Medical Robotics and Digital Surgery

DRIVING INNOVATION IN MEDICAL ROBOTICS — INTELLIGENT DATA FLOW FOR DIGITAL SURGERY

HIGHLIGHTS

Streamlines the integration of sensing, visualization and intelligent applications

Enables local and remote teleoperations with cross-platform and transport-agnostic communications

Provides reliable and low-latency data-sharing for real-time control and feedback

Provides a data-centric foundation for modular architectures as connectivity requirements and interfaces evolve

Offers built-in cybersecurity for real-time data sharing

Aligns with the latest regulatory guidance for secure architectures

RTI Connext® enables the data-driven medical systems of connected healthcare. It provides medical-grade connectivity for the development of next generation medical robotics systems. Connext enables all distributed applications in a robotic system-of-systems to seamlessly work as a single integrated solution across applications, devices and local or wide-area networks.

CONNECTIVITY IS THE FOUNDATION FOR DIGITAL SURGERY PLATFORMS

Next-generation, robotically-assisted systems are transforming minimally-invasive procedures by leveraging the convergence of AI/ML, advanced robotics and sensors, data analytics and visualization technologies. These interconnected, intelligent systems are enabling more precise, predictive, and automated procedures in the increasingly digital operating room.

What is powering this transformation? Intelligent connectivity. Seamless data-sharing across data sources, applications, and networks is driving the change in system architectures. Today, software and data flow are at the core of digital surgery.

Robotically-assisted surgical systems require the following capabilities to unlock the potential of a new era of digital surgery:

- Reliable, real-time performance and interoperability across subsystems, applications, and networks

- Integration of video, AI/ML, and robotics for intraoperative clinical guidance and automation

- Flexible and upgradeable platforms that are adaptable to evolving use cases and data interfaces

- Secure communication architectures that address regulatory and technical requirements

Connectivity is the foundation for distributed operation and integration of devices, sensors, visualization, command and control. It enables intelligent guidance for more precise procedures, improved clinical workflows, and faster patient recovery.

However, the advanced connectivity and capabilities that next-generation robotic systems require can present a number of design challenges for product teams who must deliver and evolve innovative solutions quickly to support digital surgery.

SOLVING THE CONNECTIVITY CHALLENGES OF DIGITAL SURGERY

Connext was designed specifically for secure, reliable, and real-time data-sharing for applications across complex and

distributed systems. Connext accelerates the design of flexible, system-of-systems that can integrate heterogeneous applications, devices, and data across interfaces and networks.

Built on the open Data Distribution Service (DDS™) standard, Connext provides a data-centric connectivity framework (middleware) that uniquely enables state-aware data flow through a shared data model. When applying this framework, applications may access context-aware data on demand, from any location in the connected system. This shared data model addresses many of the typical design constraints of real-time, distributed communications:

Reliable and Real-Time Connectivity: Connext provides reliable and low-latency data-sharing across distributed computing nodes and subsystems for real-time control and feedback. It achieves this without a message broker. Configurable Quality of Service features enable optimized data flow for kinematic, video, state, or other data flows.

Interoperability: Connext streamlines the integration of control, vision, robotic, and AI/ML subsystems across a surgical robotics platform. This is achieved by enabling syntactic interoperability across internal and external interfaces, providing a global, shared data space, independent of programming language, platform or network transport. The data-centric framework enables modular, future-proof applications, compatible with legacy and next-generation communication interfaces, across devices and platforms.

Cybersecurity: Connext enables secure-by-design communications that align with the latest regulatory guidance for secure architectures across internal and external interfaces. It provides the ability to configure fine-grained access control (least privilege) to data in motion, independent of transport or network location. Connext provides authentication and encryption at system and network transport boundaries. Because the communication framework is "data-aware" by design, known data structures may only be shared with authorized applications that need the data.

This approach gives customers an interoperable data-connectivity framework that abstracts the software communication infrastructure across devices and networks, allowing software teams to focus on application development instead of middleware. Connext enables reliable and secure real-time data flow through a virtual databus that keeps data in motion, laying a data-centric foundation for the design of interoperable, modular and scalable architectures.
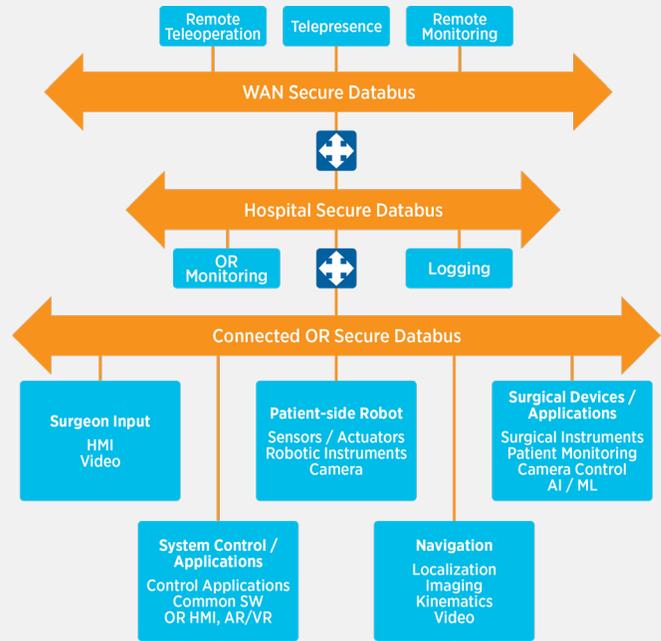
PROVEN TECHNOLOGY FOR LOCAL AND REMOTE TELEOPERATION

Connext is powering many of the leading systems used in MedTech today for robotically-assisted procedures across a number of system architectures.

For example, Monogram Orthopedics selected Connext to achieve reliable and low-latency communications for telesurgery, enabling highly precise and time-saving procedures. Monogram achieved a significant industry milestone by completing the world's first fully remote, robotically-assisted Total Knee Arthroplasty (TKA) procedure, where surgeons in New York City controlled an orthopedic robot located in Austin, Texas.

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> We feel strongly that our total knee replacement system, with RTI's underlying technology, [allows] patients to have a more stable, better-fitting knee replacement with fewer complications in a fraction of the time it takes today."
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> **Kamran Shamaei**
> CTO at Monogram Orthopedics

ABOUT RTI

Real-Time Innovations (RTI) is the infrastructure software company for smart-world systems. Across industries, RTI Connext® is the leading software framework for intelligent distributed systems. RTI runs a smarter world.

RTI is the market leader in products compliant with the Data Distribution Service (DDS™) standard. RTI is privately held and headquartered in Silicon Valley with regional offices in Colorado, Spain, and Singapore.

Your systems.
Working as one.

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