IBM Unveils Software to Expand Use of Wireless Sensor Networks and Further Smarter Systems Globally

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IBM today announced a new software development kit to expand the ability of companies and governments to harness sensors and digital devices to design and build intelligent products and systems. The software, available as a free download, aims to increase the global adoption of wireless sensor networks by making them easier to program and use. The announcement was made at the 2010 Sensors Expo & Conference.

To make wireless sensor networks easier to program and exploit, IBM has created a new software development kit — called Mote Runner — which provides an open and programmer-friendly platform to connect sensor and actuator motes within a wireless sensor network (WSN). Motes — also known as wireless sensor nodes — gather sensory information, such as temperature, movement, or light, and communicate that data across a network of wireless sensors.

Separately, IBM also announced today that MEMSIC Inc, a leading microelectromechanical systems and sensor solution provider, will offer Mote Runner on IRIS, one of its most popular sensors.

With the cost of transistors ($0.00001 each) plummeting as density increases, companies and governments are working to take advantage of transistor-rich wireless sensor networks and analytics to:

• Increase understanding of the internal and external systems that support and impact their business
• Improve the behavior and performance of business and societal systems
• Make better, more informed decisions in real-time by applying analytics to data captured from sensors
• Learn about situations occurring in business and societal systems as quickly as they happen.

However, many wireless sensor networks used to monitor and react to physical or environmental conditions are proprietary and difficult to program, therefore limiting the ability of companies, governments and universities to take advantage of them. Mote Runner addresses these challenges.

For example, Mote Runner could help a building management company deploy sensors throughout a high rise building. The technology would:

• Enable the company to develop applications for the sensors that provide the ability to monitor equipment, room temperature, water systems and more,
• Allow the company to simulate where the sensors would be positioned throughout the building and test how they would communicate,
• Provide the company with the ability to reprogram the sensors remotely once they have been placed throughout the building.

“Sensors play an important role in interconnected systems and are critical to helping business leaders understand both what is happening in a system, and what will happen next,” said Charles Lickel, vice president for IBM Software Research.“IBM is focused on empowering our clients to use sensors to instantly monitor constantly changing dynamics and apply analytics to understand and act upon these dynamics. Enabling clients to easily program and use sensor networks is core to creating

smarter systems, and the new developer tools we are unveiling today will advance our clients' ability to drive new intelligence into their businesses."

Software systems are the centerpiece of smart grids, for example, integrating multiple independent products and complex systems to perform their critical functions. Smart meters, smart appliances, and smart homes, all containing embedded software, will be interconnected with numerous back-end software applications to create significant new value for consumers, businesses, and the public.

Mote Runner

Created by IBM Research scientists, Mote Runner is a high-performance, lowfootprint run-time platform that is portable to a broad range of mote hardware and programmable in standard object-oriented programming languages, together with development and integration tooling to easily create and manage applications for wireless sensor networks.

"Sensor networks are instrumental in creating a smarter planet, therefore it is critical to make them easy to program," comments Thorsten Kramp, IBM Research staff member and co-developer of Mote Runner. "We invented Mote Runner to enable developers to take advantage of the skills they have and apply them to programming wireless sensor networks. This should proliferate the use of sensor networks around the world."

Mote Runner was invented to address several distinct challenges:

• The use of a programming language such as Java, in combination with a highly efficient virtual machine developed from the ground up for use in sensor networks, provides application portability while shielding

developers from the complexities of the underlying hardware, without sacrificing performance.

• A simulation environment, a web-based management dashboard, and an integrated development environment based on Eclipse, provide a userfriendly platform for testing, debugging, and maintaining applications sensors. This enables advanced simulation prior to deploying motes in the field, eliminating most programming errors before deployment.

• Since most sensor motes are deployed remotely, battery consumption is a key hurdle. Mote Runner was designed to run on very limited resources: an 8-bit processor, 8 kilobytes of RAM and 64 kilobytes of flash memory — roughly comparable to the operating requirements of a computer in the 1970s). In addition, Mote Runner can be used with energy harvesting techniques, to utilize solar power, for example, as a source of energy.

• Physical access to remotely deployed sensor motes to update them with new functionality is not an option for many mote deployment usage scenarios, such as installations across large agricultural areas, in a multistory building, or in locations with unique climates such as a rain forests or glaciers. Mote Runner caters to this need by including the ability to push or pull changes wirelessly with minimal interruption to the established network.

Source: IBM