Scott C. Lowe

Summary

Highly accomplished research scientist with a Ph.D. in Neuroinformatics and over a decade of experience in interdisciplinary research bridging cognitive sciences, deep learning, and artificial intelligence. Proven track record in developing advanced ML models, leading innovative projects, supervising students, and publishing impactful research in multidisciplinary collaborations. Experience in deep learning, real-time forecasting, and large-scale data processing.

Current position

since 2022 **Postdoctoral Research Fellow**, *Vector Institute*, Toronto, Canada

- Investigating and developing System 2 reasoning capabilities in Large Language Models [Paper].
- Developing multimodal ML models (vision, DNA, and text) to facilitate monitoring of global insect biodiversity, even on previously unseen species [Paper, Paper, Paper].
- Curated and released BIOSCAN-5M, a dataset of 5M samples of insects with paired image and DNA barcode data [Paper].
- Developing real-time, interactive symbolic music generation, using deep state-space models.

Responsibilities: lead research projects, supervise students, develop tooling for running experiments used by the rest of the lab.
Advisors: Prof. Sageev Oore and Prof. Graham Taylor.

Education

2012 – 2017 **Doctor of Philosophy (Ph.D. in Neuroinformatics)**, *Institute for Adaptive and Neural Computation, School of Informatics, University of Edinburgh*, Edinburgh, UK
Thesis: Decoding information from neural populations in the visual cortex. Supervisors: Profs. Mark van Rossum, Stefano Panzeri, and Alex Thiele.

2011 – 2012 **MSc with Distinction, in Neuroinformatics by Research**, *University of Edinburgh*, Edinburgh, UK, *average 75.3% — for comparison, a Distinction at* $\geq 70\%$ *is approximately equivalent to* $\geq 3.75/4$ *US GPA*
Thesis: *An information theoretic analysis of perceptual learning data from macaque V1 and V4*. Supervisors: Prof. Alex Thiele and Prof. Stefano Panzeri.

2007 – 2011 **MSci with First Class Honours, in Natural Sciences (Mathematics and Physics)**, *Durham University*, Durham, UK, *average 73.4% — for comparison, a First Class at* $\geq 70\%$ *is approximately equivalent to* $\geq 3.75/4$ *US GPA*
Thesis: *On Artifical Neural Networks*, Supervisor: Dr. Ian Jermyn.

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Experience

2020 – 2022 **Postdoctoral Research Fellow (Full time)**, *Faculty of Computer Science, Dalhousie University*, Halifax, Canada
- Steered research objectives for deployment of deep learning methods on hierarchically-annotated seafloor imagery [Paper].
- Curated and released BenthicNet, a dataset of 11M seafloor habitat images from 24k sites around the world [Paper].

Advisor: Prof. Thomas Trappenberg

2019 – 2020 **Postdoctoral Research Fellow (Full time)**, *Faculty of Computer Science, Dalhousie University*, Halifax, Canada. Joint affiliation: Dept. of Electrical and Computer Engineering
- Applied deep learning to CPAP data in partnership with NovaResp, preemptively predicting sleep apneas, subsequently reducing apneas and hypopneas by 32% [Paper, Paper].
- Collaborated with FORCE, DeepSense, and OERA to segment echograms of tidal energy sites using deep learning, decreasing errors by 60% and halving manual labour [Paper].
- Initiated research agendas focused on applying ML to healthcare and environmental monitoring, demonstrating leadership in interdisciplinary projects.

Advisors: Prof. Sageev Oore, Prof. Kamal El-Sankary

2018 – 2019 **Postdoctoral Research Fellow (Full time)**, *Faculty of Computer Science, Dalhousie University*, Halifax, Canada. Joint affiliation: Vector Institute
- Research in novel deep learning methods by deploying logical operations in logit space, inspired by neuroscience [Paper, Paper].
- Controllable symbolic music generation [Paper].

Advisors: Prof. Sageev Oore, Prof. Thomas Trappenberg.

2018 – 2018 **Postdoctoral Research Fellow (Full time)**, *School of Psychology & School of Mathematics, University of Nottingham*, Nottingham, UK

Program synthesis for visual reasoning tasks [Paper]. Advisor: Prof. Mark van Rossum.

2017 – 2017 **Co-founder and CSO (Full time)**, *Cortirio*, London, UK

Co-founder and Chief Scientific Officer at Cortirio, developing a portable brain scanner for diagnosing traumatic brain injury. Backed by Entrepreneur First.

2015 – 2015 **Technical Research Assistant (Full time)**, *Rochefort Lab, Centre for Integrative Physiology, University of Edinburgh*, Edinburgh, UK
- Developed FISSA, an open source toolbox for source-separation of neuroscientific calcium imaging data [Paper].
- Developed internal tooling for data analysis, deployed by multiple labs at UoE [Paper].

Advisor: Prof. Nathalie Rochefort.

Additional courses

Oct 2024 **Generative AI with Large Language Models**, *deeplearning.ai*, Coursera, *Grade: 100%.*

Jul 2018 **Deep Learning & Reinforcement Learning Summer School 2018**, *CIFAR & Vector Institute*, Toronto, Canada, DLRLSS2018.

Feb 2018 **Deep Learning Specialization**, *deeplearning.ai*, Coursera, *Grade: 100%.*

Aug 2016 **Machine Learning Summer School 2016**, *Universidad Católica*, Arequipa, Peru, MLSS16.

Feb 2016 **Machine Learning**, *Stanford University*, Coursera, *Grade: 100%.*

Publications

Selected papers

Apr, 2025 ZeMing Gong, Austin T. Wang, Xiaoliang Huo, Joakim Bruslund Haurum, **Scott C. Lowe**, Graham W. Taylor, Angel X. Chang. "CLIBD: Bridging Vision and Genomics for Biodiversity Monitoring at Scale". To appear at *The Thirteenth International Conference on Learning Representations (ICLR)*. arXiv:2405.17537.

Oct, 2024 **Scott C. Lowe**, "System 2 Reasoning Capabilities Are Nigh". Presented at the *System 2 Reasoning At Scale Workshop, Thirty-Eighth Annual Conference on Neural Information Processing Systems (NeurIPS)*. arXiv:2410.03662.

Dec, 2024 Zahra Gharaee*, **Scott C. Lowe***, ZeMing Gong*, Pablo Millan Arias*, Nicholas Pellegrino, Austin T. Wang, Joakim Bruslund Haurum, Iuliia Zarubiieva, Lila Kari, Dirk Steinke†, Graham W. Taylor†, Paul Fieguth†, Angel X. Chang†. "BIOSCAN-5M: A Multimodal Dataset for Insect Biodiversity". In *Proceedings of the Thirty-eighth Conference on Neural Information Processing Systems (NeurIPS)*. arXiv:2406.12723.

Jun, 2024 **Scott C. Lowe***, Joakim Bruslund Haurum*, Sageev Oore†, Thomas B. Moeslund†, Graham W. Taylor†. "An Empirical Study into Clustering of Unseen Datasets with Self-Supervised Encoders". (Under review.) arXiv:2406.02465.

Sep, 2023 Hamed Hanafi, Julia Paffile, Meagan Sinclair, Kamal El-Sankary, **Scott Lowe**, Sageev Oore, Stephen Driscoll, Thomas Penzel, Ingo Fietze, Sanjay Patel, Reena Mehra, Debra Morrison. (2023, September). "Prevention of obstructive apnea events with machine learning". *European Respiratory Journal*. **62**(67) PA573. doi:10.1183/13993003.congress-2023.PA573.

Dec, 2022 **Scott C. Lowe**, Robert Earle, Jason d'Eon, Thomas Trappenberg, Sageev Oore. (2022, December). "Logical Activation Functions: Logit-space equivalents of Probabilistic Boolean Operators". In *Proceedings of the Thirty-sixth Conference on Neural Information Processing Systems (NeurIPS)*. arXiv:2110.11940.

Aug, 2022 **Scott C. Lowe**, Louise P. McGarry, Jessica Douglas, Jason Newport, Sageev Oore, Christopher Whidden, Daniel J. Hasselman. (2022, August). "Echofilter: A Deep Learning Segmentation Model to Improve the Automation, Standardization, and Timeliness for Post-Processing Echosounder Data in Tidal Energy Streams". *Frontiers in Marine Science*. **9**:867857. doi:10.3389/fmars.2022.867857 arXiv:2202.09648.

Additional papers

Feb, 2025 **Scott C. Lowe***, Benjamin Misiuk*, Isaac Xu*, Shakhboz Abdulazizov, Amit R. Baroi, Alex C. Bastos, Merlin Best, Vicki Ferrini, Ariell Friedman, Deborah Hart, Ove Hoegh-Guldberg, Daniel Ierodiaconou, Julia Mackin-McLaughlin, Kathryn Markey, Pedro S. Menandro, Jacquomo Monk, Shreya Nemani, John O'Brien, Elizabeth Oh, Luba Y. Reshitnyk, Katleen Robert, Chris M. Roelfsema, Jessica A. Sameoto, Alexandre C. G. Schimel, Jordan A. Thomson, Brittany R. Wilson, Melisa C. Wong, Craig J. Brown†, Thomas Trappenberg†. "BenthicNet: A global compilation of seafloor images for deep learning applications". *Scientific Data* **12**, 230 (2025). doi:10.1038/s41597-025-04491-1. arXiv:2405.05241.

Nov, 2024 D Steinke, S Ratnasingham, J Agda, H Ait Boutou, I Box, M Boyle, D Chan, C Feng, **SC Lowe**, JTA McKeown, J McLeod, A Sanchez, I Smith, S Walker, CY-Y Wei, PDN Hebert. "Towards a Taxonomy Machine – A Training Set of 5.6 Million Arthropod Images". Data **2024**, 9(11), 122. doi:10.3390/data9110122

Jun, 2024 I. Xu, B. Misiuk, **Scott C. Lowe**, M. Gillis, T Trappenberg and C. J. Brown. (June 2024). "Hierarchical Multi-Label Classification with Missing Information for Benthic Habitat Imagery," In Proceedings of the *2024 International Joint Conference on Neural Networks (IJCNN)*. doi: doi:10.1109/IJCNN60899.2024.10650176.

Dec, 2023 Zahra Gharaee*, ZeMing Gong*, Nicholas Pellegrino*, Iuliia Zarubiieva, Joakim Bruslund Haurum, **Scott C. Lowe**, Jaclyn T.A. McKeown, Chris C.Y. Ho, Joschka McLeod, Yi-Yun C. Wei, Jireh Agda, Sujeevan Ratnasingham, Dirk Steinke†, Angel X. Chang†, Graham W. Taylor†, Paul Fieguth†. (2023, December). "A Step Towards Worldwide Biodiversity Assessment: The BIOSCAN-1M Insect Dataset". In *Proceedings of the Thirty-seventh Conference on Neural Information Processing Systems (NeurIPS)*. arXiv:2307.10455.

Nov, 2023 Pablo Millan Arias*, Niousha Sadjadi*, Monireh Safari*, ZeMing Gong, Austin T. Wang, Joakim Bruslund Haurum, Iuliia Zarubiieva, Dirk Steinke, Lila Kari, Angel X. Chang, **Scott C. Lowe**†, Graham W. Taylor†. (2023, November). "BarcodeBERT: Transformers for Biodiversity Analysis". (Under review.) arXiv:2311.02401.

Mar, 2023 Meagan Sinclair, Hamed Hanafi Alamdari, Julia Paffile, Kamal El-Sankary, **Scott Lowe**, Stephen Driscoll, Sageev Oore, Heather Tomson, Gregory Begin, Guillermo Aristi, Michael Schmidt, David Roach, Thomas Penzel, Ingo Fietze, Sanjay R Patel, Reena Mehra, Debra Morrison. (2023, October). "The Beginning of the AI-Enabled Preventative PAP Therapy Era: A First-in-Human Proof of Concept Interventional Study". *IEEE Transactions on Biomedical Engineering*. doi:10.1109/TBME.2023.3263379.

Sep, 2022 Isaac Xu, **Scott C. Lowe**, Thomas Trappenberg. (2022, September). "Label-Free Monitoring of Self-Supervised Learning Progress". *2022 IEEE Canadian Conference on Electrical and Computer Engineering (CCECE)*, Halifax, Nova Scotia, Canada, 2022, pp 78–84. doi:10.1109/CCECE49351.2022.9918377.

Dec, 2021 Hamed Hanafi Alamdari, Luke Hacquebard, Stephen Driscoll, Kamal El-Sankary, David C Roach, Robin LeBlanc, **Scott Lowe**, Sageev Oore, Thomas Penzel, Ingo Fietze, Michael Schmidt, Debra Morrison. (2022, July). "High Frequency-Low Amplitude Oscillometry: Continuous Unobtrusive Monitoring of Respiratory Function on PAP Machines". In *IEEE Transactions on Biomedical Engineering*, **69**(7), pp. 2202–2211. doi:10.1109/TBME.2021.3138965.

Nov, 2021 **Scott C. Lowe**, Thomas Trappenberg, Sageev Oore. (2021, November). "LogAvgExp Provides a Principled and Performant Global Pooling Operator". arXiv:2111.01742.

Nov, 2019 Lu Yihe, **Scott C. Lowe**, Penelope A. Lewis, Mark C. W. van Rossum. (2019, November). "Program synthesis performance constrained by non-linear spatial relations in Synthetic Visual Reasoning Test". arXiv:1911.07721.

Jun, 2019 Nicholas Meade*, Nicholas Barreyre*, **Scott C. Lowe**, Sageev Oore. (2019, June). "Exploring Conditioning for Generative Music Systems with Human-Interpretable Controls". In *Proceedings of the 10th International Conference on Computational Creativity, 2019*. arXiv:1907.04352.

Feb, 2018 Sander W. Keemink*, **Scott C. Lowe***, Janelle M. P. Pakan, Mark C. W. van Rossum, Nathalie L. Rochefort. (2018, February). "FISSA: A neuropil decontamination toolbox for calcium imaging signals". *Scientific Reports*, **8**. doi:10.1038/s41598-018-21640-2.

Jan, 2018 Daniel Zaldivar, Jozien Goense, **Scott C. Lowe**, Nikos K. Logothetis, Stefano Panzeri. (2018, January). "Dopamine is signaled by mid-frequency oscillations and boosts output-layers visual information in visual cortex". *Current Biology*, **28**(2). doi:10.1016/j.cub.2017.12.006.

Aug, 2016 Janelle M. P. Pakan, **Scott C. Lowe**, Evelyn Dylda, Sander W. Keemink, Stephen P. Currie, Christopher A. Coutts, Nathalie L. I. Rochefort. (2016, August). "Behavioral-state modulation of inhibition is context-dependent and cell type specific in mouse visual cortex". *eLIFE*, **5**:e14985. doi:10.7554/eLife.14985.

Sep, 2015 Michel Besserve, **Scott C. Lowe**, Nikos, K. Logothetis, Bernhard Schölkopf, Stefano Panzeri. (2015, September). "Shifts of gamma phase across primary visual cortical sites reflect dynamic stimulus modulated information transfer". *PLoS Biology*, **13**(9): e1002257. doi:10.1371/journal.pbio.1002257.

Talks

Feb, 2025 **Scott C. Lowe**. (2025, February). "BIOSCAN-5M: A Multimodal Dataset for Insect Biodiversity" [link]. Invited talk at the Voxel51 *AI, Machine Learning and Computer Vision Meetup*.

Feb, 2025 **Scott C. Lowe**. (2025, February). "BIOSCAN-5M: Multimodal biodiversity monitoring with images and DNA barcodes". Invited talk at the GrUVi Lab, Simon Fraser University, Vancouver, Canada.

Nov, 2024 **Scott C. Lowe**. (2024, November). "Multimodal biodiversity monitoring with images and DNA barcodes". Invited talk at the Visual Analysis and Perception Group, Aalborg University, Aalborg, Denmark.

Nov, 2024 **Scott C. Lowe**. (2024, November). "Multimodal biodiversity monitoring with images and DNA barcodes" [link]. Invited talk at the Pioneer Centre for Artificial Intelligence, Copenhagen, Denmark.

Apr, 2024 **Scott C. Lowe**. (2024, April). "Self-Supervised Learning Methodology". Presented at the *Self-Supervised Learning Bootcamp*, Vector Institute, Toronto, Canada, 2024.

Sep, 2023 **Scott C. Lowe**. (2023, September). "Single-modal self-supervised learning methods & background". Presented at the *Self-Supervised Learning Bootcamp*, Vector Institute, Toronto, Canada, 2023.

Feb, 2023 **Scott C. Lowe**. (2023, February). "Tutorial: Self-supervised learning methods". Presented at the *Self-Supervised Learning Reading Group*, Vector Institute, Toronto, Canada, 2023.

Jul, 2022 **Scott C. Lowe**, Robert Earle, Jason d'Eon, Thomas Trappenberg, Sageev Oore. (2022, July). "Logical Activation Functions" (Spotlight talk). Presented at the *Beyond Bayes: Paths Towards Universal Reasoning Systems Workshop, 39th International Conference on Machine Learning (ICML)*, Baltimore, Maryland, USA, 2022.

May, 2022 Craig J. Brown, Ben Misiuk, Ben DiTrolio, Thomas Trappenburg, **Scott C. Lowe**, Katleen Robert. (2022, May). "Benthic Ecosystem Mapping For Sustainable Ocean Stewardship In A Shifting Ocean Climate". Presented at *Geohab 2022*, Venice, Italy.

May, 2022 Ben Misiuk, Craig J. Brown, Vicki Ferrini, **Scott C. Lowe**, Thomas Trappenburg. (2022, May). "Comparing Manual And Automated Feature Engineering Approaches For Mapping Seabed Sediments In The Bay Of Fundy, Canada". Presented at *Geohab 2022*, Venice, Italy.

Feb, 2022 Louise P. McGarry, **Scott C. Lowe**, Jessica Douglas, Jason Newport, Sageev Oore, Christopher Whidden, and Daniel J. Hasselman. (2022, Mar). "Echofilter: A Deep Learning Segmentation Model Improves The Automation, Standardization, And Timeliness For Post-Processing And Reporting Echosounder Data In Tidal Energy Streams". Presented at *Ocean Sciences 2022 (OSM 2022)*, Virtual.

Jul, 2021 Isaac Xu, Thomas Trappenberg, **Scott C. Lowe**. (2021, July). "Toward Semi-Supervised Classification of Underwater Benthic Habitat Imagery". Presented at *Dalhousie Computer Science In-House Conference (DCSI)*, Dalhousie University, Halifax, Canada.

Jul, 2021 Shakhboz Abdulazizov, Thomas Trappenberg, **Scott C. Lowe**. (2021, July). "An Autoencoder Model of Bathymetry and Multibeam Echosound Backscatter". Presented at *Dalhousie Computer Science In-House Conference (DCSI)*, Dalhousie University, Halifax, Canada.

Jun, 2021 Chris Whidden, Jason Newport, **Scott C. Lowe**. (2021, June). "Automating the post-processing of noisy hydroacoustic fish surveying for monitoring tidal turbines". Presented at *International Conference on Ocean Energy*, Madrid, Spain (Virtual).

Oct, 2019 Nicholas Barreyre*, Nicholas Meade*, Sageev Oore, Vlado Keselj, **Scott C. Lowe**. (2019, October). "Bitwise Conditional Controls Over Language Models for Music and Text". Presented at the *2019 Science Atlantic Conference for Mathematics, Statistics and Computer Science*, Dalhousie University, Halifax, Canada. **Awarded third place**.

May, 2015 **Scott C. Lowe**, Daniel Zaldivar, Yusuke Murayama, Mark C. W. van Rossum, Nikos K. Logothetis, Stefano Panzeri. (2015, May). "What does LFP encode?". Presented at the *CINPLA Workshop: "Inferring network activity from LFPs"*, University of Oslo, Oslo, Norway.

Jan, 2014 **Scott C. Lowe**, Daniel Zaldivar, Yusuke Murayama, Mark C. W. van Rossum, Nikos K. Logothetis, Stefano Panzeri. (2014, January). "Independent channels of information in visual cortical Local Field Potentials". Presented at the *Institute for Adaptive and Neural Computation Workshop, Jan 14, 2014*, Edinburgh.

Workshop/Poster Presentations

Jul, 2024 **SC Lowe***, J Bruslund Haurum*, S Oore†, TB Moeslund†, GW Taylor†. (2024, July). "An Empirical Study into Clustering of Unseen Datasets with Self-Supervised Foundation Models". Presented at the *Foundation Models in the Wild Workshop, The Forty-first International Conference on Machine Learning (ICML)*, Wien (Vienna), Austria, 2024. [OpenReview]

Jun, 2024 Z Gong, AT Wang, J Bruslund Haurum, **SC Lowe**, GW Taylor, AX Chang. (2024, June). "BIOSCAN-CLIP: Bridging Vision and Genomics for Biodiversity Monitoring at Scale". Presented at the *The Eleventh Workshop on Fine-Grained Visual Categorization (FGVC11), The IEEE / CVF Computer Vision and Pattern Recognition Conference (CVPR)*, Seattle, USA, 2024. [PDF]

May, 2024 Z Gong, AT Wang, J Bruslund Haurum, **SC Lowe**, GW Taylor, AX Chang. (2024, May). "BIOSCAN-CLIP: Bridging Vision and Genomics for Biodiversity Monitoring at Scale". Presented at the *21st Conference on Robots and Vision (CRV)*, Guelph, Ontario, 2024. [OpenReview]. **Selected for oral presentation**.

Mar, 2024 **SC Lowe***, J Bruslund Haurum*, S Oore†, TB Moeslund†, GW Taylor†. (2024, March). "Zero-shot Clustering of Embeddings with Pretrained and Self-Supervised Learnt Encoders". Presented at the *Vector Institute Computer Vision Workshop*, Toronto, Canada, 2024.

Dec, 2023 **SC Lowe***, J Bruslund Haurum*, S Oore†, TB Moeslund†, GW Taylor†. (2023, December). "Zero-shot Clustering of Embeddings with Pretrained and Self-Supervised Learnt Encoders". Presented at the *R0-FoMo: Robustness of Few-shot and Zero-shot Learning in Foundation Models, 37th Conference on Neural Information Processing Systems (NeurIPS)*, New Orleans, Louisiana, USA, 2023. [OpenReview]

Dec, 2023 P Millan Arias*, N Sadjadi*, M Safari*, Z Gong, A. Wang, **S Lowe**, J Haurum, I Zarubiieva, D Steinke, L Kari, A Chang, G Taylor. (2023, December). "BarcodeBERT: Transformers for Biodiversity Analysis". Presented at the *Self-Supervised Learning — Theory and Practice Workshop, 37th Conference on Neural Information Processing Systems (NeurIPS)*, New Orleans, Louisiana, USA, 2023. [PDF]

Dec, 2023 **SC Lowe***, J Bruslund Haurum*, S Oore†, TB Moeslund†, GW Taylor†. (2023, December). "Zero-shot Clustering of Embeddings with Self-Supervised Learnt Encoders". Presented at the *Self-Supervised Learning — Theory and Practice Workshop, 37th Conference on Neural Information Processing Systems (NeurIPS)*, New Orleans, Louisiana, USA, 2023. [PDF]

Sep, 2022 I Xu, **SC Lowe**, T Trappenberg. (2022, September). "Label-Free Monitoring of Self-Supervised Learning Progress". Presented at the *2022 IEEE Canadian Conference on Electrical and Computer Engineering (CCECE)*, Halifax, Nova Scotia, Canada, 2022.

Jul, 2022 **SC Lowe**, R Earle, J d'Eon, T Trappenberg, S Oore. (2022, July). "Logical Activation Functions: Logit-space equivalents of Probabilistic Boolean Operators". Presented at the *Beyond Bayes: Paths Towards Universal Reasoning Systems Workshop, 39th International Conference on Machine Learning (ICML)*, Baltimore, Maryland, USA, 2022. **Selected for spotlight talk**.

Nov, 2020 **SC Lowe**, R Earle, T Trappenberg, S Oore. (2020, November). "Higher Order Activation Functions". Presented at *From Neuroscience to Artificially Intelligent Systems (NAISys)*, Cold Spring Harbor Laboratory, NY, USA.

Oct, 2019 **SC Lowe**, T Trappenberg, S Oore. (2019, October). "LogAvgExp Provides a Principled and Performant Global Pooling Operator". Presented at the *Evolution of Deep Learning Symposium*, Toronto, Canada.

Mar, 2019 SIR Pereira, N Gunasekara, **SC Lowe**, MCW van Rossum, PA Lewis. (2019, March). "Sleep and creativity: differential effects on abstraction and analogical reasoning". Presented at the *26th Annual Meeting of the Cognitive Neuroscience Society*, San Francisco, USA.

Mar, 2019 SIR Pereira, N Gunasekara, **SC Lowe**, MCW van Rossum, PA Lewis. (2019, March). "Sleep and creativity: differential effects on abstraction and analogical reasoning". Presented at the *5th Meeting of the Society for the Neuroscience of Creativity*, San Francisco, USA. **Awarded first place**.

Nov, 2016 D Zaldivar, J Goense, **SC Lowe**, NK Logothetis, S Panzeri. (2016, November). "Dopamine elicits lamina-and frequency-specific increase of information in the local-field-potentials of the macaque V1". Presented at the *2016 Meeting of the Society for Neuroscience*, San Diego, USA. Program No. 712.08.

Jul, 2016 JMP Pakan, **SC Lowe**, E Dylda, SW Keemink, SP Currie, CA Coutts, NL Rochefort. (2016, July). "Behavioural state modulation of inhibitory activity is context-dependent and cell-type specific in mouse V1." Presented at the *10th FENS Forum of Neuroscience*, Copenhagen, Denmark.

Apr, 2016 JMP Pakan, **SC Lowe**, E Dylda, SW Keemink, CA Coutts, NL Rochefort. (2016, April). "Sensory context and state-dependent modulation of inhibitory circuit activity in mouse V1". Presented at the *The Brain in Focus: New Approaches to Imaging Neurons and Neural Circuits*, Copenhagen, Denmark.

Sep, 2016 SW Keemink, JMP Pakan, **SC Lowe**, E Dylda, MCW van Rossum, NL Rochefort. (2016, September). "Independent Component Analysis (ICA) approach to extract GCampP6-somatic signals from neuropil contamination". Presented at the *5th European Visual Cortex Meeting*, Kloster Seeon, Munich, Germany.

Sep, 2016 JMP Pakan, **SC Lowe**, E Dylda, SW Keemink, CA Coutts, NL Rochefort. (2016, September). "Context-dependent activity of inhibitory circuits in V1 during locomotion". Presented at the *5th European Visual Cortex Meeting*, Kloster Seeon, Munich, Germany.

Apr, 2015 **SC Lowe**, D Zaldivar, Y Murayama, MCW van Rossum, NK Logothetis, S Panzeri. (2015, April). "Cortical dynamics across V1 laminae generate independent frequency channels encoding visual information". Presented at the *BNA2015: Festival of Neuroscience*, Edinburgh, UK. Poster Reference: P2-C-029.

Nov, 2014 **SC Lowe**, D Zaldivar, Y Murayama, MCW van Rossum, NK Logothetis, S Panzeri. (2014, November). "Different cortical layers in V1 encode different visual information in different frequency bands". Presented at the *2014 Meeting of the Society for Neuroscience*, Washington DC, USA. Program No. 532.19.

Jul, 2014 **SC Lowe**, D Zaldivar, Y Murayama, MCW van Rossum, NK Logothetis, S Panzeri. (2014, July). "Quantification of the Laminar and Frequency Structure of Information in Primary Visual Cortex". Presented at the *9th FENS Forum of Neuroscience*, Milan, Italy. Abstract number FENS-2860.

Jul, 2014 **SC Lowe**, D Zaldivar, Y Murayama, MCW van Rossum, NK Logothetis, S Panzeri. (2014, July). "Quantification of the Laminar and Frequency Structure of Information in Primary Visual Cortex". Presented at the *AREADNE 2014 session*, Santorini, Greece.

Nov, 2013 **SC Lowe**, X Chen, MCW van Rossum, S Panzeri, A Thiele. (2013, November). "Decoding spiking activity in V4, but not V1, correlates with behaviour in perceptual learning". Presented at the *2013 Meeting of the Society for Neuroscience*, San Diego, USA. Program No. 555.11.

Jul, 2013 **SC Lowe**, X Chen, MCW van Rossum, S Panzeri, A Thiele. (2013, July). "Decoding spiking activity in V4, but not V1, correlates with behavioural performance in perceptual learning task". Presented at the *Twenty Second Annual Computational Neuroscience Meeting: CNS*2013*, Paris, France. *BMC Neuroscience* 2013, **14**(Suppl 1):P385 doi:10.1186/1471-2202-14-S1-P385.

Technical Skills

Programming	Python, MATLAB, Bash/shell, regex, C/C++
ML	PyTorch, TensorFlow, PyTorch-Lightning, Scikit-learn, fastAI, Theano, Lasagne
Development	Git, pre-commit, TDD, CI/CD, GHA
Job Scheduler	Slurm, LSF
Cloud comp.	AWS, GCP
Web	PHP, JavaScript, AJAX, HTML5, CSS3
Markup	Markdown, rST, YAML, JSON, TOML, XML
Database	SQL, MySQL

Grants, honors & awards

2022 Awarded Mitacs Accelerate grant IT27877: Artificial intelligence driven monitoring and prediction of true sleep health on CPAP machines to improve patient care and reduce the harm of obstructive sleep apnea. *Total value: CAD 180,000.*

2021 Compute Canada Resources for Research Groups (RRG) competition, 2021. Project: "Global Benthic Habitats". *Value: CAD 20,059.*

2020 Awarded Mitacs Accelerate grant IT19053: Monitoring and Analysis of COVID-19 Acute Respiratory Distress Syndrome on Ventilators. *Total value: CAD 210,000.*

2019 Awarded Mitacs Accelerate grant IT16140: Active Learning for Fish School Recognition in Echograms in the Bay of Fundy. *Value: CAD 15,000.*

2018 Awarded an NVIDIA GPU Grant (Titan V).

2017 Placed 8th out of 91 in NIPS 2017: Non-targeted Adversarial Attack competition, NIPS2017 Conference Competition Track, organised by Google Brain and Kaggle.

2016 Awarded a entrepreneurial fellowship with Entrepreneur First, London.

2015 Placed 57th out of 1049 in the National Data Science Bowl plankton species classification challenge, hosted by Kaggle.

2014 Placed 16th out of 504 in the American Epilepsy Society Seizure Prediction Challenge, hosted by Kaggle.

2013 Winner of "Most Viable Business Idea" award, Amazon Scotland Hackathon 2013.

2011 Awarded a 4-year scholarship by the University of Edinburgh School of Informatics Doctoral Training Centre in Neuroinformatics, with funding from grants EP/F500385/1 and BB/F529254/1 from the UK Engineering and Physical Sciences Research Council (EPSRC), UK Biotechnology and Biological Sciences Research Council (BBSRC), and the UK Medical Research Council (MRC).

Open source projects

2024 **bioscan-dataset**, *PyTorch torchvision-style datasets for BIOSCAN-1M and BIOSCAN-5M*, available on GitHub and PyPI.

2024 **wandb_preempt**, *Checkpointer for handling preempted Weights & Biases sweeps on Slurm*, available on GitHub and PyPI.

2024 **PyTorch Experiment Template**, *A template repository to use for pytorch projects and experiments*, available on GitHub.

2022 **Echofilter**, *Automatically segment echograms (pictures of the water column acquired with echosound) to identify entrained air, sea surface, and seafloor boundaries*, available on GitHub.

2020 **Python Template Repo**, *A template repository to use for python projects and packages*, available on GitHub.

2018 **FISSA**, *A Python library for decontaminating somatic signals from 2-photon calcium imaging data*, available on GitHub and PyPI.

2016 **Superbar**, *Multi-colour bar charts for MATLAB, including customisable error bars and significance comparisons*, available on GitHub, and MATLAB FileExchange.

2016 **MOPI: MATLAB/Octave Package Installer**, *A simple and flexible package manager for both MATLAB and Octave*, available on GitHub.

2015 **MATLAB Schemer**, *A colour scheme manager for MATLAB*, available on GitHub, and through MATLAB FileExchange.

2013 **Colorlab**, *Perceptually uniform colormap generation*, available on GitHub.

Conference and Seminar Participation

since 2022 Vector Institute's *Self-Supervised Learning and Foundation Models* Reading Group Organizer.

2024 Reviewer for *The Thirteenth International Conference on Learning Representations (ICLR)*.

2024 Reviewer for *Thirty-eighth Conference on Neural Information Processing Systems (NeurIPS)*.

2023 Reviewer for *Thirty-seventh Conference on Neural Information Processing Systems (NeurIPS)*.

2021 Reviewer for eLife.

Patents

2023 Hamed Hanafialamdari, **Scott Lowe**, Stephen Driscoll, Luke Hacquebard, David Cecil Roach, Klaus Michael Schmidt. (Novaresp Technologies Inc), "Method and apparatus for determining and/or predicting sleep and respiratory behaviours for management of airway pressure". US11612708B2.

Media coverage

Nov, 2021 "Dr. Scott C. Lowe", Lodestar profile, *Journal of Ocean Technology*, **16**:3.

Nov, 2021 "Predicting depth of entrained air and seafloor boundaries: DeepSense's Echofilter Model", Trade Winds profile, *Journal of Ocean Technology*, **16**:3.

Mar, 2021 "AI software developed in N.S. provides glimpse into wild and murky Bay of Fundy", News article, *CBC*.

Supervision experience

since 2024 **Xiaoliang Huo**, *Ph.D. in Computer Science*, Simon Fraser University, Topic: Multimodal hyperbolic embeddings for insect biodiversity modelling.
Co-supervised by Prof. Angel Chang

since 2025 **Tiancheng Gao**, *Master of Computer Science*, University of Guelph, Topic: State space models (Mamba) for biodiversity modelling.
Co-supervised by Prof. Graham Taylor

since 2024 **ZeMing Gong**, *Master of Computer Science*, Simon Fraser University, Topic: Multimodal alignment for insect biodiversity modelling.
Co-supervised by Prof. Angel Chang

since 2023 **John Quinto**, *Master of Computer Science*, University of Guelph, Topic: Creating instance segmentation masks for bulk images of insects.
Co-supervised by Prof. Graham Taylor

since 2023 **Finlay Miller**, *Master of Computer Science*, Dalhousie University, Topic: Interactive MIDI generation.
Co-supervised by Prof. Sageev Oore

2023 – 2024 **Pablo Millán Arias**, *Ph.D. in Computer Science*, University of Waterloo, Thesis: "Deep Unsupervised Learning for Biodiversity Analyses".
Co-supervised by Prof. Lila Kari

2021 – 2022 **Amit Baroi**, *Master of Resource & Environmental Management*, Dalhousie University, and DeepSense Data Science Intern, Topic: Building a global benthic habitat imagery dataset.
Co-supervised by Prof. Thomas Trappenberg

2020 – 2022 **Isaac Xu**, *Master of Computer Science*, Dalhousie University, Topic: Addressing the impact of imbalanced data in self-supervised learning.
Co-supervised by Prof. Thomas Trappenberg

2020 – 2022 **Shakhboz Abdulazizov**, *Master of Computer Science*, Dalhousie University, Topic: Learning multi-modal representations of benthic habitat data.
Co-supervised by Prof. Thomas Trappenberg

2019 – 2020 **Robert Earle**, *Honours Computer Science & Statistics*, Dalhousie University, Thesis: "Behaviour Of Higher Order Activation Functions".
Co-supervised by Prof. Sageev Oore

2018 – 2019 **Nicholas Barreyre**, *Combined Honours Bachelor of Science*, Dalhousie University, Thesis: "Conditional Sequence Generation: Controlling Neural Language Models For Music And Text".
Co-supervised by Prof. Sageev Oore

2018 – 2019 **Nicholas Meade**, *Honours Bachelor of Computer Science*, Dalhousie University, Thesis: "Conditional Sequence Generation: Controlling Neural Language Models For Music And Text".
Co-supervised by Prof. Sageev Oore

Online Presence

G Scholar	Scott C. Lowe
Blog	scottclowe.com
GitHub	github.com/scottclowe
LinkedIn	linkedin.com/in/scottclowe
StackOverflow	stackoverflow.com/users/1960959/scottclowe
Kaggle	kaggle.com/scottclowe, Kaggle Competitions Master