The Transregional Collaborative Research Center
SFB/TR 8 Spatial Cognition: Reasoning, Action, Interaction
at the Universities of Bremen and Freiburg, Germany

pursues interdisciplinary long-term research in Spatial Cognition. Particular emphasis is given to:

- **Spatial Reasoning:** Knowledge representation, human spatial thinking, computational modeling, diagrammatic reasoning, cognitive and computational complexity, qualitative spatio-temporal calculi;
- **Action in Space:** Cognitive robotics, explorative localization and mapping, robot navigation, human navigation and wayfinding, sensorimotor representations of spatio-temporal structures, embodied cognition;
- **Communication and Interaction in Space:** Formal methods, spatial and linguistic ontologies, computational linguistics, environmental cognition, integration of spatial methods.

A description of the current research projects of the SFB/TR 8 can be found at [www.sfbtr8.uni-bremen.de](http://www.sfbtr8.uni-bremen.de)

The SFB/TR 8 is funded by the German Research Foundation (DFG).

The SFB/TR 8 advertises the following positions (all positions offer the opportunity to pursue a PhD):

**1 Doctoral Research Assistant / Postdoctoral Researcher**
SFB/TR 8 project A5- [ActionSpace], Universität Bremen
(TVL 13, approx. € 35,000 to € 50,000 p.a. gross)
reference number A 168/06

The researcher will develop a multi-hierarchical sensorimotor representation as well as a working memory structure and implement and test it in a mobile agent which operates in a VR environment. The agent must be able to perform exploratory localization and navigation using sensorimotor features established by actions (movements of the agent and of his sensors) and by more complex sensory properties (nonlinear wavelet features, multisensory information). Also, the researcher will manage eye tracking experiments and deal with VR environments on an experimental basis. The detailed work plan is specified in the project proposal.

The researcher should have a degree in computer science or in a related field (diploma, master’s, or Ph.D.). Strong interest in interdisciplinary collaboration is expected.

In particular, the applicant should have qualifications and/or interests in the following fields:
- Artificial intelligence and cognitive science
- Development of VR-based agent systems
- Spatial processing e.g. SLAM, topological maps, navigation
- Decisions strategies, reasoning
- Management of uncertain knowledge (e.g. Belief networks)
- Experience in software development and programming in Java, Python, C

We offer the opportunity to gain research experience in a modern and enthusiastic research environment with strong interdisciplinary and international links. Responsibilities include project work and research, publication of research results, supervision of student projects, participation in the activities of the SFB/TR 8, and contribution to research proposals.

The position is available from January 2007, subject to the availability of the funds, until the end of 2010. Extension is possible. Application deadline: 15 December 2006 (or until a suitable candidate is found). Universität Bremen is an equal opportunity employer. Women are especially encouraged to apply. Handicapped applicants with equal qualifications will be given preferential treatment.
Please address questions about the position and send your application (preferably by email) to:
Prof. Kerstin Schill (Cognitive Neuroinformatic)
SFB/TR 8 - Spatial Cognition
Universität Bremen
P.O. Box 330 440
28334 Bremen / Germany
By email: stubbemann@informatik.uni-bremen.de

1 Doctoral Research Assistant / Postdoctoral Researcher
SFB/TR 8 project A5-[ActionSpace], Universität Bremen
(TVL 13, approx. € 35,000 to € 50,000 p.a. gross)
reference number A 169/06

The researcher will develop a multi-hierarchical sensorimotor representation bases on a low-level feature extraction and implement and test it in a mobile agent which operates in a VR environment. Moreover, he/she will develop a subsystem that enables unsupervised learning of hierarchical knowledge structures. The mobile agent must be able to perform exploratory localization and navigation using sensorimotor features established by actions (movements of the agent and of his sensors) and by more complex sensory properties (nonlinear wavelet features, multisensory information). The detailed work plan is specified in the project proposal.

The applicant should have a degree in computer science or in a related field (diploma, master's, or Ph.D.). Strong interest in interdisciplinary collaboration is expected.

In particular, the applicant should have qualifications and/or interests in the following fields:
- Artificial intelligence and cognitive science
- Computer vision, image processing, natural scene statistics
- Neural networks
- Experience in software development and programming (in C, Java, Python)
- Interest in neurobiology

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1 Doctoral Research Assistant / Postdoctoral Researcher
SFB/TR 8 project A7-[FreePerspective], Universität Bremen
(TVL 13, approx. € 35,000 to € 50,000 p.a. gross)
reference number A 170/06

The researcher will develop a system that computes a 3-D model of the environment based on images from a stereo camera and data from an inertial sensor and renders a view of this model in real time. The researcher will use this system for tele-operation of a walking robot together with another SFB project but the focus here is on the algorithmic and probabilistic-estimation side. The detailed work plan is specified in the project proposal.
The applicant needs solid background knowledge in probability theory, linear algebra and efficient algorithms. The applicant should have a degree in computer science, applied mathematics or a related field (diploma, master’s, or Ph.D.) and be interested in the following fields:

- Probabilistic Robotics (Localization, Simultaneous Localization and Mapping)
- Computer Vision (feature extraction, structure from motion)
- Least square computation and probabilistic estimation
- 3-D computer graphics

The position is available immediately from January 2007 until the end of 2010. Extension is possible.

Application deadline: 15 December 2006 (or until a suitable candidate is found).

Universität Bremen is an equal opportunity employer. Women are especially encouraged to apply. Handicapped applicants with equal qualifications will be given preferential treatment.

More information about this project can be found at www.sfbtr8.uni-bremen.de/project/a7.

Please address questions about the position and send your application (preferably by email) to:
Dr. Udo Frese <ufrese@informatik.uni-bremen.de>
SFB/TR 8 - Spatial Cognition
Universität Bremen
P.O. Box 330 440
28334 Bremen / Germany

Keypoints: Probabilistic Robotics, Computer Vision, Computer Science, Applied Mathematics
Schlüsselwörter: Probabilistische Robotik, Bildverarbeitung, Informatik, Angewandte Mathematik

1 Doctoral Research Assistant / Postdoctoral Researcher
SFB/TR 8 project I1-[OntoSpace], Universität Bremen
(TVL 13, approx. € 35,000 to € 50,000 p.a. gross)
reference number A 171/06

The research project I1-[OntoSpace] employs logical specification languages and tools for constructing and delivering logically consistent ontological submodules for spatial objects, spatial relationships, functional spatial roles (e.g., landmarks) and motion-in-space. The researcher will develop techniques for the large-scale and heterogeneous structuring of ontology modules, formal foundations for inter-ontology mappings, and integrated reasoning with formally specified ontologies. This in particular means proving intended consequences as well as showing consistency of formal ontologies, applying a variety of tools that are developed elsewhere in the SFB/TR. The detailed work plan is specified in the project proposal.

The applicant should have a degree in computer science or in a related field (diploma, master’s, or Ph.D.). Strong interest in cognitive science research and in interdisciplinary collaboration is expected.

Especially, the applicant should have qualifications and/or interests in the following fields:
- Ontologies and semantic web
- Knowledge representation and reasoning
- Formal methods and theorem proving

We offer the opportunity to gain research experience in a modern and enthusiastic research environment with strong interdisciplinary and international links. Responsibilities include project work and research, publication of research results, supervision of student projects, participation in the activities of the SFB/TR 8, and contribution to research proposals.

The position is available immediately from January 2007 until the end of 2010. Extension is possible.

Application deadline: 15 December 2006 (or until a suitable candidate is found).

Universität Bremen is an equal opportunity employer. Women are especially encouraged to apply. Handicapped applicants with equal qualifications will be given preferential treatment.

More information about this project can be found at http://www.ontospace.uni-bremen.de.

Please address questions about the position and send your application (preferably by email) to:
Dr. Till Mossakowski <tm@sfbtr8.uni-bremen.de>
SFB/TR 8 - Spatial Cognition
Universität Bremen
1 Doctoral Research Assistant / Postdoctoral Researcher

SFB/TR 8 project I3-[SharC], Universität Bremen
(TVL 13, approx. € 35,000 to € 50,000 p.a. gross)
reference number A 172/06

The researcher will develop a cognitively adequate, adaptive, safe and robust multi-modal framework for spatial interaction between a user and an intelligent service robot. Based on empirical evidence, the researcher will construct cognitive models and apply formal methods to investigate shared-control situations and develop suitable human-robot interaction to clarify mode-confusion problems. The detailed work plan is specified in the project proposal.

The applicant should have a degree in computer science or in a related field (diploma, master’s, or Ph.D.). Strong interest in human-robot interaction and in interdisciplinary collaboration is expected.

In particular, the applicant should have qualifications and/or interests in the following fields:

- Artificial intelligence and cognitive science
- Human-robot interaction, especially multi-modal interaction
- Computational modeling, formal specification and model-checking
- Software development and programming (e.g., Java)

We offer the opportunity to gain research experience in a modern and enthusiastic research environment with strong interdisciplinary and international links. Responsibilities include project work and research, publication of research results, supervision of student projects, participation in the activities of the SFB/TR 8, and contribution to research proposals.

The position is available from January 2007, subject to the availability of the funds, until the end of 2010. Extension is possible. Application deadline: 15 December 2006 (or until a suitable candidate is found). Universität Bremen is an equal opportunity employer. Women are especially encouraged to apply. Handicapped applicants with equal qualifications will be given preferential treatment.

Please address questions about the position and send your application (preferably by email) to:
Dr. Hui SHI <shi@informatik.uni-bremen.de>
SFB/TR 8 - Spatial Cognition
Universität Bremen
P.O. Box 330 440
28334 Bremen / Germany

1/2 Doctoral Research Assistant / Postdoctoral Researcher

SFB/TR 8 project I3-[SharC], Universität Bremen
(1/2 TVL 13, approx. € 17,000 to € 25,000 p.a. gross)
reference number A 173/06

The researcher will develop a cognitively adequate, adaptive, safe and robust multi-modal framework for spatial interaction between a user and an intelligent service robot. Based on empirical evidence, we will construct cognitive models and apply formal methods to investigate shared-control situations, and develop suitable human-robot interaction to clarify mode-confusion problems. The detailed work plan is specified in the project proposal.

The applicant should have a degree in computer science or in a related field (diploma, master’s, or Ph.D.). Strong interest in human-robot interaction and in interdisciplinary collaboration is expected.

In particular, the applicant should have qualifications and/or interests in the following fields:
• Artificial intelligence and cognitive science
• Human-robot interaction, especially multi-modal interaction
• Computational modeling
• Software development and programming (e.g., Java)
• Collaboration with medical institutions and patient related research
• Development of questionnaires

We offer the opportunity to gain research experience in a modern and enthusiastic research environment with strong interdisciplinary and international links. Responsibilities include project work and research, publication of research results, supervision of student projects, participation in the activities of the SFB/TR 8, and contribution to research proposals.

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By email: stubbemann@informatik.uni-bremen.de

1 Doctoral Research Assistant / Postdoctoral Researcher
SFB/TR 8 project I4-[SPIN], Universität Bremen
(TVL 13, approx. € 35,000 to € 50,000 p.a. gross)
reference number A 174/06

The researcher will classify and formalize qualitative spatial calculi, relations among these calculi, spatial ontologies, and route graphs. Research tasks include both further development of the mathematical theory, the formalization and verification of critical results (like composition tables) using suitable specification languages and theorem proving tools, as well as further enhancement of these tools. The goal is to obtain both a trustworthy and efficient framework for qualitative spatial reasoning, which is applicable to reasoning tasks occurring in interactive wheelchair and robot navigation. The detailed work plan is specified in the project proposal.

The applicant should have a degree in computer science or in a related field (diploma, master’s, or Ph.D.). Strong interest in formal methods and in interdisciplinary collaboration is expected.

Especially, the applicant should have qualifications and/or interests in some of the following fields:
• Qualitative spatial reasoning
• Formal methods and theorem proving
• Category theory
• Functional programming (Haskell)

We offer the opportunity to gain research experience in a modern and enthusiastic research environment with strong interdisciplinary and international links. Responsibilities include project work and research, publication of research results, supervision of student projects, participation in the activities of the SFB/TR 8, and contribution to research proposals.

The position is available immediately / from January 2007 until the end of 2010. Extension is possible. Application deadline: 15 December 2006 (or until a suitable candidate is found). Universität Bremen is an equal opportunity employer. Women are especially encouraged to apply. Handicapped applicants with equal qualifications will be given preferential treatment.

More information about this project can be found at www.sfbtr8.uni-bremen.de/i4.

Please address questions about the position and send your application (preferably by email) to:
Dr. Till Mossakowski <tm@sfbtr8.uni-bremen.de>
SFB/TR 8 - Spatial Cognition
Universität Bremen
The research project I5-[DiaSpace] is seeking a researcher in the area of natural language dialogue. The researcher will develop approaches to natural and effective verbal interaction between agents (both human and artificial) who jointly address spatially-embedded tasks. The researcher will give particular emphasis to the mutual negotiation of spatial reference frames, spatial perspectives, scale and granularity choices, and corresponding discourse strategies. The successful applicant will work primarily with empirical methods of linguistic, discourse-analytic and psycholinguistic investigation of dialogue in the spatial domain in order to help establish the mechanisms active in establishing natural dialogue flow in increasingly complex tasks. Since the results are gradually integrated in a flexible dialogue system enabling robots to interact naturally with humans, the successful applicant will also need to interact closely with computational dialogue modeling colleagues. The detailed work plan is specified in the project proposal.

Applicants should have a degree in linguistics or in a related field (diploma, MA, or Ph.D.). Especially, applicants should have qualifications and/or interests in one or more of the following fields:

- Empirical discourse analysis
- Experimental data collection and transcription
- Spatial language and spatial cognition
- Human-robot / human-computer interaction
- Computer-based data handling, including particularly basic skills in XML and corpus annotation.

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Applications and questions about the position should be sent (preferably by email) to:
Dr. Thora Tenbrink <tenbrink@sfbtr8.uni-bremen.de>
SFB/TR 8 - Spatial Cognition
Universität Bremen
P.O. Box 330 440
28334 Bremen / Germany