DIAR **ABDLKARIM**

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I am a postdoctoral research scientist at the University of Birmingham (UK) currently working on immersive extended reality (XR) technologies for real-time sensory feedback and training for individuals and groups. I use my skills in hardware prototyping, research-oriented software development, expertise in motion capture and psychophysics to generate scientific results from first principles.

EDUCATION

2022-present EPSRC funded postdoctoral fellow at the University of Birmingham, UK

2016-2022 EPSRC funded PhD in computational neuroscience with a focus in sensory-motor control and neuroplasticity through immersive virtual-reality training, University of Birmingham, UK

2013-2014 MSc in Computational Neuroscience and Cognitive Robotics (CNCR) with distinction, University of Birmingham, UK

2009-2012 BSc in Neuroscience. Final year project focus on neuronal information processing in the brain, University of Manchester, UK

ENTREPRENEURSHIP AND EMPLOYMENT

Jun 2024-Present **Co-Founder and director of Motion Dynamics Ltd (Company No. 15797570)**
www.motiondynamics.ai
I have recently embarked on a journey with the School of Sports, Exercise and Rehabilitation and the School of Computer Science at the University of Birmingham to create a mobile phone-based sports analytics tool combining computer vision with domain knowledge for creating engaging performance feedback. We are currently applying for funding through the Innovate UK scheme, following some success through internal funding and support from the University.

Jun 2017-Present **Co-Founder and director of Obi Robotics Ltd (Company No. 10827452)**
www.obirobotics.com
Over a short period of time, we have been able to create one of the most advanced and fully self-contained data gloves on the market. My aim is to cover the following four application areas: virtual/augmented reality, robotics manipulation, gesture and health. At this stage of development, our product consists of two data gloves (16DoF) in an All-in-One wireless motion capture and communications system.

Jun 2021- Jun 2022 **Research Scientist at Meta (formerly Facebook) Reality Labs**

My role involved addressing future directions in research design for novel experimental application using wrist-based haptic feedback. I worked on creating complex immersive virtual simulations to test user performance and behaviour with the presence of real-time haptic stimulation.

Jun 2019-Dec 2019 **Research Intern at Meta (formerly Facebook) Reality Labs**
I had the opportunity to develop a series of scientific experiments on human embodiment and perception related to novel hand-tracking technologies for understanding user behaviour in a natural context.

FUNDING

Sep 2017–Aug 2018 **Industrial partnership with Adient Plc a global leader in automotive seating (£210K)** The project involved the design, prototyping and testing of the car seat of the future, targeting the luxury car segment.

Oct 2019-Oct 2020 **Co-applicant on Innovate UK grant on creating a hand assessment and rehabilitation data-glove tool for in-clinic use (£150K, TSB Reference: TS/T002913/1)** This work was in collaboration with the new Center for Neurorehabilitation at University College London.

Sep 2022-Present **Co-application on the accelerator for Adaptive Touch Testing System (£5K, BBSRC IAA)** I developed a mobile, accessible plug-and-play touch-testing system to automate and speed up clinical peripherical neuropathy assessments in hand and fingers.

Mar 2023-Sep 2023 **Recipient of an Innovate UK grant (Immersive and Creative Tech, £60K)** In collaboration with a London-based startup (OmBeond) we developed a sensorised phone case to support with breathing for wellness and anxiety reduction.

Apr 2024-Present **Recipient of a Google collaborative grant (£15K) to help develop and test new text entry techniques in extended reality (XR)** My work also led an accepted paper for CHI conference 2025.

Nov 2024-Present **Innvoate UK iCure Grant recipient for technology transfer (£35K)**
I am one of 16 candidates UK wide to be accepted on the iCure program. My role as an entrepreneurial lead is to build relationships with industry and prepare to create a spinout company in support of the university's business and industry engagement strategy.

ACADEMIC EXPERIENCE

2020-Present **MSc module: Mind, Brain and Models**, I assist master students with computational neuroscience, coding and machine-learning assignments, University of Birmingham, UK

2022-Present **XR-Crash Course for Scientists:** I developed and run a new hands-on, intensive, one-week crash-course for graduates and academics (60+ successful graduates to-date) to gain practical knowledge about immersive

extended reality development for scientific studies, University of Birmingham, UK

2022-Present **BhamXR**, I helped setup a collaborative cross-college community interested in working on extended reality applications for research, University of Birmingham, UK

2018-Present **Supervision:** I directly supervised 20+ undergraduate Psychology and CS students and 14+ CNCR, Psychology and CS MSc students on various XR and mobile related projects, University of Birmingham, UK

PUBLICATIONS

My publications cover a range of topics in the areas of perception, simulation, immersive XR, motor control and neuroplasticity. Most of my work revolves around the most advanced tool known to us, the human hands.

CHI 2025 review-paper covering all known text-entry techniques in extended reality to-date (Due to the conference's anonymity requirements the paper can only be shared via direct request).

Abdlkarim, D., Di Luca, M., Aves, P., Maaroufi, M., Yeo, S. H., Miall, R. C., ... & Galea, J. M. (2024). A methodological framework to assess the accuracy of virtual reality hand-tracking systems: A case study with the Meta Quest 2. *Behavior research methods*, *56*(2), 1052-1063. https://link.springer.com/article/10.3758/s13428-022-02051-8

Abdlkarim, D., Ortenzi, V., Pardi, T., Filipovica, M., Wing, A. M., Kuchenbecker, K. J., & Di Luca, M. (2021). PrendoSim: Proxy-Hand-Based Robot Grasp Generator. In *ICINCO* (pp. 60-68). https://hi.is.mpg.de/publications/abdlkarim21-icinco-prendosim

Ortenzi, V., Filipovica, M., Abdlkarim, D., Pardi, T., Takahashi, C., Wing, A. M., ... & Kuchenbecker, K. J. (2022, March). Robot, Pass me the tool: Handle visibility facilitates task-oriented handovers. In *2022 17th ACM/IEEE International Conference on Human-Robot Interaction (HRI)* (pp. 256-264). IEEE. https://ieeexplore.ieee.org/document/9889546

Gonzalez-Franco*, M., Abdlkarim, D*., Bhatia, A., Macgregor, S., Fotso-Puepi, J. A., Gonzalez, E. J., ... & Ahuja, K. (2024). Hovering Over the Key to Text Input in XR. *arXiv preprint arXiv:2406.09579*. https://arxiv.org/abs/2406.09579

Watkins, F., Abdlkarim, D., & Thompson, R. L. (2018). L1 and L2 sign recognition: the role of visual angle. In *3rd international conference on sign language acquisition.(Istanbul: Koç Üniversitesi)*. https://pubmed.ncbi.nlm.nih.gov/38200108/

Watkins, F., Abdlkarim, D., Winter, B., & Thompson, R. L. (2024). Viewing angle matters in British Sign Language processing. *Scientific Reports*, *14*(1), 1043. https://www.nature.com/articles/s41598-024-51330-1

Schuster, B. A., Sowden, S. L., Abdlkarim, D., Wing, A. M., & Cook, J. L. (2019). Acting is not the same as feeling: Emotion expression in gait is different for posed and induced emotions. *Front. Hum. Neurosci*, *13*. https://www.frontiersin.org/10.3389%2Fconf.fnhum.2019.229.00010/event_abstract

Tomczak, M., Li, M. S., Bradbury, A., Elliott, M., Stables, R., Witek, M., ... & Hockman, J. (2022). Annotation of soft onsets in string ensemble recordings. https://www.semanticscholar.org/paper/Annotation-of-Soft-Onsets-in-String-Ensemble-Tomczak-Li/a2d75f40e0e8e8bc69ebaa909fa86416f5642c31

Abdlkarim, D. A., Evans, J. D., Yeo, S., Wing, A. M., & Miall, C. R. (2018). Virtual reality reaching exercise to predict upper limb motor impairment. https://www.researchgate.net/publication/358221503_Virtual_reality_reaching_exercise_to_predict_upper_limb_motor_impairment

Elliott, M.T., Karim, D., Clark, T., Masood, A., Kearney, R., & Metcalfe, A. (2017). Feasibility of using the Leap Motion hand gesture sensor for tracking wrist fracture physiotherapy. https://www.semanticscholar.org/paper/Feasibility-of-using-the-Leap-Motion-hand-gesture-Elliott-Karim/478bb765852bf7404eb6287832012291e13dc81c

Abdlkarim, D & Evans, J & Yeo, Sang-Hoo & Wing, Alan & Miall, R Christopher. (2018). Virtual reality reaching exercise to predict upper limb motor impairment. https://www.researchgate.net/publication/358221503_Virtual_reality_reaching_exercise_to_predict_upper_limb_motor_impairment

Due to my involvement with industry, there are several further internal manuscripts in active development with Meta, Google, Ansell and Procter and Gamble, covering topics ranging from haptics, XR-based user studies and more, which are not yet published due to being subject to approval and proprietary restrictions.

REFERENCES

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