

## Max Planck Institute for Biological Cybernetics

The Max Planck Institute for Biological Cybernetics research aim is to understand the biological information processes in the brains of humans and animals. About 200 international scientists work in three departments and several research groups towards understanding these processes, making use of a broad variety of experimental and theoretical techniques, including electrophysiological recordings, imaging methods, virtual reality and cybernetic modeling. The Institute is one of three Max Planck Institutes in Tübingen and one of over 80 research facilities of the Max Planck Society.

## Tübingen – a historical University Town

Tübingen is located 40 km south of Stuttgart. It is a town dominated by historical buildings, large parks and wooded areas. Narrow cobblestone alleys wind between countless timber-framed houses dating back to the 15th and 16th century. In Tübingen the flair of a medieval city centre combines with the youthful vitality of a student town.

For hundreds of years, Tübingen has also been a town of science. Earl Eberhard the Bearded, later Duke of Württemberg, founded the University in 1477. Facilities such as the University Medical Center, three Max Planck Institutes and other institutions offer an excellent research and learning environment.

## Graduate Training Centre of Neuroscience

At the University of Tübingen, three international neuroscience graduate schools provide research oriented career tracks that lead to a master and doctoral degree and provide an ideal preparation for a career in science and academia. The three graduate programs complement one another ideally and, thus, provide a broad spectrum of neuroscience research and training opportunities in Tübingen.



Graduate School of  
Neural & Behavioural Sciences



Graduate School of  
Neural Information Processing



Graduate School of  
Cellular & Molecular Neuroscience

[www.neuroschool-tuebingen.de](http://www.neuroschool-tuebingen.de)

Max Planck Institute for Biological Cybernetics  
Department of Human Perception, Cognition and Action  
Prof. Dr. Heinrich H. Bülthoff, Director  
Spemannstraße 38 - 44, D - 72076 Tübingen  
[www.kyb.mpg.de](http://www.kyb.mpg.de)  
[www.cyberneum.de](http://www.cyberneum.de)

September 2015



Foto: Stefan Müller-Naumann



Foto: Sylvain Perenes

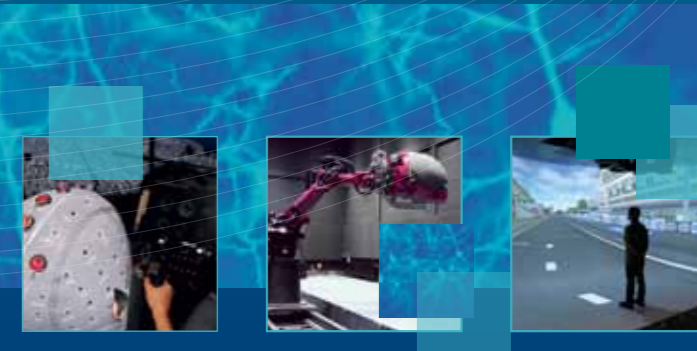
The Max Planck Institute for Biological Cybernetics is frequently looking for participants in scientific studies investigating human perception. Participation is financially compensated. For more information, please refer to this website:

<https://experiments.tuebingen.mpg.de>



# The Max Planck Institute for Biological Cybernetics

## Department of Human Perception, Cognition and Action



Max Planck Society  
Hofgartenstraße 8, D-80539 München  
[www.mpg.de](http://www.mpg.de)

MAX-PLANCK-GESELLSCHAFT

# the world in our heads

## MISSION

Researchers in the department **Human Perception, Cognition and Action** investigate psychophysical and computational aspects of high-level processing in object and face recognition, sensory-motor integration, human robot interaction, spatial cognition, and perception and action in virtual environments. For the study of motion perception in the real world and the construction of novel man-machine interfaces for cars and helicopters completely new facilities have been developed – the CyberMotion Simulator and the Cable Robot.

# DEPARTMENT Human Perception, Cognition and Action

## RESEARCH GROUPS AND THEIR FOCI

### COGNITION AND CATEGORIZATION



Investigating the role of race, sex, memorability, motion, and familiarity on face recognition

Investigating face blindness, comparing active and passive viewers, and testing observers with different physical properties

Using eye-tracking, virtual reality, morphable face models, motion capture, etc

### SOCIAL AND SPATIAL COGNITION



Understanding the cognitive processes involved in the interaction with the spatial and social environment

Examining the uniqueness and similarity of social and spatial cognitive processes

Using behavioral and neuroimaging experiments with close-to-natural virtual avatars and environments

### MOTION PERCEPTION AND SIMULATION



Measuring and modeling multisensory perception of self-motion in humans

Developing and testing perception-based motion cueing algorithms for realistic driving and flight simulation

Analyzing operator performance and control behavior in closed-loop simulations

### CYBERNETICS APPROACH TO PERCEPTION AND ACTION



Understanding human behavior in manual control tasks

Investigating novel human-machine interfaces

Developing novel helicopter augmentation strategies

### AUTONOMOUS ROBOTICS AND HUMAN-MACHINE SYSTEMS

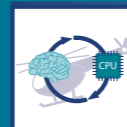


Designing of original methods to let humans co-operate with complex, semi-autonomous robotic systems

Developing of autonomous behaviors through control, on-board sensing, and estimation

Investigating of the physical interaction between robots and their nearby environment

### COGNITION & CONTROL IN HUMAN-MACHINE SYSTEMS



Facilitating information retrieval and processing for man-machine interactions

Identifying and mitigating cognitive workload in steering systems

Adaptive technologies for assisting human steering behavior

## ASSOCIATED RESEARCH GROUPS

### SPACE AND BODY PERCEPTION



Investigating human perception and behavior using ecologically valid and immersive virtual reality

Focusing especially on the perception of the size, shape and form of our surrounding world and our bodies

Considering the implications of our scientific results for improving design specifications for VR software and technology

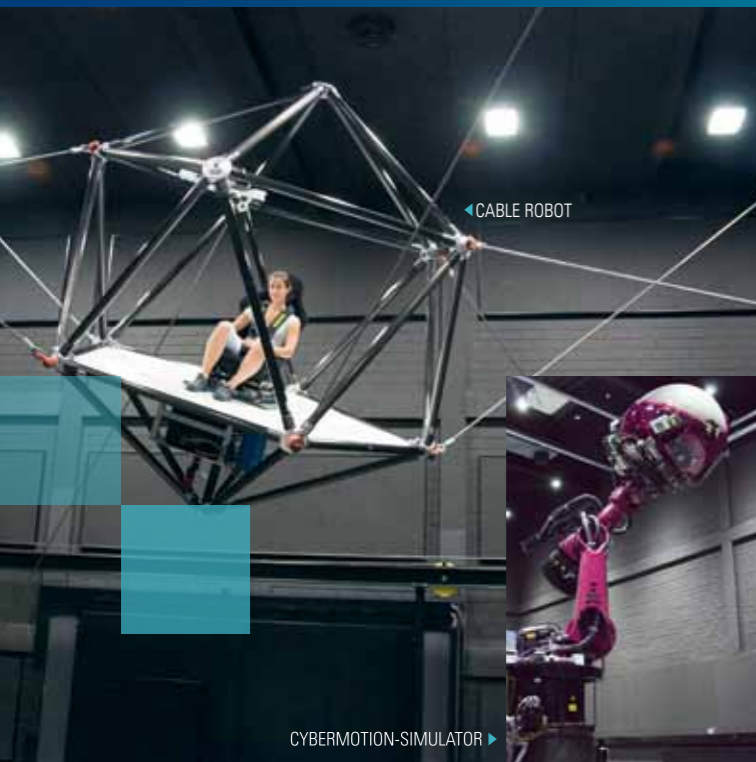
### SENSORIMOTOR LEARNING AND DECISION-MAKING



Understanding computational principles underlying sensorimotor learning and control

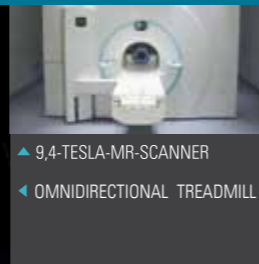
Testing these principles in behavioral experiments in virtual reality

Investigating sensorimotor invariants and the effect of limited information-processing resources on learning and decision-making



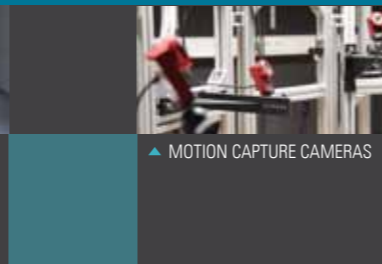
CABLE ROBOT

CYBERMOTION-SIMULATOR

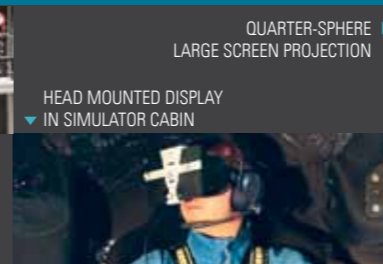


9.4-TESLA-MR-SCANNER

OMNIDIRECTIONAL TREADMILL



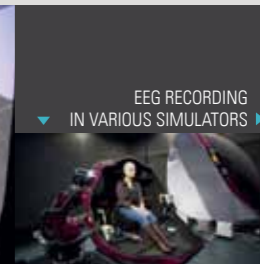
MOTION CAPTURE CAMERAS



HEAD MOUNTED DISPLAY  
IN SIMULATOR CABIN



QUARTER-SPHERE  
LARGE SCREEN PROJECTION



EEG RECORDING  
IN VARIOUS SIMULATORS

