

RESUME

Firas Mawase

Place of birth: Haifa, Israel

Family: Married+3

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ACADEMIC DEGREES

- | | |
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| 2010-2015 | Ph.D., Department of Biomedical Engineering
Ben-Gurion University, Israel |
| 2009-2010 | M.Sc., Department of Biomedical Engineering
(Magna cum Laude, GPA 95/100)
Ben-Gurion University, Israel |
| 2005-2009 | B.Sc., Department of Biomedical Engineering
(Summa cum Laude. GPA 93/100)
Ben-Gurion University, Israel |

ACADEMIC APPOINTMENTS

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| 2018-present | Assistant Professor
Dept. of Biomedical Engineering
Technion, Israel Institute of Technology |
| 2015-2018 | Postdoctoral fellow
Dept. of Physical Medicine and Rehabilitation
Johns Hopkins School of Medicine, USA |
| 2013 | Visiting Scientist
Dept. of Motor Neuroscience and Movement Disorders
University College of London (UCL), UK |
| 2013 | Visiting Scientist
Depts. of Physiology and Biomedical Engineering
The Rehabilitation Institute of Chicago (RIC), USA
Northwestern University, Chicago, USA |

RESEARCH INTERESTS (briefly)

Sensorimotor Neuroscience, Neurorehabilitation, MRI-based Neuroimaging, Rehabilitation Engineering, Motor Learning – adaptation and skill learning, Brain-Machine interfaces - developing EMG and EEG-based prosthetic hand for amputees, Computational and Translational motor control. Quantification and modulation of motor recovery after stroke.

TEACHING EXPERIENCE

Solid Mechanics - 334222

Level: undergraduate

Taught: Spring 2023 - present

Institution: Technion, Israel Institute of Technology

Comments: Co-lecturer with Prof. J. Sznitman

Projects in Biomedical Engineering – 334014/5 (Fall/Spring)

Level: undergraduate

Taught: Fall 2021 - present

Institution: Technion, Israel Institute of Technology

Comments: Annual course

Biomechanics in Rehabilitation - 336506

Level: undergraduate/graduate

Taught: Spring 2019 - present

Institution: Technion, Israel Institute of Technology

Comments: Renewed course by F. Mawase

Human Neuroimaging and Brain Stimulation - 336014

Level: undergraduate/graduate

Taught: Spring 2019 - present

Institution: Technion, Israel Institute of Technology

Comments: New course introduced by F. Mawase, co-lecturer with Prof. T. Horowitz-Kraus

MATLAB for Biomedical Engineering - 36712323

Level: undergraduate

Taught: Fall 2012 - Fall 2014

Institution: Ben-Gurion University of the Negev

TECHNION ACTIVITIES

2022-present	Board member, May-Blum-Dahl Technion Human MRI Research Center
2021-present	Board member, Healthy Aging Initiative
2021-present	Member of steering committee, Accessibility of Arab students
2019-present	Member of academic committee, Technion Autonomous Systems Program (TASP)

DEPARTMENTAL ACTIVITIES

2021-present	Secretary of the Faculty Council
2019-2021	Member of the search committee for new faculty member candidates, Biomedical Engineering, Technion

PUBLIC PROFESSIONAL ACTIVITIES

Reviewer for journals:

Nature Human Behaviour, Proceedings of the National Academy of Sciences (PNAS), Brain, eLife PLOS Computational Biology, IEEE Transactions on Neural Systems & Rehabilitation Engineering, Annals of the New York Academy of Sciences, Journal of Neuroscience, Cerebral Cortex, Journal of Neurophysiology Journal of Cognitive Neuroscience, Neurorehabilitation and Neural Repair, Brain Stimulation, Scientific Reports, Experimental Brain Research, Journal of Aging and Physical Activity, IEEE Transactions on Systems, Man and Cybernetics, Part A.

Reviewer for grants:

Israel Science Foundation (ISF)
 US-Israel Binational Science Foundation (BSF)
 Dutch Research Council

Organizational positions:

2021-present Board Member, The Israeli Association for Physical Medicine and Rehabilitation

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Israeli Society for Neuroscience (ISFN)
 The Israeli society of Physiology and Pharmacology meeting (ISPP)
 The Society for Neuroscience (SFN)
 The Society for the Neural Control of Movement (NCM)
 The American Society of Neurorehabilitation (ASNR)
 Israeli Society for Medical and Biomedical Engineering (ISMBE)

FELLOWSHIPS, AWARDS AND HONORS

2022	Uzi & Michal Halevy Award for Innovative Applied Engineering
2019	MAOF Fellowship, Excellence fellowship for outstanding young faculty
2018	The Alfred Blalock Award, best clinical work at Johns Hopkins School of Medicine
2015-2017	Rothschild Fellowship by Yad-Hanadiv, Postdoctoral fellowships in Israel
2015-2017	Ministry of Science and Technology, Postdoctoral research fellowship
2015	Karniel Computational Motor Control Workshop (CMCW), young researcher award
2015	Society of Neural Control of Movement (NCM), Scholarship for graduate students
2010-2014	Kreitman Scholarship for outstanding PhD students
2014	Zlotowski Center for Neuroscience Award for the best PhD research project
2013	Alpha Omega Award, Best poster award, 1 st place at CMCW
2011	National Institute for Psychobiology in Israel (NIPI), Travel Award

SUPERVISION OF GRADUATE AND POST-GRADUATE STUDENTS**Postdoc members: 1**

Dr. Abed Sulieman, Postdoc (2019-2021), *The role of use-dependent plasticity in voluntary movement*. Currently senior Data Scientist at Novocure.

Completed MSc theses: 5

Ohad Rajchert (2023), *Differential neural control of finger flexion and extension during dexterous movements in humans*. Dept. of Biomedical Engineering. Supervisor: Firas Mawase.

Yuval Shaine (2023), *MR spectroscopy reveals neurochemical imbalance associated with motor recovery after ischemic stroke*. Dept. of Biomedical Engineering. Supervisor: Firas Mawase.

Gili Kamara (2022), *Finger movement generalization across directions and hands: a comparison between musicians and non-Musicians*. Dept. of Biomedical Engineering. Supervisor: Firas Mawase.

Mor Finestine (2022), *Functional reorganization of the cerebellar-thalamic-cortical network in patients with essential tremor (ET)*. Dept. of Biomedical Engineering. Supervisor: Firas Mawase.

Ashraf Kadry (2021), *Computational neural network provides naturalistic solution for recovery of finger dexterity after stroke*. Dept. of Biomedical Engineering. Supervisor: Firas Mawase.

PhD theses in progress: 1

Chen Avraham, PhD student (direct PhD track), *Neural and behavioral basis of de-novo skill learning*. Dept. of Biomedical Engineering. Supervisor: Firas Mawase. Starting year: 2022, Expected Graduation: 2024.

MSc theses in progress: 10

Mariana Nicola, *The association between intracortical inhibition and finger individuation*. Dept. of Biomedical Engineering. Supervisor: Firas Mawase. Starting year: 2020, Expected Graduation: 2023.

Yoel Melul, *EEG-based brain-machine prosthetic hand for amputees*. Dept. of Biomedical Engineering. Supervisor: Firas Mawase. Starting year: 2021, Expected Graduation: 2023.

Yara Abu-Hana, *The effect of motivation in motor adaptation*. Dept. of Biomedical Engineering. Supervisor: Firas Mawase. Starting year: 2021, Expected Graduation: 2024.

Ori Rajchert, *Reversible inactivation of the cerebellum output during motor generalization*. Dept. of Biomedical Engineering. Supervisor: Firas Mawase. Starting year: 2022, Expected Graduation: 2025.

Amitay Lev, *Representation of finger movements in the human cerebellum*. Dept. of Biomedical Engineering. Supervisor: Firas Mawase. Starting year: 2023, Expected Graduation: 2025.

Guy Hamburger, *MRI-compatible haptic device for finger somatosensory functions*. Dept. of Biomedical Engineering. Supervisor: Firas Mawase. Starting year: 2023, Expected Graduation: 2025.

Amit Kadosh, *The role of the ipsi and contra-lesional motor cortex in the recovery of distal functions after stroke*. Dept. of Electrical Engineering (cross supervision). Supervisor: Firas Mawase. Starting year: 2023, Expected Graduation: 2025.

Taima Zoabi, *Restoring fine-control of upper limb after stroke*. Dept. of Biomedical Engineering. Supervisor: Firas Mawase. Starting year: 2023, Expected Graduation: 2025.

Asmaa Abo-Hamam, *Restoring gross-control of upper limb after stroke*. Dept. of Medicine. Primary Supervisor: Prof. David Tanne, Secondary advisor: Firas Mawase. Starting year: 2023, Expected Graduation: 2025.

Aseel Nama, *Automation of clinical sensory function assessment via a multidimensional haptic robot*. Dept. of Mechanical Engineering. Primary Supervisor: Prof. Alon Wolf, Secondary advisor: Firas Mawase. Starting year: 2022, Expected Graduation: 2025.

RESEARCH GRANTS (external funding only)**Competitive:**

2023 - 2028	Type: Personal Grant PI: Firas Mawase Source: Israel Science Foundation (ISF) Title: The role of the cerebellum in finger dexterity Amount: 1,500,000 ILS
2023 - 2027	Type: Personal Grant PIs: Firas Mawase (Technion) and Vikram Chib (Johns Hopkins University) Title: The impact of motivation on motor learning: a computational and neural investigation Source: United States-Israel Binational Science Foundation (BSF) Amount: 250,000 USD
2020-2022	Type: Personal Grant PI: Firas Mawase Title: Closed-loop frequency-dependent transcranial alternating current stimulation (tACS) system for modulating retention of motor memory Source: German Israel Foundation (GIF) Amount: 25,000 Euros
2019-2023	Type: Personal Grant PI: Firas Mawase Title: The role of use-dependent plasticity mechanism in voluntary movement Source: Israel Science Foundation (ISF) Amount: 1,200,000 ILS
2019-2023	Type: New Faculty Equipment Grant PI: Firas Mawase Source: Israel Science Foundation (ISF) Amount: 1,992,000 ILS

Other sources:

2023-2027	Type: Consortium Grant Co-PIs: Simona Bar-Haim (main, Israel), Firas Mawase (Israel), Lior Shmuelof (Israel), David Tanne (Israel), Amro Akram (West Bank), Muhammed Al-Jarrah (Jordan), Tamar Weiss (Israel) Title: Evaluation of an accessible and affordable neurorehabilitation program to promote recovery and to enhance quality of life after stroke (RESTRO) Source: US-AID Middle East Regional Cooperation (MERC) Amount: 134,445 USD (Mawase); 997,729 USD (total)
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PUBLICATIONS

Note: PI marked in **bold**, graduate students, postdocs and research scientists are underlined.
IF=Impact Factor, Q=Quartile Score.

Theses (direct PhD track)

1. **Mawase F**. Predictive capabilities of the motor system in individuals with cerebral palsy. PhD Thesis No. 99192600. Biomedical Eng, Ben-Gurion University of the Negev. BGU Arrane Central Library, 2014.

Refereed papers in professional journals

1. **Mawase F** and Karniel A (2010). Evidence for predictive control in lifting series of virtual objects. *Experimental Brain Research* 203:447–452. (**IF = 2.064; Q2**).
2. **Mawase F**, Bar-Haim S, Karniel A (2011). Lack of predictive control in lifting series of virtual objects by individuals with diplegic Cerebral Palsy. *IEEE Transactions on Neural Systems and Rehabilitation Engineering* 19:686–695. (**IF = 4.9; Q1**).
3. **Mawase F** and Karniel A (2012). Adaptation to sequence force perturbation during vertical and horizontal reaching movement- averaging the past or predicting the future? *Frontiers in Systems Neuroscience* 6:60. (**IF = 3.0; Q2**).
4. **Mawase F**, Haizler T, Bar-Haim S, Karniel A (2013). Kinetic adaptation during locomotion on a split-belt treadmill. *Journal of Neurophysiology* 109:2216-2227. (**IF = 2.714; Q1**).
5. **Mawase F**, Shmuelof L, Bar-Haim S, Karniel A (2014). Savings in locomotor adaptation explained by changes in learning parameters following initial adaptation. *Journal of Neurophysiology* 111:1444–1454. (**IF = 2.714; Q1**).
6. **Mawase F**, Bar-Haim S, Joubran K, Rubin L, Karniel A, Shmuelof L (2016). Increased adaptation rates and reduction in trial-by-trial variability in subjects with cerebral palsy following a multi-session locomotor adaptation training. *Frontiers in Human Neuroscience* 10:203. (**IF = 2.9; Q2**).
7. Leib R, **Mawase F**, Karniel A, Donchin O, Rothwell J, Nisky I*, Davare M* (2016). Stimulation of PPC affects the association between motion and force signals for perception of stiffness and not the control of motion. *Journal of Neuroscience* 36:10545-10559. (**IF = 6.709; Q1**).
8. **Mawase F**, Bar-Haim S, Shmuelof L (2017). Formation of long-term locomotor memories is associated with functional connectivity changes in the cerebellar-thalamic-cortical network. *Journal of Neuroscience* 37:349-361. (**IF = 6.709; Q1**).

9. Avraham G, **Mawase F**, Shmuelof L, Donchin O, Mussa-Ivaldi S, Nisky I (2017). Representing delayed force feedback as a combination of current and delayed states. *Journal of Neurophysiology* 118:2110-2131. (IF = **2.714**; Q1).
10. **Mawase F**, Uehara S, Bastian AJ, Celnik P (2017). Motor learning enhances use-dependent plasticity. *Journal of Neuroscience* 37:2673-2685. (IF = **6.709**; Q1).
11. Uehara S, **Mawase F**, Celnik P (2018). Learning similar actions by reinforcement or sensory-prediction errors rely on distinct physiological mechanisms. *Cerebral Cortex* 28:3478-3490. (IF = **4.86**; Q1).
12. **Mawase F**, Lopez D, Celnik P*, Haith A* (2018). Movement repetition facilitates response preparation. *Cell Reports* 24:801-808. (IF = **9.995**; Q1).
13. Uehara S, **Mawase F**, Therrien AS, Cherry-Allen KM, Celnik P (2019). Interactions between motor exploration and reinforcement learning. *Journal of Neurophysiology*. 122(2):797-808. (IF = **2.714**; Q1).
14. Jossinger S, **Mawase F**, Ben-Shachar M, Shmuelof L (2020). Locomotor adaptation is associated with microstructural properties of the inferior cerebellar peduncle. *Cerebellum*. 19:370–382. (IF = **3.5**; Q1)
15. **Mawase F**, Cherry-Allen KM, Xu J, Anaya M, Uehara S, Celnik P (2020). Pushing the rehabilitation boundaries: hand motor impairment can be reduced in chronic stroke. *Neurorehabilitation and Neural Repair*. 34 (8), 733-745. (IF = **4.895**; Q1).
16. Solomonow-Avnon D, **Mawase F** (2020) The dose and intensity matter for chronic stroke. *Journal of Neurology, Neurosurgery and Psychiatry*. 90(10):1187-1188. (IF = **13.654**; Q1).
17. Dawidowicz G, Shaine Y, **Mawase F** (2022). Separation of multiple motor memories through implicit and explicit processes. *Journal of Neurophysiology*. 127(2):329-340. (IF = **2.714**; Q1).
18. Uehara S, **Mawase F**, Cherry-Allen KM, Runnalls K, Khan M, Celnik P (2023). No polarity-specific modulation of prefrontal-to-M1 interhemispheric inhibition by transcranial direct current stimulation over the lateral prefrontal cortex. *Neuroscience*. 513:54-63. (IF = **3.708**; Q2).
19. Kamara G, Rajchert O, Solomonow-Avnon D and **Mawase F** (2023). Generalization reveals asymmetric and interactive control networks for multi-finger dexterous movements. *Cell Reports*. 42(3):112214. (IF = **9.995**; Q1).
20. Suliman A, Solomonow-Avnon D, **Mawase F** (2023). Cortically-evoked movement in humans reflects history of prior executions, not plan for upcoming movement. *Journal of Neuroscience*. 43 (27) 5030-5044. (IF = **6.709**; Q1).

Review articles

21. Xu J*, **Mawase F***, Schieber MH (*accepted pending minor revision*). Evolution, biomechanics, and neurobiology converge to explain selective finger motor control. *Physiological Reviews*. *Equally contributed. (**IF = 37.31; Q1**).

Preprints

1. Khatib S, Chib VS, **Mawase F** (2023), Motivation upregulates the adaptive response in sensorimotor learning. *bioRxiv* doi.org/10.1101/2023.09.17.558102.
2. Rajchert O*, Ofir-Geva S*, Melul Y, Khoury-Mireb M, Wonderman Bar-Sela O, Granot O, Caspi T, Frenkel-Toledo S, Soroker N, **Mawase F** (2023). Direction-dependent neural control of finger dexterity in humans. *bioRxiv* doi.org/10.1101/2023.04.25.538234.
3. Kadry A*, Solomonow-Avnon D*, Norman S, Xu J, **Mawase F** (2023). An ANN models cortical-subcortical interaction during post-stroke recovery of finger dexterity. *bioRxiv* doi.org/10.1101/2021.06.22.449412. *Equally contributed.

Refereed Papers in Conference Proceedings

1. **Mawase F**, Haith A, Celnik P (2016). Repetition enhances movement preparation. Advances in Motor Learning and Motor Control (MLMC) meeting, San Diego, CA, USA.
2. **Mawase F**, Wymbs N, Uehara S, Celnik P (2016). Reward gain model describes cortical use-dependent plasticity. IEEE Engineering in Medicine and Biology Society (EMBC), pp 5-6.
3. **Mawase F**, Uehara S, Bastian A, Celnik P (2015). Reinforcement mechanisms underlie use-dependent plasticity in human motor behaviors. Translational and Computational Motor Control (TCMC) meeting, Chicago, IL, USA.
4. Uehara S, **Mawase F**, Celnik P (2015). LTP-like plasticity in the primary motor cortex reflects reinforcement mechanism of motor learning. Translational and Computational Motor Control (TCMC) meeting, Chicago, IL, USA.
5. **Mawase F**, Shmuelof L, Karniel A. (2013). In search of a common mechanism of motor Savings: Experience-dependent changes in learning parameters during locomotor. Translational and Computational Motor Control (TCMC) meeting, San Diego, CA, USA.

CONFERENCES

Plenary, keynote or invited talks

1. Toward unraveling the neural control of finger dexterity, Multisensory Integration in Action Conference, December 13-15 2022, Israel. **Invited talk**

2. Pushing the boundaries by hand: recovery of finger dexterity in chronic stroke, Israel Society for Physical Medicine and Rehabilitation, December 18-19, 2019, Israel. **Invited talk**
3. Probing and modulating use-dependent plasticity in the motor cortex, Israel Society for Neuroscience (ISF), January 8-11, 2019, Israel. **Invited talk**
4. Piano-like skill learning for stroke rehabilitation, Israel Society for Medical and Biological Engineering (ISMBE), February 25-26, 2019, Israel. **Invited talk**
5. Brain and Music: Piano-like skill learning for stroke rehabilitation, The Israeli society of Physiology and Pharmacology meeting (ISPP), February 14, 2019, Israel. **Invited talk**

Invited Seminars in Universities

- 2023 Edmond and Lily Safra Center for Brain Sciences. The Hebrew University. ‘Unlocking the secrets of finger Dexterity - What lesions teach us about human neural control’.
- 2023 Department of Biomedical Engineering, Ben-Gurion University, ‘Neural control of finger dexterity’.
- 2019 Department of Physiotherapy, Tel-Aviv University. ‘Piano-like skill learning for recovery of finger individuation in stroke’.

Participation in conference organizing

1. Multisensory Integration in Action Conference, December 2022, Ma'alot – Tarshiha, Israel.
Conference organizer and Chair
2. Karniel Computational Motor Control Workshop” at Ben-Gurion University. **Conference co-Chair**
3. BrainTech session at the Israel Society for Medical and Biological Engineering (ISMBE), Haifa, February 25-26, 2019. **Session co-Chair**