



INDUSTRIAL TECHNOLOGIES PROGRAM

Honeywell Wireless and Sensing Project

Wireless Network for Secure Industrial Applications, and Sampling & Composition Analysis Technologies

Honeywell International is serving as the lead organization for a multi-part project that will help ITP's Sensors and Automation Activity further its goal of developing integrated measurement systems for operator-independent control of manufacturing processes

Wireless Network for Secure Industrial Applications

For this project, researchers will examine several promising wireless technologies and select the one most likely to meet the demanding requirements of industrial production lines.

The selected technology will be tested at multiple sites to see how well it satisfies the key considerations of operational reliability, sustained performance in harsh environments, invulnerability to interference, security and

bandwidth efficiency, and other factors that are critical for the ultimate wide-spread deployment of robust wireless sensor networks in manufacturing. In addition to production line measurement and control, the anticipated low-cost of this technology will enable wireless sensors to be used to determine energy- and environmental-related process parameters that are not traditionally monitored.

The resulting Wireless Network for Secure Industrial Applications (WNSIA) will build on spread spectrum technology to transmit data from sensors to the control system, and then into advanced control applications. It will result in an open architecture system that incorporates robust radio communications, flexible network protocols, and security features needed for the large-scale deployment of low-cost industrial wireless sensors.



Applications and Benefits

WNSIA: Applying wireless network technology to steam traps, electric motors, and steam injection systems used in oil production is expected to save 192 trillion Btu annually.

NeSSI/PHASED: This technology will enable more cost-effective sample validation, quality control, and environmental compliance, resulting in reduced life-cycle costs to design, build, and operate the sampling systems.



Honeywell's wireless pressure sensor (left) transmits data to wireless infrastructure nodes (right). A collection of these nodes forms the backbone of Honeywell's industrial wireless network.

Process Stream Sampling and Composition Analysis

This project will develop and demonstrate innovative technology for sampling and composition analysis of gaseous and liquid process streams. The developments produced by the project will lead directly to reduced process upsets, energy consumption and environmental emissions, as well as enhanced economic competitiveness. The project will develop and test two technologies:

- Phased Heater Array Structure for Enhanced Detection (PHASED)
–A revolutionary gas composition microanalyzer that is low-cost, compact, and fast.
- New Sampling Sensor Initiative (NeSSI)
– A new process stream sampling and measurement system that is modular, networked, and (potentially) intrinsically safe and standardized.

Project Plans and Progress

Project History: This project was awarded under the Sensors, Controls, and Automation Crosscutting Technologies solicitation. The award was signed in the spring of 2004.

WNSIA

To carry out the WNSIA project, researchers:

- Have defined project technology and demonstration requirements.
- Have created the overall system design and have designed and built the components.
- Are integrating and testing system components.
- Will build demonstration equipment (such as demonstration sensors).
- Will perform field demonstration system integration and systems lab testing.
- Will perform field demonstration testing.

NeSSI/PHASED

For NeSSI, end-user team members:

- Have designed and developed the NeSSI installation, including safety checks and test protocol.
- Are preparing to install these systems and interface with the available analytics.
- Will monitor, evaluate, and report on the performance of their NeSSI systems.

For PHASED, researchers:

- Have designed a rugged version of PHASED suitable for industrial conditions, with reduced power consumption and systems analysis support.
- Have designed PHASED to interface with micro-discharge detectors (MDDs), optimized geometry and adsorber film, and added systems analysis support.
- Have fabricated PHASED and MDDs chips, as well as the needed test electronics, software, and PHASED operator interface upgrades. Fabricated PHASED chips with interface to MDDs.
- Are conducting lab tests to characterize the performance (sensitivity, selectivity, speed of response, and stability) of PHASED micro gas analyzers with a number of test gases, such as house nitrogen, room air, natural gas, and special test-gas mixtures.
- Have completed a commercialization plan for the PHASED micro gas analyzer.

Project Partners

WNSIA:

Honeywell International (Lead organization)
Adcon Telemetry GmbH
Aprion
Ember Corporation
Electric Power Research Institute
Figure 8 Wireless, Inc.
Honeywell Specialty Materials
NTRU Cryptosystems, Inc.
Omnex Control Systems, Inc.

NeSSI/PHASED:

Honeywell International (Lead Organization)
Cavition, Inc.
University of Illinois
Air Products and Chemicals, Inc.
UOP LLC (a Honeywell company)

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A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.



U.S. Department of Energy
Energy Efficiency and Renewable Energy

Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable

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