# Mohit Agarwal

# PhD Student at Georgia Tech

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# Research Interests

Brain-Computer Interfaces Reinforcement Learning Human-In-The-Loop ML Ubiquitous Computing Machine/Deep Learning

# Selected Coursework

Computer Science
Machine Learning
Deep Learning
Artificial Intelligence
Computation and Brain
Information Visualization
Applied Cryptography
Mobile Computing
Data Structure & Algorithms

Mathematics

Probability & Statistics Linear Algebra Convex Optimization

### Technical Skills

**Programming Languages** 

- Python MATLAB C/C++
- Java R Web: HTML CSS d3 JS

Deep Learning Frameworks

• Tensorflow • Torch

### Selected Awards

- 2nd Position Worldwide in ISBI Melanoma Detection Challenge
- Semi-Finalist Qualcomm Innovation Fellowship'18

# Responsibilities

PC Member

- ICWSM'20 Session Chair
- Allerton'19

Reviewer

 CHI, CogSci, IMWUT, ICWSM, IEEE TMC, MobileHCI, AutomotiveUI Education\_

**Georgia Institute of Technology** 

Fall'14 - Present (USA)

MS/PhD in Electrical and Computer Engineering | GPA: 4.0/4.0

Advisor: Prof. Raghupathy Sivakumar | Expected Graduation: Fall 2020

Indian Institute of Technology Kanpur

Fall'10 - Spring'14 (India)

Bachelors in Electrical Engineering | GPA: 8.7/10.0

Internships.

# **Apple** | Wireless Technologies

Summer'18 (USA)

**RAT Simulator:** Developed a system-level discrete event simulator in C++ to characterize and optimize the parameters of a radio-access technology (undisclosed, and developed in-house)

# Lawrence Livermore National Labs | Machine Learning

Summer'17 (USA)

**High Dimensional Spectral Sampling Methods:** Automated pair-correlation function estimation for arbitrary point clouds (traditionally requires manual tuning or multiple days of MD simulation)

## Cisco | Deep Learning

Summer'16 (USA)

**Video Action Classification:** Designed DNNs using LSTMs in Tensorflow, for action recognition in video clips using UCF-101 dataset| Proposed stateful model performed with > 25% accuracy improvement

### **Syracuse University** | Wireless Communication

Summer'13 (USA)

**Automatic Modulation Classification in WSNs:** Developed algorithm for automatic identification of digital modulation in wireless communication in the presence of noisy environment using Bayesian model | Proposed *Collapsed Gibbs sampling* based approach, with > 90% accuracy for higher-order QAMs

Selected Research Projects\_\_\_

# Multi-Human Assisted Learning for Machine Agents using EEG

Fall'18 - Present

- | Brain-Computer Interfaces (BCIs) and Reinforcement Learning [Doctoral Research Work]
- 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
- 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
- Experimentally showed that error-potentials can be learned in a zero-shot manner (with AUC > 0.8), and achieves 2.25x acceleration in training while making 75.56% fewer queries

#### Low-Power Command Detection for BCI Wearables

Fall'16 - Spring'18

| BCIs, Ubiquitous Computing and Statistical Learning [Doctoral Research Work]

- Proposed a wakeup command design and detection strategy enabling always-on BCI wearables to run on low-power mode achieving 2.7x improvement in battery life
- Proposed algorithm to self-learn and detect eye-blinks in user brainwaves with 98% accuracy

# Skin Lesion Analysis towards Melanoma Detection | Deep Learning

Spring'16

 Automated skin cancer detection by proposing CNN based deep architectures for skin lesion classification | 81.3% accuracy, 2nd position worldwide in ISBI Melanoma Detection Challenge

Selected 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", **IEEE Allerton 2019** 

Mohit Agarwal, Duo Xu, F. Fekri and Raghupathy Sivakumar, "Playing Games with Implicit Human Feedback", Workshop on Reinforcement Learning for Games at AAAI, 2020

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)