

# Rutav Shah

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## EDUCATION

Education	Institute	Year	CPI / %
B. Tech: Computer Science and Engineering	IIT Kharagpur	June'18 - Present	9.65 / 10

## TECHNICAL SKILLS

- **Languages** : Python | C | C++ | PHP |  $\LaTeX$ .
- **Libraries and Tools** : PyTorch | MuJoCo | OpenCV | ROS | Gazebo.
- **Relevant Coursework** : Reinforcement Learning, Image Processing, Scalable Data Mining, Artificial Intelligence, Deep learning, Machine Learning, Parallel Programming, Probability & Statistics, Algorithms I&II

## PUBLICATIONS

- **RRL : Resnet as Representation for Reinforcement Learning.** *Rutav Shah, Dr. Vikash Kumar.*  
International Conference on Machine Learning (ICML), 2021 [Video] [ArXiv] [Website]
- **Contrast and Mix: Temporal Contrastive Video Domain Adaptation with Background Mixing.**  
*Aadarsh Sahoo\*, Rutav Shah\*, Dr. Rameswar Panda, Dr. Kate Saenko, Dr. Abir Das.* [Website]  
Neural Information Processing Systems (NeurIPS), 2021

## RESEARCH EXPERIENCE

- **Robotics Institute Summer Scholar (RISS) program, Carnegie Mellon University**  
*Advisor: Dr. Vikash Kumar, Dr. Yunzhu Li, Dr. Abhinav Gupta* [Video] [Paper] [Poster]
  - Representations play an important role in learning policies efficiently with **better generalization**.
  - Learns representation that is (a) robust to environmental variations (b) semantically meaningful.
  - Policy acquired using such representations generalize to **semantically similar, unseen** objects.
- **Contrast and Mix: Temporal Contrastive Video Domain Adaptation with Background Mixing**  
*Advisor: Dr. Abir Das, Dr. Rameswar Panda, Dr. Kate Saenko* [Accepted at NeurIPS 2021]
  - **Unsupervised domain adaptation (UDA)** reduces the burden of collecting large-scale supervised data by adapting a model learned on a labelled source domain to an unlabelled target domain.
  - Novel extension to temporal contrastive loss by background mixing that allows additional positives per anchor, thus adapting contrastive learning to **leverage action semantics shared across domains**.
  - Additionally, integrate a supervised contrastive learning objective using pseudo label information from the target domain to **enhance discriminability of the latent space**.
  - Extensive experiments on **several challenging benchmarks** (UCF-HMDB, Jester and Epic-Kitchens).
- **RRL : Resnet as Representation for Reinforcement Learning**  
*Advisor: Dr. Vikash Kumar* [Accepted at ICML 2021]
  - **Learning via visual observations space** bears a few challenges (a) Input space is quite high dimensional. (b) Contains a lot of noise, it is flushed with information irrelevant to the task.
  - Demonstrate that **features learned by image classification models** are general towards different tasks, robust to visual distractors, can **efficiently acquire policies** from proprioceptive inputs.
  - On a simulated high-dimensional dexterous manipulation tasks, our approach can learn behaviors directly from visual inputs with **performance and sample efficiency approaching state-based methods**.

## MENTORING & OUTREACH

- Part of initial team at Robotics Institute, Carnegie Mellon University for creating a global, non-profit, two-way communicative platform that enhances educators' ability to engage students in robotics.
- Teaching assistant at *Epsilon Camp, Raising a Mathematician, India* targeted to provide an early start and exposure to higher level Mathematics for students of ages 9 to 12 - Website
- Mentored three students at the undergraduate level regarding academics and coursework.

## COMPETITIONS

- **EkLavya 7.0, Intelligent Ground Vehicle Competition (IGVC), 2019, Oakland University, USA**
  - **Secured First Position** in the Qualification round and Runners up position in the Auto-Nav Challenge.
  - Used various ROS packages, implemented RANSAC and modified the same to fit for the purpose.

## ACADEMIC ACHIEVEMENTS

- **2nd Position, Mathematical Olympiad, Indian Institute of Technology, Kharagpur, 2019**
- **JEE Advanced, All India Rank 257 (Top 0.1%), Indian Institute of Technology (IITs), 2018**
- **KVPY, All India Rank 278 (Top 1%), Department of Science and Technology, Government of India, 2017**
- **Merit in Indian National Mathematical Olympiad, Homi Bhabha Centre for Science Education (HBCSE), 2016**