# Nikhil Agarwal

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## Summary


*Masters Computer Science student with 2 years of work experience on optimization algorithms in the Vehicle Routing Problem domain. Currently research assistant at the Interactive Robotics Lab, working on Reinforcement Learning algorithms, seeking full time position starting July 2021.*


## Education

- **Arizona State University** — Tempe, AZ
  *Master of Science in Computer Science(Thesis); GPA: (3.83/4.0)* — *Aug. 2018 – May. 2021*
- **PES Institute of Technology** — Bangalore, India
  *Bachelor of Technology in Computer Science and Engineering; GPA: (8.53/10.0)* — *Aug. 2012 – July. 2016*

## Professional Experience

- **Arizona State University** — Tempe, AZ
  *Research and Teaching Assistant (Tensorflow, PyTorch, Bullet, Gym)* — *Jun 2019 - May 2021*
  - **Research Assistant - Reinforcement Learning**: Research on novel reinforcement learning problems, consisting both model-based (PDDM, Dreamer) and model-free (AdaCurv) algorithms applied to MuJoCo-based complex robotic environments.
- **Intel Labs** — Arizona, US
  *Graduate Intern (Tensorflow, PyTorch, Kubernetes)* — *May 2020 - Aug 2020*
  - **Reinforcement Learning**: Worked on developing model-based RL algorithms (PDDM, Dreamer) that learn policies in complex environments faster, while also taking highly risk-averse actions, all by leveraging distributed RL rewards (C-51).
- **Tesco PLC** — Bangalore, India
  *Software Developer (Java, AWS, React Native, Couchbase)* — *Aug 2016 - Jun 2018*
  - **Vehicle Routing Problem**: Developed Heuristic and meta-heuristic algorithms solving Vehicle Routing Problems in Supply Chain on end-customer delivery schedule optimization for the whole of UK.
    - Deployed real-time on 350+ stores operating 12500+ delivery vans everyday on multiple shifts.
    - Increased van utilization by 7-8% across the entire estate.
    - Awarded resilient individual award for 2017-18 across Tesco Engineering India.
  - **Tesco Labs**: Researched customer shopping behavior when using NLP bots.
    - Built a IOS/Android hybrid app to test online group shopping behaviour at various age groups using chatbots.
    - App went live to a group of 30+ families across UK, receiving positive feedback

## Academic Projects

- **Adacurv (PyTorch, Bullet)**: Worked on 2nd order natural gradient descent based optimization algorithm for model-free Reinforcement Learning, tested on OpenAI gym MuJoCo environments.
- **Learning lane changing policies (Python, Numpy, VRep)**: Implemented Max Entropy based Inverse Reinforcement Learning algorithm, training car to avoid random objects using distance sensor in a simulated 3-lane env developed in VRep.
- **Air dribble using quadcopter (Tensoflow, VRep)**: Trained quadcopter to bounce a ball in air, using policy-based RL algorithms VPG and PPO. The environment was built in VRep.
- **Image-based Search Engine (Python, Numpy, Pandas)**: Given an image, used techniques like Page rank, Personalized page rank, k-nearest neighbours, locality sensitive hashing for retrieving similar images from a dataset of 8900+ images belonging to 30 different categories.
- **Bitcoin Pricing Prediction (TensorFlow, Numpy, Pandas, Matplotlib)**: Compiled own dataset by crawling web for 33 different parameters. Implemented basic neural network to predict bitcoin prices.

## Activites

- **NeurIPS 2019**: Finished 12th rank after 2nd round in the Learn to Move - Walk Around challenge (Reinforcement Learning on Musculoskeletal Models).
- **Phoenix Children's Hospital**: Collaborated with doctors from Phoenix Children Hospital as part of Luminosity Lab, ASU on a research project to help identify and address communication gaps between patients and their doctors.