

Topics for Master and Bachelor theses

Are you a student from Goethe University in Frankfurt or interested in writing an external thesis in our lab? We are continually offering exciting Master and Bachelor thesis topics for highly motivated students from Physics, Computer Science, Mathematics, Biophysics or Bioinformatics. Please check out our research areas below. If you have a strong academic record and are interested in any of these areas, please send an [email](#) to Jochen Triesch explaining your motivation. Please attach a short CV and transcript of your grades obtained so far.

Area 1: Developmental AI

Developmental AI is an emerging field that aims to build artificial intelligences that can learn completely autonomously, like infants and children (or scientists), to make sense of the world around them by exploring and interacting/experimenting with it. Have you ever wondered how babies learn, or if a machine could be curious? Have you ever wondered how an AI might be able to design and interpret experiments by itself? We're studying these questions by letting AIs "grow up" in simulated worlds and comparing their development to that of human infants. We believe that mimicking the cognitive development of humans in this way is the most promising route towards creating more human-like artificial intelligences and, ultimately, machine consciousness. We are also organizing a [global online lecture series](#) in this area.

Area 2: Learning in Spiking Neural Networks

Compared to today's AI systems, biological brains are much more energy efficient. For example, your brain runs on a budget of just 20 Watts. One reason for this efficiency is that biological neurons communicate via discrete binary voltage pulses called spikes rather than continuous-valued activity levels. We are interested in better understanding the mechanisms through which networks of spiking neurons in the brain can learn and how we can mimic these learning abilities in technical systems. We use computer simulations and mathematical analysis to better understand the principles that allow our brains to learn and how we can mimic this in technical systems.

Area 3: Machine Learning for Healthcare

Modern machine learning techniques are revolutionizing medical diagnosis, sometimes performing better than human experts. We are interested in developing machine learning methods for a range of topics in healthcare and Neuroscience research, including understanding disease progression, discovering biomarkers, and developing early diagnosis methods, mostly in the context of neurologic and psychiatric disorders. We are also exploring the potential benefits of virtual reality technology for diagnosis and treatment of vision disorders.

Check out our [lab's publications](#) for recent example projects in these areas.