

Mohamed Abdelhack

POSTDOCTORAL FELLOW · KREMBIL CENTRE FOR NEUROINFORMATICS

250 College St. Toronto ON

✉ mohamed.abdelhack.37a@kyoto-u.jp | 🏠 <https://mabdelhack.github.io/> | 📺 mabdelhack | 🐦 @mabdelhack

Education

Kyoto University

PHD INFORMATICS

Kyoto, Japan

2015 - 2019

Okinawa Institute of Science and Technology

MSc SCIENCE AND TECHNOLOGY

Okinawa, Japan

2012 - 2015

Alexandria University

BSc ELECTRICAL ENGINEERING

Alexandria, Egypt

2008 - 2012

Professional Experience

- 2021- **Postdoctoral Research Fellow**, Krembil Centre for Neuroinformatics, Centre for Addiction and Mental Health
- 2019-2021 **Postdoctoral Research Assistant**, Department of Anesthesiology, Washington University in St. Louis
- 2018-2019 **Researcher**, Graduate School of Medicine, Kyoto University
- 2015-2018 **Research Assistant**, Graduate School of Informatics, Kyoto University
- 2015-2018 **Student Intern**, Department of Neuroinformatics, Advanced Telecommunication Research Institute
- 2011 **Summer Intern**, Laboratory of Neural Injury and Repair, Wadsworth Center

Publications

* equal contribution; + mentored student

PUBLISHED

- Abdelhack, Mohamed**; Zhukovsky, Peter; Milic, Milos; Harita, Shreyas; Wainberg, Michael; Tripathy, Shreejoy; Griffiths, John; Hill, Sean and Felsky, Daniel. *In press*. Opposing brain signatures of sleep in task-based and resting-state conditions. *Nature Communications*.
- Abdelhack, Mohamed**; Zhang, Jiaming; Tripathi, Sandhya; Fritz, Bradley A; Felsky, Daniel; Avidan, Michael S; Chen, Yixin; and King, Christopher R. 2023. A modulation layer to increase neural network robustness against data quality issues. *Transactions on Machine Learning Research*.
- Cheng Fan L.*; Horikawa, Tomoyasu; Majima, Kei; **Abdelhack, Mohamed**; Aoki, Shuntaro C.; Hirano, Jin and Kamitani, Yukiyasu. 2023. Reconstructing visual illusory experience from human brain activity. *Science Advances*.
- King, Christopher R et al. (**Abdelhack, Mohamed** as a part of the ACTFAST Study Group). 2023. An intraoperative telemedicine program to improve perioperative quality measures: The ACTFAST-3 randomized clinical trial. *JAMA Network Open*.
- Abdelhack, Mohamed**. 2022. An in vivo assay to study locomotion in *Caenorhabditis elegans*. *MethodsX*.
- Ortiz, Abigail; Sanches, Marcos; **Abdelhack, Mohamed**; Schwaiger, Tyler R; Wainberg, Michael; Tripathy, Shreejoy J; Felsky, Daniel; Mulsant, Benoit H; Fiedorowicz, Jess G. 2022. Sex-specific associations between lifetime diagnosis of bipolar disorder and cardiovascular disease: a cross-sectional analysis of 257,673 participants from the UK Biobank. *Journal of Affective Disorders*.
- Hueniken, Katrina; Somé, Nibene Habib; **Abdelhack, Mohamed**; Taylor, Graham; Marshall, Tara Elton; Wickens, Christine M; Hamilton, Hayley A; Wells, Samantha; Felsky, Daniel. 2021. Machine learning-based predictive modeling of anxiety and depressive symptoms during 8 months of the COVID-19 global pandemic: repeated cross-sectional survey study. *JMIR mental health*.

Fritz, Bradley A; **Abdelhack, Mohamed**; King, Christopher R; Chen, Yixin; and Avidan, Michael S. 2020. Update to ‘Deep-learning model for predicting 30-day postoperative mortality (Br J Anaesth 2019; 123: 688–95). *British Journal of Anaesthesia*.

Abdelhack, Mohamed and Kamitani, Yukiyasu. 2018. Sharpening of hierarchical visual feature representations of blurred images. *eNeuro*.

Nedelescu, Hermina; **Abdelhack, Mohamed**; and Pritchard, Arwel T. 2018. Regional differences in Purkinje cell morphology in the cerebellar vermis of male mice. *Journal of neuroscience research*.

Nedelescu, Hermina and **Abdelhack, Mohamed**. 2013. Comparative morphology of dendritic arbors in populations of Purkinje cells in mouse sulcus and apex. *Neural Plasticity*.

UNDER REVIEW

Abdelhack, Mohamed*; Tripathi, Sandhya*; Chen, Yixin; Avidan, Michael S; and King, Christopher R. Social vulnerability and surgery outcomes: A cross-sectional analysis. Preprint: <https://doi.org/10.21203/rs.3.rs-3580911/v1>

Abdelhack, Mohamed. An open-source tool for hyperspectral image augmentation in tensorflow. Preprint: <https://arxiv.org/abs/2003.13502>

Dolling-Boreham, Roberta M⁺; Mohan, Akshay; **Abdelhack, Mohamed**; Elton-Marshall, Tara; Hamilton, Hayley A; Boak, A; Felsky, Daniel. Identifying Psychosocial and Ecological Determinants of Enthusiasm in 13,661 Youth: An Integrative, Cross-sectional Analysis Using Machine Learning.

Tripathi, Sandhya; Fritz, Bradley A; **Abdelhack, Mohamed**; Avidan, Michael S; Chen, Yixin; and King, Christopher R. Multi-view representation learning to schema match databases. Preprint: <https://dx.doi.org/10.2139/ssrn.4567954>

Hall, Siobhan Mackenzie; Kochin, Daniel; Carne, Carmel; Herterich, Patricia; Lewers, Kristen Lenay; **Abdelhack, Mohamed**; Ramasubramanian, Arun; Michael Alphonse, Juno Felecia; Ung, Visotheary; El-Gebali, Sara; Currin, Christopher Brian; Plomp, Esther; Thompson, Rachel; Sharan, Malvika. 10 Simple Rules for pushing boundaries of inclusion at academic events.

IN PREP

Suzuki, Keita*; **Abdelhack, Mohamed***; Murakami, Akio; Majima, Kei; Cheng Fan; Kamitani, Yukiyasu and Takahashi, Hidehiko. Schizophrenia patients possess a diffuse neural activation pattern to object recognition.

Abdelhack, Mohamed*; Murakami, Akio*; Majima, Kei; Cheng Fan; Kamitani, Yukiyasu and Takahashi, Hidehiko. Analysis of top-down and bottom-up processes of visual recognition in schizophrenia using deep neural network models

Abdelhack, Mohamed; Gonzalez-Torres, Christina; Ortiz, Abigail; Goldstein, Benjamin; and Felsky, Daniel. Population-level integrative modelling of factors associated with elevated cardiovascular disease risk in women with bipolar disorder.

Salah, Alaa⁺; Mostafa, Abdalrhman⁺; Abedi, Reem⁺; El Masri, Ghinwa⁺; Hammad, Ghada⁺; Eltaras, Menna⁺; Fadl, Amira⁺; Khaira, Enas⁺; Elsubaie, Rawan; **Abdelhack, Mohamed**. Arabs in Neuroscience: a case for localization in diversity educational programs.

Awards, Fellowships, Honors, & Grants _____

2023	IBRO Meetings Support - For Arabs in Neuroscience Initiative , International Brain Research Organization	\$CA 3,570 (eq.)
2023	Simons Collaboration on the Global Brain (SCGB) Conference Award Program - For Arabs in Neuroscience Initiative , Simons Foundation	\$CA 26,338 (eq.)
2022	Top Reviewer Award , Conference on Neural Information Processing Systems	
2022	womenmind™2022 Postdoctoral Fellowship Competition , Centre of Addiction and Mental Health	\$CA 65,000
2022	IBRO Diversity Grant - For Arabs in Neuroscience Initiative , International Brain Research Organization	\$CA 3,226 (eq.)
2022	Highlighted Reviewer of ICLR 2022 , International Conference on Learning Representations	
2019	Fourth Place in Image Recognition Hackathon , AI Hack Tunisia	Internship Offer
2018	Monbukagakusho Scholarship , Japanese Ministry of Education, Culture, Sports, Science and Technology	\$CA 10,335 (eq.)
2017	Monbukagakusho Scholarship , Japanese Ministry of Education, Culture, Sports, Science and Technology	\$CA 21,610 (eq.)
2017	Summer School Cost Waiver , Computational and Cognitive Neuroscience Summer School	\$CA 1,975 (eq.)
2016	Tuition Exemption Award , Kyoto University	\$CA 5,034 (eq.)
2015	Tuition Exemption Award , Kyoto University	\$CA 2,517 (eq.)
2015	Admission Fee Waiver Award , Kyoto University	\$CA 2,650 (eq.)
2010	Cairo International Biomedical Engineering Conference Registration Fee Grant , Misr El Kheir Foundation	\$CA 20 (eq.)

Presentations

* *presenting author*; + *mentored student*

INVITED TALKS

Oct 2023. *Computational Neuroscience, neural data analysis and modelling*. Invited talk: NeuroPedia Neural Engineering Webinar Series.

Aug 2023. *Machine-learning and neuroscience synergy to uncover mental health*. Invited talk: American University in Cairo, Cairo, Egypt.

Dec 2022. *The future of Neuro-AI through the lens of early career researchers*. Invited panel: Montreal AI & Neuroscience Conference 2022, Montreal, Canada.

Jul 2022. *What can human and computer vision reveal to us about brain health?*. Invited talk: Simply Neurocon Conference 2022, Online.

May 2022. *Computational neuroscience and applications in medicine*. Invited webinar: IEEE Engineering in Medicine and Biology Society American University of Sharjah Student Branch, Online.

Apr 2022. *Computational neuroscience (Arabic)*. Invited webinar: Egypt Scholars.

Oct 2021. *Computational neuroscience (Arabic)*. Invited webinar: Birzeit University, Online.

Dec 2020. *Top-down modulation in human visual cortex*. Invited webinar: Society of Neuroscientists of Africa.

CONTRIBUTED PRESENTATIONS

Abdelhack, Mohamed; Murakami, Akio; Suzuki, Keita; Majima, Kei; Cheng Fan; Kamitani, Yukiyasu and Takahashi, Hidehiko. 2023. *Uncovering the Visual Processing Imbalance in Schizophrenia Using Deep Neural Network Representations*. Accepted Poster presentation: *The New VISTAs in Vision Research*, Vision Research Conference, Toronto, Canada (Upcoming).

Abdelhack, Mohamed*; Zhukovsky, Peter; Milic, Milos; Harita, Shreyas; Wainberg, Michael; Tripathy, Shreejoy; Griffiths, John; Hill, Sean and Felsky, Daniel. 2023. *Sleep and depression show contradicting neural signatures during task-engaged and resting states*. Oral presentation: *Canadian Computational Neuroscience Spotlight*, Online.

- Abdelhack, Mohamed***; Zhang, Jiaming; Tripathi, Sandhya; Fritz, Bradley A; Felsky, Daniel; Avidan, Michael S; Chen, Yixin; and King, Christopher R. 2023. Bio-inspired modulation to enhance the robustness of deep learning models against healthcare data quality problems. Oral presentation: T-CAIREM AI in Medicine Conference. Toronto, Canada.
- Bakkar, Nour Mounira*; Mostafa, Abdalrhman⁺; **Abdelhack, Mohamed**; El-Yazbi, Ahmed F. 2023. A Convolutional Neural Network Model Classifies Beat-to- Beat Arterial Pressure Time-series: Sex Stratification And Cardiovascular Risk Prediction. Poster presentation: American Heart Association Scientific Sessions 2023.
- Hoxha, Isabelle; Mudrik, Noga; Urai, Anne; Kienigiell, Dante; Forest, Jeremy; **Abdelhack, Mohamed**; Peters, Megan A K; Halper, Nick; Zhang, Ru-Yuan; Lu, Xinquan; Butler, John S.* 2023. Opening Computational Neuroscience to a Wider Audience: Virtual Escape Room for Kids. Poster presentation: Conference on Cognitive Computational Neuroscience. Oxford, United Kingdom.
- Abdelhack, Mohamed***; Zhukovsky, Peter; Milic, Milos; Hill, Sean; Felsky, Daniel. 2023. Unraveling conflicting neural signatures of subjective and objective sleep measures. Poster presentation: Organization for Human Brain Mapping Annual Meeting. Montreal, Canada.
- Hara, Shuhei*; Suzuki, Keita; Murakami, Akio; Majima, Kei; **Abdelhack, Mohamed**; Cheng Fan; Takahashi, Hidehiko and Doya, Kenji. 2023. Elucidation of the dysfunction in sensory processing in schizophrenia. Poster presentation: Computational Psychiatry Conference, Dublin, Ireland.
- Abdelhack, Mohamed***; Zhukovsky, Peter; Milic, Milos; Harita, Shreyas; Griffiths, John; Hill, Sean and Felsky, Daniel. 2023. Sleep and depression show contradicting neural signatures during task-engaged and resting states. Oral presentation: University of Toronto, Department of Psychiatry Research Day. Toronto, Canada.
- Bakkar, Nour Mounira*; Mostafa, Abdalrhman⁺; **Abdelhack, Mohamed**; El-Yazbi, Ahmed F. 2023. A convolutional neural network model classifies beat-to-beat arterial pressure time-series: sex stratification and cardiovascular risk prediction. Poster presentation: ASPET 2023 Annual Meeting. St. Louis, MO.
- Abdelhack, Mohamed***; Zhukovsky, Peter; Milic, Milos; Hill, Sean; Felsky, Daniel. 2023. Shared Neural Representations between Sleep and Depression and Their Effect on Visual Perception. Poster presentation: Society of Biological Psychiatry Annual Meeting. San Diego, CA.
- Dolling-Boreham, Roberta M*; Mohan, Akshay; **Abdelhack, Mohamed**; Elton-Marshall, Tara; Hamilton, Hayley A; Boak, A; Felsky, Daniel. 2023. Identifying psychosocial and ecological determinants of enthusiasm in youth using machine learning. Poster presentation: International Conference on Health Policy Statistics. Scottsdale, AZ.
- Hoxha, Isabelle; Mudrik, Noga; Urai, Anne; Kienigiell, Dante; Forest, Jeremy; **Abdelhack, Mohamed**; Peters, Megan A K; Zhang, Ru-Yuan; Lu, Xinquan; Halper, Nick; Butler, John S.* 2022. Virtual escape room for kids: opening online conferences to a wider audience. Poster presentation: SCI:COM
- Abdelhack, Mohamed***; Zhukovsky, Peter; Milic, Milos; Felsky, Daniel. 2022. Effect of sleep on neural coding in early visual cortex revealed in a large population study. Poster presentation: Society for Neuroscience Annual Meeting, San Diego, CA.
- Salah, Alaa⁺; Mostafa, Abdalrhman⁺; Abedi, Reem⁺; El Masri, Ghinwa⁺⁺; Hammad, Ghada⁺; Eltaras, Menna⁺; Fadl, Amira⁺; Khaira, Enas⁺; **Abdelhack, Mohamed**. 2022. Computational neuroscience in the arabic region. Flash talk: Neuromatch Conference 5.0.
- Abdelhack, Mohamed***; Zhukovsky, Peter; Milic, Milos; Felsky, Daniel. 2022. Effect of sleep on neural coding in early visual cortex revealed in a large population study. Poster presentation: Krembil Centre for Neuroinformatics Open House.
- Elsherif, Omar^{**}, **Abdelhack, Mohamed**. 2021. Modeling image sharpening in human visual cortex using computer vision models. Flash talk: Neuromatch Conference 4.0.
- Abdelhack, Mohamed***. 2021. Big data in the wild: modulation of artificial intelligence model weights in real time. Flash talk: Krembil Centre for Neuroinformatics Open House.
- Abdelhack, Mohamed***. 2021. Modulation layer for combating missing data. Oral talk: Anesthesiology Research Data Blitz, Washington University in St. Louis, St. Louis, MO.
- Abdelhack, Mohamed*** and Kamitani, Yukiyasu. 2020. Visual misrecognition reveals contradiction between lower and higher visual cortex activations. Flash talk: Neuromatch Conference 3.0.
- Abdelhack, Mohamed***; King, Christopher R; Tripathi, Sandhya; Fritz, Bradley; Chen, Yixin; Avidan, Michael. 2020. Post-operative mortality prediction with and without the use of intraoperative features. Poster presentation: AMIA 2020 Symposium.

- Abdelhack, Mohamed*** and Kamitani, Yukiyasu. 2019. Top-down modulation in human visual cortex revealed by brain decoding with deep neural network representation. Poster presentation: CiNet Conference, Osaka, Japan.
- Murakami, Akio*; **Abdelhack, Mohamed***; Majima, Kei; Cheng Fan; Kamitani, Yukiyasu and Takahashi, Hidehiko. 2019. Representational structure of the higher visual cortex in schizophrenia. Poster presentation: Mechanism of Brain and Mind Winter Workshop, Hokkaido, Japan.
- Murakami, Akio*; **Abdelhack, Mohamed***; Majima, Kei; Cheng Fan; Kamitani, Yukiyasu and Takahashi, Hidehiko. 2018. Analysis of top-down and bottom-up processes of visual recognition in schizophrenia using deep neural network models. Poster presentation: International Consortium on Hallucination Research, Kyoto, Japan.
- Abdelhack, Mohamed*** and Kamitani, Yukiyasu. 2017. Top-down neural processing that supplements missing image features revealed by brain decoding with deep neural network representation. Poster presentation: Vision Science Society Annual Meeting, St. Pete Beach, FL.
- Nedelescu, Hermina*; **Abdelhack, Mohamed**; and Pritchard, Arwel T. 2016. Purkinje cell heterogeneity in the anterior and posterior cerebellar lobule. Dynamic poster presentation: Society for Neuroscience Annual Meeting, San Diego, CA.
- Abdelhack, Mohamed*** and Maruyama, Ichiro. 2015. Locomolyzer: a comprehensive tool for animal locomotion analysis. Poster presentation: Congress of the European Society of Biomechanics, Prague, Czechia.
- Abdelhack, Mohamed***. 2014. Adaptation in locomotion behavior of *Caenorhabditis elegans*. Poster presentation: Okinawa Computational Neuroscience Course, Okinawa, Japan.
- Abdelhack, Mohamed*** and Nedelescu, Hermina. 2013. Investigating the effect of anatomical location on Purkinje cell morphology. Poster presentation: Society for Neuroscience Annual Meeting, San Diego, CA.

Teaching Experience

Sep 2023	American Academy of Neurology - Egypt Student Chapter, Statistics Bootcamp , Instructor	<i>Online</i>
Jun-Jul 2023	KCNI Summer Academy , Instructor	<i>Toronto, Canada</i>
Nov 2022	IBRO-ARC School on Impact of Lifestyle Modification on Neurodegenerative Disorders from Preventive and Therapeutic Perspectives , Instructor	<i>Mansoura, Egypt</i>
Aug 2022	IBRO-Simons Computational Neuroscience Imbizo , Teaching Assistant	<i>Cape Town, South Africa</i>
Jun 2022	Introduction to Computational Neuroscience , Lecturer and Course Lead	<i>Online</i>
Jul 2020	Neuromatch Academy , Lead Teaching Assistant	<i>Online</i>
2013	An Introduction to Interdisciplinary Science Workshop , Instructor & organizer	<i>Okinawa, Japan</i>
Jul 2009 & Jun 2012	IEEE Alexandria Student Branch , C Programming Instructor	<i>Alexandria, Egypt</i>

Mentoring

2023	Mai Gamal , Visiting Student, Krembil Centre for Neuroinformatics	Toronto, ON
2022-2023	Cathlyn Chen , Research Student, Krembil Centre for Neuroinformatics	Toronto, ON
2021-2023	Roberta M Dolling-Boreham , Research Student, Krembil Centre for Neuroinformatics	Toronto, ON
2021	Katrina Heuniken , MSc Student, Krembil Centre for Neuroinformatics	Toronto, ON
2021-	Abdalrhman Mostafa , Mentee, Arabs in Neuroscience	Online
2021	Omar ElSharif , Mentee, Arabs in Neuroscience	Online
2020-2021	Jiaming Zhang , Intern, Department of Computer Science, Washington University in St. Louis	Online
2020-2021	Jerome Gammie , Intern, Department of Computer Science, Washington University in St. Louis	St. Louis MO
2017-2019	Shirin Vafae , Intern/MSc student, Graduate School of Informatics, Kyoto University	Kyoto, Japan
2018-2019	Fan Cheng , Intern/PhD Student, Graduate School of Informatics, Kyoto University	Kyoto, Japan
2018-2019	Ken Shirakawa , Undergraduate thesis student, Graduate School of Informatics, Kyoto University	Kyoto, Japan
2018-2019	Emi Satake , Master student, Graduate School of Informatics, Kyoto University	Kyoto, Japan

Outreach & Professional Development

SERVICE AND OUTREACH

2022	Neuromatch Conference 5.0 , Organizer	Online
2020-	Arabs in Neuroscience , Founder	Canada
2021-	The Africa I Know , Mentorship Team Member	Online
2021	Neuromatch Conference 4.0 , Organizer	Online
2021	Neuromatch Academy , Chief Communication Officer & Outreach Coordinator	Online
2021	Neuromatch Academy Computational Neuroscience Summer School , Project Mentor	Online
2019-2021	Washington University Postdoc Society , Policy Committee Member	St. Louis MO
2011	Brain-Computer Interfacing Challenge , Judging Panel Member	Albany, NY

DEVELOPMENT

Cultivating Community in Academia, online interview at the show "PhD - The Philosophical Drama."

Careers in Neuroscience Panel Discussion, invited by Alexandria Neuroscience Committee.

Computational and Cognitive Neuroscience Summer School 2017, New York University Shanghai, China.

OIST Computational Neuroscience Course 2014, Okinawa, Japan.

PEER REVIEW

Journals

PLOS One

British Journal of Anaesthesia

Journal of Biomedical Informatics

Conferences

The Conference on Neural Information Processing Systems (NeurIPS)

International Conference on Learning Representations (ICLR)

The International Joint Conference on Artificial Intelligence (IJCAI)

IEEE Big Data

PROFESSIONAL MEMBERSHIPS

Temerty Centre for AI Research and Education in Medicine

Organization for Human Brain Mapping