

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; 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*.

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.

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.

Abdelhack, Mohamed; Zhukovsky, Peter; Milic, Milos; Harita, Shreyas; Griffiths, John; Hill, Sean and Felsky, Daniel. Sleep-insomnia superposition: opposing brain signatures of sleep in task-based and resting-state conditions.

IN PREP

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

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

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.

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⁺; Fadel, 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).

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.

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.

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	Abdalkhman 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, 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