



Young people are the  
engine of interdisciplinary  
research at the ACCESS Centre.

KARL HENRIK JOHANSSON, DIRECTOR,  
THE ACCESS CENTRE



# ACCESS YOUR FUTURE

KTH ACCESS is a Linnaeus Centre

**C**onnected. Intelligent transportation systems, active buildings, and smart power grids. Home-based health care, wireless manufacturing and positioning systems that work anywhere and everywhere.

At the ACCESS Centre, we're finding ways to facilitate communication between people, systems and machines. A holistic approach helps us to achieve results with broad applicability.

Through networked systems we're laying a foundation for a more sustainable society, less stressful life and a more responsible future.



With the ACCESS Centre, KTH has created a research environment of high international repute that acts as a magnet for top talent.

Peter Gudmunsson, President, KTH







# SMART AND SECURE

Imagine an autonomous networked system that helps you manage your electricity use and costs by telling you when it is cheapest to run your home appliances or charge your electric car.

Sonja Buchegger, ACCESS Faculty and Associate Professor of Computer Science:

"At ACCESS we have a bottom-up perspective, the organisation is research driven. Teamwork is key."

Or envision a network that communicates with cars on the highway to coordinate the flow of traffic, reducing the time wasted in traffic jams.

Perfect, right? ACCESS researchers are thinking one step ahead and are already busy designing the wireless networked systems of the future.

This research substantially deals with safety and security issues, which involves everything from ensuring that systems continue to function when a node stops working, to preventing someone from exploiting them for personal gain. Disruption of a control system regulating the flow of traffic could have dangerous consequences for motorists. The researchers at ACCESS work on assessing vulnerabilities, build in security and defences against outside attacks in such systems. At the same time they

## DID YOU KNOW...?

The ACCESS Distinguished Lecture Series brings *internationally renowned researchers* to Stockholm 10 times a year.

*Intelligent transportation systems* mean that traffic can flow 25 percent more efficiently and securely by allowing cars to communicate with each other. In the Scoop Project, truck platooning is put to a real test.

We played an *important role in the*

*development of Skype.*

Our researchers, in collaboration with industry partners, study the fundamental ramifications of the expanding reliance on information and communications technology worldwide.



Henrik Sandberg,  
ACCESS Faculty  
and Assistant  
Professor of  
Automatic Control

*“Our research is aimed at detecting security loopholes in the systems, and designing possible solutions to these problems.”*

intend to make them better, faster and cheaper.

But these problems are far from being only technical. The ability of users to operate these intended systems in actuality is highly relevant. So the work also deals with teaching users how to actually use the systems, to increase awareness and make it easy to use the systems in a safe manner.

Sonja Buchegger, ACCESS Faculty and Associate Professor of Computer Science, whose background spans the fields of economics, security and computer networking, explains that an intellectually flexible, interdisciplinary approach is important when making a system secure.

“Many factors are in play and affect security. Hackers are driven by a variety of motives to penetrate, manipulate and destroy networks. Understanding the underlying causes of attacks is critical to counteracting the threats they pose. By understanding them it’s easier to prevent and eliminate these threats.”

She gives an example from her current work on how to build social networks, like Facebook, with greater security and privacy.

“We’d like to see a broadly-based, non-commercial network that is so secure that users don’t need to worry about their personal information winding up in the hands of unauthorised companies or individuals,” she says.

ACCESS professor Peter Händel oversaw the development of a *prize-winning infra-red warning system* that helps drivers to avoid potentially deadly collisions with moose.

ACCESS researchers are designing wireless

energy-management infrastructure for the *smart grid project* which can be used in the Stockholm Royal Seaport, a new housing and commercial development in central Stockholm that is pushing the boundaries of what is possible in terms of smart and sustainable urban planning.



György Dán, ACCESS  
Faculty and Assistant  
Professor of Commu-  
nications Networks

The ACCESS Centre attracts international talent, making for a stimulating research environment. An informal atmosphere promotes exchange of knowledge and insights with colleagues from a wide variety of fields. The quality of results testifies to the strengths of this approach.

“The different groups complement one another very well,” says Henrik Sandberg, ACCESS Faculty and Assistant Professor of

*“There’s always a lot going on.”* Automatic Control. “Every aspect of the research process, from the most fundamental to the most specialised, is represented. We’ve been very successful at recruiting a broad range of highly qualified young researchers. There’s always a lot going on, and all kinds of people visiting. The atmosphere is similar to what you would expect at a top American university.”

The Distinguished Lecture Series, featuring well-known speakers from a range of disciplines, rounds out the expertise of the Centre’s own faculty.

“The post-lecture discussion sessions, which provide an opportunity to brainstorm with leading researchers from around the world, are especially valuable,” according to György Dán, ACCESS Faculty and Assistant Professor of Communications Networks.

We conduct fundamental research relating to the design of self-managing, scalable, networked systems characterized by real-time information sharing.

ACCESS graduate school offers approximately 10 *doctoral-level courses* in networked systems each year.





## Say goodbye to the rat's nest of cables

Replacing cabled connections between different nodes in a control system of a production line, for example in a paper mill, with a wireless sensor network may bring significant savings in time and money. Besides being cheaper and easier to install and operate, wireless networked systems enable a more extensive use of automatic control technology. Allowing for practically unlimited numbers of measurements and real-time adjustments along the entire production chain means real gains in responsiveness. ¶

Young blood has a renewing effect on research. The ACCESS Centre attracts an uncommonly broad-minded mix of young students and scientists.

ERIK AURELL  
Co-DIRECTOR,  
THE ACCESS CENTRE

## BETTER TREATMENT IN THE CONVENIENCE OF YOUR HOME

Home-based health care offers many advantages for stroke patients, who previously had to spend significantly more time in hospitals. Less disruption of familiar rhythms improves the prospects for recovery. A network that collects data in the home and communicates with hospital-based systems opens a wider range of resources to home-based patients. ¶



### ACCESS Linneaus Centre

**COMPRISES 34 FACULTY MEMBERS**, 7 postdoctoral researchers and 100 doctoral students from the Schools of Computer Science, Electrical Engineering and Engineering Sciences.

**OPERATES ON AN ANNUAL** research budget of approximately EUR 10 million, substantially provided through grants from The Swedish Research Council, the European Commission, the Swedish Foundation for Strategic Research, Swedish Governmental Agency for Innovation Systems, European Research Council, Knut and Alice Wallenberg Foundation, Ericsson.

**FEATURES A HOLISTIC APPROACH** to networked systems research, encompassing expertise in fields like electrical engineering, computer science, applied mathematics, information and communications technology, systems and control theory, network optimization and management and network security.





## Driving efficiency reduces environmental impact

Traffic jams are not only frustrating because of all the braking and acceleration, they're also a mess from an environmental standpoint. Emissions could be reduced by having cars communicate with one another and with a central computer system to maintain safe distances and a consistent flow of traffic. Fewer collisions would be another dividend. ¶



## Expanding usability of positioning systems

GPS technology, familiar to almost anybody who drives a car or owns a mobile phone, is finding its way into new applications like children's clothing to monitor their whereabouts. But GPS has its problems, including a dramatic drop in performance indoors and underground. New positioning technology that overcomes these limitations would entail better safety for the millions of police, fire and military personnel who risk their lives to save the lives of others in dangerous situations like large open buildings such as shopping malls or underground railway systems. ¶



Working at ACCESS is:

**Challenging**—an interdisciplinary culture means you are always exposed to fresh perspectives.

**Exciting**—working on real problems motivates you to do your best.

**Rewarding**—ACCESS has an excellent track record in terms of delivering results relevant to multiple specialisations.

György Dán, ACCESS Faculty and Assistant Professor of Communication Networks

**PURSUES COLLABORATION WITH** companies and organisations of all shapes and sizes, including Ericsson, Scania, ABB, IBM, CISCO, TeliaSonera, Intel, Global IP Solutions, GN ReSound, Interfleet Technology, Rymdbolaget, Swedish Defence Research Agency and United Technologies Research Center.

**ENJOYS PARTNERSHIPS** with such universities as UC Berkeley, Stanford, CalTech, ETH Zurich, Tsinghua University, the Chinese Academy of Sciences and Kyoto University.

**OUR POSTDOCTORAL PROGRAMME ADMITS** three researchers per year within the fields of communi-

cations infrastructure, distributed management, networked services and signal and systems theory.

For additional information see [www.access.ee.kth.se](http://www.access.ee.kth.se).

by

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