

Computer Science Research Internships in Singapore with the University of Illinois

At the Advanced Digital Sciences Center in Singapore, we are looking for excellent undergraduate and graduate students in computer engineering, computer science, electrical engineering and closely related fields to join us for summer internships. Our internships are designed for students who are considering or pursuing a career in research. Our interns contribute to cutting-edge research projects while they build professional connections and expertise.

Our interns collaborate closely with ADSC's research scientists, postdoctoral researchers, and Illinois faculty. Many of our interns become coauthors on publications or patent applications from the projects they join. Our undergraduate internships are an excellent preparation for graduate research programs.

Singapore is a pleasant place to live and work: very safe, tropical, and modern. Thirty percent of the people living in Singapore are foreigners, so it is easy for everyone to feel at home.

**Visit adsc.illinois.edu
for more information!**



ADSC's offices are at Fusionopolis in Singapore.

Who are we?

The Advanced Digital Sciences Center (ADSC) is a center for research led by faculty of the University of Illinois at Urbana-Champaign. ADSC is located at Singapore's hub for high-tech research, Fusionopolis.

ADSC aims to transform the way people and organizations use and interact with information technologies, while contributing to the advance of the knowledge-based economy in Singapore and beyond. Research projects at ADSC focus on Interactive Digital Media and the Smart Grid. Projects are initiated and led by University of Illinois faculty. ADSC is an English-speaking workplace.

ADSC was established in 2009, with core funding from Singapore's Agency for Science, Technology and Research (A*STAR). Today ADSC has over 50 full-time researchers and 15 associated Illinois faculty. In 2012, ADSC had over 40 research interns from all over the world.

**Apply on line, at
my.engr.illinois.edu/apply.**

We ask for your resume, one or two recommendation letters, the transcript from your undergraduate and graduate institution(s), and a short statement that summarizes your internship and long-term goals.

Our intern positions in summer 2013 will be similar to the list below of our September 2012 positions. Many positions are for students with a strong mathematical background in topics such as matrix theory, linear algebra, graph theory, optimization theory (linear/convex optimization, Lagrangian multipliers, KKT condition), game theory, mathematical analysis, probability theory, random processes (Markov chains and processes, renewal theory, basic martingale), queuing theory, mathematical economics, or statistics.

- We are using tiny microphone arrays to solve audio research problems. We seek interns to work on localizing multiple sound sources, blind source separation, and 3D audio reproduction.
- We seek interns to help us design and analyze algorithms that randomly perturb data analysis results, in order to satisfy a rigorous data privacy standard called *differential privacy*. The challenge is to perturb the data analysis results as little as possible (see <http://differentialprivacy.weebly.com>).
- We use Markov games to decide how to allocate resources to defend a smart power grid against attackers. We seek interns to help reduce the computational complexity of our approach (see <https://sites.google.com/site/adscsmartgrid/integrative-security-assessment/defending-tool>).
- We use depth cameras like the Kinect for visual analytics tasks such as fine-grained action recognition and localization (see <https://sites.google.com/site/multimodalvisualanalytics/home>). We are looking for interns to design and implement algorithms and features for this purpose.
- We seek interns to help us investigate and develop efficient, scalable, and robust algorithms for object recognition: human faces, language characters, city landmarks, or generic object categories (such as cars and animals), using sparse and low-rank techniques (see http://web.adsc.com.sg/perception/index_goal.html).
- A cognitive radio can determine whether a frequency channel is vacant and available to unlicensed users. We seek interns to help us construct reliable physical and medium control algorithms for cognitive radio networks, so that even if some radios misbehave, the performance of the network as a whole degrades gracefully.
- We have the world's most cost-effective algorithms for estimating dense visual correspondences from a pair of stereo images or video frames (see <https://sites.google.com/site/adscitem/>). We seek interns to help us extend this to long-standing challenges of matching two or more images with non-rigid photometric and/or geometric changes.
- We have the world's fastest and reliable image and video segmentation algorithms (see <https://sites.google.com/site/adscitem/>). We seek interns to help us develop an automated way to co-segment and annotate a general user's photo stream taken for a specific moment, and demonstrate this on a mobile tablet device.
- We seek interns to help us use game theory to investigate how different applications/users interact and affect each other's performance when sharing network bandwidth. For example, peer-to-peer users, video on demand, and instant messaging all have very different needs.
- With Content Centric Networking, the future Internet will exploit caches at the core of the network, i.e., the routers. We seek interns to help us design and mathematically analyze the performance of a network of inter-dependent network content caches.
- We seek interns to help us develop a mobile-cloud based visual computing system for large-scale, unstructured image registration, 3D reconstruction, and augmented rendering for exciting navigation, localization and visualization services.
- We want to make our state-of-the-art algorithms for image registration and tracking moving objects run in real time (25x faster) (<http://adsc.illinois.edu/videoanalytics>). We seek interns to help parallelize, port, and add GPU support.
- Our AutoScout prototype for sports video analysis automatically analyses American football videos (see <https://sites.google.com/site/videoadsc/autoscout>). We seek interns to help us with several tasks: automatically detect players at the beginning of a video; develop a multi-object tracking method that considers the correlation among players; develop an action recognition method that will automatically identify important actions (e.g., catching the ball); and develop methods for motion estimation and prediction for players and the ball.
- We are developing a framework for automatic video analysis (see <http://adsc.illinois.edu/videoanalytics>). We seek interns to help investigate and develop methods to model actions and activities in video (e.g., using trajectories obtained from tracking objects in video, using sparse representation methods, or developing a new deformable part model for action detection); develop a video retrieval system (e.g., "find all players who have run this route"); retarget a video so its interesting parts are appropriate for a particular display size; and automatically summarize videos.
- We are creating a real-time "surveillance" system to recognize and analyze typical daily activities in our office (see <https://sites.google.com/site/videoadsc/autoscout#TOC-Smart-Office>). We seek interns to help us develop methods for real-time multiple object detection and tracking across multiple cameras.
- We have developed a novel, effective, and efficient filtering framework to deal with highly ill-posed computer vision problems, as an alternative to global optimization techniques. We seek interns to investigate the theoretical relationship between these two approaches, to provide a basis for new hybrid (advanced) vision algorithms.
- We have developed state-of-the-art methods for image enhancement and visual correspondence estimation. We seek interns to help extend this to challenging cases such as video data, which may cause serious 'flicker' problems.
- We make working with digital photo collections easier through image processing algorithms that support more automation and better user interfaces (see <http://vintage.winklerbros.net/>). We seek interns to help develop advanced machine learning methods that model image content, the human visual system, and user preferences, and run very fast.
- We seek interns with a strong math background to work on computer vision applications in face and gait recognition, human activity analysis, and scene understanding (see <https://sites.google.com/site/elujiwen/research>).