

# Honey DINESH NIKAM

## Senior Undergraduate, IIT Kanpur

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### EDUCATION

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| 2022 | <b>Indian Institute of Technology, Kanpur</b><br>Bachelor of Technology, Mechanical Engineering, CGPA : 9.2/10                          |
| 2018 | <b>Arihant School of Arts, Commerce and Science, Pune</b><br>Maharashtra State Board of Secondary and Higher Secondary Education, 92.3% |

### PUBLICATIONS

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| Sep 2020<br>May 2021 | <b>Long Short-Term Memory Implementation Exploiting Passive RRAM Crossbar Array</b> [arXiv]<br><b>Honey Nikam, Siddharth Satyam, Shubham Sahay</b><br>IEEE Transactions on Electron Devices<br>‣ Encoded LSTM network parameters shared across the different time steps as the conductance-states of a passive RRAM crossbar array to perform in-situ computations.<br>‣ Introduced a hybrid of stochastic gradient descent and Manhattan rule for training.<br>‣ Performed an extensive analysis of the proposed LSTM network implementation considering the non-ideal hardware artefacts such as device-to-device variations, non-linearity, noise, etc.<br>‣ Proposed implementation outperforms the prior digital and active 1T1R RRAM array-based LSTM implementations by several orders of magnitude in terms of area and energy consumption.<br><span>RNN</span> <span>LSTM</span> <span>Neuromorphic computing</span> |
| Sep 2020<br>Jul 2021 | <b>Energy-Efficient Implementation of Generative Adversarial Networks on Passive RRAM Crossbar Arrays</b> [arXiv]<br><b>Siddharth Satyam, Honey Nikam, Shubham Sahay</b><br>Under Review<br>‣ Implemented a hardware-aware simulation of Generative Adversarial Networks to synthesize realistic looking images of the MNIST dataset<br>‣ Introduced a weight-to-conductance mapping rule which allows for positive and negative weight matrices.<br>‣ Analysed the effects of true random noise as the input on the accuracy and energy efficiency of GANs.<br>‣ Compared the accuracy of the proposed implementation with active 1T-1R and software counterparts.<br><span>GAN</span> <span>RRAM</span> <span>Memristor Crossbar Arrays</span>                                                                                                                                                                              |

### RESEARCH PROJECTS

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| Aug 2021<br>Ongoing | <b>Spectrum Based Fault Localization Using Graph Neural Networks</b> [report]<br>Prof. Subhajit Roy, Department of Computer Science, IIT Kanpur<br>‣ Implemented the spectrum based fault localization problem as a graph neural network with test cases and components represented as graph nodes.<br>‣ Generated node embedding vectors by aggregation of messages from test nodes to component nodes.<br>‣ Computed component bug suspicion probabilities using embedding vectors through feed forward networks.<br>‣ Compared results with respect to state of the art metrics for fault localization such as Ochiai and Tarantula.<br><span>Spectrum Based Fault Localization</span> <span>Graph Neural Networks</span> <span>Deep Graph Library</span> |
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### WORK EXPERIENCE

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| May 2021<br>Aug 2021 | <b>Software Engineering Intern, Uber, Hyderabad</b><br>‣ Implemented different time series models to predict Uber Eats data for the next 7 days such as city-wise gross bookings, web sessions etc.<br>‣ Built a Long-Short Term Memory Network and Bayesian Neural Network implementation that provides time series prediction along with uncertainty estimation.<br>‣ Implemented and analysed classical time-series models such Autoregressive Integrated Moving Average, Exponential Smoothings and packages such as Prophet (Facebook Open Source), orbit (Uber Open Source) to find the best fit model for predictive forecasting.<br>‣ Collaborated with the team that developed Orbit, Uber's open-source package for time series forecasting.<br><span>time-series forecasting</span> <span>Bayesian LSTM</span> <span>ARIMA</span> |
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Jul 2019	<b>Summer Intern, Talentpod Techserve, Bangalore</b> <span>[code]</span>
May 2019	<ul style="list-style-type: none"> <li>➤ Built a Django web application with a user's social media reliant MongoDB database and a TensorFlow powered low level cognitive filtering news recommendation system.</li> <li>➤ Used news APIs for searching and retrieving live articles where the queries and keywords were extracted from user's emails such as keywords in the sender/receiver, subject, tf-idf ranked keywords in the mail body</li> <li>➤ Experimented with libraries such as NLTK, TensorFlow, Keras, scikit-learn for better classification, keyword extraction, and document analysis to improve the relevancy between the news articles and the user's mails.</li> </ul> <div> <span>Recommender Systems</span> <span>NLP</span> <span>TensorFlow</span> <span>Django</span> <span>MongoDB</span> </div>

## PROJECTS

Mar 2020	<b>Differential Text Highlighter, Association of Computing Activities, IIT Kanpur</b>
Feb 2020	<ul style="list-style-type: none"> <li>➤ Mentored a group of six students on the basics of Natural Language Processing</li> <li>➤ Built a text highlighter that highlights text in different shades on the basis of importance of sentences using extractive text summarization.</li> </ul> <div> <span>NLP</span> <span>NLTK</span> </div>
Apr 2021	<b>Computational Fluid Modelling, Prof. K. Muralidhar, IIT Kanpur</b> <span>[code]</span>
Feb 2021	<ul style="list-style-type: none"> <li>➤ Performed higher order explicit schemes to solve systems of differential equations.</li> <li>➤ Studied discretization errors, compared the time complexity and stability of different order schemes.</li> <li>➤ Numerically simulated velocity distribution of turbulent flow using Navier Stokes equations.</li> </ul> <div> <span>Fortran</span> <span>MATLAB</span> </div>
Mar 2019	<b>Fundamentals of Theoretical Computer Science, Association of Computing Activities, IIT Kanpur</b>
Jan 2019	<ul style="list-style-type: none"> <li>➤ Studied preliminaries of Theory of Computation, Discrete Mathematics and Number Theory.</li> <li>➤ Dived deeper into the concepts of Turing Machines, Undecidability, Context-free grammars and languages, Finite Automata, Regular Expressions etc.</li> <li>➤ Worked on proving the equivalency of Multi-Tape Turing Machine and Single-Tape Turing Machine.</li> </ul> <div> <span>Finite Automata</span> <span>CFL</span> <span>NP</span> </div>

## RELEVANT COURSEWORK

<b>Programming</b>	Data Structures and Algorithms, Fundamentals of Computing
<b>Mathematics</b>	Linear Algebra, Multivariable Calculus, Complex Analysis, ODE, PDE
<b>Electronics</b>	Introduction to Electrical Engineering, Power Electronics, Control Systems
<b>Psychology</b>	Human Perceptual Processes, Cognitive Neuroscience, Language Acquisition


## TECHNICAL SKILLS

<b>Languages</b>	Python, C++, C, HTML, CSS, JavaScript
<b>Frameworks</b>	NodeJs, Django, TensorFlow, Matplotlib, Keras
<b>Utilities</b>	MySQL, Git, MongoDB, Heroku, Linux Shell Utilities, $\LaTeX$ , MATLAB

## ACHIEVEMENTS

	Received a <b>Pre-Placement Offer from Uber India R&amp;D team</b>
	<b>Academic Excellence Award</b> for exceptional academic performance in sophomore year
<b>Examinations</b>	<b>Goethe-Zertifikat A2 Fit in Deutsch 2</b> (German Examination Level A2) <b>Regional Mathematics Olympiad</b> (State-Level), Merit Certificate <b>Maharashtra Talent Search Examination</b> (State-Level), Merit Certificate
<b>Competitions</b>	<b>Pitch Prime 2019 Winner</b> , Idea pitching event for the students of IIT Kanpur
<b>Dance</b>	<b>Bharatnatyam Prarambhik</b> , Tilak Maharashtra Vidyapeeth, Pune

## EXTRACURRICULARS

<b>Leadership</b>	Senior Executive, Entrepreneurship Cell, IIT Kanpur Secretary, Book Club, IIT Kanpur
<b>Positions</b>	Student Guide and Academic Mentor, Counselling Service, IIT Kanpur
<b>Talks</b>	Department of Cognitive Science, IIT Kanpur  The Circular Problem of Attention and Perception  How Intelligent is Perception?  Are Sensation and Perception Separate Stages?