Ta-Chu Kao

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Current position

2021– Postdoctoral Research Fellow, Gatsby Computational Neuroscience Unit, London, U.K.

Experience

2021 Research Scientist, MediaTek Research, Cambridge, U.K.

2021 Research Scientist Internship, Facebook Reality Labs, New York, U.S.A.

2019 Visiting researcher, Janelia Research Campus, U.S.A.
Hosted by Professor Karel Svoboda

2016 Research assistant, CNCB, University of Oxford, U.K.
Worked with Professor Tim Vogels

2017 Full-stack Developer Summer Internship, *Wincomm*, Hsinchu, Taiwan

2015 Policy Think Tank Autumn Internship, *Savantas*, Hong Kong

2015 Strategy Consulting Summer Internship, *Cartesian*, London, U.K.

2014 Barrister Chambers Winter Mini-pupillage, *Temple Chambers*, Hong Kong

2014 Venture Capital Summer Internship, *CTBC Capital*, Taipei, Taiwan

2013 Global Marketing Summer Internship, *HTC*, Taipei, Taiwan

Publications

Peer-reviewed papers

Kao TC, Sadabadi MS, Hennequin G (2020) Optimal anticipatory control as a theory of motor preparation: a thalamocortical model, Neuron.

Kao TC, Hennequin G (2019) Neuroscience out of control: control-theoretic perspectives on neural circuit dynamics, Current Opinion in Neurobiology.

Kao TC, Porter MA (2017) Layer Communities in Multiplex Networks, Journal of Statistical Physics.

Refereed conference proceedings

Kao TC*, Jensen KT*, Bernacchia A, Hennequin G (2021) Natural continual learning: success is a journey, not (just) a destination, In: Advances in Neural Information Processing Systems. *equal contributions.

Jensen KT*, **Kao TC***, Stone JT, Hennequin G (2021) Scalable Bayesian GPFA with automatic relevance determination and discrete noise models, In: Advances in Neural Information Processing Systems. *equal contributions.

Jensen KT, **Kao TC**, Tripodi M, Hennequin G (2020) Manifold GPLVMs for discovering non-Euclidean latent structure in neural data, In: Advances in Neural Information Processing Systems.

Jensen KT, **Kao TC**, Tripodi M, Hennequin G (2020) mGPLVM: Beyond the Euclidean Brain, *Bernstein Conference* (contributed talk).

Schimel M, **Kao TC**, Hennequin G, (2020) Is motor preparation an optimal control strategy?, Bernstein Conference (poster).

Schimel M, **Kao TC**, Hennequin G (2020) Modelling the learning of new motor skills during a curl-field task, FENS 2020.

Kao TC, Seri M, Wang L (2019) OwlODE: making ODEs first-class Owl citizens, ICFP ML Workshop.

Kao TC, Sadabadi MS, Hennequin G (2017) Orthogonal preparatory and movement subspaces in monkeys, mice, and an inhibition-stabilized network, Cosyne.

Sadabadi MS, **Kao TC**, Hennequin G (2017) Flexible, optimal motor control in a thalamo-cortical circuit model, Cosyne.

Invited commentary

Kao TC, Hennequin G (2018) Null ain't dull: new perspectives on the motor cortex, Trends in Cognitive Sciences (spotlight article)

Preprints

Schimel M, **Kao TC**, Jensen KT, Hennequin G (2021) iLQR-VAE: control-based learning of input-driven dynamics with applications to neural data

Kao TC, Hennequin G (2021) Automatic differentiation of Sylvester, Lyapunov, and algebraic Riccati equations

Reviewing activity

PLoS One

*e*Life

Nature Neuroscience

Invited talks

06/2021 A theory of motor preparation and control, Carnegie Mellon University, U.S.A.

04/2020 Controlling the controller, Columbia Zuckerman Institute, U.S.A.

11/2019 A model of optimal movement preparation, Janelia Research Campus, U.S.A.

11/2019 Neuroscience out of control, Janelia Research Campus, U.S.A.

Teaching

2018—2020 Lab demonstrator, Engineering Department, University of Cambridge

Introduction to Neuroscience

2018—2020 Supervisor, Engineering Department, University of Cambridge

Systems and Control
Inference

Introduction to Neuroscience
Signal and Pattern Processing
Mathematical Methods

Education

2017– 2021 PhD in Engineering, University of Cambridge, Cambridge, U.K.
Advised by Dr Guillaume Hennequin and Professor Máté Lengyel

2012–2016 Master of Physics and Philosophy, University of Oxford, Oxford, U.K.
Advised by Professor Mason A. Porter

Grants, honours & awards

2018–2020 Taiwan Ministry of Education overseas study scholarship

2018–2019 Trinity-Barlow scholarship, Trinity College, University of Cambridge

2012–2016 First-class honours (3rd in the year), University of Oxford

2012–2016 Nuffield Scholarship, St. Hilda's College, University of Oxford

Software

mGPLVM, Manifold Gaussian Process Latent Variable Models in Pytorch

iLQR, Implementation of iLQR in OCaml

OCaml MLIR, OCaml bindings to MLIR

Owl, Numerical computing library in OCaml

OwlDE, ODE solvers in OCaml

Owl Opt, Numerical optimisation library in OCaml

Owl ARPACK, Large-scale eigenvalue problem solvers in OCaml

Skills

Experienced with Python, OCaml, Typescript, Pytorch and JAX

Fluent in English, Mandarin, and Cantonese