

Revolutionary sensor system protects ports, bridges and distribution centres

April 27 2009

(PhysOrg.com) -- Özlem Durmaz Incel, researcher at the University of Twente, the Netherlands, has developed a spectacular new method that enables wireless sensor networks to function up to ten times more efficiently. Networks based on this revolutionary method can be used for an extremely wide range of applications. They can, for example, be used for the surveillance of bridges, ports and distribution centres. They can also greatly increase efficiency in transport and logistics, for example in large ports.

An enormous number of collaborative sensors are needed to enable complicated, automated logistics processes to run well. Until now, scientists have not succeeded in enabling large numbers of sensors to communicate with one another without interference. In the port of Rotterdam, for example, hundreds of roll containers, trucks and cargo ships 'talk' to one another by means of a network of intelligent sensors that communicate without wires. The network was, however, subject to all sorts of interference. This technical problem has now been solved in a highly ingenious manner by Özlem Durmaz Incel, who makes use of automated communication along changing frequencies. This means that the sensors can always talk to one another without disturbing other sensors. If it is not possible on one frequency, they automatically switch to another. Sensor networks of this kind are currently working, without interference, at places where large numbers of closely-packed sensors collect and send great quantities of information.

Ms Durmaz Incel's breakthrough will ensure that ports, bridges and

distribution centres can be protected very precisely and very efficiently. For example, in order to detect damage in bridges, various factors, including the [vibration](#) and wind speed, have to be measured - by many hundreds of sensors at the same time. The wireless sensor network must therefore be able to collect and send 500 measurements per second. By monitoring these factors well, problems can be detected early. The surveillance of large ports and distribution centres can now also be greatly improved. In such environments, many thousands of sensors are located on a small surface area. By monitoring the vicinity very precisely, a leakage from a cargo ship, for instance, can be discovered in good time.

The researcher from Twente developed a multi-channel Multiple Access Control-protocol that can send data through multiple channels simultaneously. It is also very energy efficient and highly scalable. This new protocol increases the speed of transfer considerably and more data can be sent. By making use of multiple frequencies, the [sensors](#) themselves can choose the best channel along which to send the information. As a result, the network is not subject to interference. The data received is double that received by means of a single frequency. Not every sensor node is able to reach the base station, but it can send its data to an adjacent sensor node. The receiving sensor node then calculates an average value and sends only that data, which also increases the speed of the data transfer.

Provided by University of Twente ([news](#) : [web](#))

Citation: Revolutionary sensor system protects ports, bridges and distribution centres (2009, April 27) retrieved 24 April 2024 from <https://phys.org/news/2009-04-revolutionary-sensor-ports-bridges-centres.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.