Mohamed Abdelhack

Postdoctoral Fellow · Krembil Centre for Neuroinformatics

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Education

Kyoto University   *Kyoto, Japan*
PhD Informatics   *2015 - 2019*
- Advisor: Prof. Yukiyasu Kamitani

Okinawa Institute of Science and Technology   *Okinawa, Japan*
MSc Science and Technology   *2012 - 2015*
- Advisor: Dr. Ichiro Maruyama

Alexandria University   *Alexandria, Egypt*
BSc Electrical Engineering   *2008 - 2012*
- Communications and Electronics Department
- Honors thesis/undergrad research advisor: Dr. Hania Farag

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; Zhang, Jiaming; Tripathi, Sandhya; Fritz, Bradley A; Feslky, 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*.

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*.

In Review

Abdelhack, Mohamed. An open-source tool for hyperspectral image augmentation in tensorflow.

Mostafa, Abdalrhman[+]; Bakkar, Nour Mounira; **Abdelhack, Mohamed**; El-Yazbi, Ahmed F. Can arterial blood pressure predict age? A convnet classification task.

In Prep

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 youth using machine learning.

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

Cheng Fan; Horikawa, Tomoyasu; Majima, Kei; **Abdelhack, Mohamed**; and Kamitani, Yukiyasu. Reconstructing visual illusory experience from human brain activity

Abdelhack, Mohamed; Zhukovsky, Peter; Milic, Milos; Hill, Sean and Felsky, Daniel. When less is more: Untangling the complex relationships between self-reported insomnia, accelerometry-based sleep duration, and mental health using functional MRI.

Abdelhack, Mohamed*; Tripathi, Sandhya*; Avidan, Michael S; Chen, Yixin; and King, Christopher R. Post-operative complications association with social vulnerability measurements.

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.

Abdelhack, Mohamed; Allam, Mona; and Elsherif, Omar. Modelling sharpening in the human visual cortex using deblurring methods.

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.

Spychala, Nadine; Hernandez-Garcia, Alex; Schumann, Frank; Jablonka, Jan; **Abdelhack, Mohamed**; James, Katie; Atay, Melvin Selim; Kording, Konrad. All boats rise together: going against wrong incentives in academia for better life and better science - a survey-based opinion paper.

Tripathi, Sandhya; Fritz, Bradley A; **Abdelhack, Mohamed**; Avidan, Michael S; Chen, Yixin; and King, Christopher R. Deep learning to jointly schema match, impute and transform databases.

Tripathi, Sandhya; Fritz, Bradley A; **Abdelhack, Mohamed**; Avidan, Michael S; Chen, Yixin; and King, Christopher R. (Un)fairness in Post-operative Complication Prediction Models.

Awards, Fellowships, Honors, & Grants

2023	**Simons Collaboration on the Global Brain (SCGB) Conference Award Program - For Arabs in Neuroscience Initiative**, Simons Foundation	*$US 20,000*
2022	**Top Reviewer Award**, Conference on Neural Information Processing Systems	
2022	**womenmind™2022 Postdoctoral Fellowship Competition**, Centre of Addiction and Mental Health	*$CA 65,000*
2022	**IBRO Diversity Grant - For Arabs in Neuroscience Initiative**, International Brain Research Organization	*€2,200*
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	*¥JP 1.1 M*
2017	**Monbukagakusho Scholarship**, Japanese Ministry of Education, Culture, Sports, Science and Technology	*¥JP 2.3 M*
2017	**Summer School Cost Waiver**, Computational and Cognitive Neuroscience Summer School	*$US 1,500*
2016	**Tuition Exemption Award**, Kyoto University	*¥JP 535,800*
2015	**Tuition Exemption Award**, Kyoto University	*¥JP 267,900*
2015	**Admission Fee Waiver Award**, Kyoto University	*¥JP 282,000*
2010	**Cairo International Biomedical Engineering Conference Registration Fee Grant**, Misr El Kheir Foundation	*£EG 100*

Presentations

* presenting author; + mentored student

INVITED TALKS

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*; 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 (Upcoming).

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 (Upcoming).

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. ASPET 2023 Annual Meeting (Upcoming).

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.

Hoxha, Isabelle; Mudrik, Noga; Urai, Anne; Kienigiel, 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.

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

Nov 2022	**IBRO-ARC School on Impact of Lifestyle Modification on Neurodegenerative Disorders from Preventive and Therapeutic Perspectives**, Instructor	*Mansoura, Egypt*
Aug 2022	**IBRO-Simons Computational Neuroscience Imbizo**, Teaching Assistant	*Cape Town, South Africa*
Jun 2022	**Introduction to Computational Neuroscience**, Lecturer and Course Lead	*Online*
Jul 2020	**Neuromatch Academy**, Lead Teaching Assistant	*Online*
Jul 2009 & Jun 2012	**IEEE Alexandria Student Branch**, C Programming Instructor	*Alexandria, Egypt*

Mentoring

2022-	**Cathlyn Chen**, Research Student, Krembil Centre for Neuroinformatics	*Toronto, ON*
2021-	**Roberta M Dolling-Boreham**, Research Student, Krembil Centre for Neuroinformatics	*Toronto, ON*
2021-2022	**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 Vafaee**, Intern, Graduate School of Informatics, Kyoto University	*Kyoto, Japan*
2018-2019	**Fan Cheng**, Intern, 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*
2018-2019	**Akira Murakami**, 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	*Online*
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*
2013	**An Introduction to Interdisciplinary Science Workshop**, Instructor & organizer	*Okinawa, Japan*
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

Society for Neuroscience
Temerty Centre for AI Research and Education in Medicine