

IO-LINK WIRELESS FOR COBOTS AND ROBOTS

Robotic arms play a key role in modern factories, perform complex operations that were previously done manually, in a much more precise, quick, and efficient manner. Robotic arms either act on their own (Robots) or in a collaborative environment along with human operators (Cobots). But whether for assembly tasks, pick & drop or handling of hazardous materials, Robots and Cobots all require sensors and actuators at their end-of-arm, commonly referred to as End-of-arm-tooling ("EOAT").

FREEDOM IN MONITORING & CONTROL

For operation of sensors and end effectors, other than power, automation requires connectivity for control and monitoring. However, the key requirement in robotics is freedom and flexibility in motion, rotation, and inflection. This means that cabling that can reach the EOAT has to be designed in such a way that it does not limit the actual operation of the robotic arm. This proves to be a challenging task for many designs, and a major engineering tradeoff between connectivity and flexibility.

MODULARITY

Robots and Cobots are often designed as a platform, where the motion, rotation and bending are the key functionality. Thus, robotic arms that are used for lifting or gripping can share the same mechanics as robots used for welding or screwing. The only difference is the choice of EOAT that are added or modified at a later stage based on the actual deployment and automation tasks in the manufacturing facility. End-effectors and EOAT manufacturers are often different entities than the Robot manufacturers, requiring an independent communication channel. In addition, advanced applications may require multiple sensors and actuators to be deployed, dictating varying bandwidth and connectivity specifications.

RETROFIT AND COLLABORATION

One solution for deploying specific or additional end-effectors and sensors at the end-of arm is through external cabling, using mounting accessories. While such solutions may solve the connectivity and modularity constraints, they prove to be costly and cumbersome, and pose additional constraints on the motion and functionality of the robots. When it comes to Cobots, where humans interface with the arm, external cabling poses an even bigger obstacle, making collaboration substantially more complex.



WIRELESS SOLUTIONS

The constraints in deploying EOAT makes wireless connectivity a requirement for many applications. Wireless connectivity makes the design and form factor more attractive, and not needing to account for cables enables functionalities such as continuous rotation, improved operational reach and modular deployment of sensors and actuators. It also reduces deployment costs, maintenance cost (due to cable wear-and-tear) and unplanned downtime.

Yet, traditional wireless technologies are not fit for the industrial operational requirements posed by Robots and Cobots. Operation of actuators and monitoring sensors in the industrial automation requires very low latency and response time along with high reliability and immunity to noise and interferences. Technologies such as Wi-Fi, Bluetooth and Zigbee are simply not reliable nor fast enough for such applications.

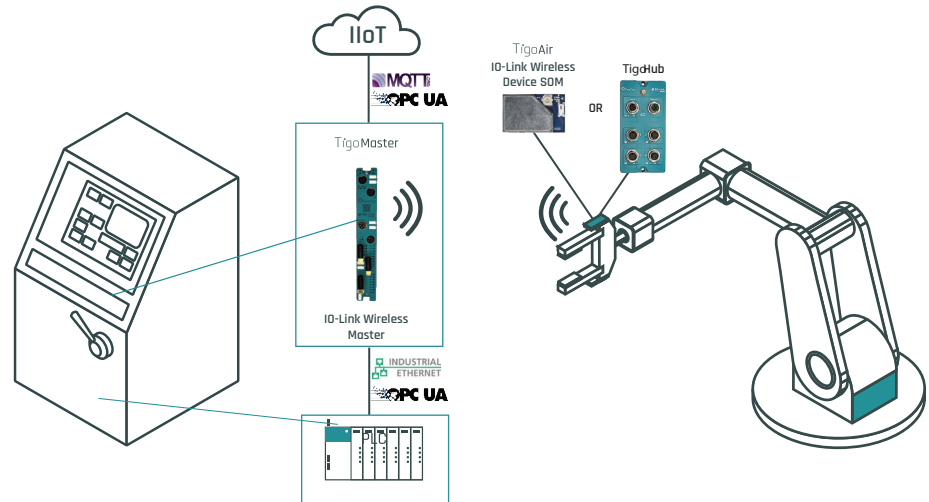
IO-LINK WIRELESS

Unlike the conventional wireless technologies that were designed for IT (Information Technology) and general connectivity, IO-Link Wireless was designed as a standard for industrial OT (Operation Technology) and factory automation applications such as Robotics. As an extension of the IO-Link standard, IO-Link Wireless is a deterministic wireless protocol, assuring operational automation of 5ms low latency. With a built-in noise immunity, it performs at an extremely low PER (Packet Error Rate) of $1e-9$, making it 6 orders of magnitude (one million times) more reliable than other wireless systems. Thus, IO-Link Wireless makes wireless connectivity to Robots and Cobots EOAT a common reality as reliable as wired communication while being unbound.



DEPLOYMENT ARCHITECTURE

To enable this solution, CoreTigo's TigoAir wireless device connectivity SOM (System-On-Module) is integrated at the end-of-arm allowing IO-Link Wireless connectivity to the end-effectors. It connects wirelessly to the TigoMaster, which can control up to 16 devices. The TigoMaster can either be placed on the Robot itself or in the production line's control box where it can control the EOAT on several Robots. The TigoMaster communicates the data and control in real-time to and from the automation PLC through a preferred industrial ethernet protocol (such as Ethernet/IP, EtherCAT or Profinet) and in parallel can also send monitoring data to an IIoT platform through protocols such as MQTT and OPC-UA.



APPLICATIONS



CoreTigo's wireless device connectivity TigoAir SOM is used by leading end-effectors providers, enabling never-before possible applications. One such design is for a modular deployment end-of arm mount that currently supports a variety of models of Vacuum Pumps and Grippers by top manufacturers. A Robotic arm platform equipped with such an IO-Link Wireless mount can then be completely independent of cabling and equipped with the required actuator on a per-need basis. Thus, it can still perform all the required tasks as if it had a wired connectivity, without the constraints of wires.

Other end effectors and sensors can be mounted as a retrofit on any Robot/ Cobot platform, using CoreTigo's TigoBridge which allows turning any IO-Link device into an IO-Link Wireless device, seamlessly, with no dedicated design and no prior integration. The TigoBridge comes as a standalone unit with IP67 enclosure, allowing to use it as-is, out of the box with no integration efforts, or as a SOM for device manufacturers' quick and low-effort integration within an existing device. For multiple IO Link sensor/actuator applications, the TigoHub can be mounted on the EOAT to provide the wireless connection.



For further information, please contact us at: info@coretigo.com | www.coretigo.com | +972-747-69-10-20

ABOUT CORETIGO

CoreTigo is unbinding the industrial space by providing high-performance IO-Link-Wireless communication solutions for machine builders, system integrators and industrial equipment manufacturers, CoreTigo's products enable the design and retrofit of machines and production lines that were not possible before. These solutions increase flexibility, adaptivity and modularity, resulting in cost effectiveness, increased productivity and downtime reduction. Embraced by industrial leaders, the IO-Link-Wireless global standard, fit for harsh factory environments and motion control applications, provides cable-grade connectivity for millions of sensors, actuators and industrial devices worldwide.