# Sepehr Mahmoudian

Computational Neuroscientist


26.02.1992

Hannoversche Str. 103,
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Germany

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Iranian


## Social Network

Google scholar (my name)

GitHub (sepehrmn)

LinkedIn (my name)

## Languages

English ●●●●●

German ●●●○○

Persian ●●●●●

## Skills

Python, C/C++, LaTeX

Pytorch, Keras, Scikit-learn

Git, Linux, macOS, Windows

## Knowledge

Neural Networks, Deep Learning, Reinforcement Learning

Information Theory, Mathematical modeling, Statistical Analysis

High Performance Computing, Distributed Systems

## Employement

2019 – now **Scientific Researcher** University of Göttingen

Development of a new type of deep (hierarchical) recurrent neural networks that do unsupervised learning using goals specified in information theoretic terms. The networks are informed and constrained at a very abstract level by the brain's structure.

2017 – 2019 **Scientific Researcher** University of Frankfurt

Analysis of information transmission in neural networks using machine learning techniques and information theory.

2017 – 2019 **Guest Scientist** Max Planck Institute for Dynamics and Self-Organization

Worked on analysis of neuroimaging data using Python with sci-kit learn

2015 – 2017 **Scientific Researcher** Jülich Research Center

- Neural network modeling of liquid state machines (recurrent neural networks with encoders and decoders) for classification.
- Analysis of neural dynamics using machine learning and development of techniques in C++ and Python.

2010 – 2012 **Software Developer** Centre for Content Creation

Development of iOS applications using C/Objective-C and SQL.

## Education

2017 – now **Doctorate in Natural Sciences** TU Darmstadt

Currently in progress. Topic is on deep recurrent neural networks.

2012 – 2014 **Master's by Research in Neuroscience** University College London

Highest attainable grade obtained: Distinction (CGPA 4.0/4.0). Distinction is top 10 percent.
Thesis work involved reinforcement learning and Bayesian modeling of decision-making to answer questions in computational psychiatry. Prior to a research year, spent a year on formal education in neuroscience, from molecular to systems.

2009 – 2012 **BSc (hons) in Computer Science** Anglia Ruskin University, Cambridge

First class honours (CGPA of 4.0/4.0). Achieved the highest attainable grade for every single module and top 1 percent of the department.

## Awards

- Projects done as a software engineer won over 20 awards (mostly gold).
- Recipient of the highly competitive UCL graduate scholarships.

# Publications

2020 **[Re] Measures for investigating the contextual modulation of information transmission**
*ReScience C*
Sepehr Mahmoudian - http://doi.org/10.5281/zenodo.3885793

2020 **Partial Information Decomposition Contextual Neurons in NEST**
*NEST Conference*
Sepehr Mahmoudian

2019 **Passing the message: representation transfer in modular balanced networks**
*Reservoir computing using the NEST simulator.*
Frontiers (2019) - https://doi.org/10.3389/fncom.2019.00079

2018 **Information theoretic goal Functions for creating functional hierarchical neural Networks**
*The third workshop on advanced methods in theoretical neuroscience — Dynamics of learning and computations in neuronal circuits*
Sepehr Mahmoudian, Fabian Mikulasch, Michael Wibral

2017 **NEST 2.14.0 public release**
*Contributed to this open source neural network simulator. All contributions are peer reviewed.*
https://zenodo.org/record/882971

2017 **Studying the role of dopamine in action and perception with 'active inference' and a hierarchical gaussian filter in a social decision-making task with different environmental volatilities**
*https://doi.org/10.12751/nncn.bc2017.0120*
Sepehr Mahmoudian, Rick Adams, Christoph Mathys, and Karl Friston

2017 **NEST 2.12.0 public release**
*Contributed to this open source neural network simulator. All contributions are peer reviewed.*
https://zenodo.org/record/259534

2014 **Active Inference as a framework for individual quantitative phenotyping of mental processes with an example of application in studying the role of dopamine in adaptive decision-making.**
*MRes thesis*
Sepehr Mahmoudian supervised by Rick Adams, Christoph Mathys, and Karl Friston

# References

- Ph.D supervisor: Prof. Dr. Michael Wibral - michael.wibral@uni-goettingen.de
- Jülich employer: Prof. Dr. Abigail Morrison - a.morrison@fz-juelich.de
- MRes supervisor: Dr. Rick Adams - rick.adams@ucl.ac.uk