

EDUCATION

Max Planck Institute for Intelligent Systems, Tübingen

Germany

Ph.D., Computer Science

Feb 2021 – present

Advisor: Prof. Michael Black

Carnegie Mellon University, School of Computer Science

Pittsburgh, USA

Master of Science in Computer Vision (MSCV)

Dec 2018

GPA: 4.15/4.33, Advised by Prof. Kris Kitani

Birla Institute of Technology and Science (BITS), Pilani

Hyderabad, India

Bachelor of Engineering with Honors in Electronics and Communication

July 2016

Engineering, Minor in Finance

GPA: 9.16/10 (top 2% among 1500 students, Merit scholarship recipient)

PUBLICATIONS

· **3D Human Pose Estimation via Intuitive Physics**

S Tripathi, L Muller, P C Huang, D Tzionas, M J Black. (under submission)

· **PERI: Part Aware Emotion Recognition In The Wild**

A Mittel, S Tripathi. ECCVW 2022

<https://cvml.page.link/peri>· **Occluded Human Mesh Recovery**

R Khirodkar, S Tripathi, K Kitani. CVPR 2022

<https://cvml.page.link/ochmr>· **AGORA: Avatars in Geography Optimized for Regression Analysis**

P Patel, P C Huang, J Tesch, D T Hoffman, S Tripathi, M J Black. CVPR 2021

<https://cvml.page.link/agora>· **PoseNet3D: Unsupervised 3D Human Shape and Pose Estimation**

S Tripathi, S Ranade, A Tyagi, A Agarwal. 3DV 2020 (oral)

<https://cvml.page.link/pose>· **Learning to Generate Synthetic Data via Compositing**

S Tripathi, S Chandra, A Agarwal, A Tyagi, J Rehg, V. Chari. CVPR 2019

<https://cvml.page.link/learn>· **C2F: Coarse-to-fine Vision Control System for Automated Microassembly**

S Tripathi, D Jain, H Sharma. Nanotechnology and Nanoscience Asia, 2018

<https://cvml.page.link/c2f>· **Sub-cortical morphology and voxel based features for Alzheimer's disease classification**

S Tripathi, SH Nozadi, M Shakeri, S Kadoury. ISBI 2017

<https://cvml.page.link/shape>· **Deep spectral-based shape features for Alzheimer's Disease classification**

M Shakeri, H Lombaert, S Tripathi, S Kadoury. MICCAI-SESAMI, 2016

<https://cvml.page.link/spec>

PATENTS

· **Three-dimensional pose estimation.**

S Tripathi, S Ranade, A Tyagi, A Agarwal. US Patent 11526697

· **Generation of synthetic image data using three-dimensional models.**

S Tripathi, S Chandra, A Agarwal, A Tyagi, J Rehg, V. Chari. US Patent 10909349

· **Generation of synthetic image data for computer vision models**

S Tripathi, S Chandra, A Agarwal, A Tyagi, J Rehg, V. Chari. US Patent 10860836

RESEARCH
EXPERIENCE**3D Human Pose Estimation via Intuitive Physics**

Dec 2021 – present

Advisor: Prof. Dimitrios Tzionas, Prof. Michael Black

MPI-IS, Tübingen

· Proposed novel biomechanically-inspired intuitive physics terms that are simple, differentiable and compatible with parametric body models such as SMPL/SMPLX

· Demonstrated that incorporating differentiable physics in 3D human pose estimation pipelines results in physically-plausible meshes

· Collected Mocap data with extreme poses to test our approach in challenging scenarios

Occluded Human Mesh Recovery

Aug 2021 – Dec 2021

Advisor: Prof. Kris Kitani

CMU

· Proposed a novel top-down mesh recovery architecture capable of leveraging image spatial context for handling multi-person occlusion and crowding

AGORA: Avatars in Geography Optimized for Regression Analysis

Aug 2020 – Dec 2020

Advisor: Prof. Michael Black

MPI-IS, Tübingen

· Developed a 3D human shape and pose estimation model trained on synthetic data that generalizes to real scenes using various 2D and 3D losses

· Added robustness to occluded scenes and support for the SMIL child model

· Evaluated our model on several 2D and 3D datasets and ran ablation studies

PoseNet3D: Unsupervised 3D Human Shape and Pose Estimation

Feb 2019 – Nov 2019

Collaborators: Dr. Amit Agarwal, Dr. Ambrish Tyagi

Amazon Lab126

- Proposed self-consistency and adversarial losses to train a novel unsupervised teacher model to estimate 3D human pose from RGB videos
- Weak supervision from the teacher was used to train a student model for estimating SMPL body mesh
- Solved issues such as occlusion, domain-gap and temporal jitter leading to realistic and smooth 3D sequence reconstructions on multiple in-the-wild video datasets

Learning to Generate Synthetic Data via Compositing

May 2018 – Nov 2018

Advisors: Prof. James Rehg, Dr. Amit Agrawal, Dr. Ambrish Tyagi

Amazon Lab126

- Proposed a network for generating novel composite images that retain scene context and realism
- Developed algorithms for efficient training of object detection and image classification models on synthetic composite data, using an online hard-positive mining approach
- Improved baseline Faster-RCNN mAP by 3.5% and baseline SSD mAP by 2.7% on various datasets.

ClassPaths: Weakly supervised class-specific subnets for faster-inference

Dec 2017 – Dec 2018

Advisors: Prof. Kris Kitani, Dr. Ambrish Tyagi, Dr. Varsha Hedau

CMU

- Exploited class-wise parameter redundancy and activation map sparsity for finding class-specific subnets (ClassPaths) for faster inference
- Proposed an auxiliary supervisor network trained on a multi-loss formulation to jointly optimize accuracy, sparsity, pair-wise selectivity and quantization on the learned class-specific subnets
- Deep-networks employing ClassPaths achieved similar performance as a full capacity network, with 40%-60% FLOPS reduction during inference

Deep Spectral-based Shape Features for Alzheimer's Disease Classification

Feb 2016 – Jul 2016

Undergraduate Thesis, Advisor: Dr. Samuel Kadoury

Univ. of Montreal

- Developed an unsupervised framework for classification of Alzheimer's disease patients using noisy T1-weighted MRI brain images
- Proposed a combination of grey-matter voxel-based intensity variations and 3D structural (shape) features parameterized with a spherical-harmonics representation
- Results presented near state-of-the-art accuracies (>89%) – outperformed conventional MRI shape-based strategies by 22%-27%

C2F: Coarse-to-Fine Vision Control System for Automated Microassembly

May 2014 – Dec 2014

Advisor: Dr. H D Sharma

Central Electronics Engineering Research Institute, Pilani

- Developed a completely automated, visual-servoing based closed loop system to perform 3D micromanipulation and microassembly tasks
- Solved challenges around object recognition/tracking, scene understanding, path planning and obstacle avoidance
- Results led to a ~75% reduction in setup and run time as compared to manual operation, while mitigating any risk of collision during grasp-and-drop experiments

SCHOLARSHIPS AND AWARDS

- Best business model and best pitch, Cyber Valley Startup Incubation Program 2022, Germany 2022 for our startup “YOGI – a virtual yoga classroom”
- IISc Bangalore Summer Research Fellowship – top 20 across India 2015
- *Best Technical Association Award*, BITS-Pilani 2014
- Tournament Winner, Cricket, Arena'13 National Sports Festival 2013
- Undergraduate MERIT scholarship, BITS Pilani – top 2% students 2012
- Founder President's Scholarship, Amity International – top student for 6 years 2011
- Junior Science Talent Search Examination (JSTSE) Scholarship – Ranked 22 in 20,000 applicants 2008

ACADEMIC DUTIES

Reviewer – CVPR 2022, BMVC 2022
 Reviewer – ICCV 2021, CVPR 2021
 Reviewer – ECCV 2020 (*Outstanding reviewer award*)
 Reviewer – CVPR 2020

TEACHING EXPERIENCE

Teaching Assistant – 16-720: Computer Vision, Prof. Kris Kitani Fall 2018, CMU
 Head Teaching Assistant – 16-385: Computer Vision, Prof. Ioannis Gkioulekas Summer 2018, CMU

PROFESSIONAL EXPERIENCE

Amazon Sunnyvale, USA
 Applied Scientist II (AS-II) (*promoted from AS-I in Sep 2020*) Feb 2019 – Feb 2021
 Improved 3D human activity reconstruction from 2D videos for enhancing action recognition/detection.
 Supported Computer Vision algorithm development for the new Echo Show. Worked on virtual try-on and body measurement estimation from images.

Amazon Lab126 Cupertino, USA
 Applied Scientist Intern May 2018 – Aug 2018

Worked on task-aware generation of synthetic image composites for training deep networks

Franklin Templeton Investments

Hyderabad, India

Summer Intern | Project: Financial Modelling for Tactical Asset Allocation

May 2015 – Aug 2015

Built machine-learning models for capturing statistical associations like lead-lag correlation and one directional causality which achieved a 12% improvement in hit-rate for forecasting yield-spreads (US-OAS)

**TECHNICAL
SKILLS**

Programming Languages Python, C++/C, MATLAB

Tools and Frameworks Pytorch, Tensorflow, Blender

**RELEVANT
COURSES**

16-826 Visual Learning and Recognition, CMU

10-601 Introduction to Machine Learning, CMU

16-822 Geometry Based Methods in Vision, CMU

16-811 Mathematical Fundamentals for Robotics, CMU

16-720 Computer Vision, CMU

**ACADEMIC
PROJECTS**

**Learning Scene Saliency Maps Using Superpixel-augmented
Convolutional Neural Networks**

Aug 2017 – Dec 2017

- Extracted SLIC superpixel segmentations in input images and defined a range and color separation vector as input to a Siamese Convolutional Neural Network (CNN)
- Trained the network on the ECSSD saliency dataset. Superpixels allow for significant speedup (4x) in training while capturing a larger spatial context, leading to more precise saliency maps

**Towards Integrating Model Dynamics for Sample Efficient Reinforcement
Learning**

Jan 2017 – May 2017

- Developed a principled approach for solving sample inefficiency issues while deploying model-free reinforcement learning in real environments
- Learned a dynamics model of the world by assuming domain-specific priors on real-world episodes. Used the learned dynamics model to augment real-world episodes as the training progressed
- Established that augmenting real-world data using an approximate world-model tends to be significantly more sample efficient than naïve model-free reinforcement learning

LEADERSHIP

- Member, External Affairs Committee (Graduate Student Assembly), CMU
- Secretary, Electrical and Electronics Association, BITS Pilani
Led a team of 37 members. Organised 25 major events, 6 during the technical festival
- Computer Vision Mentor, Student Mentorship Program (SMP), BITS Pilani
Conducted evening classes for teaching 30 junior batch students
- Represented BITS Pilani cricket team in inter-college cricket tournaments and sports festivals
- Organizer of National Seminar on Indian Space Technology (NSIST-2014)

**EXTRA-
CURRICULAR**

- Teaching volunteer at Nirmaan – BITS Pilani | www.nirmaan.org

Mar 2014 – Dec 2015

- Teaching volunteer at LaSalle Boys and Girls Club, Montreal | www.bgclasalle.com

Mar 2016 – Jul 2016

- Teaching volunteer at Amitasha – Teaching the girl child | www.amity.edu/amitasha

Mar 2009 – Mar 2010