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Accelerate Interventional Radiology System Development

Doctors have long relied on diagnostic radiology to identify and pinpoint patient disorders before treatment. Modern interventional radiology (IR) equipment allows them to obtain real-time medical images in the operating room as a procedure unfolds, informing their work and speeding progress.

Hospitals are eager to expand the use of IR, which can lower costs, reduce risks, improve patient outcomes, and shorten hospital stays. However, the equipment makers of these systems find it tough to meet their needs. Building an IR machine that can rapidly analyze medical images and deliver on-the-spot guidance is technologically complex, and medical equipment requires lengthy certification reviews before it can be released.

Embedded computing OEMs help medical equipment providers overcome many hurdles. For example, companies like Siemens Healthineers, a leading innovator in healthcare tech; HY Medical, a developer of computer vision medical imaging systems; and digital surgery platform provider Caresyntax can obtain expert assistance with product design and technology selection, achieve certification faster, and deliver equipment to customers sooner.

By incorporating the right hardware into their equipment, they can assure hospitals and clinics will receive support for many years, sparing them the expense of costly upgrades and fixes.

Using AI in Medical Imaging

IR systems comprise a mix of hardware and software components that must work together seamlessly to provide near-real-time results and are complicated to design. And because the equipment is used for treating patients, it is classified as safety-critical and must meet exacting technical requirements to achieve certification. Bringing a new product to market often takes years.

Prodrive Technologies, a global OEM and manufacturer of embedded computing systems, is a prime example of how having a partner with deep healthcare technology experience is essential for medical equipment builders. "Building, testing, and integrating complex systems is what we've been doing for the past 30 years," says Bartosz Straszak, Sales Manager of Prodrive.

In addition to radiology technologies, the company also has expertise in technologies essential for medical machine operations, including motion control, which is needed to stabilize the C-arm that many X-ray and CT machines use during procedures. The C-arm swivels around the patient to capture real-time, high-resolution images from many angles, giving physicians a multidimensional view of the surgical area without having to move the patient. Prodrive also produces gradient amplifiers, which modulate the delivery of magnetic fields in MRI machines.

"From the point where an image is captured to the point where it's processed, we have all the experience and components to help developers build their systems. When they come to us with custom requirements, we can incorporate them and provide a complete product," Straszak says.

Prodrive also tests, validates, and certifies safety-critical products at its own facilities, potentially shaving years off development time. Though the company does not

design software, it can help builders make decisions about deploying it effectively. For example, if a builder wants to use AI software to automatically annotate medical images in near-real time, Prodrive can help them select the best hardware platform for running the program efficiently.

Prodrive can also refer equipment builders to software partners, to assist with tasks such as training computer vision models to recognize medical images. "We help our customers by introducing them to the right software partners. It becomes a three-way partnership," Straszak says.

Supporting Critical Systems with High-Performance Computing

Fast, reliable hardware lies at the heart of Prodrive IR systems. "Image processing is a very computationally intensive process, and we rely on Intel components as the base," Straszak says.

Prodrive's Zeus servers use 4th Gen Intel® Xeon® Scalable processors and 5th Gen Intel® Xeon® Scalable processors to process data-heavy images almost instantaneously. The company's Poseidon industrial PCs use 13th Gen Intel® Core™ processors and 14th Gen Intel® Core™ processors, allowing medical staff to do real-time AI image analysis and editing—a capability recently made possible by improvements in Intel processors' speed and efficiency.

"The latest generations of Intel Core processors are three or four times more powerful than those of five years ago. That allows builders to create solutions that were previously too expensive to be commercially viable," Straszak explains.

Another boon for equipment makers—and their hospital customers—is the electronic hardware's long-term support. "Intel provides extremely long life cycles for embedded computing equipment—up to 15 years. That means that even if product development takes two to three years, the equipment can still be manufactured unchanged for 12 years," Straszak says.

Reliability and ongoing maintenance are especially strong selling points for hospital machines. Making even small changes to the hardware that's used near patients can trigger the need for recertification, indefinitely delaying the deployment of sought-after equipment.

The Evolving IR Future

As IR deep-learning models gather more data from systems in operation, their accuracy and capabilities will continue to improve. In the future, generative AI may play a part in annotating diagrams for medical staff, creating summaries of surgical reports, and perhaps even more.

"In many cases, AI can see details that the human eye cannot, but it sometimes struggles to make accurate decisions," Straszak says. "Generative AI may be able to explain AI decisions, which could then be verified by humans. We must be able to trust AI output to create new features."