

# MARK SEN DONG

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Nationality: New Zealand (with German permanent residency), Location: Munich, Germany

## WORK EXPERIENCE

### 03/2023-PRESENT CO-FOUNDER | SENIOR MACHINE LEARNING ENGINEER | DATA SCIENTIST

Gefyra AI Technologies, Munich, Germany

- Co-founded an AI consultancy company providing AI software solutions to healthcare services, businesses and research institutes. Leading projects from idea conceptualisation, AI algorithm development to product deployment.
- Developed and deployed a Deep Learning-based brain age estimation app using MRI brain images, first of its kind in the world (App link: [Neurofind](#)).
- Developing an LLM-powered precision scientific paper search engine incorporating 18 million paper abstracts from the entire PubMed archive with retrieval-augmented generation RAG (Demo video: [PubMedGPT](#)).

### 03/2020-PRESENT GUEST RESEARCHER

Max Planck Institute of Psychiatry, Munich, Germany

- Collaborate and provide consultant services to clinicians, researchers and PhD students on the topic of applying AI for the prevention, diagnosis, and treatment optimization of psychiatric disorders.

### 03/2020-03/2023 SENIOR MACHINE LEARNING ENGINEER | DATA SCIENTIST 01/2018-03/2020 FULL STACK MACHINE LEARNING ENGINEER | DATA SCIENTIST

University Hospital of Munich (LMU Klinikum), Munich, Germany

- Lead AI specialist in the section of precision psychiatry, specialising in the prediction, prevention, diagnosis, and treatment optimization of psychiatric disorders using ML methods and implementing models in clinical environment.
- Developed the award-winning [[A](#), [B](#)] AI-powered mental health recommendation app for the detection of depression and anxiety and provide individual risk factors identification and personalized recommendations, unique in the field and currently been validated in large-scale studies around the world (App link: [ELSA](#)) [[1](#)].
- Developed and validated a sequential prediction system to accurately predict the treatment outcome of rTMS on schizophrenia patients, increasing treatment response rate from 50% to 93% [[2](#)].
- Co-developed ML algorithms which can detect autism from clinical assessment videos [[3](#)] [[4](#)].
- Developed and implemented models to predict the stress and anxiety level of healthcare workers during COVID pandemic 3 months in advance, in order to provide early intervention [[5](#)].
- Led the development and maintenance of ML model platform for clinical and research applications utilising multimodal data including MRI, genetic data and clinical assessments. It currently houses 9 specialized models with a monthly active user of 120 (App link: [NM model library](#)) [[2](#)] [[5](#)] [[6](#)] [[7](#)].

### 01/2016-03/2020 SOFTWARE ENGINEER | RESEARCHER

Technical University of Munich, Munich, Germany

- Worked on research projects and prove-of-concept in the field of climatic engineering and architectural informatics.
- Co-developed an urban microclimate simulation tool for evaluating thermal comfort (Link: [Urban Microclimate](#)) [[8](#)].
- Co-developed a household energy consumption monitoring app aimed at raising awareness of power consumption through user-friendly visualization and interactive competition (Link: [PowerApp](#)).

### 01/2016-01/2018 SOFTWARE ENGINEER | PROJECT ENGINEER 08/2015-12/2015 ENGINEERING INTERN

Transsolar Energietechnik GmbH, Munich, Germany

- Part of the software development team, developing new features for in-house environmental simulation software.
- Worked on numerous projects in the field of optimizing building energy consumption and minimizing carbon foot print.

## EDUCATION

### 02/2021-2024 (EXPECTED) PHD IN HUMAN BIOLOGY (DR.RER.BIO-HUM)

Ludwig Maximilian University of Munich, Munich, Germany

Focus: Application of Machine Learning models for precision psychiatry in clinical environment

### 10/2012-08/2015 M.SC, ADVANCED CONSTRUCTION AND BUILDING TECHNOLOGIES

Technical University of Munich, Munich, Germany

Passed with distinction (Score:1.5)

### 03/2019-03/2012 BACHELOR OF ARCHITECTURAL STUDIES

Victoria University of Wellington, Wellington, New Zealand

## SKILLS

- Programming Languages: Python, Javascript, PHP, Matlab, C++
- ML & Deep Learning: TensorFlow, Keras, PyTorch, PyMC3, XGBoost, Scikit-learn, Pandas, Scipy, Numpy, CUDA
- LLM & NLP: Hugging face, Langchain, RAG, Vector store, Prompt Engineering, ChatGPT, Llama 3, BERT, Transformer
- Cloud computing: AWS, EC2, S3, Heroku, CI/CD, Google Colab, Docker, Kubernetes, Git, CLI
- Data mining: Selenium, BeautifulSoup
- Back-end: Flask, FastAPI, mySQL, mongoDB
- Front-end: React.JS, D3.JS, JQuery, AJAX, HTML, CSS, Graphic and UI/UX design
- Medical data experiences: MRI, Polygenic Risk Scores (PRS), Electronic Health Record (EHR), Clinical and Cognitive questionnaires, Blood sample biomarkers, Clinical interviews (video & transcript), medical data harmonization
- Research skills: quantitative statistical analyses, data visualization, scientific paper writing, presentation at conferences
- Soft skills: Extensive familiarity with clinical environment and medical software development, Product concept generation and prototyping, Lean start-up thinking and start-up experience, Project management and scheduling, Team leadership and knowledge sharing

## AWARDS AND ACHIEVEMENTS

- (10/2023) Poster Award from European College of Neuropsychopharmacology (ECNP) Congress, Barcelona, Spain
- (11/2022) Finalist in Max Planck Foundation Startup Demo day, Munich, Germany
- (04/2022) Guest Lecturer for system engineering course at Cornell University, NY, USA
- (10/2022, 10/2020) Organizer and expert-level tutor of LMU machine learning summer school, Munich, Germany
- (08/2018) Winner of LMU machine learning summer school, Munich, Germany
- (10/2011) Engineering prize winner in US Department of Energy, Solar Decathlon competition, Washington DC, USA
- (02/2009) New Zealand national NCEA scholarship award for graphic design, Wellington, New Zealand

## SELECTED PUBLICATIONS

[Google Scholar Profile](#) || 16 co-authorships || 4 first/co-first authorships

1. **Dong, M.S.**, Popovic, D., *et al.* Detecting Common Mental Illnesses in the Global South Using Accessible and Interpretable Machine Learning: A Usecase Study in ELSA-Brasil Cohort. Available at SSRN: <https://ssrn.com/abstract=4159566> or <http://dx.doi.org/10.2139/ssrn.4159566>
2. **Dong, M.S.**, Rokicki, J., Dwyer, D. *et al.* Multimodal workflows optimally predict response to repetitive transcranial magnetic stimulation in patients with schizophrenia: a multisite machine learning analysis. *Transl Psychiatry* 14, 196 (2024). <https://doi.org/10.1038/s41398-024-02903-1>
3. Koehler, J.C.\*, **Dong, M.S.\***, Song, D.Y. *et al.* Classifying autism in a clinical population based on motion synchrony: a proof-of-concept study using real-life diagnostic interviews. *Sci Rep* 14, 5663 (2024). <https://doi.org/10.1038/s41598-024-56098-y>
4. Koehler, J.C., **Dong, M.S.**, Bierlich, A.M. *et al.* Machine learning classification of autism spectrum disorder based on reciprocity in naturalistic social interactions. *Transl Psychiatry* 14, 76 (2024). <https://doi.org/10.1038/s41398-024-02802-5>
5. Adorjan, K.\*, **Dong, M.S.\***, Wratil, P.R. *et al.* Development and Validation of a Simple Tool for Predicting Pandemic-Related Psychological Distress Among Health Care Workers. *J. technol. behav. sci.* (2024). <https://doi.org/10.1007/s41347-023-00380-9>
6. Dwyer, D.B., Buciuman M., Ruef A., Kambeitz, J., **Dong, M.S.** *et al.* Clinical, Brain, and Multilevel Clustering in Early Psychosis and Affective Stages. *JAMA Psychiatry*. 2022;79(7):677–689. <https://doi.org/10.1001/jamapsychiatry.2022.1163>
7. Antonucci, L. A., Penzel, N., Sanfelici, R., Pigoni, A., Kambeitz-Ilankovic, L., Dwyer, D., Ruef, A., **Dong, M.S.**, ... Koutsouleris, N. Using combined environmental–clinical classification models to predict role functioning outcome in clinical high-risk states for psychosis and recent-onset depression. *The British Journal of Psychiatry*, 2022;220(4):229–245. doi:10.1192/bjp.2022.16
8. Perini, K., Chokhachian, A., **Dong, S.**, Auer, T. Modeling and simulating urban outdoor comfort: Coupling ENVI-Met and TRNSYS by grasshopper. *Energy and Buildings*. 2017;152:372–384. <https://doi.org/10.1016/j.enbuild.2017.07.061>

## LANGAUGES

English: Native || Chinese: Native || German: B2 (Intermediate)