

# Kowshik Thopalli

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## EDUCATION

<b>PhD Electrical Engineering, Signal Processing (CGPA: 4.0/4.0)</b>	<b>01/2018 -09/2022 (Expected)</b>
Ira A. Fulton School of Engineering, Arizona State University, Tempe, AZ	
<b>M.S., Electrical Engineering, Signal Processing (CGPA: 3.97/4.0)</b>	<b>01/2016 - 12/2017</b>
Ira A. Fulton School of Engineering, Arizona State University, Tempe, AZ	
<b>Thesis-</b> Perturbation Robust Representations of Topological Persistence Diagrams	
<b>Bachelors in Technology, Electrical Engineering (CGPA: 9.09/10)</b>	<b>08/2009 - 05/2013</b>
Gandhi Institute Of Technology and Management, Visakhapatnam, India	

## PROFESSIONAL EXPERIENCE

<b>Graduate Research Assistant, Geometric Media Lab, ASU, Tempe   Matlab, Python, R</b>	<b>08/2017 – present</b>
<ul style="list-style-type: none"><li>I am an ML researcher with a strong focus on computer vision. I have worked and published in areas of computer vision such as Unsupervised Domain Adaptation, Domain Generalization, Visual Navigation using Reinforcement Learning, Counter-factual learning for explainable AI, and 3D reconstruction from sparse views. I have also collaborated with a large inter-university team to innovate and build systems that enable home-based stroke rehabilitation.</li><li>My current research interests are innovating and proposing algorithms to improve the robustness of machine learning models under different distribution/domain/task shifts and knowledge-integrated data learning.</li></ul>	
<b>Lawrence Livermore National Laboratories, Research Intern, Livermore, California   PyTorch</b>	<b>06/2021 – 08/2021</b>
<ul style="list-style-type: none"><li>Proposed a principled algorithm to improve the generalization of computer vision models to unseen domains using meta-learning and deep ensembling techniques. The proposed solution improved upon state-of-the-art by more than 3% points across multiple benchmarks.</li><li>This resulted in two NeurIPS workshop papers and one journal submission.</li></ul>	
<b>Microsoft Research, Research Intern, Seattle, WA   PyTorch   MultiModal Learning   Geo-Spatial</b>	<b>05/2020-08/2020</b>
<ul style="list-style-type: none"><li>Developed AsyncFusion a novel patent-pending solution to multimodal problems with systemic asynchronicity between spatial and temporal modalities.</li><li>AsyncFusion applications include - Geospatial applications such as precision agriculture, interpolation of soil moisture across a farm given sparse sensor deployment, and predicting wildfire boundary maps.</li></ul>	
<b>SRI International, Center for vision technologies, Research Intern, Princeton, NJ   PyTorch   Habitat</b>	<b>05/2019 - 08/2019</b>
<ul style="list-style-type: none"><li>Constructed efficient algorithms for visual navigation via Deep Reinforcement Learning (PPO)</li><li>Proposed novel attention schema for utilizing scene semantics using Transformers.</li><li>Achieved 38% relative improvement on navigation metrics (Success weighted by Path Length) on MP3d dataset against prior art given the same amount of agent's experience.</li><li>Work published in International Conference on Robotics Applications, ICRA'2021</li></ul>	
<b>Lawrence Livermore National Laboratories, Research Intern, Livermore, California   PyTorch</b>	<b>06/2018 – 08/2018</b>
<ul style="list-style-type: none"><li>Proposed a novel approach to the problem of unsupervised domain adaptation via Grassmannian analysis (resulted in a paper in ICASSP'19).</li><li>Constructed Optimal Transport based generative models and GAN's that can generate manifold-valued samples.</li></ul>	
<b>Larsen &amp; Toubro Inc, Sr Engineer (Electrical), Odisha, India</b>	<b>07/2013 – 08/2015</b>
<ul style="list-style-type: none"><li>Worked as a Senior Engineer in the supply chain management department through collecting and managing the data of vendors and co-ordination with the on-site planning department.</li></ul>	

## SELECTED PUBLICATIONS

- Thopalli, K\*, Ahmed, T\*, Rikakis, T., Turaga, P., Kelliher, A., Huang, J. B., & Wolf, S. L. (2021). [Automated movement assessment in stroke rehabilitation](#). *Frontiers in Neurology*, 1396. (\* equal contribution)
- Thiagarajan, J. J., Thopalli, K., Rajan, D., & Turaga, P. (2022). [Training calibration-based counterfactual explainers for deep learning models in medical image analysis](#). *Nature Scientific Reports*, 12(1), 1-15.
- Thopalli, K., Turaga, P. K., & Thiagarajan, J. J. (2021, October). [Re-labeling Domains Improves Multi-Domain Generalization](#). In *NeurIPS 2021 Workshop on Distribution Shifts: Connecting Methods and Applications*.
- Thopalli, K., Katoch, S., Thiagarajan, J. J., Turaga, P. K., & Spanias, A. (2021, October). [Multi-Domain Ensembles for Domain Generalization](#). In *NeurIPS 2021 Workshop on Distribution Shifts: Connecting Methods and Applications*.

- **Thopalli, K.**, Katoch, S., Spanias, A., Turaga, P., & Thiagarajan, J. J. [Improving Multi-Domain Generalization through Domain Re-labeling](#). Under Review IEEE TNNLS
- Thopalli, K., Thiagarajan, J. J., Anirudh, R., & Turaga, P. K. (2022). [Revisiting Deep Subspace Alignment for Unsupervised Domain Adaptation](#). Under Review (IEEE TIP)
- **Thopalli, K.**, Anirudh, R., Thiagarajan, J. J., & Turaga, P. (2019, May). [Multiple subspace alignment improves domain adaptation](#). In ICASSP 2019-2019 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) (pp. 3552-3556). IEEE
- Seymour, Z., **Thopalli, K.**, Mithun, N., Chiu, H. P., Samarasekera, S., & Kumar, R. (2019). [MaAST: Map Attention with Semantic Transformers for Efficient Visual Navigation](#). 2021 International Conference on Robotics and Automation (ICRA). IEEE, 2021
- A. Som\*, **Thopalli, K.\***, K. N. Ramamurthy, V. Venkataraman, A. Shukla, P. Turaga, [Perturbation Robust Representations of Topological Persistence Diagrams](#), European Conference on Computer Vision (ECCV), September 2018. (\* equal contribution)
- **Thopalli, K.**, Thiagarajan, J. J., Anirudh, R., & Turaga, P. (2019). [SALT: Subspace Alignment as an Auxiliary Learning Task for Domain Adaptation](#). *arXiv preprint arXiv:1906.04338*.
- Venkatesh, B., Thiagarajan, J. J., **Thopalli, K.**, & Sattigeri, P. (2020). [Calibrate and Prune: Improving Reliability of Lottery Tickets Through Prediction Calibration](#). *arXiv preprint arXiv:2002.03875*.
- **Thopalli, K.\***, Katoch, S.\*, Thiagarajan, J. J., Turaga, P., & Spanias, A. (2019). [Invenio: Discovering Hidden Relationships Between Tasks/Domains Using Structured Meta Learning](#) (\* equal contribution)

## TECHNICAL SKILLS

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- **Programming Languages:** *Python, MATLAB, R, Max*
- **Machine Learning tools:** *PyTorch, TensorFlow, Keras, Scikit-learn.*
- **Packages:** Topological Data Analysis ( TDA-R, DIPHA, Ripser, TTK), Python Optimal Transport, pandas
- **Application software:** OpenCV, AWS, Git, VMWare, MeshLab, Blender
- **Relevant Coursework:** Deep Learning, Computer Vision Pattern Recognition, Convex Optimization, Random Processes, Image Processing, Computational Cameras, Machine Learning, Quantum Computing.

## TEACHING EXPERIENCE

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- Served as a T.A. and grader for EEE 202- Electrical Circuits-1 hands-on Lab with more than 100 students with a focus on understanding the practical applications along with maintaining tight safety precautions.
- Teaching assistant to the transdisciplinary graduate class AME 520- Understanding Activity that uses motion capture studios and real-time video processing.

## AWARDS

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- Received 4 awards at SRI International: Most Innovative | Most Impactful | Best Poster and People's Choice

## LEADERSHIP

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- Served as the president of SPICMACAY ASU (for 2.5 years) a student organization at ASU for promoting Indian classical music and arts
  - Organized multiple classical vocal concerts and dance performances with ASU students as the main performers
  - Invited renowned Indian classical artists for concerts and raised funds for the same.