



INU-100

CONNECTS 3D CAMERA WITH HIGH-PERFORMANCE COMPUTER

EU research project on real-time immersive telepresence
uses SEH device server



Video conferences and meetings with collaboration solutions such as Teams, Zoom or Webex have become standard daily tools. However, in practice, physical and virtual worlds are still very far apart. Immersive telepresence has the potential to overcome this separation. The SPIRIT research project within the framework of Horizon Europe, the European Union's research and innovation framework program, brings together eight companies to develop a technical innovation framework for collaborative telepresence applications. A small but important component in this is the INU-100 industrial USB device server from SEH.

One topic of this project is researching compression methods for three-dimensional, virtual holographic communication, i.e. how the amount of data transmitted can be reduced while maintaining the best possible quality. The necessary computing power is provided by a high-performance server in a server room of the project partner Deutsche Telekom. As a server room is not a suitable location for a holo-conference, the required 3D camera is located in a quiet laboratory room. The connection between the camera and the remote server is established via a USB interface, which is connected to this server via the INU-100 USB device server from SEH. The server itself is connected to a 5G test network. In this test network, 3D augmented reality glasses connected to a 5G smartphone are the recipients of the holographic communication.



Source: SPIRIT Project



Performance is everything

This research scenario represents a controlled environment in which precise measurements of performance and quality are possible. In the public mobile network this would only be possible to a limited extent, since it is never known in detail who is using the network and what is happening on the Internet between the cloud and the mobile network.

The SPIRIT project is currently researching the requirements of holographic communication, which will probably be in place within the next few years. Desktop computers and laptops are expected to have a higher level of performance and will be able to carry out the complex calculations required for holographic communication, in particular the image compression, on the local device. Currently, the project still relies on high-performance server computers, usually located in a remote room. This is where the INU-100 industrial device server from SEH, specially developed for the transmission of large video data, is used.



Focus on USB 3D camera

The key component of a telepresence application is clearly the video capturing of participants by camera. In the case of immersive telepresence, however, this must be a so-called depth camera, which, unlike a normal webcam, can capture objects not only two-dimensionally, but three-dimensionally, i.e. also in depth. The Intel RealSense depth camera is used in the project.

Like most cameras used in PC environments, depth cameras are connected to the respective end device via USB. This is usually practical for existing applications in the office, meeting room or gaming environment, as every desktop or laptop is at least accessible via a USB adapter. However, this is not the case in the research environment of the SPIRIT project, because to process the large amounts of data quickly generated by the 3D camera, a high-performance server is required that does not have a connection to the camera. This task is fulfilled by the INU-100 device server from SEH, which was specially designed for use in data centers and server cabinets.

In the test scenario, the 3D camera still needs to be connected to a high-performance server in a data centre. However, the SPIRIT research project is looking to the future. What is currently reserved for high-performance computers in data centers could soon be present in every laptop.



The INU-100 and SU-302 are made for simple installation in control cabinets via top-hat rail housing.



Future conference room with extra server room

It is also conceivable, however, that conference rooms will rely on the computing power of high-performance servers in the future. This may either be because the computing power is not yet available in small computers, or simply to keep noise and waste heat in conference rooms to a minimum. In addition, a powerful computer in the server room could be used to operate several depth cameras from different conference rooms. In the SPIRIT team, Ericsson GmbH, the telecommunications equipment supplier in the consortium, has therefore decided to integrate Intel's USB depth camera into the hardware environment in the data center via SEH's INU-100 USB device server.

The INU-100 from SEH was chosen because the amount of data that the camera generates requires at least a device supporting USB 3.0. Many other devices on the market only support USB 2.0. Driver support for Linux was also required, which the INU-100 provides as well. The device server should also be connected and communicate via a real Ethernet network. Other devices on the market also use Ethernet cables, but they often use proprietary protocols. Integration into an existing data center network is therefore difficult.



SEH INU-100 strength in industrial environments

The INU-100 USB device server, on the other hand, is ideal for demanding industrial environments with USB 3.0 SuperSpeed. With a support for the isochronous USB mode, it offers great advantages, especially when transmitting video data. The isochronous mode guarantees a certain bandwidth with limited latency and a constant data rate, and data is streamed continuously, which is important for time-critical applications. It can also be easily installed in the server cabinet using the standardised DIN rail housing.

The Intel RealSense depth camera is connected to a high-performance server on which various virtual machines (VMs) are running. Standard Linux systems are used for this. However, it was important that the INU-100 also works with VMs. SEH provided direct support in setting up the environment.

The INU-100 from SEH showed its strengths here: The camera generates high data rate that can usually only be managed with at least USB 3. The delay times (latencies) are also measured during the tests. These cannot be completely avoided, but the researchers are grateful for every component in the test setup that, like the INU-100, does not add significant additional latencies.

The SEH USB device server for industrial environments has thus clearly proven its suitability for demanding industrial environments: high performance paired with flexibility and competent support.

Features INU-100 USB Deviceserver

- › USB devices are integrated seamlessly and comfortably
- › Access control via a PC/Industrial PC possible
- › The use of standard USB devices allows for a cost-effective solution
- › Fail-safe and highly available
- › The integrated change-over (CO) relay allows for automatic or event-controlled switching
- › Fast data transfer with up to 100 MB/s
- › The INU-100 ensures highest data security during transmission

SPIRIT

Telepresence represents the next generation of communication applications that will significantly improve immersive experiences in both human-to-human and human-to-machine interactions by blurring the physical and virtual worlds. While this is already influencing how we work, it will have an even greater impact in the future, contributing to increased resilience to environmental disruptions, industry productivity, and energy efficiency. Due to their complexity, cost, data compression, and bandwidth requirements, these solutions have not been scaled yet.

SPIRIT (Scalable Platform for Innovations on Real-time Immersive Telepresence), which is funded by the European Commission's Horizon Europe programme, researches, develops, and demonstrates low-latency and scalable solutions that will ultimately bring real-time immersive telepresence into practice.

Website: <https://spirit-project.eu/>



SEH Computertechnik GmbH

SEH Computertechnik is an innovator for network solutions, primarily in the licensed software/USB management and printing sectors. Founded in 1986 as a custom software and technology company, SEH has evolved to offer professional and secure network solutions for all types of businesses across a variety of industries. SEH adapts its technologies to create unique, highly integrated solutions with exceptional price/performance ratios.

All SEH products are developed and produced at the company's headquarters in Bielefeld, Germany. U.S. headquarters are located in Phoenixville, PA, with offices across Europe, Asia and North America.

