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**Indian Institute of Technology Kanpur** July'10 - May'14  
*Bachelors in Electrical Engineering*  
**GPA: 8.7/10.0**

**Publications**

**Mohit Agarwal** and Raghupathy Sivakumar, “Charge for a whole day: Extending Battery Life for BCI Wearables using a Lightweight Wake-Up Command”, ACM CHI 2020

**Mohit Agarwal** and Raghupathy Sivakumar, “BLINK: A Fully Automated Unsupervised Algorithm for Eye-Blink Detection in EEG Signals”, Allerton 2019

**Mohit Agarwal**, Duo Xu, Faramarz Fekri and Raghupathy Sivakumar, “Playing Games with Implicit Human Feedback”, Workshop on Reinforcement Learning for Games at AAAI, 2020

**Mohit Agarwal**, SK Venkateswaran and R. Sivakumar, “Human-in-the-loop RL with an EEG wearable headset: on effective use of brainwaves to accelerate learning”, ACM WearSys’20

**Mohit Agarwal** and Raghupathy Sivakumar, “Cerebro: A Wearable Solution to Detect and Track User Preferences using Brainwaves”, ACM WearSys Workshop at MobiSys 2019

**Mohit Agarwal** and Raghupathy Sivakumar, “THINK: Toward Practical General-Purpose Brain-Computer Communication”, HotWireless Workshop at MobiCom 2015

Ekansh Gupta, **Mohit Agarwal** and Raghupathy Sivakumar, “Blink to Get In: Biometric Authentication for Mobile Devices using EEG Signals”, ICC 2020

Atul Kumar Sinha, **Mohit Agarwal** and Ajit K. Chaturvedi, “Multi-Level SINR Thresholding for Reduced Complexity MIMO Detection” in NCC, 2013

Onur Ozdemir, Lakshmi N. Theagarajan, **Mohit Agarwal**, T. Wimalajeewa and Pramod K. Varshney, “An MCMC Approach to Multisensor Linear Modulation Classification”, WCNC 2017

**Mohit Agarwal**, Duo Xu, Faramarz Fekri and Raghupathy Sivakumar, “Accelerating Reinforcement Learning Agent with EEG-based Implicit Human Feedback”, IEEE Transactions on Systems, Man, and Cybernetics: Systems (under submission)

**Technical Skills** Python, C/C++, Java, MATLAB/R, Android Development, Web (HTML/CSS/d3.js), L<sup>A</sup>T<sub>E</sub>X  
Deep Learning Frameworks: **Tensorflow**, Caffe, Torch and Keras

Internships	<b>Apple, USA</b> - Wireless Technologies Group Summer'18 <i>Wireless Software Development</i> , Mentors: Firouz Behnamfar and Velu Elangovan <ul style="list-style-type: none"> <li>Developed a system-level discrete event simulator in C++ to characterize and optimized the parameters of a radio-access technology (undisclosed, and developed in-house)</li> </ul>
	<b>Lawrence Livermore National Laboratory</b> - CASC Summer'17 <i>Machine Learning Research</i> , Mentor: J. J. Thiagarajan <ul style="list-style-type: none"> <li>Automated the Pair-Correlation Function (PCF) estimation for arbitrary point clouds (which traditionally either require manual tuning for estimation, or takes several days for MD simulation)</li> </ul>
	<b>Cisco Systems, Inc. USA</b> Summer'16 <i>Deep Learning Research</i> , Mentors: Rob Liston and Dan Tan <ul style="list-style-type: none"> <li>Designed DNNs using LSTMs in Tensorflow, for action recognition in video clips using UCF-101</li> <li>The proposed stateful model performed with more than 25% accuracy over stateless model</li> </ul>
	<b>Syracuse University, USA</b> - Sensor Fusion Lab Summer'13 <i>Wireless Communication Research</i> Mentor: Prof. Pramod Varshney <ul style="list-style-type: none"> <li>Developed algorithm for automatic identification of digital modulation in wireless communication in the presence of noisy environment having unknown channel parameters using Bayesian model</li> <li>Proposed <i>Collapsed Gibbs sampling</i> based approach for channel parameter estimation</li> <li>Performs with more than 90% correct classification probability for higher-order QAMs</li> </ul>
Research Experience	<b>Multi-Human Assisted Learning for Machine Agents using EEG</b> Aug'18 - Present <i>BCI Research Project, Reinforcement Learning (Doctoral Thesis: Prof. Sivakumar and Prof. Fekri)</i> <ul style="list-style-type: none"> <li>Research, design and develop an interesting solution paradigm allowing humans to assist RL algorithms without burdening human-in-the-loop through EEG-based brain waves</li> <li>Demonstration of the impact of our approach in improving state-of-the-art RL algorithms (e.g., DQN) by developing multiple Atari-like discrete-grid based games in OpenAI Gym</li> <li>Experimentally showed that error-potentials can be learned in a zero-shot manner (with AUC <math>\geq 0.8</math>), and achieves a training acceleration of <b>2.25x</b> while making 75.56% less queries</li> </ul>
	<b>Low-Power Command Detection for BCI Wearables</b> Aug'16 - Aug'18 <i>BCI Research Project, Ubiquitous Computing, Deep Learning (Doctoral Thesis: Prof. Sivakumar)</i> <ul style="list-style-type: none"> <li>Proposed a wakeup command detection design and detection strategy enabling always-on BCI wearables to run on low-power mode achieving <b>2.7x</b> improvement in battery life</li> <li>Proposed BLINK, an algorithm to self-learn and detect eye-blinks in user brainwaves with <b>98% accuracy</b> and low false-positive rate without requiring any user-training</li> </ul>
	<b>THINK: Turning Thoughts into Action</b> Jan'15 - July'15 <i>BCI Research Project under Prof. Sivakumar as a part of Master's Thesis</i> <ul style="list-style-type: none"> <li>Developed THINK, a general purpose platform to communicate by mere imagination</li> <li>Explored signal processing and detection of <i>mu-waves</i>, specifically in non-invasive domain (EEG)</li> <li>Achieved counter-intuitive results for system accuracy (<b>81.2%</b>), think rate and form-factor</li> </ul>

<b>Academic Projects</b>	<b>VisualAIDS: An Interactive visualization of HIV/AIDS data</b> Oct'17 - Nov'17	
	<i>Information Visualization Project</i> (Information Visualization: Prof. Alex Endert)	
	<ul style="list-style-type: none"> <li>An interactive visualization designed in d3.js to investigate and explore HIV/AIDS data for various countries over time. More information at <a href="http://www.agmohit.com/VisualAIDS/">www.agmohit.com/VisualAIDS/</a></li> </ul>	
	<b>Modelling the Rehearsal Effect of Humans</b> Oct'16 - Nov'16 <i>Neuroscience and Machine Learning Project</i> (Computation and Brain: Prof. Santosh Vempala) <ul style="list-style-type: none"> <li>Demonstrated the notion of forgetting and rehearsal in humans in the realm of neural networks</li> <li>Successfully simulated Ebbinghaus forgetting curve and learning curve, and explored various rehearsal properties by building a Recurrent Neural Net in Tensorflow</li> </ul>	
	<b>Skin Lesion Analysis towards Melanoma Detection</b> Mar'16 - Apr'16 <i>Deep Learning Project</i> (Deep Learning: Prof. Zsolt Kira) <ul style="list-style-type: none"> <li>Automated skin cancer detection by proposing Deep Learning architectures based on CNNs for skin lesion segmentation, feature extraction and classification</li> <li>Won 2nd prize for the classification (81.3%) and feature extraction in ISBI 2016 Challenge</li> </ul>	
	<b>General Game Playing Agent</b> Jan'13 - Apr'13 <i>Artificial Intelligence Project</i> (Artificial Intelligence: Prof. Amitabha Bhattacharaya) <ul style="list-style-type: none"> <li>Developed an artificial gaming agent, capable of playing any game without human intervention</li> <li>Selected amongst top 5 projects, to compete on a global scale in GGP competition in AAI</li> </ul>	
	<b>Computer Science</b>	Machine learning, Deep Learning, Artificial Intelligence, Computation and Brain, Applied Cryptography, Mobile Computing, Advanced Programming Techniques, Android Application Development, Information Visualization, Data Structure and Algorithms
	<b>Mathematics</b>	Probability and Statistics, Linear Algebra, R Programming
<b>Academic Courses</b>	<b>Telecom/SP</b>	Information and Coding Theory, Random Processes, Digital Communication Networks, Communication Systems, Digital Signal Processing, Statistical Signal Processing, Advanced Digital Communications, Wireless Communications and Networks, Convex Optimization in SP/COM
	<b>Grants</b> NSF Award #1837369, <i>CPS: Small: Multi-Human Assisted Learning for Multi-Agent Systems using Intrinsically Generated Event-Related EEG Potentials</i> (\$500,000 PI: Prof. Sivakumar, Co-PI: Prof. Fekri, Jan'19 - Dec'21): Co-authored the awarded proposal with significant technical contribution	
	<b>PC Member</b>	ICWSM 2020
	<b>Session Chair</b>	Allerton 2019: Statistical and Signal Processing
<b>Professional Service</b>	<b>Reviewer</b>	ACM CHI'20, IMWUT'20,19, CogSci'20, ACT'19, MobileHCI'19, ICWSM'20,'19, AutomotiveUI'19,, IEEE Transactions on Mobile Computing'17,'18,'19