Curriculum Vitae

Siddharth Narayanaswamy
School of Informatics
University of Edinburgh
10 Crichton St, Newington, Edinburgh EH8 9AB

Professional Experience

Reader in Explainable AI, School of Informatics, University of Edinburgh
July 2020 —

Safe & Ethical AI Senior Research Fellow, The Alan Turing Institute
July 2022 —

Safe & Ethical AI Research Fellow, The Alan Turing Institute
Nov 2019 — May 2021

Senior Researcher, Department of Engineering Science, University of Oxford
May 2019 — July 2020

Postdoctoral Research Assistant, Department of Engineering Science, University of Oxford
Jan 2016 — Apr 2019

Postdoctoral Scholar, Department of Psychology, Stanford University
Apr 2014 — Dec 2015

Graduate Research Assistant, School of Electrical & Computer Engineering, Purdue University
Aug 2008 — Mar 2014

Education

Doctor of Philosophy (PhD), School of Electrical & Computer Engineering, Purdue University
Aug 2008 — Mar 2014

Thesis: Compositionality in Vision and Language

Bachelor of Engineering (BE), Electronics & Communication, Anna University, India
Aug 2004 — Aug 2008

Grants & Fellowships

Turing — Advanced Autonomy through Human-AI collaboration Co-I Oct 2021 — Dec 2022

Edinburgh Lab for Integrated AI PI Oct 2021 — Apr 2024

Huawei Edinburgh Lab PI July 2021 — July 2025

Facebook ParlAI Research Award Co-Investigator Oct 2017 — Nov 2018

EPSRC MURI Grant EP/N019474/1 — Commonsense Visual Reasoning Senior/Key personnel Jan 2016 — Aug 2020

Peer-Reviewed Journal Articles

J6 R. de Bem, A. Ghosh, T. Ajanthan, O. Miksik, A. Boukhayma, N. Siddharth*, and P. H. S. Torr*. DGPose: Deep Generative Models for Human Body Analysis International Journal of Computer Vision (IJCV) 128.5 (2020), pp. 1537–1563.

J5 A. Murry, N. Siddharth, N. Nardelli, A. Glennerster, and P. H. S. Torr. Lessons from Reinforcement Learning for Biological Representations of Space Vision Research (VR) 174 (2020), pp. 79–93.

J4 D. P. Barrett*, A. Barbu*, N. Siddharth*, and J. M. Siskind. Saying What You’re Looking For: Linguistics Meets Video Search IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI) 38.10 (2016), pp. 2069–2081.

J3 H. Yu*, N. Siddharth*, A. Barbu*, and J. M. Siskind. A Compositional Framework for Grounding Language Inference, Generation, and Acquisition in Video Journal of Artificial Intelligence Research (JAIR) 52 (2015), pp. 601–713.

J2 A. Barbu*, N. Siddharth*, A. Michaux, and J. M. Siskind. Simultaneous Object Detection, Tracking, and Event Recognition Advances in Cognitive Systems (ACS) 2 (2012), pp. 203–220.

J1 N. Siddharth*, A. Barbu*, and J. M. Siskind. Seeing Unseeability to See the Unseeable Advances in Cognitive Systems (ACS) 2 (2012), pp. 77–94.

Peer-Reviewed Conference Proceedings

C25 M. Oppen, V. Prokhorov, and N. Siddharth. StrAe: Autoencoding for Pre-Trained Embeddings using Explicit Structure In Empirical Methods in Natural Language Processing (EMNLP). Dec. 2023.

C24 Y. Liang, J. Tenenbaum, T.-A. Le, and N. Siddharth. Drawing out of Distribution with Neuro-Symbolic Generative Models In Advances in Neural Information Processing Systems (NeurIPS). Dec. 2022.

C23 Y. Shi, N. Siddharth, P. Torr, and A. R. Kosiornek. Adversarial Masking for Self-Supervised Learning In International Conference on Machine Learning (ICML). June 2022.

C22 T. Joy, Y. Shi, P. H. S. Torr, T. Rainforth, S. M. Schmon, and N. Siddharth. Learning multimodal VAEs through mutual supervision In International Conference on Learning Representations (ICLR). May 2022.

C21 T. A. Le, K. M. Collins, L. Hewitt, K. Ellis, N. Siddharth, S. J. Gershman, and J. B. Tenenbaum. Hybrid Memoised Wake-Sleep: Approximate Inference at the Discrete-Continuous Interface In International Conference on Learning Representations (ICLR). May 2022.
C20  N. Miao, E. Mathieu, N. Siddharth, Y. W. Teh, and T. Rainforth.
On incorporating inductive biases into VAEs
In International Conference on Learning Representations (ICLR). May 2022.

C19  Y. Shi, J. Seely, P. Torr, N. Siddharth, A. Hannun, N. Usunier, and G. Synnaeve.
Gradient Matching for Domain Generalization
In International Conference on Learning Representations (ICLR). May 2022.

C18  T. Joy, S. Schmon, P. Torr, N. Siddharth*, and T. Rainforth*.
Capturing Label Characteristics in VAEs
In International Conference on Learning Representations (ICLR). May 2021.

C17  Y. Shi, B. Paige, P. Torr, and N. Siddharth.
Relating by Contrasting: A Data-efficient Framework for Multimodal Generative Models
In International Conference on Learning Representations (ICLR). May 2021.

C16  M. Igli, A. Gambardella, N. Nardelli, N. Siddharth, W. Böhmer, and S. Whiteson.
Multitask Soft Option Learning
In Uncertainty in Artificial Intelligence (UAI). Aug. 2020.

C15  Y. Shi*, N. Siddharth*, B. Paige, and P. H. S. Torr.
Variational Mixture-of-Experts Autoencoders for Multi-Modal Deep Generative Models
In Advances in Neural Information Processing Systems (NeurIPS). Dec. 2019, pp. 15692–15703.

C14  T. A. Le, A. R. Kosiorek, N. Siddharth, Y. W. Teh, and F. Wood.
Revisiting Reweighted Wake-Sleep for Models with Stochastic Control Flow
In Uncertainty in Artificial Intelligence (UAI). July 2019.

C13  E. Mathieu*, T. Rainforth*, N. Siddharth*, and Y. W. Teh.
Disentangling Disentanglement in Variational Autoencoders
In International Conference on Machine Learning (ICML). June 2019, pp. 4402–4412.

C12  B. Esmaeili, H. Wu, S. Jain, A. Bozkurt, N. Siddharth, B. Paige, D. H. Brooks, J. Dy, and J.-W. van de Meent.
Structured Disentangled Representations
In International Conference on Artificial Intelligence and Statistics (AISTATS). Apr. 2019, pp. 2525–2534.

C11  R. De Bem, A. Ghosh, A. Boukhayma, T. Ajanthan, N. Siddharth*, and P. Torr*.
A conditional deep generative model of people in natural images
In Winter Conference on Applications of Computer Vision (WACV). Jan. 2019, pp. 1449–1458.

C10  S. Webb, A. Golinski, R. Zinkov, N. Siddharth, T. Rainforth, Y. W. Teh, and F. Wood.
Faithful Inversion of Generative Models for Effective Amortized Inference
In Advances in Neural Information Processing Systems (NeurIPS). Dec. 2018, pp. 3074–3084.

C9   D. Massiceti, N. Siddharth, P. K. Dokania, and P. H. S. Torr.
FlipDial: A Generative Model for Two-Way Visual Dialogue
In Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR). June 2018, pp. 6097–6105.

C8   N. Siddharth, B. Paige, J.-W. van de Meent, A. Desmaison, N. D. Goodman, P. Kohli, F. Wood, and P. H. S. Torr.
Learning Disentangled Representations with Semi-Supervised Deep Generative Models
In Advances in Neural Information Processing Systems (NeurIPS). Dec. 2017, pp. 5927–5937.

C7   A. Barbu*, D. P. Barrett**, W. Chen, N. Siddharth*, C. Xiong, J. J. Corso, C. D. Fellbaum, S. J. H. Catherine Hanson, S. Helie, E. Malaia, B. A. Pearlmutter, J. M. Siskind, T. M. Talavage, and R. B. Wilbur.
Seeing is Worse than Believing: Reading People’s Minds Better than Computer-Vision Methods Recognize Actions
In Proceedings of the European Conference on Computer Vision (ECCV). Sept. 2014, pp. 612–627.

C6   N. Siddharth*, A. Barbu*, and J. M. Siskind.
Seeing What You’re Told: Sentence-Guided Activity Recognition in Video
In Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR). June 2014, pp. 732–739.

C5   Y. Cao, D. P. Barrett, A. Barbu, N. Siddharth, H. Yu, A. Michaux, Y. Lin, S. Dickinson, J. M. Siskind, and S. Wang.
Recognizing Human Activities from Partially Observed Videos
In Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR). June 2013, pp. 2658–2665.

C4   A. Barbu*, A. Bridge, Z. Burchill, D. Coroian, S. Dickinson, S. Fidler, A. Michaux, S. Mussman, N. Siddharth*, D. Salvi, L. Schmidt, J. Shangguan, J. M. Siskind, J. Waggner, S. Wang, J. Wei, Y. Yin, and Z. Zhang.
Video In Sentences Out
In Proceedings of the Twenty-Eighth Conference on Uncertainty in Artificial Intelligence (UAI). Aug. 2012, pp. 102–112.

C3   N. Siddharth*, A. Barbu*, and J. M. Siskind.
A Visual Language Model for Estimating Object Pose and Structure in a Generative Visual Domain
In Proceedings of the IEEE International Conference on Robotics and Automation (ICRA). May 2011, pp. 4854–4860.

C2   A. Barbu*, N. Siddharth*, and J. M. Siskind.
Learning Physically-Instantiated Game Play Through Visual Observation
In Proceedings of the IEEE International Conference on Robotics and Automation (ICRA). May 2010, pp. 1879–1886.

C1   N. Siddharth, M. Manivannan, S. Devasahayam, and G. Mathew.
Design of a Do-It-Yourself VR based Laparoscopic Simulator
In Medicine Meets Virtual Reality (MMVR). 2009.

Technical Reports

T7  A. B. Palmarini, C. G. Lucas, and N. Siddharth.
DreamDecompiler: Improved Bayesian Program Learning by Decompiling Amortised Knowledge
*ArXiv e-prints*, arXiv:2306.07856 (June 2023), arXiv:2306.07856. arXiv: 2306.07856 [cs.AI].

T6 V. Prokhorov, I. Titov, and N. Siddharth. 
**Autoencoding Conditional Neural Processes for Representation Learning**
*ArXiv e-prints*, arXiv:2305.18485 (May 2023), arXiv:2305.18485. arXiv: 2305.18485 [cs.LG].

T5 D. Massiceti, V. Kulharia, P. K. Dokania, N. Siddharth, and P. H. S. Torr. 
**A Revised Generative Evaluation of Visual Dialogue**
*ArXiv e-prints*, arXiv:2004.09272 (Apr. 2020), arXiv:2004.09272. arXiv: 2004.09272 [cs.CV].

T4 S. Bhatti, A. Desmaison, O. Miksik, N. Nardelli, N. Siddharth*, and P. H. S. Torr*. 
**Playing Doom with SLAM-Augmented Deep Reinforcement Learning**
*ArXiv e-prints* (Dec. 2016). arXiv: 1612.08380 [cs.AI].

T3 A. Stuhlmüller, R. X. D. Hawkins, N. Siddharth, and N. D. Goodman. 
**Coarse-to-Fine Sequential Monte Carlo for Probabilistic Programs**
*ArXiv e-prints* (Sept. 2015). arXiv: 1509.02962 [cs.AI].

T2 A. Barbu*, N. Siddharth*, C. Xiong, J. J. Corso, C. D. Fellbaum, C. Hanson, S. J. Hason, S. Helie, E. Malaiya, B. A. Pearlmutter, J. M. Siskind, T. M. Talavage, and R. B. Wilbur. 
**The Compositional Nature of Verb and Argument Representations in the Human Brain**
*ArXiv e-prints* (June 2013). arXiv: 1306.2293 [q-bio.NC].

T1 A. Barbu*, A. Bridge, D. Coroian, S. Dickinson, S. Mussman, N. Siddharth*, D. Salvi, L. Schmidt, J. Shangguan, J. M. Siskind, J. Waggoner, S. Wang, J. Wei, Y. Yin, and Z. Zhang. 
**Large-Scale Automatic Labeling of Video Events with Verbs Based on Event-Participant Interaction**
*ArXiv e-prints* (Apr. 2012). arXiv: 1204.3616 [cs.CV].

Workshop Publications

W11 M. Opper, J. Morrison, and N. Siddharth. 
**On the Effect of Curriculum Learning with Developmental Data for Grammar Acquisition**
In *EMNLP Workshop CoNLL-CMCL Shared Task BabyLM Challenge*. 2023.

W10 M. Opper, V. Prokhorov, and N. Siddharth. 
**StrAE: Autoencoding for Pre-Trained Embeddings using Explicit Structure**
In *EMNLP Workshop on Unimodal & Multimodal Induction of Linguistic Structures*. 2022.

W9 N. Siddharth and B. Paige. 
**Learning Generative Models from Classifier Uncertainties**
In *ICML Workshop on Uncertainty & Robustness in Deep Learning*. 2020.

W8 C. S. de Witt, B. Gram-Hansen, N. Nardelli, A. Gambardella, R. Zinkov, P. Dokania, N. Siddharth, A. B. Espinosa-Gonzalez, A. Darzi, and P. H. S. Torr. 
**Simulation-Based Inference for Global Health Decisions**
In *ICML Workshop on ML for Global Health*. 2020.

W7 R. de Bem, A. Ghosh, T. Ajanthan, O. Miksik, N. Siddharth*, and P. H. S. Torr*. 
**A Semi-supervised Deep Generative Model for Human Body Analysis**
In *ECCV Workshop on Human Behaviour Understanding*. 2018.

W6 M. Igl, W. Boehler, A. Gambardella, P. H. S. Torr, N. Nardelli, N. Siddharth, and S. Whiteson. 
**Inference and Distillation for Option Learning**
In *NeurIPS Workshop on Infer to Control*. 2018.

W5 D. Massiceti*, P. K. Dokania*, N. Siddharth*, and P. H. S. Torr. 
**Visual Dialogue without Vision or Dialogue**
In *NeurIPS Workshop on Critiquing and Correcting Trends in Machine Learning*. 2018.

W4 E. Mathieu*, T. Rainforth*, N. Siddharth*, and Y. W. Teh. 
**Disentangling Disentanglement**
In *NeurIPS Workshop on Bayesian Deep Learning*. 2018.

W3 N. Siddharth, B. Paige, J.-W. van de Meent, A. Desmaison, N. D. Goodman, P. Kohli, F. Wood, and P. H. S. Torr. 
**Inducing Interpretable Representations with Variational Autoencoders**
In *NIPS Workshop on Interpretable Machine Learning in Complex Systems*. 2016.

W2 A. Barbu*, N. Siddharth*, and J. M. Siskind. 
**Language-Driven Video Retrieval**
In *CVPR Workshop on Vision Meets Cognition*. 2014.

W1 N. Siddharth and N. D. Goodman. 
**Informative Scene Descriptions**
In *CVPR Workshop on Language and Vision*. 2014.

Patents

P1 A. Barbu, N. Siddharth, H. Yu, and J. M. Siskind. 
**Correlating Videos and Sentences**. U.S. pat. 9183466. Nov. 2015.
### Invited Presentations

| Presentation                                                                 | Venue                          | Date   |
|----------------------------------------------------------------------------|--------------------------------|--------|
| Multimodal Representation Learning                                         | Online                          | May 2023 |
| Bayesflow Research Talk                                                    | Google Brain — Bayesflow        | Jun 2022 |
| Hybrid Artificial Intelligence                                            | AAAI (Virtual)                  | Feb 2021 |
| CAIDA Research Seminar                                                     | University of British Columbia  | Dec 2019 |
| International Multimodal Communication Centre (IMCC) Seminar               | University of Oxford            | Nov 2019 |
| Psychology Research Seminar                                               | University of Glasgow           | Jan 2019 |
| Seminar on Joint Processing of Language and Visual Data                   | Dagstuhl                        | Jan 2019 |
| Foundations of Situated and Multimodal Communication                      | IWCS, Montpellier               | Sept 2017 |
| Artificial Intelligence and Natural Computation Seminar                   | University of Birmingham        | May 2017 |
| ATI Probabilistic Programming Workshop                                    | Alan Turing Institute           | Feb 2016 |
| Artificial Intelligence and Natural Computation Seminar                   | University of Birmingham        | Sept 2013 |
| COGS Research Seminar                                                     | University of Sussex            | Oct 2013 |
| Machine Learning and Perception Seminar                                   | Microsoft Research (Cambridge)  | Oct 2013 |

### Professional Services

| Role                      | Organizations/Conferences |
|---------------------------|---------------------------|
| Area Chair                | NeurIPS, ICML             |
| PC Member                 | IJCAI 2016                 |
| Reviewing                 | AAAI, CVPR, ICRA, ICDL, ICLR, ICML, IJCAI, NeurIPS, PAMI, IJCV, PRL |
| Workshops                 | Language and Vision Workshop — CVPR 2015, 2017, 2018, 2019 |
|                           | Learning Disentangled Representations — NeurIPS 2017 |

### Teaching

| Course Code | Course Title                       | Institution                                      | Year(s)   |
|-------------|-----------------------------------|--------------------------------------------------|-----------|
| IAML        | Applied Machine Learning          | School of Informatics, University of Edinburgh   | 2022 —    |
| IAML        | Introduction to Applied Machine Learning | School of Informatics, University of Edinburgh | 2021 — 2022 |
| DME         | Data Mining and Exploration       | School of Informatics, University of Edinburgh   | 2021      |
| HDS-M02     | Bayesian Modelling                | Health Data Science (EPSRC CDT), University of Oxford | 2019 — 2019 |
|             | Games Programming in C++         | Coursework Module, Department of Engineering, University of Oxford | 2016 — 2018 |
| EE570       | Artificial Intelligence           | TA (Unofficial), Jeffrey Mark Siskind, Purdue University | 2008 — 2012 |
| EE473       | Introduction to Artificial Intelligence | TA (Unofficial), Jeffrey Mark Siskind, Purdue University | 2008 — 2012 |

### Supervision

| Name                      | Title                        | Current Institution     |
|---------------------------|------------------------------|-------------------------|
| Mattia Opper              | PhD (ongoing)                |                         |
| Magdalena Proszewska      | PhD (ongoing)                |                         |
| Yuge Shi                  | DPhil 2023/Oxford (now at DeepMind) | DeepMind               |
| Tom Joy                   | DPhil 2023/Oxford (now at Five AI (BOSCH)) | Five AI (BOSCH)         |