

# 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

- Advisor: Prof. Yukiyasu Kamitani

Kyoto, Japan

2015 - 2019

### Okinawa Institute of Science and Technology

MSC SCIENCE AND TECHNOLOGY

- Advisor: Dr. Ichiro Maruyama

Okinawa, Japan

2012 - 2015

### Alexandria University

BSC ELECTRICAL ENGINEERING

- Communications and Electronics Department
- Honors thesis/undergrad research advisor: Dr. Hania Farag

Alexandria, Egypt

2008 - 2012

## Professional Experience

- 2021- **Postdoctoral 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

### PUBLISHED

- 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;** Zhang, Jiaming; Tripathi, Sandhya; Fritz, Bradley A; Felsky, Daniel; Avidan, Michael S; Chen, Yixin; and King, Christopher R. A Modulation Layer to Increase Neural Network Robustness Against Data Quality Issues. *Neural Networks*.

**Abdelhack, Mohamed.** An in vivo assay to study locomotion in *Caenorhabditis elegans* . *MethodsX*.

IN PREP

**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;** Zhukovsky, Peter; Milic, Milos and Felsky, Daniel. Effect of sleep on the visual recognition circuitry and its interaction with mental health and cognition.

## Awards, Fellowships, Honors, & Grants

2022	<b>womenmind 2022 Postdoctoral Fellowship Competition</b> , Centre of Addiction and Mental Health	CA\$ 65,000
2022	<b>IBRO Diversity Grant - For Arabs in Neuroscience Initiative</b> , International Brain Research Organization	€2,200
2022	<b>Highlighted Reviewer of ICLR 2022</b> , International Conference on Learning Representations	
2019	<b>Fourth Place in Image Recognition Hackathon</b> , AI Hack Tunisia	Internship Offer
2018	<b>Monbukagakusho Scholarship</b> , Japanese Ministry of Education, Culture, Sports, Science and Technology	¥1.1 M
2017	<b>Monbukagakusho Scholarship</b> , Japanese Ministry of Education, Culture, Sports, Science and Technology	¥2.3 M
2017	<b>Summer School Cost Waiver</b> , Computational and Cognitive Neuroscience Summer School	\$US 1500
2016	<b>Tuition Exemption Award</b> , Kyoto University	¥535,800
2015	<b>Tuition Exemption Award</b> , Kyoto University	¥267,900
	<b>Admission Fee Waiver Award</b> , Kyoto University	¥282,000
2010	<b>Cairo International Biomedical Engineering Conference Registration Fee Grant</b> , Misr El Kheir Foundation	£EG 100

## Presentations

\* *presenting author*; + *mentored student*

### INVITED TALKS

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 for Neuroscientists of Africa.

### CONTRIBUTED PRESENTATIONS

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. (Upcoming)

**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 2022. (Upcoming)

Salah, Alaa<sup>+</sup>; Mostafa, Abdalrhman<sup>+</sup>; Abedi, Reem<sup>+</sup>; El Masri, Ghinwa<sup>++</sup>; Hammad, Ghada<sup>+</sup>; Eltaras, Menna<sup>+</sup>; Fadl, Amira<sup>+</sup>; Khaira, Enas<sup>+</sup>; **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<sup>++</sup>, **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. Oral 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, Yukiya. 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, Yukiya. 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<sup>\*</sup>; **Abdelhack, Mohamed\***; Majima, Kei; Cheng Fan; Kamitani, Yukiya 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<sup>\*</sup>; **Abdelhack, Mohamed\***; Majima, Kei; Cheng Fan; Kamitani, Yukiya 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, Yukiya. 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<sup>\*</sup>; **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

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

2021-	<b>Abdalkhman Mostafa</b> , Mentee, Arabs in Neuroscience	Online
2021	<b>Omar ElSharif</b> , Mentee, Arabs in Neuroscience	Online
2020-2021	<b>Jiaming Zhang</b> , Intern, Department of Computer Science, Washington University in St. Louis	Online
2020-2021	<b>Jerome Gammie</b> , Intern, Department of Computer Science, Washington University in St. Louis	St. Louis MO

## Outreach & Professional Development

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### SERVICE AND OUTREACH

2022	<b>Neuromatch Conference 5.0</b> , Organizer	Online
2020-	<b>Arabs in Neuroscience</b> , Founder	Online
2021-	<b>The Africa I Know</b> , Mentorship Team Member	Online
2021	<b>Neuromatch Conference 4.0</b> , Organizer	Online
2021	<b>Neuromatch Academy</b> , Chief Communication Officer & Outreach Coordinator	Online
2021	<b>Neuromatch Academy Computational Neuroscience Summer School</b> , Project Mentor	Online
2019-2021	<b>Washington University Postdoc Society</b> , Policy Committee Member	St. Louis MO
2013	<b>An Introduction to Interdisciplinary Science Workshop</b> , Instructor	Okinawa, Japan
2011	<b>Brain-Computer Interfacing Challenge</b> , 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

Neural Networks

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