Massachusetts, USA*

· Working on the project FASCIA: Analysed PSG signals, built CNN-LSTM models (with explanations) for automatic sleep scoring. Integrated the pipeline on a real-time open-source web-based interface using socket programming, Node.js, Express.ejs for the website, D3.js for the visualization, MongoDB for the database — [Code]

Uber — May 2020 - Jul 2020
Software Development Intern — *Bangalore, Karnataka, India*

· Used ideas in Reinforcement Learning (Bayesian Thompson Sampling for the Multi Arm Bandit problem) to solve the Explore-Exploit Problem in Advertising. Worked with Java, Python, Hive, Apache Spark, SQL, HDFS, Amazon AWS Lambda. Wrote comprehensive tests (90% coverage), and detailed documentation to assist future users. Wrote rigorous Postman API requests, exported them to the codebase for ease of use for future developers.

Dalhousie University- MITACS GRI   May 2019 - Aug 2019
MITACS Summer Research Intern — advised by Prof. Julien Ross   *Halifax, Nova Scotia, Canada*

· Worked on ideas from linear algebra to support 'Secure, fast, and efficient optimization of quantum circuits'. The project demonstrated the steps of reducing the cost of a CNOT Dihedral quantum circuit by reducing the number of T gates and replacing them with less expensive gates such as (S, CS or CCZ) — [Paper].

Central Electronics Engg. Research Institute (CEERI)   May 2018 - Aug 2018
Summer Research Intern — advised by Dr. Sundaresan Balasubramaniam   *Chennai, India*

· Developed an automated defect detection and analysis system using Tensorflow in python for object detection and classification. Used heavy Image Processing in OpenCV for feature extraction, and Visual C++ for GUI, including MYSQL for the database. Used a uEye camera compatible with OpenCV API functions for real time classification — [Code]

PROJECTS

Constructing and Evaluating an Explainable Model for COVID-19 Diagnosis from Chest X-rays   Aug 2020 - Present
Prof. Ashwin Srinivasan, Dr. Lovekesh Vig — APPCAIR

· Extracted domain-specific features directly from the image data using DNNs, and constructed a symbolic model for the diagnosis of COVID-19 from chest X-ray using these features. Generated visual and textual explanations, and integrated all steps in a web-based interface.

Diagnosis of COVID-19 Patients Using Chest X-Rays   Apr 2020 - Jun 2020
Prof. Ashwin Srinivasan, Dr. Lovekesh Vig — APPCAIR

· Built a segmentation model to isolate the lung region from the rest of the X-ray, and built a model to detect COVID-19 from the segmented lung. Employed embeddings of disease symptoms produced by the CheXNet network and created an ensemble to assist the model in classification. ROC - 99.8. Prime Minister's office is interested in using this tool for mass screening in airports and railway stations.

Transfer Learning for Medical Imaging   Jan 2020 - Jun 2020
Prof. Ashwin Srinivasan, Dr. Lovekesh Vig — APPCAIR, TCS Research

· Evaluated the efficacy of transfer of a brain-lesion model to the lung, and the transfer of a lung-lesion model to the brain by comparing against a model constructed without model-transfer and using lesion-agnostic transfer.

Peer to Peer AI Tracing App for COVID-19   Apr 2020 - May 2020
Prof. Yoshua Bengio — In Collaboration with MILA, Montreal

· One of the contributors for the software of a Peer to Peer tracing app for use in Canada. Was mentioned in MILA's white paper for the same as a contributor.

Social Networks: Telegram Chatbot To Enhance Question-Answer Chats   Aug 2019 - Dec 2019
Prof. Neena Goveas

· Built a platform agnostic Social Networks & NLP-based Python interface that scrapes data off chats, classifies users as experts or users according to activity, and suggests experts (using Betweenness Centrality) as well as timings for various topics extracted from the chat (using RAKE). Tested on Ubuntu IRC chat logs, and has been implemented for a university chat group.

Portable Holter Monitor with Real Time Threat Detection   Jan 2019 - Apr 2019
Prof. Neena Goveas

· Created models for the detection of sleep apnea from real time ECG data and achieved an accuracy of 90%. Wrote scripts on a Raspberry Pi for processing the data from the hardware to run the model and give real time threat detection.

SCHOLARSHIPS AND AWARDS

- **Nov 2020** — Ranked 2nd globally in the Adelaide Ingenuity Challenge 2020 organized by the University of Adelaide in collaboration with CAISS 2020

- **Sep 2020** — Ranked 7th among women in India in Code-Hers 1.0, organised by NIT Warangal

- **Sep 2020** — Awarded 1st place in ACM-W India Celebrations of Women in Computing Poster Competition
- **Aug 2020** — One of 50 students selected from India for the Google Research India AI Summer School for the Human Computer Interaction + AI for Social Good track
- **July 2020** — Recipient of the Grace Hopper Celebration India Scholarship 2020 for female students from computing, engineering and IT backgrounds.
- **Nov 2019** — 1st Runner-up in India for NETAPP's SheCode hackathon
- **Aug 2019** — One of 40 students selected from India for 2020 Summer Internship at Uber, India
- **Jan 2019** — One of 100 students selected from India for the MITACS Globalink Scholarship to pursue research in Canada
- **2017** — Recipient of India's INSPIRE scholarship (Innovation in Science Pursuit for Inspired Research)
- **2016** — Received medal from the Government of India for scoring in the top 0.1 percentile in India in Physics Board Exams (99/100)
- **2014** — Recipient of the NTSE Scholarship (National Talent Search Examination scholarship)
- **2013** — Recipient of Gold medal in mathematics (ranked 12th in SE Asia) in APMOPS, Singapore

TEACHING/MENTORSHIP AND VOLUNTEERING

- Instructor for the Center of Technical Education (CTE) course on 'Introduction to Causal Inference'.
- Teaching Assistant for Object Oriented Programming. Designed questions, junit tests, and conducted weekly evaluative labs to test **200** students on principles of Object-Oriented Programming in Java.
- Teaching Assistant for Computer Programming. Designed weekly labs from scratch for **900** first year undergraduate students as a part of their continuous evaluation. Assisted students in completing design projects.
- Co-founder of BITS Goa Women in Tech (BGWiT). BGWiT is an initiative to reduce the gender gap in technology, and foster interactions, networking, and sharing of ideas among women interested in technology — [Links]
- Core member and Mentor at SAiDl, BITS Pilani. SAiDl is a non-profit, professional group of motivated individuals based out of BITS Pilani, working on research and application of Artificial Intelligence and Deep Learning.
- Volunteer for WiML workshop at NEURIPS 2020.
- Volunteer at Teach Zari. Volunteered at Zari village (Goa, India) to teach students school-level math.

MEMBERSHIP

- **2020**: Women in Machine Learning
- **2020**: ACM-W India
- **2020**: Grace Hopper Celebration India

EXTRA CURRICULARS

- **Founder and Chief Coordinator — Synchronoise, The BITS Goa Acapella Crew:** Took music theory lessons for over 100 members. Part of the team that ranked 2nd in South India for Acapella
- **Core member — The Literary and Debating Club:** Organised 'Contention', one of India's largest debates. Organised several national level poetry slams for the flagship poetry slam event 'InVerse'.
- **Marketing Manager — The Department of Sponsorship and Management (DoSM):** Raised sponsorship for India's largest cultural festival with a budget of 7.5 Million.
- Completed Gold-star level Certification in swimming (Singapore)
- Black Belt holder in Taekwondo, recognized by the Singapore Taekwondo Federation (STF)
- Passed Grade 3 in Piano, ABRSM (Singapore)