Krishna Murthy JATAVALLABHULA

PhD candidate | Mila, Université de Montréal

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Montréal, QC. Canada

Research interests: Interplay of robotics, computer vision, deep learning, computer graphics, and physics (at least three of the five)

Education

2018-Present	PhD. in Computer Science, Université de Montréal, Montréal, Canada.	GPA: 4.15/4.00
2015-2017	MS by research in Computer Science and Engineering, *International Institute of Information Technology, Hyderabad, India*	GPA: 10.00/10.00
2011-2015	M.Sc. (Tech.) Information Systems (Bachelor's degree), *Birla Institute of Science and Technology (BITS), Pilani, India.*	GPA: 6.71/10.00

Work

May 2019 – August 2019 | **Deep Learning Research Intern | NVIDIA, Toronto, Canada**

Intern with Prof. Sanja Fidler's group. Interplay of computer vision, deep learning, and computer graphics research. Led the development of Kaolin, a 3D deep learning library for PyTorch.

November 2017 – June 2015 | **Research Assistant | Robotics Research Center, IIIT Hyderabad, India**

Conducted research in perception for autonomous driving and SLAM, taught graduate classes.

Autonomous Driving | Computer Vision | Robotics | Deep Learning | SLAM

May 2015 – August 2014 | **Research Assistant | INSPIRE lab, BITS Pilani, India**

Developed distributed/asynchronous techniques for multi-robot terrain coverage.

Multi-robot systems | Fault-tolerant distributed networks

Honors and Awards

- 2021 **NVIDIA graduate fellowship**. Awarded one of five PhD fellowships worldwide.
- 2021 **Google PhD fellowship** North America - Machine perception, Speech technology, and Computer vision (**declined**)
- 2021 **Outstanding reviewer** for the International Conference on Learning Representations
- 2020 **RSS pioneer 2020**. Selected to the *Robotics Science and Systems pioneers* cohort of 2020, a group of 22 leading senior PhD students and postdocs in the field.
- 2020 **Best paper award**. Our paper titled *Maplite: Autonomous intersection navigation without a detailed prior map* won the best paper award for 2020, announced by *Robotics and Automation Letters*.
- 2020 **Top reviewer** for the *European Conference on Computer Vision* (ECCV), 2020. Awarded to the top 215 reviewers.
- 2019 **DIRO Excellence Award**. Received the award for the second consecutive year, for academic and research excellence.
- 2018 **ICRA PhD Forum**. Selected to present my work at the PhD Forum, ICRA 2018, right in the first semester of my PhD. Received generous travel support. (
- 2018 **DIRO Excellence Award**. Received an award of excellence from DIRO, Université de Montréal for academic and research excellence.
- 2017 **Graduated top of class**. Graduated with a GPA of $10.00/10.00$ during my Masters at IIIT Hyderabad.
- 2017 **RAS travel grant**. Awarded to cover my travel expenses for ICRA 2017, the premier robotics conference.
- 2017-2018 **Qualcomm Innovation Fellowship Finalist**. A spin-off of my work on Shape Priors for Road-Scene Understanding has been shortlisted as a finalist for the Qualcomm Innovation Fellowship (QINF), India.
- 2015-2018 **IIIT Hyderabad research fellowship**. Awarded a fellowship to cover tuition and living expenses during my Masters. Total value (approx.):
- 2012-2015 **Hackatronics**. Won the annual electronics hack contest for three years in a row. Conducted anually at BITS Pilani, Rajasthan India.

Successful Grant Proposals

2020 **IVADO fundamental research grant**. "*Differentiable perception, graphics, and optimization for weakly supervised 3D perception*". Co-written with 3 principal investigators: Liam Paull, James Forbes, Derek Nowrouzezahrai.

2014 **L K Maheshwari Grant**. Awarded a seed grant for a proposal involving cooperative navigation of a heterogeneous swarm of aerial and ground robots.

Featured publications

GradSim: Differentiable simulation for system identification and visuomotor control ICLR 2021

Krishna Murthy Jatavallabhula*, Miles Macklin*, Florian Golemo, Vikram Voleti, Linda Petrini, Martin Weiss, Breandan Considine, Jérôme Parent-Lévesque, Kevin Xie, Kenny Erleben, Liam Paull, Florian Shkurti, Derek Nowrouzezahrai Video OpenReview

gradSLAM: Dense SLAM meets automatic differentiation ICRA 2020

Krishna Murthy Jatavallabhula, Ganesh Iyer, Liam Paull Video Project page

MapLite: Autonomous intersection navigation without a detailed prior map (Best paper award) RAL 2020

Teddy Ort, **Krishna Murthy Jatavallabhula**, Rohan Banerjee, Sai Krishna Gottipati, Dhaivat Bhatt, Igor Gilitschenski, Liam Paull, Daniela Rus Video Paper

Kaolin: A PyTorch Library for Accelerating 3D Deep Learning Research Whitepaper

Krishna Murthy Jatavallabhula, Edward Smith, Jean-Francois Lafleche, Clement Fuji Tsang, Artem Rozantsev, Wenzheng Chen, Tommy Xiang, Rev Lebaredian, Sanja Fidler Paper Code

MonoLayout: Amodal scene layout from a single image WACV 2020

Kaustubh Mani, Swapnil Daga, Shubhika Garg, N. Sai Shankar, **Krishna Murthy Jatavallabhula**, K. Madhava Krishna Video

Beyond Pixels: Leveraging Geometry and Shape Cues for Multi-Object Tracking ICRA 2018

Sarthak Sharma, Junaid Ahmed Ansari, **Krishna Murthy Jatavallabhula**, K. Madhava Krishna Paper(PDF) Code

Reconstructing Vehicles From a Single Image: Shape Priors for Road Scene Understanding ICRA 2017

Krishna Murthy Jatavallabhula, G.V. Sai Krishna, Falak Chhaya, and K. Madhava Krishna Paper(PDF)

Other refereed publications

DRACO: Weakly Supervised Dense Reconstruction And Canonicalization of Objects ICRA 2021

Rahul Sajnani, AadilMehdi Sanchawala, **Krishna Murthy Jatavallabhula**, Srinath Sridhar, K. Madhava Krishna Paper Video Project page

AutoLay: Benchmarking monocular layout estimation IROS 2020

Kaustubh Mani, N. Sai Shankar, **Krishna Murthy Jatavallabhula**, K. Madhava Krishna Project page

Probabilistic object detection: Strengths, Weaknesses, Opportunities ICML Workshops 2020

Dhaivat Bhatt, Dishank Bansal, Gunshi Gupta, Hanju Lee, **Krishna Murthy Jatavallabhula**, Liam Paull

Multi-object Monocular SLAM for Dynamic Environments IV 2020

Gokul Nair, Swapnil Daga, Rahul Sajnani, Anirudha Ramesh, Junaid Ahmed Ansari, **Krishna Murthy Jatavallabhula**, K. Madhava Krishna

Reconstruct, Rasterize and Backprop: Dense shape and pose estimation from a single image CVPR Workshops 2020
Aniket Pokale, Aditya Aggarwal **Krishna Murthy Jatavallabhula**, K. Madhava Krishna

GradSLAM: Automagically differentiable SLAM CVPR Workshops 2020, RSS Workshops 2020
Krishna Murthy Jatavallabhula, Ganesh Iyer, Soroush Saryazdi, Liam Paull Video Project page

Deep Active Localization RAL 2019
Sai Krishna*, Keehong Seo*, Dhaivat Bhatt, Vincent Mai, **Krishna Murthy Jatavallabhula**, Liam Paull Paper (PDF) Code

INFER: INtermediate representations for FutureE pRediction IROS 2019
Shashank Srikanth, Junaid Ahmed Ansari, Karnik Ram R, Sarthak Sharma, **Krishna Murthy Jatavallabhula**, Madhava Krishna K Paper (PDF)
Project Page

Geometric Consistency for Self-Supervised End-to-End Visual Odometry CVPR Workshops 2018
Ganesh Iyer*, **Krishna Murthy Jatavallabhula***, Gunshi Gupta, K. Madhava Krishna, and Liam Paull. Paper (PDF) Project page

CalibNet: Geometrically-Supervised Extrinsic Calibration using 3D Spatial Transformer Networks IROS 2018
Ganesh Iyer, Karnik Ram R., **Krishna Murthy atavallabhula**, K. Madhava Krishna Paper(PDF) Project page

The Earth ain't Flat: Reconstrution of Vehicles on Steep and Bumpy Roads from a Monocular Camera IROS 2018
Junaid Ahmed Ansari, Sarthak Sharma, Anshuman Majumdar, **Krishna Murthy Jatavallabhula**, K. Madhava Krishna Paper(PDF)
Project page

Constructing Category-Specific Models for Monocular Object SLAM ICRA 2018
Parv Parkhiya, Rishabh Khawad, **Krishna Murthy Jatavallabhula**, Brojeshwar Bhowmick, K. Madhava Krishna Paper(PDF)

Shape Priors for Real-Time Monocular Object Localization in Dynamic Environments IROS 2017
Krishna Murthy Jatavallabhula, Sarthak Sharma, and K. Madhava Krishna Paper(PDF)

FAST: Synchronous Frontier Allocation for Scalable Online Multi-Robot Terrain Coverage JIRS 2017
Avinash Gautam, Bhargav Jha, Gourav Kumar, **Krishna Murthy Jatavallabhula**, SP Arjun Ram, and Sudeept Mohan

Cluster, Allocate, Cover: An Efficient Approach for Multi-robot Coverage SMC 2015
Avinash Gautam, **Krishna Murthy Jatavallabhula**, Gourav Kumar, SP Arjun Ram, Bhargav Jha, and Sudeept Mohan

Maxxyt: An Autonomous Wearable Device for Real-Time Tracking of a Wide Range of Exercises UKSIM 2015
Danish Pruthi, Ayush Jain, **Krishna Murthy Jatavallabhula**, Ruppesh Nalwaya, and Puneet Teja

Preprints

f-Cal: Variational calibration of aleatoric uncertainty in regression UNDER REVIEW
Dhaivat Bhatt, Kaustubh Mani, Dishank Bansal, Hanju Lee, **Krishna Murthy Jatavallabhula**, Liam Paull

RobustPointSet: A Dataset for Benchmarking Robustness of Point Cloud Classifiers arXiv 2020
Saeid Asgari Taghanaki, Jieliang Luo, Ran Zhang, Ye Wang, Pradeep Kumar Jayaraman, **Krishna Murthy Jatavallabhula** Paper Code

Professional Service and Volunteering

2017-Present	Reviewer for ICRA, IROS, RAL, AAAI, CVPR, ICCV, ECCV, ACCV, ICVGIP, CRV, CoRL, ICLR, Neurips, ICML
2020	Student Volunteer, ICML (International Conference on Machine Learning)
2020	Student Volunteer, RSS (Robotics Science and Systems)
2020	Student Volunteer, ICLR (International Conference on Learning Representations)

Outreach and Inclusion

2020	Mentor, Neurips workshop (DiffCVGP)
2020	Diversity and inclusion panel, RSS (Robotics Science and Systems)
2018	Mentor, AI for social good workshop. McGill University.

Workshops and Sessions Co-organized

2021	*Program co-chair*, Beyond the research paper: Rethinking how we share scientific understanding in ML (ICML 2021 workshop, scheduled).
2021	*Program co-chair*, Robotics Science and systems pioneers workshop (RSS 2021, scheduled).
2021	*Organizer*, Robot learning seminar series: Mila and REAL - Winter 2021.
2020	*Program co-chair*, Differentiable vision, graphics, and physics applied to machine learning (Neurips 2020, scheduled). Webpage
2020	*Organizer*, Robot learning seminar series: Mila and REAL - Fall 2020. Webpage
2019	*Breakout session organizer*, Pan-Canadian SOCMLx.

Talks

Apr 7 2021	(Scheduled) Microsoft autonomous systems
Mar 26 2021	(Scheduled) AI in robotics - University of Toronto
Feb 23 2021	KUIS AI (Istanbul) - **Building differentiable models of the 3D world**
Jan 19 2021	MIT Vision seminar - **Building differentiable models of the 3D world**
Oct 11 2020	IEEE chapter, Indonesia - **Deep learning for robot perception**
Sep 22 2020	Cornell robotics group - **gradSLAM: Dense SLAM meets automatic differentiation**
Aug 29 2020	CV Talks, India: Computer vision talks - **gradSLAM: Automagically differentiable SLAM**
Jul 2020	Robotics Science and Systems pioneers - **gradSLAM: Dense SLAM meets automatic differentiation**
Jul 2020	Robotics Science and Systems: structured approaches to robot learning workshop - **gradSLAM: Automagically differentiable SLAM**
Jun 2020	CVPR: Deep declarative networks workshop - **gradSLAM: Automagically differentiable SLAM**
Feb 2019	NVIDIA Webinar - **3D deep learning with Kaolin**

Courses (Co-)Taught or Assisted

2021	**Representation Learning** at Mila and Université de Montréal, with Aaron Courville.
2020	**Advanced projects in deep learning** at Mila, with Pierre-Luc Carrier and Joumana Ghosn.
2017	**Mobile Robotics and Computer Vision** at IIIT Hyderabad, with Prof. K. Madhava Krishna.
2016	**Mobile Robotics** at IIIT Hyderabad, with Prof. K. Madhava Krishna.

Students Mentored

A list of students I have closely mentored (e.g. on a research or technical project).

3	Students at their PhD level or equivalent.
8	Students pursuing Masters programs (Mila, Université de Montréal and IIIT Hyderabad, India)
23	Students at their undergraduate level of study (includes visitors / interns at Mila, Université de Montréal and IIIT Hyderabad, India)

References

References provided upon request