

# AYUSH SOMANI

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## EDUCATION

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- **UiT The Arctic University of Norway, Tromsø (Ongoing)** Credit: 10 ECTS  
*FYS-3810 Individual Special Curriculum in Cell Culture & Imaging - Master's degree* Spring 2021  
Supervisor: Deanna Wolfson, Researcher in Ultrasound, Microwaves & Optics, Department of Physics & Technology
- **Indian Institute of Technology (Indian School of Mines) Dhanbad, India** GPA: 8.4  
*Integrated Master of Technology - Mathematics and Computing, July 2016 to May 2021* July 2016 - Present
- **UiT The Arctic University of Norway, Tromsø, Norway** Credit: 20 ECTS  
*FYS-3820 Individual Special Curriculum in Digital Staining of Microscopy Images* May 2020 - August 2020  
Supervisor: Prof. Krishna Agarwal, Associate Professor, Department of Physics & Technology  
Prof. Dilip K. Prasad, Associate Professor, Department of Computer Science
- **UZH- University of Zürich, Switzerland** Credit: 6 ECTS  
*International Summer School in Deep Dive into Blockchain* Spring 2020  
Course Director: Professor Claudio J. Tessone, Department of Network Science, Universität Zürich
- **Chitrakut Fine Art School, West Bengal, India** 1<sup>st</sup> class Distinction  
*Bachelor of Fine Arts (Visharad in Shilpa)* 2005 - 2014  
9 years of apprenticeship experience recognized by West Bengal State Academy of Dance, Drama & Fine Arts, India
- **Emmanuel Mission School, Kota, India** Percentage: 88.6  
*Central Board of Secondary Education* April 2014 - March 2016
- **Saint Xavier's School, Raiganj, India** Percentage: 94.8  
*Indian Certificate of Secondary Education* April 2002 - March 2014
- **Other Studies** Completed: 270+ work hours  
*University and DeepLearning.ai Online Courses offered by Coursera* 2017 - Present  
**Deep Learning Specialization** - [deeplearning.ai](https://www.coursera.org/learn/deeplearning-ai) - 85 work hours  
**Machine Learning** - Stanford University - 60 work hours  
**Algorithmic Toolbox** - University of California San Diego - 37 work hours  
**Introduction to Data Science in Python** - University of Michigan - 31 work hours  
**Programming for Everybody** - University of Michigan - 19 work hours  
**Cameras, Exposure, and Photography** - Michigan State University - 18 work hours  
**TensorFlow Developer Professional Certificate** - [deeplearning.ai](https://www.coursera.org/certificates/tensorflow-developer) - 20 out of 80 work hours (Ongoing)  
**Generative Adversarial Networks Specialization** - [DeepLearning.ai](https://www.coursera.org/learn/generative-adversarial-networks) - 84 work hours (Ongoing)

## SKILLS SUMMARY

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- **Programming Lang.:** Python, C++, HTML, CSS, LaTeX, Solidity.
- **Work Knowledge:** MATLAB, Visual Code, Docker, GIT, GCP, Anaconda, SQL, Kubernetes, Makefiles, CUDA.
- **Frameworks:** Tensorflow, PyTorch, Keras, Graph-tool, CMake, OpenGL, Boost C++ Libraries, Flask.
- **Soft Skills:** Leadership, Team Work, Adaptability, Creativity.

## PUBLICATIONS

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- **Somani A. et al.:** (2021) Digital Staining of Mitochondria in Label-free Live-cell Microscopy. In: Palm C., Deserno T.M., Handels H., Maier A., Maier-Hein K., Tolxdorff T. (eds) Bildverarbeitung für die Medizin 2021. Informatik aktuell. Springer Vieweg, Wiesbaden. [https://doi.org/10.1007/978-3-658-33198-6\\_55](https://doi.org/10.1007/978-3-658-33198-6_55).
- **A. A Sekh\* and A. Somani\*, et al.:** "Virtual labelling of mitochondria using label-free images enables separating acidic and non-acidic mitochondria". Being prepared for Nat. BioTech. Tentative submission: May 2021.
- **N. Meena\*, A. Somani\*, and D.K. Prasad:** "Deep learning based object detection of maritime objects from moving ships", IEEE Transactions on Intelligent Transportation Systems, 2020, under preparation.
- **A. Somani and D.K. Prasad:** "Maritime color constancy", Journal of Optical Society of America A, 2021, under preparation.

\* equal first authorship

## INNOVATION CHALLENGE

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- **Flipkart GRiD 2.0: Engineering Campus Challenge**  
*Machine Learning & Software Development Challenge'20* *June 2020 - September 2020*  
National Finalist Rank 3 from among 29,000+ participants in Electronic Invoicing using Image Processing. Implemented an intuitive UI based solution to digitize the system generated scanned invoice. The proposed method achieves 87.19% accuracy in text recognition and extraction with the structure class detection algorithm and blur handling multi-threading pipeline. Youtube link of the team: <https://youtu.be/8CpJASxQuZY>
- **Incentivised Social Welfare Coin (Blockchain)**  
*UZH- University of Zürich, Switzerland* *July 2020*  
Finalist Team. Project: Implementation of a decentralized application (DApp) to incentivize more people towards contributing to society by introducing a tokenized economy of benefits on top of a privately run Neo Blockchain using TypeScript. Created the token on the NEO ONE platform and develop a smart contract for bike sharing as an example of application. The project with the source code was submitted to Universität Zürich.
- **RedStart Startup Challenge: Research Conclave'19**  
*IIT Guwahati, India* *March 2019*  
Among top 20 finalists across India. Project: Pitch Firebase Database implementation to a friendly tailored UI/UX design to eliminate the middlemen in Agricultural trade.
- **Walmart's Problem Statement: HackFest'19**  
*IIT ISM Dhanbad, India* *March 2019*  
Implementation of an innovative idea of "Smart Shopping Cart for Automatic Object Detection and Billing". A system that consists of a display screen, AI object detection camera, microprocessor, Zigbee, IR and weight sensor implemented on the shopping cart allowing faster check-out. Among top 10 out of 138 teams selected to participate in Walmart's 36 hours long coding Hackathon.

## RESEARCH PRESENTATIONS IN ACADEMIC CONFERENCES

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- **Bildverarbeitung fuer die Medizin 2021 (BVM Workshop)**  
*OTH Regensburg, Germany* *March 2021*  
Presented paper titled "Digital Staining of Mitochondria in Label-free Live-cell Microscopy" as Proceedings, German Workshop on Medical Image Computing, Regensburg.
- **The Second Joint SIAM/CAIMS Annual Meeting & Imaging Science Conference**  
*Toronto, Canada* *Virtual  
July 2020*  
Presented work titled "Short-term earthquake prediction using ML by study of subionospheric VLF/LF propagation and ionospheric TEC anomalies" under a special session on undergraduate research. Link to the accepted minisymposium submission: [https://meetings.siam.org/sess/dsp\\_talk.cfm?p=107294](https://meetings.siam.org/sess/dsp_talk.cfm?p=107294)
- **Student Research Convention'19**  
*IIT Kanpur, India* *March 2019*  
Presented paper on "An investigation to analyse the effect of Three-Point shooting in probabilistic winning of a basketball match" under the conference(s) on Computer Science and Artificial Intelligence.
- **MathSport Asia'18**  
*Xavier School of Management (XLRI), Jamshedpur, India* *December 2018*  
Presented Paper titled "Applying statistics to study the effect of different balls in the competitiveness of a cricket test match" proceedings under springer publication.

## RESEARCH INTERNSHIP AND EXCHANGE

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- **UiT- The Arctic University of Norway (Ongoing)**  
*Exchange master student (INTPART project of RCN, project number 309802)* *Tromsø, Norway  
January 2021 - July 2021*  
6-month international exchange fellowship recognized by the Research Council of Norway for research on "Interpretability of Deep Learning Models" at Department of Physics and Technology, UiT Tromsø.
- **UiT- The Arctic University of Norway**  
*Summer Research Internship (Virtual/Remote internship pilot project)* *Tromsø, Norway  
April 2020 - September 2020*  
6-month internship project was titled "Object detection in maritime environment using deep learning".
  - **Paper Writing (Ongoing):** Implemented the Minkowski framework generating state-of-the-art algorithms for NUS RAW dataset & validating the Singapore Marine dataset. Apart from the statistical and gamut based approach, comparison being made with deep learning-based algorithms amidst the proposed CNN architecture to calculate the white balancing of uniform outdoor illumination.
  - **Benchmarking:** Generation of Illumination Estimation for video dataset calculating the angular recovery error and the new reproduction angular error proposed by Graham D. Finlayson.
  - **Supervisor:** Prof. Dilip K. Prasad, Associate Professor, Department of Computer Science.

## TECHNICAL INTERNSHIP

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- **Travel Buddy** Gurugram, Haryana, India  
*Data Scientist (Part-Time, Contractual)* March 2020 - April 2020
  - **Content Moderation:** Built ML model with rest-ful API for Text and Media Moderation. The model handles the text moderation using BERT as a base for contextual classification while F-RCNN based solution detects toxic content in video and images. Model assigns a confidence score against label for automatic moderation resulting in 78% drop in customer reporting of the toxic contents.
  - **Supervisor:** Mr. Vijay Saini, CTO, Travel Buddy.
- **Qik Stay Pvt. Ltd** New Delhi, India  
*Data Analyst (Summer Internship)* June 2019 - July 2019
  - **Customer Profiling and Segmentation:** Piloting program to drive ancillary revenues through use of RFM analysis algorithms for the identification of profitable customers in the context of CRM. Used Linear Regression Techniques to create a model to predict the prices of hotel rooms in the Indian Market. Achieved an R-squared value of 0.86.
  - **Supervisor:** Mr. Krishna Kumar Meena, Head Mobile Application, Qik Circle.

## WORKSHOP ATTENDANCE

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- **26th ACM SIGKDD Conference on Knowledge Discovery & Data Mining, San Diego Convention Center, United States:** Workshop on Industrial Recommendation Systems (IRS) and the Hands-on Tutorial session on “Put Deep Learning to Work: Accelerate Deep Learning through AWS EC2 and ML Services” in August 2020. Received the KDD’20 Student Travel Award funded by SIGKDD.
- **Effective Communication & Collaboration:** Robertson Center for Intercultural Leadership at International House UC Berkeley held in July’20.
- **CRYPTONITE 2020:** Online Workshop in Cryptocurrency held by Finstreet in May 2020.
- **Augmented Reality:** Seminar & Workshop on ‘Augmented Reality’ by HT India Lab in 2016.

## PROJECTS

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- **Prediction of P-waves using ML (Time Series Analysis, Machine Learning):** Prediction of P-waves and Noise using the Random Forest Classifier to obtain an accuracy of 94.3%. Identification of P-waves (body waves) to predict the intensity of destructive love-waves (surface wave). Tsunami Modelling based on wave number count and Epicenter localization. (Sep ’19)
  - *Dr. Sanjeev Anand Sahu, Mathematics and Computing, IIT Dhanbad.*
- **Objection Detection and Localization (Flipkart):** Implementation of ResNet using Keras Functional API, YOLOv3, Data Augmentation, CNN using TensorFlow and Long Short Term Memory to maximize the accuracy of real time object localization complexity dataset with accuracy of 90.6% (March’19).
- **Vison - Multimedia search engine (NLP, Search Engine, Web Crawlers, Multimedia Processing):** Research oriented, open source, search engine for bringing reverse multimedia search to small & mid scale enterprises. Tech: Python, NodeJS, Intel OpenVino Toolkit, Selenium, TensorFlow (Jan’19).
  - *Prof. Subhashis Chatterjee, Mathematics and Computing, IIT Dhanbad*
- **Extraer-Language translator tool (Image Processing, Arduino):** A live translator used to capture images and translate into text using image segmentation. This helps the people with visual or auditory impairment to communicate with ease. Tech: Python, Open-CV, Pytesseract, Arduino (Aug’18).
- **Credit Card Fraud Detection (Supervised Machine Learning):** Explored and visualized several datasets of credit card transactions using pandas and matplotlib. Improved the existing isolation forest algorithm using c.45 decision trees, to increase the recall metric of anomalies from 86% to 92% (Summer ’18).
  - *Reference: Machine Learning by Stanford University (Coursera).*
- **Automatic Image Segmentation (Graph Theory and Unsupervised Learning):** Automatic segmentation of areas of interest in colored images using graph cuts and Gaussian mixture Model with clustering algorithms (Winter’17).
  - *Dr. Pramod Kumar Kewat, Applied Mathematics, IIT Dhanbad*
- **Detection of rotation of Convex object using chain code (Digital Image Processing):** Developed an algorithm which uses directional Freeman Chain Code to detect rotation of two input object images (Monsoon’17).

## ACADEMIC COURSEWORK

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- **Academic Courses:**
  - Mathematics:** Linear Algebra, Modern Algebra, Statistical Inference, Probability and Statistics, Discrete Mathematics, Operational Research, Numerical Methods, Real Analysis, Complex Analysis, Ordinary and Partial Differential Equation, Sampling Theory, Functional Analysis, Measure Theory, Number Theory, Graph Theory.
  - Computer Science:** Data Structure, Design and Analysis of Algorithm, GPU Computing with CUDA, DBMS, Operating System, Computer Graphics, Theory of Computation, Computer Networks, Object Oriented Programming, Computer Organization, Software Engineering, Information and Coding Theory, Software Computing.
- **Online Courses:**
  - Coursera:** Deep Learning Specialization, Machine Learning by Stanford University (grade- 96.9%), Algorithmic Toolbox by University of California (grade- 94.0%), Python Programming by University of Michigan (grade- 95.8%).
  - Others:** 6.042 [MIT]: Mathematics for CS, 6.001 [MIT]: Introduction to CS with Python, Khan Academy: Linear Algebra, Udemy: Mastering Data Structure & Algorithm using C++.

## POSITIONS OF RESPONSIBILITY

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- **President**, Society of Industrial and Applied Mathematics, IIT ISM Student Chapter. 2019 - Present
- **Branch Representative**, Mathematics and Computing, IIT ISM Dhanbad. 2017 - Present
- **Student Chapter Representative**, Second Joint SIAM/CAIMS Annual Meeting. July 2020
- **Co-ordinator**, Data Science Club, IIT ISM Dhanbad. 2019 - 2020
- **Founder & Mentor**, SIAM Coding Classes, IIT ISM Dhanbad. 2018 - 2020
- **Technical Head**, Institute's SPEC Website Designing Committee. 2018 - 2019
- **Head of Media**, Sports and Physical Education Center. 2018 - 2019
- **Event Organizer**, Jharkhand Open at World Cube Association. Sept 2018
- **Volunteer**, provides free education in a student-run NGO- Kartavya. 2016 - 2018
- **Sports Captain**, Saint Xavier's School. 2012 - 2013

## HONORS AND AWARDS

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- **INTPART Exchange Fellowship**: Invited for exchange program with UiT The Arctic University of Norway.
- **Dare2Compete Awards 2021**: Among D2C Top 5 College Champions decided on the basis of competing and winning various competitions globally covered in Forbes India on 7th April'21.
- **Samsung Innovation Award 2020**: Our project proposal has been selected by Samsung Research Centre, Bangalore as winner for the SIA held in November'20.
- **Student Travel Award**: Nominated to receive the 26th ACM KDD'20 award funded by SIGKDD.
- **MCM Scholarship by Government of India**: Awarded to top 25% students of respective branch in IIT Dhanbad.
- **Gold Honour**: Placed among top 2% of all participants in International Astronomy and Astrophysics Olympiad'20.
- **GATE 2020**: Cleared Graduate Aptitude Test in Engineering in Computer Science and Information Technology conducted by IIT Delhi on behalf of Department of Higher Education, Ministry of HRD, Govt. of India.
- **Gold Honour**: Reached finals & among top 3% of all participants in International Mathematics Youth Challenge'19.
- **Mathematics (Project Euler)**: Solved 125+ problems, within top 1% of members (Username- ayushsomani001).
- **Gold Medalist**: District Youth Science Fair'13 and felicitated by Chief Minister of West Bengal.
- **Distinction Certificate**: Science, Mathematics & Computer skills by The University of New South Wales.
- **Olympiads**: Numerous Gold and Silver Medals and Merituous Certificate for National & International Olympiads.  
AIR 27 in National Science Olympiad'08  
141<sup>th</sup> in International Olympiad of Science'09  
AIR 182 in Unified Cyber Olympiad'10  
279<sup>th</sup> in International Olympiad of English Language'14

## EXTRA-CURRICULAR ACTIVITIES

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- **Inter-IIT Cultural Meet'18**: 2nd runner-up in Culinary Arts among 23 participating IITs held at IIT Roorkee.
- **Google Maps Contributor**: Among top local guides received over 2 million photography views.
- **UZH BINGO Award**: Awarded by Universität Zürich for excelling all the assignments and social interactions.
- **Ambassador Award of Excellence**: Contribution to International Youth Math Challenge 2019.
- **District Swimming Competition'13**: 3rd in 100m freestyle swimming held in Uttar Dinajpur, West Bengal.
- **Aavhan, IIT Bombay**: Certificate of completion of 3 km 18 - 30yr Men virtual run in record time of 11 min 34 sec.
- **Mountaineer Trekker**: Trekked with Himalayan Mountaineers' & Trekkers' Association during 2006 - 2011.

## HOBBIES

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- **Video-Editing**: Started a self-managed YouTube channel 'Cheesy Tooth' having more than 11k views.
- **Culinary Arts**: Being a sweet tooth, I love experimenting with desserts and cheese dishes.
- **Photography**: Capturing the memories I create while cooking and travelling. A bliss to remember them and share with my friends.
- **Travelling**: Passion of exploring the historic and scenic beauties of the world.

## SOCIAL CONNECT

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- **Email**: ayushsomani001@gmail.com
- **GitHub**: github.com/AyushSomani001
- **LinkedIn**: linkedin.com/in/AyushSomani001
- **Quora**: quora.com/Ayush-Somani-7
- **Youtube**: youtube.com/channel/CheesyTooth
- **Instagram**: instagram.com/sunami\_strikesss