# Girish Varma

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## Employment

- Assistant Professor — 2019 - now
  Center for Security, Theory and Algorithmic Research and Machine Learning Lab,
  Kohli Center for Intelligent Systems, **IIIT Hyderabad**.
- Senior Project Scientist — 2016 - 2019
  Kohli Center for Intelligent Systems, **IIIT Hyderabad**.
  Area of Research: Applied Computer Vision and Machine Learning.
  Advisor: Prof. C V Jawahar
- Postdoctoral Researcher — 2015 - 2016
  Faculty of Mathematics and Computer Science, **Weizmann Institute of Science**, Israel.
  Area of Research: Theoretical Machine Learning.
  Advisor: Prof. Irit Dinur

## Education

- PhD. in Computer and Systems Science, School of Technology and Computer Science, — 2011 - 2015
  **Tata Institute of Fundamental Research, Mumbai.**
  Area of Research: Algorithms and Complexity.
  Advisor: Prof. Prahladh Harsha.
- MS. in Computer Science, School of Technology and Computer Science, — 2008 - 2011
  **Tata Institute of Fundamental Research, Mumbai.**
  Area of Research: Approximate Counting and Sampling Problems.
  Advisor: Prof. Manoj Gopalkrishnan.
- B.Tech. Computer Science & Engineering, — 2004 - 2008
  **National Institute of Technology, Calicut.**

## Research Summary

My research interest include Computer Vision, Machine Learning, Learning Theory, Graph Theory and Algorithms. Specific research areas include: Model Compression techniques using Graph Theory for making Deep Neural Networks efficient, applications of Computer Vision in Autonomous Navigation and Transportation Problems. I also collaborate on Interdisciplinary problems with faculty and partners from Medical, Science, Mobile Computing domains.

## Sponsored Projects

### *As PI*

- Manjeera Digital Systems: Efficient Implementation of Text to Speech on Specialized Processor.
- Adtechcorp Technologies Pvt Lt: Automated Seed Quality Estimation using Computer Vision.
- Intel Bangalore: Data Sets for Autonomous Navigation Research in Indian Traffic Conditions.

### *As CoPI*

- Fight for Sights Grant: Developing a Prototype Artificial Intelligence-based Eye Tracker (A-EYE) for the Diagnosis and Monitoring of Eye Movement Disorder. In collaboration with clinical researchers from University of Leicester.

## Professional Services & Contributions

### *Program Committee Duties*

- IJCAI'20, IJCAI'18, AMAS'19, AAAI'19, Autonomous Navigation in Unconstrained Environments Workshop, ECCV'18.

### *Workshop & Challenges*

- IDD Challenge. NCVPRIPG '19.
- AutoNUE Workshop and Challenge at ICCV'19.
- Scene Understanding Challenge for AutoNUE Workshop, ECCV'18.
- Autorickshaw Detection Challenge, NCVPRIPG '17.

### *Summer Schools & Tutorials*

- Challenges and Advances in Vision-Based Self-Driving at ICVGIP'18.
- Computer Vision for Autonomous Navigation at NCVRPRIPG '17.
- Summer Schools on Computer Vision and Machine Learning. CVIT. IIIT Hyderabad.

## Recognition & Visits

### *Awards*

- JTCF Novel Technology paper award Finalist at International Conference on Intelligent Robots and Systems (IROS), 2018.
- Best Runner-Up award for a paper at CVPR IEEE Embedded Vision Workshop, 2018.

### *Fellowships*

- Dean's Postdoctoral Fellowship, Faculty of Math and Computer Science, 2015 - 2016, Weizmann Institute, ISRAEL.
- Google India PhD Fellowship in Algorithms, 2011.

### *Invited Talks*

- Invited Lecture at International Center for Transformative Artificial Intelligence (ICTAI) Workshop on Unstructured Driving Scenarios in India organized by NITI Aayog, TIFR and Intel.
- Paper invited for Oral/Spotlight Presentations (among 3% of total submissions) at European Conference on Computer Vision (ECCV'18) and British Machine Vision Conference (BMVC'18).

### *Visits*

- MPI Institute for Informatik, Saarbrucken, Germany funded by Indo-German Max Planck Center on Computer Science (IMPECS). Host: Prof. Kurt Melhorn.
- Weizmann Institute of Science, Israel. Host: Prof. Irit Dinur.
- New York University, USA. Host: Prof. Subhash Khot.
- Internship at Google Bangalore during UG.

## SELECTED PUBLICATIONS

List to all publications available at Google Scholar. Citations: 367, h-index: 9, i10-index: 8

### *Model Compression*

- Dharma Teja Vooturi, Girish Varma, Kishore Kothapalli. Ramanujan Bipartite Graph Products for Efficient Block Sparse Neural Networks. Concurrency and Computation: Practice and Experience Journal. 2021
- Girish Varma, Ameya Prabhu, & Anoop Naboothiri. "Deep Expander Networks: Efficient Deep Networks from Graph Theory", European Conference on Computer Vision. **(Oral Presentation ECCV'18)**.
- Nikitha Varullapalli, Sriharsha Annameni, Girish Varma, Manu Mathew, Nagori Soyeb & C V Jawahar, "Efficient Semantic Segmentation using Gradual Grouping", CVPR, IEEE Embedded Vision Workshop, 2018. **Best Runner-Up Award**.
- Dharma Teja Vooturi, Girish Varma, Kishore Kothapalli. Dynamic Block Sparse Reparameterization of Convolutional Neural Networks. The IEEE International Conference on Computer Vision (**ICCV**) Workshops, 2019.

### *Complexity Theory*

- Amey Bhangale, Ramprasad Saptrishi, Rakesh Venkat & Girish Varma, "On Fortification of Projection Games", Randomized Algorithms **(RANDOM'15)**.
- Venkat Guruswami, Prahladh Harsha, Johan Håstad, Srikanth Srinivasan & Girish Varma. "Super-polylogarithmic hypergraph coloring hardness via low-degree long codes.", SIAM Journal on Computing **(SICOMP)**, 2016. Preliminary version appeared in Proc. 46th ACM Symp. on Theory of Computing **(STOC'14)**.
- Amey Bhangale, Prahladh Harsha & Girish Varma, "A Characterization of hard-to-cover CSPs", Theory of Computing Journal **(ToC)**. Preliminary version appeared in Computational Complexity Conference **(CCC'15)**.
- Girish Varma, "Reducing uniformity in Khot-Saket hypergraph coloring hardness reductions", Chicago Journal of Theoretical Computer Science **(CJTCS)**, 2015(3).

*Algorithms & Graph Theory*

- Kshitij Gajjar, Girish Varma, Prerona Chatterjee, Jaikumar Radhakrishnan. "Generalized Parametric Path Problems.", 37th Conference on Uncertainty in Artificial Intelligence **(UAI)** 2021.
- Irit Dinur, Prahladh Harsha, Srikanth Srinivasan & Girish Varma, "Derandomized graph product results using the low degree long code", Symp. on Theoretical Aspects of Computer Science **(STACS'15)**.
- Vincenzo Bonifaci, Kurt Mehlhorn, & Girish Varma, "Physarum can compute shortest paths", Journal of Theoretical Biology **(JTB)**. Preliminary version appeared in Sym. on Discrete Algorithms **(SODA'11)**.
- Ajesh Babu, Nutan Limaye, Jaikumar Radhakrishnan & Girish Varma, "Streaming algorithms for some language recognition problems", Theoretical Computer Science Journal **(TCS)**. Preliminary version appeared in Theory and Applications of Models of Computation **(TAMC'10)**.

*Machine Learning & Computer Vision*

- Kalluri, Tarun and Varma, Girish and Chandraker, Manmohan and Jawahar, C.V. *Universal Semi-Supervised Semantic Segmentation.* IEEE International Conference on Computer Vision (ICCV'19).
- Soham Saha, Girish Varma & C V Jawahar, "Improved Visual Relocalization by Discovering Anchor Points", British Machine Vision Conference **(BMVC'18) Spotlight Presentation**.
- Sudhir Kumar, Girish Varma & C V Jawahar, "Cityscale Road Audit System using Deep Learning", International Conference on Intelligent Robots **(IROS'18)**, **JTCF Novel Technology paper award for Amusement Culture Finalist.**
- Girish Varma, Anbumani Subramanian, Anoop Namboodiri, Manmohan Chandraker, C V Jawahar. "IDD: A Dataset for Exploring Problems of Autonomous Navigation in Unconstrained Environments", IEEE Winter Conf. on Applications of Computer Vision **(WACV'19)**.

*Interdisciplinary*

- *Deep learning enabled inorganic material generator.* Yashaswi Pathak, Karandeep Singh Juneja, Girish Varma, Masahiro Ehara and U. Deva Priyakumar. Journal of Physical Chemistry Chemical Physics.
- *Using Artificial Intelligence (AI) to Classify Retinal Developmental Disorders.* . Invest. Ophthalmol. Vis. Sci. 2020;61(7):4030.

## TEACHING

| | |
|---|---|
| • Linear Algebra | April 2021 |
| • Probability and Statistics | Aug 2020, 2019 |
| • Machine Learning for Natural Sciences | Jan 2021, Jan 2020, Aug 2019, Jan 2019 |
| • Probabilistic Graphical Models | Jan 2020 |
| • Modern Complexity Theory | Aug 2020 |
| • Advanced Mathematical Structures | Aug 2019 |