



Sensor Networks

Sensor networks use a large number of ultra-small devices, known as sensor nodes, to form a network without the aid of any established infrastructure. In these networks, the individual nodes are capable of sensing their environments and either processing the information locally or sending it to one or more collection points through wireless links.

Through their ability to monitor their surroundings and provide detailed data, sensor networks have tremendous potential to benefit a broad range of sectors. They can be used for many things, including environmental areas such as monitoring for seismic activity and forest fires, creating industrial efficiencies, traffic control, security and military operations and even improved health care.

Researchers at the Communications Research Centre Canada (CRC), the Federal Government's primary laboratory for research and development into telecommunications technologies, are working on a number of fronts to address challenges limiting the broad deployment of these technologies.

Networking Technologies

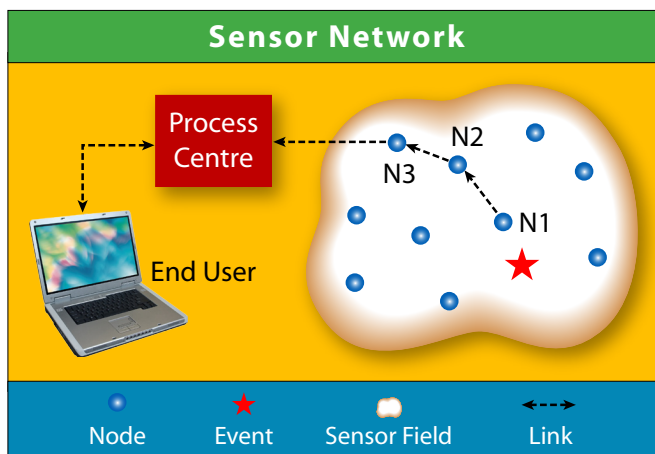
For obvious reasons, having strong network infrastructure is essential to sensor network technologies. CRC is investigating technologies to support these networks, such as:

- Researching new schemes to route information through a large number of nodes and handle scalability issues. This includes support for the data-centric nature of most sensor networks.
- Investigating schemes that support the routing function such as addressing, localization and energy-efficiency, which are required by the nature of sensor network environments.
- Studying interlayer protocol interactions between the link and routing to evaluate the optimization of the routing path selected.
- Defining approaches to allow groups of sensor nodes to discover their neighbours, detect holes or partitions, reorganize and recover from network partitioning.
- Definition and implementation of synchronization techniques to enable sensors to associate events with time and coordinate activities based on a common time reference.

Wireless Communications & Hardware

Research at CRC is looking at a number of radio frequency and communication system issues in order to improve the reliability and integrity of sensor networks. Areas of research include:

- Studying scalability issues of wireless sensor networks.
- Developing strategies to overcome signal propagation effects and to improve coverage.
- Studying optimal modulation techniques and optimal multiple access schemes for this environment.
- Conducting comparisons of the various sensor hardware devices available, experimenting with evaluation kits and conducting further development as needed.
- Studying context awareness in a multi-modal sensory environment.
- Performing simulations and random deployments to find the minimum node density required to establish a basic wireless ad hoc network.



For more information on CRC's work in this area, contact:

Louise Lamont,
Program Manager,
Mobile Ad hoc and Sensor Network Systems
Communications Research Centre
Phone: 613- 991-9635
Fax: 613- 998-9648
E-mail: Louise.Lamont@crc.ca

Luc Boucher,
Program Manager,
Wireless Applications and Systems Research
Communications Research Centre
Phone: 613-998-2050
Fax: 613-990-7987
E-mail: Luc.Boucher@crc.ca