ETZ Zurich – Swiss Federal Institute of Technology Zurich

Applied Cognitive Science & Design Research Opportunities at ETH Zurich
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Looking for contributors ranging from doctoral students to Senior Post-Docs

Starting in February 2013, a new research group will be established at ETH Zurich with a focus on Applied Cognitive Science, especially linking cognitive science research to interactive systems and architectural design. The group is hosted in the Behavior section of the Department of Humanities, Social and Political Sciences, with strong links to computer science and architecture. Christoph Hölscher, Professor of Cognitive Science, will lead the group.

The new group is open to researchers with a background in cognitive science, psychology / behavioral research, computer science, interaction design or architectural design, among others.

Expressions of interest from graduate students and young researchers are now being received. Depending on level of experience, post-doctoral researchers can join the group either as Post-Docs (Assistent) or on a lecturer/senior-lecturer level (Oberassistent). This is your unique opportunity to shape the identity of a new research lab bridging behavioral and design disciplines.

A key aim for cognitive science reaching out to design disciplines is to offer insight for designers into the cognitive processes, capabilities and limitations of humans as cognitive agents. We support designers in putting themselves into the perspective of the user. We generate theories of cognitive processes to underpin design work, and we develop empirical methods for studying interaction and learning with environments, devices and artifacts. An emphasis will be on Virtual Reality simulation and visual attention (eye-tracking). This approach ties in with evidence-based design movements in architecture and human-computer interaction. Furthermore, we will contribute to the curricular development by generating cognition and design courses for students and practitioners in design disciplines.

We envision an international group of researchers with broad interest in applications and a passion for connecting research themes and methods across disciplinary boundaries. We will translate basic research into applied projects, including established as well as new collaborations with industry partners in spatial and computational domains (e.g., Frankfurt Airport, Google).

Example applications:

- Wayfinding in public buildings and urban environments. Modeling the impact of architectural features and cognitive abilities on movement decisions, orientation and building usability. Bridging architectural theory, design and cognition.
- Modeling human cognition in emergency situations, e.g. decision making and route choice in fire evacuation; understanding the handling of tools under stress (e.g. icons/instructions on emergency equipment)

- Usability of tailored software for complex workplaces (e.g. stock market brokers and analysts) and research on information filtering, visual attention and reasoning in such highly dynamic work environments
- User-centered design of adaptive interfaces (e.g. Search Engines), user modeling for adaptive systems based on spatial and device-interaction data
- User interaction with mobile devices, mapping, location-based services (e.g. Google Maps, building on established collaboration with Google)
- Modeling online and real-world movement of individuals and groups, inferring psychological states and needs
- Computational modeling of user behavior and user cognition with ACT-R or other cognitive architectures, agent models of individual and group movement behavior.
- Develop design guidelines based on cognitive science research, develop design support tools for CAAD / CAD
- Investigate the use of sketches & gestures as external representations in design
- Organization of work processes, design workspaces, innovations in the design studio
- User Models, GOMS, Visual Attention models; Simulation of movement patterns
- Understand the interplay of user and artifacts as complex systems in the tradition of Hutchins "Cognition in the Wild"

ETH Zurich will supply Virtual Reality simulation and experimentation facilities, using both a CAVE and an HMD based setup, including eye-tracking capabilities. A behavior observation and usability lab will be created to support research on HCI themes ranging from complex workplace software to mobile applications. The group will have their own lab-based eye-tracking facilities for these purposes as well as access to mobile eye-trackers. The department also hosts the ETH Decision Science lab with 30+ networked computers, allowing the running decision making experiments in social settings.

Candidates at any level should bring a strong methodological background into our group; you should be familiar with some the following:

- Planning and conducting behavioral experiments
- Advanced statistical techniques (multi-variate, mixed models, time-series, sequence mining, etc.)
- Spatial analysis of buildings (e.g. space syntax) and/or collaboration with architects on such analyses
- Collaboration on the design of virtual buildings towards empirical studies
- Computational modeling of behavior / cognition, e.g., ACT-R or other cognitive architectures, agent modeling, traffic flow modeling
- Virtual Reality techniques (CAVE, HMD setups), simulation of architectural spaces / CAD modeling, planning and implementing lab-based navigation experiments based on VR software (WorldViz Vizard or other)
- Eye-tracking with stationary or mobile systems
- Qualitative and formal analysis of decision making tasks based on human-computer interaction approaches (cognitive walkthrough, cognitive task analysis, simplified GOMS modeling), in domains of spatial cognition and/or interaction design
- Preparation of manuscripts for publication in international journals / at conferences

The new group will strive for a balanced mix of technical skills across the academic levels. Especially candidates at a post-doc level are expected to share responsibilities in establishing and running the new labs for the group.

ETH Zurich provides a world-class research and teaching environment, welcomes fresh and independent thinking, and offers competitive salaries suitable even for a premium location like Zurich.

New members of the group can start as early as February 2013 or whenever you are available.

If you are interested in contributing to Applied Cognitive Science and shaping our new group, please get in touch. Ideally include a statement of interest and a short CV.
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