Avishkar **Saha**

✉ a.saha@surrey.ac.uk | ⌨ avishkarsaha | in avishkar-saha | ⚲ google-scholar

Summary

I'm a final-year PhD student in Computer Vision and Machine Learning at the University of Surrey's CVSSP, under the supervision of Prof. Richard Bowden. So far my research has explored the intersection of **Computer Vision, Geometric Deep Learning and Causality**. In particular, I am interested in building models which can reason about entities and their relations in the real world.

My interests include, but are not limited to: *Deep Learning for Relational Reasoning, Data Efficient Machine Learning, Generative Modeling and Optimizing Neural Network Memory Consumption*.

Education

University of Surrey
Surrey, U.K

PhD in Computer Vision and Machine Learning
Jan.2020 - Oct. 2024 (Expected)

- I develop **deep learning** methods for **scene understanding** and **generative models for graphs**.
- Supervisors: Prof. Richard Bowden, Dr. Chris Russell & Dr. Oscar Mendez

University of Bath
Bath, U.K

MSc in Machine Learning & Autonomous Systems · Grade: Distinction, 79.8%
Sep.2018 - Sep. 2019

- **Thesis title:** "Style invariant graph representations for object recognition"
- Supervisor: Prof. Peter Hall

University of Bath
Bath, U.K

MEng in Structural Engineering · Grade: First Class Honours, 1:1
Sep.2014 - Jun. 2018

- Received the **Basil Spence Silver Award** for the final year project.

Work Experience

Amazon (AWS)
Tübingen, Germany

Applied Scientist, Intern
Dec. 2022 - June 2023

- Interned at the **Causal Representation Learning Lab**, working on object-centric causal reasoning in computer vision.
- Wrote and submitted a NeurIPS paper on learning causal structures in physical systems.
- Supervisory team: Thomas Brox, Francesco Locatello and Chris Russell.

University of Surrey
Surrey, U.K

Teaching Assistant
Feb. 2020 - June. 2021

- Teaching assistant for Machine Learning and NLP modules for Master's students.

BuroHappold
Bath, U.K

Engineering Software Developer
Jun. 2017 - Sep. 2017

- Developed a **software toolkit for generative models of 3D structures**. This was initially implemented for a global team of 10-15 engineers.
- Wrote a **multi-objective particle swarm optimiser** to optimise the 3D structure of Qatar Foundation Stadium, resulting in reduced material usage by 15%.

University of Bath
Bath, U.K

Lead Ambassador, Structural Engineering Department
Oct. 2016 - May 2017

- Gave presentations to prospective engineering students on every Open Day, and then ran half-day mini design projects with the students to give them a flavour of the course's major design projects.

BuroHappold
Bath, U.K

Engineering Software Developer
Jun. 2016 - Sep. 2016

- Implemented **genetic and dynamic mesh relaxation algorithms** to design key 3D structures in the new Tottenham Hotspurs Stadium in London.

Populous *London, U.K*
COMPUTATIONAL DESIGNER *Mar. 2014 - Sep. 2015*
- Developed **geometric algorithms for panelling complex surfaces**, which were used to construct the new Tottenham Hotspurs Stadium in London.

BuroHappold *Bath, U.K*
ENGINEERING SOFTWARE DEVELOPER, INTERN *Feb. 2013 - Feb. 2014*
- Developed a **software toolkit for analyzing 3D structures**.

Awards

INTERNATIONAL

2022   **Outstanding Paper Award**, International Conference of Robotics and Automation (ICRA) 2022   *Philadelphia, U.S.A*

DOMESTIC

2018   **Basil Spence Silver Award**, University of Bath, for excellence in engineering in MEng final year project   *Bath, U.K*

Publications

First author

1. (under review) Avishkar Saha, Francesco Locatello, Thomas Brox and Chris Russell. *One step at a time: time-varying causal structures for physical systems*. **Submitted to a major Machine Learning conference**.

2. (under review) Avishkar Saha, Oscar Mendez, Chris Russell and Richard Bowden. *Learning Stable Topologies for Point Cloud Labelling*. **Submitted to a major Computer Vision conference**.

3. Avishkar Saha, Oscar Mendez, Chris Russell and Richard Bowden. *Learning Adaptive Neighborhoods for Graph Neural Networks*. **ICCV 2023**.

4. Avishkar Saha, Oscar Mendez, Chris Russell and Richard Bowden. *"The Pedestrian next to the Lamppost" Adaptive Object Graphs for Better Instantaneous Mapping*. **CVPR 2022**.

5. Avishkar Saha, Oscar Mendez, Chris Russell and Richard Bowden. *Translating Images into Maps*. **ICRA 2022**. **Oustanding Paper Award.**

6. Avishkar Saha, Oscar Mendez, Chris Russell and Richard Bowden. *Enabling spatio-temporal aggregation in Birds-Eye-View Vehicle Estimation*. **ICRA 2021**.

Others

1. James Ross, Oscar Mendez, Avishkar Saha, Mark Johnson and Richard Bowden. *BEV-SLAM: Building a Globally-Consistent World Map Using Monocular Vision*. **IROS 2022**.

Presentations

International Conference on 3D Vision 2022 *Prague, Czech Republic*
TUTORIAL: BEV MAPPING AND ADDRESSING ITS SHORTCOMINGS *September 2022*
- I conducted a half-day tutorial based on our work in mapping images to birds-eye-view for autonomous vehicles.

Amazon *Tubingen, Germany*
INVITED TALK: SPARSE REPRESENTATIONS FOR SCENE UNDERSTANDING *July 2022*
- I gave a talk on the use of graphs for 3d object detection and mapping, based off our CVPR 2022 paper.

Computer Vision and Pattern Recognition Conference 2022 *New Orleans, U.S.A*
PRESENTATION: ADAPTIVE OBJECT GRAPHS FOR BETTER INSTANTANEOUS MAPPING *June 2022*
- I presented our paper *""The Pedestrian next to the Lamppost" Adaptive object graphs for better instantaneous mapping"*, which proposed a graph-based method for object localization.

International Conference on Robotics and Automation 2022 *Philadelphia, U.S.A*
PRESENTATION: TRANSLATING IMAGES INTO MAPS *May 2022*
- For our Outstanding Paper Award, I presented our work *"Translating Images into Maps"*.

Wayve *London, U.K*

January 2022

- I gave a talk on our work in mapping images to birds-eye-view for autonomous vehicles.

Skills

Programming languages	Python, C++, C#, JAVA
Deep learning libraries	PyTorch, Tensorflow, PyTorch Lightning, Fabric, NumPy
HPC	AWS, SLURM
Operating Systems	Unix, Linux
Computer Graphics	Rhino, Maya, Blender

Service to the scientific community

Reviewing

1. TPAMI 2022, CVPR 2023, ICCV 2023

Teaching

1. Teaching assistant for Natural Language Processing COM3029 — University of Surrey (2021)
2. Teaching assitant for Machine Learning and Data Mining — University of Surrey (2020)

Software

`avishkarsaha/translating-images-into-maps` Official PyTorch code for our paper Translating Images into Maps

References

Prof. Richard Bowden, University of Surrey *Surrey, U.K*

R.BOWDEN@SURREY.AC.UK

Dr. Chris Russell, Amazon (AWS) *Tübingen, Germany*

CMRUSS@AMAZON.DE

Reference letters available upon request