Changmin Yu, Ph.D.

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Academic Positions

UNIVERSITY OF CAMBRIDGE, Cambridge, United Kingdom
Postdoctoral Research Associate 3/24 – 12/24; 6/25 –
Advisor: *Máté Lengyel*
Jointly funded through Leverhulme Trust and Isaac Newton Trust.

UNIVERSITY COLLEGE LONDON, London, United Kingdom
Honorary Research Fellow 3/24 –

Industrial Positions

OPTIVER, Shanghai, China
Machine Learning Research Engineer 1/25 – 6/25

Education

UNIVERSITY COLLEGE LONDON, London, United Kingdom
PhD in Computational Neuroscience and Machine Learning 6/24
Supervisors: *Neil Burgess*, *Maneesh Sahani*
Thesis: *Hippocampus-Inspired Representation Learning for Artificial Agents*
Examiners: Peter Dayan, Andrew Saxe
Funded through UCL-DeepMind Scholarship.

UNIVERSITY OF CAMBRIDGE, Cambridge, United Kingdom
MPhil in Applied Mathematics and Computational Biology (Distinction) 9/18
Supervisors: *Stephen Eglen*, *Leonardo Bottolo*
Dissertation: Bayesian Nonparametric Clustering of Genomics Data

IMPERIAL COLLEGE LONDON, London, United Kingdom
BSc in Mathematics and Statistics (First Class Honours) 6/17
Supervisors: *Emma McCoy*, *Mauricio Barahona*

Fellowships & Awards

Leverhulme Early Career Fellowship (with matched funding from Isaac Newton Trust) 5/26
DAAD AInet Fellowship 4/26
Society for Neuroscience (SfN) Trainee Professional Development Award (TPDA) 8/24
NeurIPS Scholar Award 10/22; 10/23
UCL Foundational-AI CDT DeepMind Scholarship 9/19
Cambridge–Shell Scholarship 10/18
Pembroke College Bursary 10/17
Imperial College Mathematics Dean's List 6/16; 6/17
Imperial College Mathematics Book Prize 10/16
Imperial College UROP Bursary 6/16

Publications (Reversed Chronological Order)

Peer-Reviewed Journal Articles and Conference Proceedings

Changmin Yu, Zilong Ji, Jake Ormond, John O'Keefe, Neil Burgess. "Hippocampal theta sweeps indicate goal direction during navigation." DOI: https://doi.org/10.1101/2025.08.21.671551. *Accepted in principle* at *Nature Neuroscience*, 2026.

Changmin Yu, Máté Lengyel. "Hierarchical successor representation for robust transfer." In Proceedings of *International Conference on Machine Learning (ICML)*, 2026. **Spotlight paper** (top 2.2% of all submissions).

Zilong Ji*, Tianhao Chu*, Xingsi Dong*, **Changmin Yu**, Daniel Bush, Neil Burgess, Si Wu. "Dynamical modulation of hippocampal replay sequences through firing rate adaptation." DOI: https://doi.org/10.1038/s41467-025-68042-3. *Nature Communications* 17(1282), 2026.

Changmin Yu, Maneesh Sahani, Máté Lengyel. "Discovering temporally compositional neural manifolds with switching infinite GPFA." In Proceedings of *International Conference on Learning Representations (ICLR)*, 13, 2025. **Spotlight paper** (top 3.2% of all submissions).

Changmin Yu, Neil Burgess, Maneesh Sahani, Samuel J. Gershman. "Successor-predecessor intrinsic exploration." In Proceedings of *Advances in Neural Information Processing Systems (NeurIPS)*, 36, 73021–73038, 2023.

William I. Walker*, Hugo Soulat*, **Changmin Yu**, Maneesh Sahani. "Unsupervised representational learning with recognition-parametrised probabilistic models." In Proceedings of *The International Conference on Artificial Intelligence and Statistics (AISTATS)*, 25, 4209–4230, 2023.

Changmin Yu, Hugo Soulat, Neil Burgess, Maneesh Sahani. "Structured recognition in generative models with explaining away." In Proceedings of *Advances in Neural Information Processing Systems (NeurIPS)*, 35, 40–53, 2022.

Changmin Yu, Dong Li, Jianye Hao, Jun Wang, Neil Burgess. "Learning state representations via retracing in reinforcement learning." In Proceedings of *International Conference on Learning Representations (ICLR)*, 10, 2022.

Tang, Hongyao, Zhaopeng Meng, Jianye Hao, Chen Chen, Daniel Graves, Dong Li, **Changmin Yu** et al. "What about inputting policy in value function: policy representation and policy-extended value function approximator." In Proceedings of *the AAAI Conference on Artificial Intelligence* (Vol. 36, No. 8, pp. 8441–8449). **Long presentation** (top 0.8% of all submissions), 2022.

Changmin Yu, Timothy Behrens, Neil Burgess. "Prediction and generalisation over directed actions by grid cells." In Proceedings of *International Conference on Learning Representations (ICLR)*, 9, 2021.

Changmin Yu, Marko Seslija, George Brownbridge, Sebastian Mosbach, Markus Kraft, Mohammad Parsi, Mark Davis, Vivian Page, Amit Bhave. "Deep kernel learning approach to engine emissions modeling." DOI: https://doi.org/10.1017/dce.2020.4. *Data-Centric Engineering* 1, e4, 2020.

Conference Workshops / Abstracts

Changmin Yu, Zilong Ji, Jake Ormond, John O'Keefe, Neil Burgess. "Hippocampal theta sweeps indicate goal direction during navigation." *Computational and System Neuroscience (CoSyne)*, 2026.

Changmin Yu, Máté Lengyel. "A unifying theory of hippocampal remapping through the lens of contextual inference." *Computational and System Neuroscience (CoSyne)*, 2025.

Changmin Yu, Máté Lengyel. "Uncovering variability in neural encoding with infinite Gaussian Process Factor Analysis." *NeuroAI Workshop at NeurIPS*, 2024.

Zilong Ji, Tianhao Chu, Xingsi Dong, **Changmin Yu**, Daniel Bush, Neil Burgess, Si Wu. "Dynamical modulation of hippocampal replay sequences through firing rate adaptation." *CoSyne*, 2024.

Julian Coda-Forno, **Changmin Yu**, Qinghai Guo, Zafeirios Fountas, Neil Burgess. "Leveraging episodic memory to improve world models for reinforcement learning." *MEMARI Workshop at NeurIPS*, 2022.

Changmin Yu, Dong Li, Hangyu Mao, Jianye Hao, Neil Burgess. "Learning state representations via temporal cycle-consistency constraint in model-based reinforcement learning." *SSLRL Workshop at ICLR*, 2021.

Preprints

Changmin Yu, Shir R. Maimon, Tamir Eliav, P. Dylan Rich, Albert K. Lee, Nachum Ulanovsky, Máté Lengyel. "The hippocampus as a hierarchical predictive map."
Under review at *Neuron*.

Changmin Yu, David Mguni, Dong Li, Aivar Sootla, Jun Wang, Neil Burgess. "SEREN: knowing when to explore and when to exploit." *arXiv preprint arXiv:2205.15064*, 2022.

In Preparation

Changmin Yu*, Ishan Kalburge*, Máté Lengyel. "Curriculum learning shapes solution-space geometry in biological and artificial networks."

Changmin Yu, Máté Lengyel. "Hippocampal flickering is widespread and probabilistically well-calibrated."

Academic/Industrial Research Internships

META REALITY LABS, New York, NY, United States
Research Scientist Intern 7/23 – 12/23
Developed state-of-the-art decoding algorithm for non-invasive BMI.

HARVARD UNIVERSITY, Cambridge, MA, United States
Visiting Researcher, Center for Brain, Mind and Machine 9/22 – 1/23
Hosted by Samuel J. Gershman.

MICROSOFT RESEARCH, Beijing, China
Research Scientist Intern, Machine Learning Group 3/21 – 6/21

HUAWEI, NOAH'S ARK LAB, Beijing, China
Research Scientist Intern, Decision Making and Inference Group 11/20 – 2/21

DEPARTMENT OF ENGINEERING, UNIVERSITY OF CAMBRIDGE, Cambridge, United Kingdom
Research Assistant, Computational Modelling Group 10/18 – 8/19

Selected Invited Talks and Presentations

"The hippocampus as a hierarchical predictive map." Simons Junior Neuroscientist Workshop, New York, NY, United States. 7/26.

"The hippocampus as a hierarchical predictive map." Spotlight presentation, 7th Mathematics of Neuroscience and AI Conference, Rome, Italy. 6/26.

"Hippocampal theta sweeps indicate goal direction during navigation." CoSyne 2026 Poster Session, Lisbon, Portugal. 3/26.

"A unifying theory of hippocampal remapping through the lens of contextual inference." CoSyne 2025 Poster Session, Montreal, Canada. 3/25.

"Goal-directed anticipatory coding and phase coding in hippocampal place cells." SfN TPDA Workshop, Chicago, IL, United States. 10/24.

"Dynamical modulation of hippocampal replay sequences through firing rate adaptation." CoSyne 2024 Poster Session, Lisbon, Portugal. 2/24.

"Successor-predecessor intrinsic exploration." Harvard Reinforcement Learning Workshop, Cambridge, MA, United States. 8/23.

"Neural-inspired world models." The Zuckerman Institute, Columbia University, New York, NY, United States. 1/23.

"Learning state representations via retracing in RL." UCL Foundational AI CDT Showcase Presentation, London, United Kingdom. 4/22.

"Prediction and generalisation over directed actions by grid cells." Wellcome Trust Collaborative Award, London, United Kingdom. 6/20.

"Deep kernel learning approach to engine emissions modelling." AI and Machine Learning in Chemical Engineering, Cambridge, United Kingdom. 6/19.

Teaching

Teaching Assistant, *Computational Neuroscience*, University of Cambridge 3/24 – 6/24

Teaching Assistant, Cold Spring Harbor Asia Computational Neuroscience Summer School 6/24 – 7/24

Teaching Assistant, *COMP0085, COMP0086, COMP0089*, UCL 20 – 21

Selected Professional Activities

Conference Reviewer: *ICLR* '22 '23 '24 '25, *ICML* '22 '23 '24 '25 '26, *NeurIPS* '22 '23 '24 '25, *AISTATS* '23 '24 '25.

Journal Reviewer: *Nature Neuroscience*, *Nature Communications*, *Neuron*, *PNAS*, *Annals of Applied Statistics*, *Physical Review E*.