

## 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, C P Huang, O Taheri, M J Black, D Tzionas. (under submission)

· **MIME: Human-Aware 3D Scene Generation**

H Yi, C P Huang, S Tripathi, L Hering, J Thies, M J Black. (under submission)

<https://cvml.page.link/mime>· **PERI: Part Aware Emotion Recognition In The Wild**

A Mittel, S Tripathi. ECCVW 2022

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

R Khrodkar, 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

<b>PoseNet3D: Unsupervised 3D Human Shape and Pose Estimation</b>	Feb 2019 – Nov 2019
<i>Collaborators: Dr. Amit Agarwal, Dr. Ambrish Tyagi</i>	<i>Amazon Lab126</i>
<ul style="list-style-type: none"> <li>· Proposed self-consistency and adversarial losses to train a novel unsupervised teacher model to estimate 3D human pose from RGB videos</li> <li>· Weak supervision from the teacher was used to train a student model for estimating SMPL body mesh</li> <li>· 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</li> </ul>	
<b>Learning to Generate Synthetic Data via Compositing</b>	May 2018 – Nov 2018
<i>Advisors: Prof. James Rehg, Dr. Amit Agrawal, Dr. Ambrish Tyagi</i>	<i>Amazon Lab126</i>
<ul style="list-style-type: none"> <li>· Proposed a network for generating novel composite images that retain scene context and realism</li> <li>· Developed algorithms for efficient training of object detection and image classification models on synthetic composite data, using an online hard-positive mining approach</li> <li>· Improved baseline Faster-RCNN mAP by 3.5% and baseline SSD mAP by 2.7% on various datasets.</li> </ul>	
<b>ClassPaths: Weakly supervised class-specific subnets for faster-inference</b>	Dec 2017 – Dec 2018
<i>Advisors: Prof. Kris Kitani, Dr. Ambrish Tyagi, Dr. Varsha Hedau</i>	<i>CMU</i>
<ul style="list-style-type: none"> <li>· Exploited class-wise parameter redundancy and activation map sparsity for finding class-specific subnets (ClassPaths) for faster inference</li> <li>· 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</li> <li>· Deep-networks employing ClassPaths achieved similar performance as a full capacity network, with 40%-60% FLOPS reduction during inference</li> </ul>	
<b>Deep Spectral-based Shape Features for Alzheimer's Disease Classification</b>	Feb 2016 – Jul 2016
<i>Undergraduate Thesis, Advisor: Dr. Samuel Kadoury</i>	<i>Univ. of Montreal</i>
<ul style="list-style-type: none"> <li>· Developed an unsupervised framework for classification of Alzheimer's disease patients using noisy T1-weighted MRI brain images</li> <li>· Proposed a combination of grey-matter voxel-based intensity variations and 3D structural (shape) features parameterized with a spherical-harmonics representation</li> <li>· Results presented near state-of-the-art accuracies (&gt;89%) – outperformed conventional MRI shape-based strategies by 22%-27%</li> </ul>	
<b>C2F: Coarse-to-Fine Vision Control System for Automated Microassembly</b>	May 2014 – Dec 2014
<i>Advisor: Dr. H D Sharma</i>	<i>Central Electronics Engineering Research Institute, Pilani</i>
<ul style="list-style-type: none"> <li>· Developed a completely automated, visual-servoing based closed loop system to perform 3D micromanipulation and microassembly tasks</li> <li>· Solved challenges around object recognition/tracking, scene understanding, path planning and obstacle avoidance</li> <li>· 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</li> </ul>	

## SCHOLARSHIPS AND AWARDS

• Best business model and best pitch, Cyber Valley Startup Incubation Program 2022, Germany	2022
• IISc Bangalore Summer Research Fellowship – top 20 across India	2015
• <i>Best Technical Association Award</i> , 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

<b>Amazon</b>	Sunnyvale, USA
Applied Scientist II (AS-II) ( <i>promoted from AS-I in Sep 2020</i> )	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.	

	<b>Amazon Lab126</b> Applied Scientist Intern Worked on task-aware generation of synthetic image composites for training deep networks	Cupertino, USA May 2018 – Aug 2018
	<b>Franklin Templeton Investments</b> Summer Intern   Project: Financial Modelling for Tactical Asset Allocation 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)	Hyderabad, India May 2015 – Aug 2015
<b>TECHNICAL SKILLS</b>	<i>Programming Languages</i> Python, C++/C, MATLAB <i>Tools and Frameworks</i> Pytorch, Tensorflow, Blender	
<b>RELEVANT COURSES</b>	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	
<b>ACADEMIC PROJECTS</b>	<b>Learning Scene Saliency Maps Using Superpixel-augmented Convolutional Neural Networks</b> <ul style="list-style-type: none"> <li>· Extracted SLIC superpixel segmentations in input images and defined a range and color separation vector as input to a Siamese Convolutional Neural Network (CNN)</li> <li>· 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</li> </ul>	Aug 2017 – Dec 2017
	<b>Towards Integrating Model Dynamics for Sample Efficient Reinforcement Learning</b> <ul style="list-style-type: none"> <li>· Developed a principled approach for solving sample inefficiency issues while deploying model-free reinforcement learning in real environments</li> <li>· 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</li> <li>· Established that augmenting real-world data using an approximate world-model tends to be significantly more sample efficient than naïve model-free reinforcement learning</li> </ul>	Jan 2017 – May 2017
<b>LEADERSHIP</b>	<ul style="list-style-type: none"> <li>• Member, External Affairs Committee (Graduate Student Assembly), CMU</li> <li>• Secretary, Electrical and Electronics Association, BITS Pilani Led a team of 37 members. Organised 25 major events, 6 during the technical festival</li> <li>• Computer Vision Mentor, Student Mentorship Program (SMP), BITS Pilani Conducted evening classes for teaching 30 junior batch students</li> <li>• Represented BITS Pilani cricket team in inter-college cricket tournaments and sports festivals</li> <li>• Organizer of National Seminar on Indian Space Technology (NSIST-2014)</li> </ul>	
<b>EXTRA-CURRICULAR</b>	<ul style="list-style-type: none"> <li>• Teaching volunteer at Nirmaan – BITS Pilani   <a href="http://www.nirmaan.org">www.nirmaan.org</a></li> <li>• Teaching volunteer at LaSalle Boys and Girls Club, Montreal   <a href="http://www.bgclasalle.com">www.bgclasalle.com</a></li> <li>• Teaching volunteer at Amitasha – Teaching the girl child   <a href="http://www.amity.edu/amitasha">www.amity.edu/amitasha</a></li> </ul>	Mar 2014 – Dec 2015 Mar 2016 – Jul 2016 Mar 2009 – Mar 2010