From Fuel Cells to Solar-Powered Solutions

FROM FUEL CELLS TO SOLAR-POWERED ENERGY SOLUTIONS

Brief

25 years ago, attitudes concerning renewable energy started to change as environmental concerns became more apparent. Coupled with the scarcity of natural resources; technological advancements made a large push to create new and more convenient ways of obtaining renewable energy like wind power, hydroelectric power, or even solar power in homes and businesses. The long-time use of the combustion engine was in need of an upgrade and in the 1990s; the world was introduced to the first-ever fuel cell electric engine for commercial automobiles. Demonstrated by the U.S. Department of Energy and Arthur D. Little management consulting firm in conjunction with Plug Power and the Energy Department's Los Alamos National Laboratory in 1997, the fuel cell managed to generate electricity using oxygen from the air and compressed hydrogen.

From Fuel Cells to Solar-Powered Solutions

Since its first commercial use more than 20 years ago, the fuel cell has managed to spread into public and corporate usage for large scale operations. A new "tri-generation" fuel cell and hydrogen energy station in California can not only produce transportation fuel for dozens of electric cars each day, but also electrical power for a nearby industrial facility. The fuel cell has been an important step for alternative and renewable energy since it has helped bring more mainstream attention to "green" technologies that can affect larger populations and facilities.

Companies are now constantly looking for new ways to utilize other forms of alternative energy, like solar power- which is being used by homes and businesses to power various appliances. Solar panels, which are made up of a series of small semiconductors, can convert direct sunlight particles into electrons and can then

be converted into electricity. This electricity can then be sent directly into fuse boxes to power applications such as HVAC, lighting fixtures, charging stations for electric vehicles and more. Over the years, solar cells have been made with different material including different types of silicon, which has led to improved efficiency in capturing and converting sunlight. Early silicon solar cells had 6 percent efficiency in the 1950's but now reach more than 44 percent in recent years- meaning higher sunlight absorption and increased electricity wattage. Furthermore, the creation of the energy storage battery means gives homes and businesses the ability to use solar energy to power their facilities at any time of the day, not just when the sun is shining.

Utilizing solar power as an alternative energy source is not only helping reduction in global greenhouse effects, but also saves money on energy bills and decreases electric utility usage. Storing solar energy can now be achieved with energy storage batteries, which can be used to absorb energy at various times during the day and provide electricity for home or large facilities' energy consumption. Axiomtek's embedded controllers, like the ICO or rBOX DIN-rail series, can be programmed to prevent overcharging, monitor operational functions, communicate key data and status and optimize energy use based on usage patterns and setting preferences.
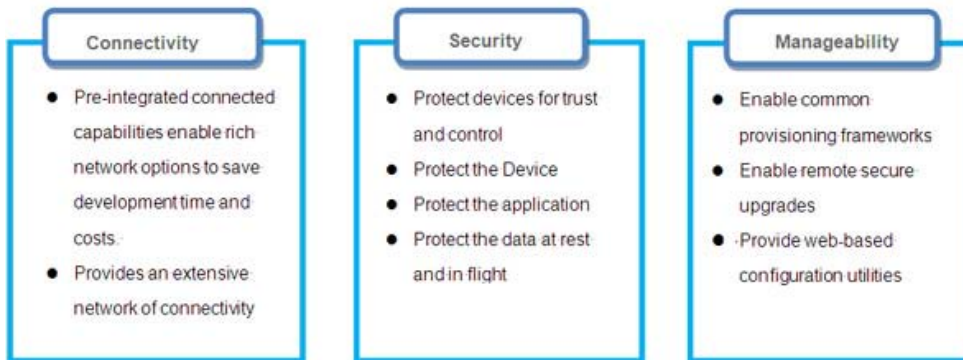
Axiomtek ICO300-MI

The application-ready din-rail embedded industrial IoT platform utilizes low power Intel® Atom™ processor E3815 (1.46 GHz) and supports DDR3L system memory maximum up to 4GB, delivering high performance and low power consumption. It simplifies the development process and achieves accelerated business transformation of IoT environment. This intelligent Intel® Atom-based IoT gateway system provides a perfect solution for IoT & M2M, industrial and embedded applications such as power plant automation, facility monitoring systems, intelligent transportation systems and other harsh environments.

Axiomtek's new industrial gateway system features low power consumption Intel® Atom processor, wireless connectivity, rich expansions, and robust design, ideal for machine or factory automation and smart IoT gateway. The slim-type **ICO300-MI** comes with robust IP40-rated housing and is designed to withstand

temperatures range from -20°C to +70°C in extreme environments. Furthermore, the ultra-lightweight and compact design is well suited for any space-limited application. The wide range 12~24 VDC power input with terminal block, overvoltage and reverse protection can lower the risk of data loss under human manipulation.

Connectivity	Security	Manageability
• Pre-integrated connected capabilities enable rich network options to save development time and costs • Provides an extensive network of connectivity	• Protect devices for trust and control • Protect the Device • Protect the application • Protect the data at rest and in flight	• Enable common provisioning frameworks • Enable remote secure upgrades • Provide web-based configuration utilities

The application-ready machine to machine platform, ICO300-MI, supports Intel® Moon Island Gateway solution for the Internet of Things (IoT). Customers could connect their widely distributed systems via wireless network such as 3G/GPRS. It also avails users to manage a variety of systems effortlessly with a wide range of industrial interfaces for both new and existing installation into the Internet of Things environment. It simplifies the process of deployment of IoT gateways and achieves accelerated business transformation.

Axiomtek's DIN-rail embedded controllers, the rBOX product series; heavy-duty fanless touch panel PCs, the GOT product series; and embedded systems, the ICO and IPC product series are suited to perfectly work in the renewable energy and power utility industries. These products have useful features including rugged designs for use in harsh environments, wide operating temperature ranges, wireless connectivity for communications, wide voltage ranges, high graphics performance, and Power over Ethernet capabilities. Axiomtek provides product solutions to help support the "green" energy movement.

About Axiomtek Co., Ltd.

Axiomtek Co. Ltd. is one of the world's leading designers/manufacturers of PC-based industrial computer products. From our roots as a turnkey systems integrator specializing in data acquisition and control systems, Axiomtek has mirrored the PC evolution in various industries by shifting our focus toward the design and manufacture of PC-based industrial automation solutions.

Axiomtek Co., Ltd. established in 1990, has more than 60 distributor partners globally. Axiomtek offers Industrial PCs (IPC), Single Board Computers and System on Modules (slot CPU card, small form factor embedded boards & SoM), Fanless & Rugged Embedded System (eBOX, tBOX and rBOX), Industrial Firewall Platform, Industrial Gateway Solution, Touch Panel Computers (TPC), Medical PCs (MPC), Human Machine Interface (HMI), Digital Signage and Players (DS), Industrial Network and Network Appliances (NA).

As an associate member of the Intel® Internet of Things Solutions Alliance, Axiomtek continuously develops and delivers cutting edge solutions based on the latest Intel® platforms.