The Battle Between Humans and Robots in Automation

For many years, the idea of autonomous robots taking over all work in a factory or assembly line was seen as progress – replacing workers to perform tasks on assembly lines to improve overall efficiency with a high price tag. It is also seen as a threat to the job security of factory workers. Much has been debated over the years about this topic and the current trend of collaborative robots has emerged as an alternative. Instead of completely replacing factory workers with robots, some companies are looking into the integration of collaborative robots arms, cobots for short, which can work alongside with human workers. They can be programmed to autonomously operate within a limited list of tasks or need human assistance to complete specific applications. The cobots are less expensive than fully functional robots, yet they can operate with much higher precision, perform heavy-duty work in more dangerous conditions, and offer lower error rates than humans. These cobots are usually compact in size, versatile in its use, affordable, efficient and easy to configure, setup and maintain. Human workers are free to perform responsibilities that require manual dexterity, ingenuity and complex problem solving – something that even advanced robots cannot perform just yet.

Collaborative Robot Quickly Gains Popularity

The collaborative robot concept has gained popularity in recent years. Some say these cobots will revolutionize production. It can help smaller operations offer better competition and gain ground in their markets as well as enhance productivity and efficiency in large factories. Experts are seeing a strong growth potential for cobots in the near future. Some said they expect to see the growth level increase tenfold between now and 2020. The price of these cobots is expected to continue to fall, hence, increased adoption rate for use in automation. Mid- to small-size companies soon are expected to be able to enjoy its use and expanded applications. Newer available technologies, i.e., vision sensors and 3D sensors have come into play and help widen the use of cobots. It is certain that cobots will be used in many more new applications as technology progresses and associated costs drop.

How Cobots Work?

The majority of recent cobots are simple robotic arms that consist of computer/embedded boards/systems, sensors, vision systems, human interface units, power supplies, etc. They are programmed to perform specific tasks that may include, inspection for outliers, lifting heavy items, assembling parts, monitoring specific functions of other machines or tasks, moving items and more. These robots can stop themselves on impact with sensors and handle heavy loads beyond human capabilities. It can be programmed for specific movements that human's anatomy is incapable of performing. Most cobots are safe to work alongside humans and can navigate around them to avoid potential injuries.

Cobots and Other Advanced Computer Hardware Technology for Automation

The real brains behind these collaborative robotic arms are the industrial embedded motherboards, PC-based controllers and touch panel PCs that are used to control cobots, factory assembly line equipment including sensors and actuators and other robotics in factory automation. Axiomtek's compact, industrial-grade Pico-ITX embedded motherboards can be integrated into cobots to control a variety of their functionality and task performance. Axiomtek's Pico-ITX product line offers scalable CPU options including the advanced 6th generation Intel® Core™ I family and Celeron® processors, high expandability, rich I/Os including USB, DIO, PCI Express and Gigabit LAN ports with great graphical capabilities and Intel® AMT support for remote management. Axiomtek's comprehensive product line of the extreme compact Pico-ITX form factor motherboards can pack a punch and is among the best in the market.

Axiomtek's EtherCAT Master Controllers, Industrial PCs, DIN-rail embedded controllers, touch panel PCs and embedded motherboards are made specifically for automation and can be used as robotic controllers. Additionally, they can be used as PLCs, PACs, edge processors, IoT gateway device and more in factory automation environment. They are highly customizable and designed with flexibility in mind for various topologies and communication options to connect with other edge devices, sensors, and more. These systems can be used for a variety of automation industry applications such as robotics, inventory management, quality control, assembly line control and more. They are designed to help enhance productivity, increase efficiency, reduce human errors, and offer a higher return on investment.

Another specialized embedded system product line designed specifically for automation is Axiomtek's EtherCAT Master Controllers, which feature support for Acontis EtherCAT Master Stack and are verified with IntervalZero EtherCAT Master Stack and Solution KingStarIO32 for interoperability between connected devices. They also support Windows real-time extension RTX64 and offer seamless integration with servo devices. Axiomtek's EtherCAT Master Controller product line features scalable CPU options along with high customizability and flexibility for communication options. They come equipped with an EtherCAT port, making it a breeze to connect. These specialized embedded systems offer distributed clock function that support synchronization of all slave devices. Axiomtek also offers rugged EtherCAT Master industrial PCs with expansion slots and many rich, flexible features designed for a wide range of automation applications.

Axiomtek's embedded computer systems can be integrated into a variety of automation industry applications since these systems feature high performance CPUs, wireless communication options, wide operating temperature ranges and more. The product line is a modularized embedded computer specifically designed with

versatility - and time and cost efficiency in mind. The system can be customized with different I/Os to fit the specific needs of various projects. It is an ideal system for integration within one platform. It supports multi-system configurations with cable-less assembly. The system can be customized in a short period of time with off-the-shelf modules. The base unit offers scalable CPUs with many features in place. Optional modules include, LAN, integrated I/O and more.

The ICO300, Axiomtek's controller designed as an IoT gateway, features the low power consumption Intel® Atom™ E3815 processor, isolated GbE LAN ports for reliable communication options as well as extensive wireless communication options and more.

Design Assistance and Engineering Services

Axiomtek's design assistance and value-added service teams have many years of successful experience assisting automation industry customers with their important project needs. They can provide overall project support or task-specific assistance during development, testing, deployment and post-deployment phases. Axiomtek's capable and experienced teams, which include hardware, software and application engineers, can deliver what is needed, when it is needed and with the highest quality available that is known to exceed customer expectations.

What the Future may Bring

Advancements in embedded computer hardware are constantly pushing the limits of what can be improved in a factory. The evolving landscape of the automation industry depends largely on availability and investment costs to adopt emerging technologies. Who knows - maybe the future of automation will be true evolutionary innovations, where collaboration between machines and humans results in the highest quality products, efficient operations and optimum values for the manufacturers, workers and consumers.

Product Showcase:

Within each of these standard configurations, standard off-the-shelf modules can be purchased to further customize the embedded system. Examples of the many options are: a module that includes PoE x 4 and USB 3.0 ports for applications such as automated optical inspection (AOI), an 8-port GbE copper module for industrial firewall applications, and a multi-COM port module for extensive communication needs such as those required by retail kiosk applications, etc.

eBOX671-885-FL-ECM - EtherCAT Master Controller with Real-time OS Support and 4 Gigabit POE Ports

- Scalable CPU options with 4th Generation Intel® Core™ i7/i5/i3 or Celeron® processors with Intel® Q87 chipset
- Verified with IntervalZero EtherCAT Master Solution KingStarIO32 for interoperability and one EtherCAT port for fast/reliable communication options between devices
- Two internal PCI Express Mini Card slots for 3G/LTE/4G/Wi-Fi for wireless communication options
- Operational stability with wide operating temperature range of -20°C to +50°C (-4°F to +122°F)

IPC932-230-FL-ECM - Fanless EtherCAT Master Barebone System with Great Expansion Capabilities

- Scalable CPU options with 4th Generation Intel® Core™ i7/i5/i3 or Celeron® processors
- Verified with IntervalZero EtherCAT Master Solution KingStarIO32 for interoperability and one EtherCAT port for fast and reliable communication options between devices
- One Gigabit LAN port for IoT communication options
- Operational stability with wide operating temperature range of -10°C to + 50°C (14°F to +122°F)

ICO300 - Compact and Highly Reliable IoT Gateway Controller for Automation IoT Applications

- Low power consumption Intel® Atom™ E3815 or E3827 processors
- Wireless communication options with one full-size PCI Express Mini Card, one SIM socket and two antennas
- Reliable communication options with two isolated 10/100/1000Mbps Ethernet ports
- Operational stability with wide operating temperature range of -20°C to +70°C (-4°F to +158°F)

GOT3157W-881-PCT - Heavy-duty Fanless Touch Panel PC for Human Machine Interface (HMI) Use

- 15.6" WXGA PCT multi-touch screen with 400 nits brightness
- Scalable 4th Generation Intel® Core™ i7/i5/i3, Celeron® or Pentium® processors
- Rich I/O options with two RS-232/422/485, audio, two USB 3.0 ports, two USB 2.0 ports, HDMI, two GbE LAN ports and two mini PCIe ports
- Operational stability with wide operating temperature of 0°C to +40°C (32°F to +104°F) and flexible power options with 19VDC input

PICO500 - High Performance and Highly Customizable Pico-ITX Embedded Motherboard

- Scalable CPU options with 6th Generation Intel® Core™ i7/i5/i3 or Celeron® processors
- Delivers Ultra HD visual experiences through an integrated Intel® HD graphic engine to support HDMI and 18/24-bit single/dual channel LVDS
- Rich I/O options with flexible board-to-board connector for one HD audio port, four USB 3.0 ports, one PCIe x1, one DDI, and two UART interfaces
- Easy remote management and maintenance with Intel® AMT 11.0 on Intel® Core™ i7 and i5