KARUSH SURI

LinkedIn ◇ Google Scholar ◇ GitHub
Homepage- karush17.github.io
Email- karush.suri@mail.utoronto.ca

RESEARCH INTERESTS

Karush is a graduate student at the University of Toronto completing his M.A.Sc in Electrical and Computer Engineering. His research focuses on developing novel intelligent agents for reinforcement learning, deep learning, planning and robotic control.

EDUCATION

University of Toronto 2019 - Present
Master of Applied Science (M.A.Sc) *Toronto, Canada*

- Department: Electrical & Computer Engineering
- Thesis: Deep Hierarchical Reinforcement Learning (link) (video)
- Advisors: Prof. Yuri A. Lawryshyn & Prof. Konstantinos N. Plataniotis
- GPA: 4/4

Amity University 2015 - 2019
Bachelor of Technology (B.Tech) *Delhi, India*

- Department: Electronics & Communication Engineering
- Thesis: Application of Deep Learning & Game Theory for Sign Language Recognition using Wearable Sensors (link)
- Advisor: Prof. Rinki Gupta
- GPA: 8.78/10

SCHOLARSHIPS & AWARDS

University of Toronto, Canada
Electrical & Computer Engineering Fellowship *2020-2021*
Edward S. Rogers Graduate Scholarship *2019-2020*

Amity University, India
Best in Technical Innovation Award (class of 2015-2019) *2019*
Most Frugal Innovation Award *2018*
100% Curriculum Merit Scholarship *2015*

Others
Young Achievers Award *2015*

RESEARCH APPOINTMENTS

Borealis AI 2019 - Present
Thesis Researcher *Toronto, Canada*

- Proposed Energy-based MIXer (EMIX) networks for surprise minimization in multi-agent StarCraft II.
- Proposed Evolution-based Soft Actor Critic (ESAC) combining ES and SAC with novel Automatic Mutation Tuning (AMT) for sample-efficient and scalable reinforcement learning.
- Proposed bilevel hierarchical framework for practical deep hierarchical reinforcement learning applications using energy-based policies.

University of Toronto 2019 - Present
Graduate Research Assistant- Reinforcement Learning *Toronto, Canada*

- Affiliated with the Center for Management of Technology & Entrepreneurship (CMTE)
- Developing joint policy optimization algorithms for continuous control and multi-agent reinforcement learning.
- Developed Hierarchical Reinforcement Learning methods for cooperation and competition with Multi-Agent Learning using CapsNet and ConvNet.
- Improved policy gradient algorithms in conjunction with evolution-based methods.

Amity University 2017 - 2019
Undergraduate Research Assistant- Deep Learning *Delhi, India*

- Affiliated with the Signal Processing & Deep Learning Lab
- Project entitled "Indian Sign Language to Spoken Language Translator using data from Wearable Multisensor Armbands" Funded by the Department of Science and Technology, Government of India.
- Proposed novel CapsNets and ConvNets for non-cooperative games in real-time gesture recognition from wearable IMUs
- Proposed Master-Slave Nets for knowledge transfer in hand motion using sEMG sensors.

PUBLICATIONS

- Karush Suri, Xiao Qi Shi, Konstantinos N. Plataniotis, Yuri A. Lawryshyn, "*Energy-based Surprise Minimization for Multi-agent Value Factorization*", Deep Reinforcement Learning Workshop, 34^{th} Conference on Neural Information Processing Systems (NeurIPS) 2020. (website) (arXiv)
- Karush Suri, Xiao Qi Shi, Konstantinos N. Plataniotis, Yuri A. Lawryshyn, "*Maximum Mutation Reinforcement Learning for Scalable Control*", Deep Reinforcement Learning Workshop, 34^{th} Conference on Neural Information Processing Systems (NeurIPS) 2020. (website) (arXiv)
- Karush Suri, Rinki Gupta, "*Continuous Sign Language Recognition from Wearable IMUs using Deep Capsule Networks and Game Theory*", Computers And Electrical Engineering, Elsevier, Vol. 78, 2019. (arXiv) (code)
- Karush Suri, Rinki Gupta, "*Transfer Learning for sEMG-based Hand Gesture Classification using Deep Learning in a Master- Slave Architecture*", 3^{rd} International Conference on Communication and Computational Intelligence (IC3I) 2018, IEEE. (arXiv) (code)

INDEPENDENT STUDIES

- Karush Suri, "*On Variational Generalization Bounds for Unsupervised Visual Recognition*", Report, 2020. (link) (code)
- Karush Suri, "*On Cooperation in Multi-Agent Reinforcement Learning*", Report, 2020. (link) (code)
- Karush Suri, Shashank Saurav, "*Attentive Hierarchical Reinforcement Learning for Stock Order Executions*", Report, 2020. (link) (code)

TEACHING ASSISTANTSHIPS

- ECE1512H *Digital Image Processing and Applications*, University of Toronto (Winter 2021)
- CSC104H *Computational Thinking*, University of Toronto (Winter 2021)
- CSC2209H *Computer Networks*, University of Toronto (Fall 2020)
- CSC458H *Computer Networking Systems*, University of Toronto (Fall 2020)
- CSC258H *Computer Organization*, University of Toronto (Winter 2020)

· MATH *Integral Calculus*, Sai Kripa Orphanage (Summer 2016)
· MATH *Numerical Differentiation*, Sai Kripa Orphanage (Summer 2016)
· MATH *Linear Algebra*, Sai Kripa Orphanage (Summer 2016)

INDUSTRY EXPERIENCE

EdAuthority 2018-2019
Content Management Intern- Data Science *Delhi, India*

· Published blog posts on data science concepts and their extensions to the education industry.
· Backend website management and development of scalable solutions for a digital platform.

Airtel 2018
Summer Engineering Intern *Delhi, India*

· Project entitled "Fundamentals of Network Communication".
· Calibrated network interface cards and connectivity sensors for throughput handling.

Reliance Jio 2017
Summer Engineering Intern *Delhi, India*

· Project entitled "Excel Data Processing Automator using Python Programming".
· Automated excel data management for spreadsheet handling and cell-to-cell logging.

Sony 2016
Summer Engineering Intern *Delhi, India*

· Project entitled "LCD Television Systems and BRAVIA Engine Applications".
· Programmed BRAVIA engine cards for video processing and image analysis.

ORGANIZATIONAL WORK & SERVICES

IEEE Signal Processing & Integrated Networks (SPIN) 2017-2019
Lead Organizer *Delhi, India*

· Head of the stage team at 6^{th} SPIN.
· Member of the coordinating committee at 5^{th} SPIN.
· Member of the volunteering committee at 4^{th} SPIN.

Signal Processing & Deep Learning Lab 2017-2019
Lab Assistant *Delhi, India*

· Hand motion data collector for lab test subjects.
· sEMG and IMU sensor calibrator for real-time demonstrations.

TECHNICAL SKILLS

Languages- Python, Lua, MATLAB, HTML, SQL, C, C++, Assembly, Markdown, LaTeX.
Frameworks- PyTorch, Tensorflow, torch7, Keras, Numpy, Flask, scikit-learn, Matplotlib.
Platforms- Amazon Web Services, Google Cloud Platform, Git.