

# Nishant Kumar

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## EDUCATION

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### IIT (BHU), Varanasi

B.Tech in Electronics Engineering (GPA: 9.3/10)

Varanasi, India  
2018 - 2022(Expected)

### Carmel Junior College

ICSE with Computer Science (Percentage: 96.40)

Jamshedpur, India  
2001 - 2016

## WORK EXPERIENCE

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### Research Intern at University of Alberta

Supervisor: Dr Matthew E. Taylor (IRL lab)

[paper]  
Jan - May 2021

- Proposed a set of multiagent heterogeneous agents (HAMMER) who master multi-level coordination through messaging, thereby enhancing the capabilities of state-of-the-art reinforcement learning algorithms.
- Our work was **accepted** in the Adaptive and Learning Agents workshop, **AAMAS 2021**.

### MasterCard AI intern

Mentors: Gaurav Dhama

[paper]  
May - Jul 2021

- Formulated a novel gradient-free approach which uses evolution to create specialized perturbation attacks (ESPA) on classifiers.
- Demonstrated its **excellent sample efficiency**, by producing successful attacks using just **4%** queries of HopSkipJump.
- The 2-month work was **accepted** as an oral presentation at **ICMLA 2021**.

### Google Summer of Code (mlpack)

Mentors: Marcus Edel, Rahul Prabhu

[link]  
May - Aug 2020

mlpack is a fast, flexible machine learning library, written in C++ and developed at **FASTLab, Georgia Tech**.

- Improved the current **QLearning** implementation, and added **Dueling, Noisy, Categorical and N-Step** extensions, with tests, as improvements on DQN, thus completing the **Rainbow** [Hessel et al., 2017] architecture.
- Implemented **Soft Actor-Critic (SAC)** [Haarnoja et al., 2019] for continuous action space, along with its tests.

### Microsoft Research NYC developer

Reinforcement Learning Open Source fest; Mentors: Peter Chang, Jack Gerrits

[link]  
May - Aug 2021

Vowpal Wabbit is known for its ability to solve complex machine learning problems extremely fast.

- Worked on making it even faster by multi-threading the parser bottleneck for all three input formats.
- Re-designed and implemented cache to support efficient parallel parsing, improving performance by **25%**.
- Improved performance of text parser by **60%** and added support for multi-threaded JSON parsing (now **68%** faster).
- Exposure:** locks, mutexes, condition variables, valgrind, callgrind, mutrace, GDB for multithreading

## SELECTED PROJECTS

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- Evolutionary Computing**: On-browser AI playing the Flappy bird game, using Javascript. Dec 2018 [link]
- Visual Servoing on grid-world robot**: Involves BFS path planning and PID control. Jan 2019 [link]
- Dynamic Hand Gesture recognition system**: Using gestures to control PC, drive a RC car. April 2019 [link]
- Math Helper**: Solves calculus and algebraic equations from camera feed, and plots them in real time. Mar 2019 [link]
- JerBot - a biomimetic bipedal bot**: An innovative approach for addressing the problem of biped locomotion. Dec 2019 [link]
- Intelligent pick and place robot**: useful in warehouses with large workspaces. Aug 2020 [link]
- FMA-DQN**: a novel formulation to perform federated, distributed learning for Deep RL algorithms. Dec 2020 [link]
- Skin Lesion Image Classification**: Dealing with unbalanced dataset + ensembling large models. Feb 2020 [link]
- Insti-app**: App for managing activities of IIT(BHU), used by 1000+ students across campus. Dec 2020 [link]

## AWARDS AND ADDITIONAL INFORMATION

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- One among **10** students selected globally (among **3** in India), for the RL Open Source fest [link], by **Microsoft**. April 2021 [link]  
Received a stipend of **\$ 10,000** for the **4** month project.
- Qualified for the **National Finale** in **Flipkart** GRID 2.0 Robotics challenge. Aug 2020 [link]
- Selected among **1199** students, out of **51,244** students from **178** countries registered for the prestigious **Google** Summer of Code Program, 2020. May 2020 [link]
- 1st** Prize out of **50+** teams in MLware, the Machine Learning Event of Technex'20. Feb 2020 [link]
- 1st** Prize in Mosaic, the Machine Learning and Computer Vision Event of Electronics fest Udyam'19. Apr 2019 [link]
- 1st** Prize in Pixelate, the Computer Vision Event of technical fest Technex'19. Mar 2019 [link]
- Secured All India Rank **2434** in JEE Advanced 2018 among **150,000** candidates. June 2018
- Appointed as the **Joint Head** of the elite **Club of Programmers**, IIT(BHU). Organised workshops, talks and hackathons to promote research-oriented machine learning in the institute. Aug 2020 - Present
- Programming Skills:** C++, Python, C, Dart, JavaScript, LaTeX, Java
- Technology Skills:** Keras, FastAI, PyTorch, Scikit-learn, Pandas, OpenCV, git, Tensorflow, Raspberry Pi, Arduino