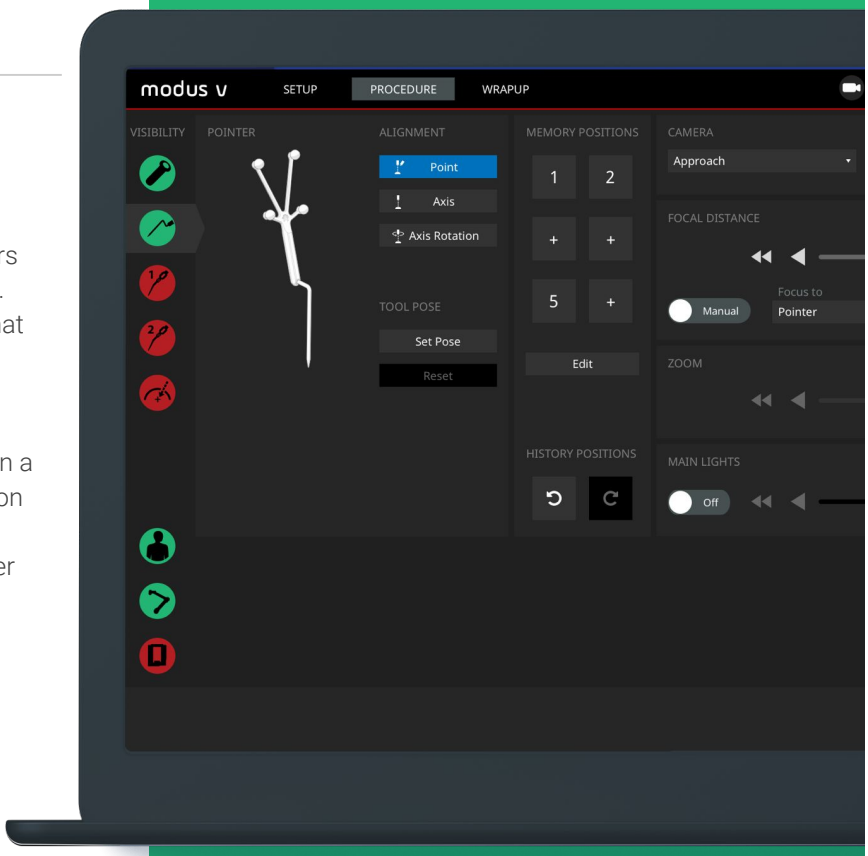
Synaptive Modus V™

How Rangle Helped Synaptive Power the Next Generation of Neurosurgical Robotics

synaptive

Synaptive collaborates with leading clinicians and healthcare systems to integrate revolutionary products and services that cross traditional barriers and information silos in and beyond the operating room.

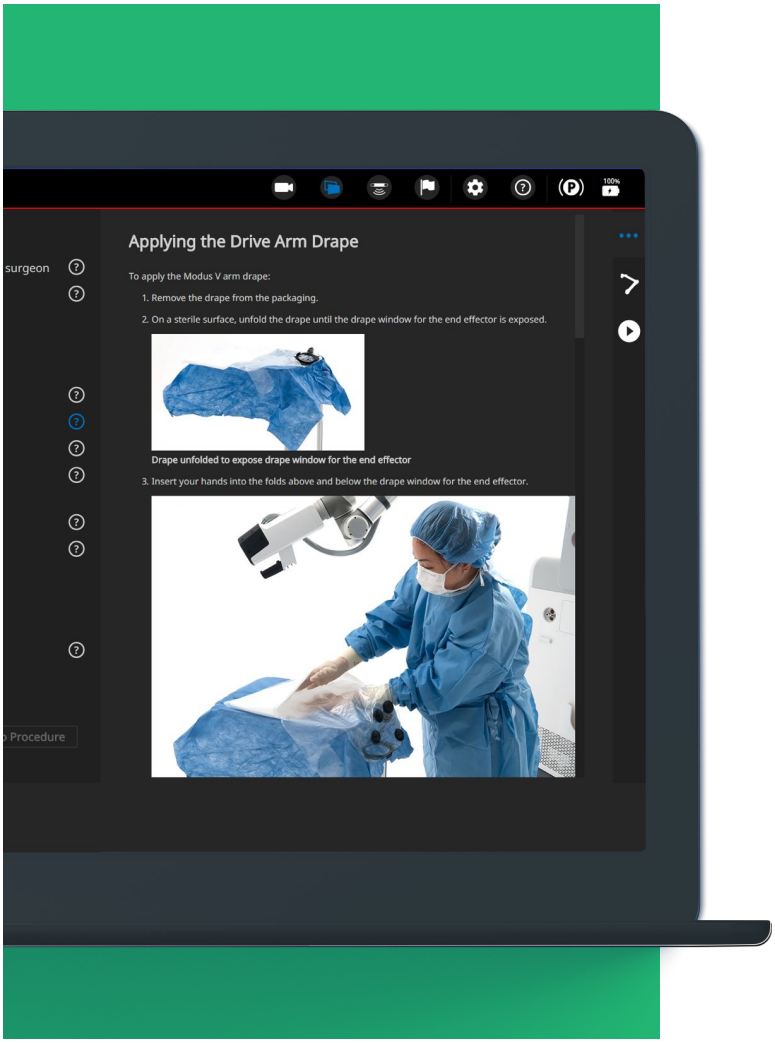


Key Takeaways

In just five months, Synaptive and Rangle:

- Developed a complex application that powers highly precise neurosurgical robotic devices.
- Customized a collaborative, agile process that allowed for weekly demonstrations to stakeholders, rapid iteration, and frequent communication.
- Leveled up Synaptive's development team on a modern tech stack to maintain the application internally.
- Built a component library being used by other Synaptive technologies.
- Employed Angular — a modern, web-based framework backed by Google, a long-term Rangle partner — to simplify future development of other applications.

info@rangle.io | +1 (416) 737-1555



About Synaptive

Synaptive Medical Inc. is a medical device and technology company disrupting the status quo to give surgeons, hospitals, researchers – and especially patients — a connected experience.

Creating technology that addresses surgical challenges while contributing to the best possible outcomes for patients inspires and guides their advancements across medical devices, medical imaging and information science.

Finding the Right Partner

Synaptive wanted to migrate a key software platform to the latest version of Angular. Although Synaptive considered making internal hires, they needed a rapid solution and believed their business needs would be better served by partnering with Rangle. They engaged Rangle to collaborate on the migration.

> “Rangle’s development approach made it easy to extend our team and was a fantastic complement to our technical capability.”

Wes Hodges

Co-Founder, Synaptive

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Cutting-Edge Neurosurgical Devices

Synaptive is revolutionizing the way neurosurgeons perform cranial and spine procedures by developing connected experiences using cutting-edge technology originally designed for the International Space Station to meet the needs of the operating room. Synaptive has adapted technology first developed by the Canadian Space Agency to design and build a robotic arm now used in hospitals across North America to assist surgeons in delicate surgeries to preserve tissue, extend quality of life and, in some cases, save lives.

Their second-generation robotic digital microscope — Modus V™ — incorporates state-of-the-art optics and video processing technology to give surgeons an unprecedented view of the surgical field. Mounting the optics to an automated, robotic arm improves ergonomics for the whole surgical team, while projecting the optical feed via on a high-resolution monitor gives everyone in the OR the same view of the procedure, increasing teamwork and communication. Modus V's automation assists the surgeons by allowing them to keep their hands in the surgical field, reducing the need for manual manipulation and potentially shortening the length of surgery and the time a patient remains under anesthetic. When combined with BrightMatter™ Plan and Guide, Synaptive's surgical planning and navigation products, Modus V may allow surgeons to approach and extract some tumors that may otherwise be deemed inoperable.

High-Level Goals

Synaptive had an existing software user interface built for their first-generation robotic system. To support more complex features built into Modus V, the older tech stack needed a complete overhaul. Synaptive required a dynamic, web-based solution that was just as innovative and intuitive as the hardware itself, and which would complement their existing product line. Furthermore, Synaptive was looking for a solution that they could easily maintain internally and that would provide the flexibility to iterate down the line.

Collaborating From the Start

Synaptive and Rangle's main stakeholders held a two-day session to align everyone and set shared objectives. The medical device market has several unique challenges, including extremely strict regulatory requirements. The kickoff session provided the necessary context for Synaptive's goals, Rangle's deliverables, and how to ensure the final product was compliant with applicable regulations.

> "This was a true collaboration right from the outset. By establishing an iterative process, we delivered working software in one-week sprints and held demonstrations for key stakeholders. When features needed tweaking or weren't quite what Synaptive had imagined, it was easy to change and adapt. That's one benefit of how Rangle partners: we strive for a relationship based on outcomes, not plans."
>
> **Nick Van Weerdenburg**
> Founder & CEO, Rangle

Getting Immersed in the User Experience

To better understand Synaptive's needs, Rangle visited the company's testing lab to work with BrightMatter™ Drive, the company's first-generation robot, on an artificial brain simulator. The experience allowed Rangle's team to develop a stronger understanding of the challenges surgeons face in the operating room and an appreciation for what it's like to use hardware in a surgical setting. This experience informed the Rangle team's approach to user experience and UX design and ensured developers were building the necessary components to address all identified challenges.

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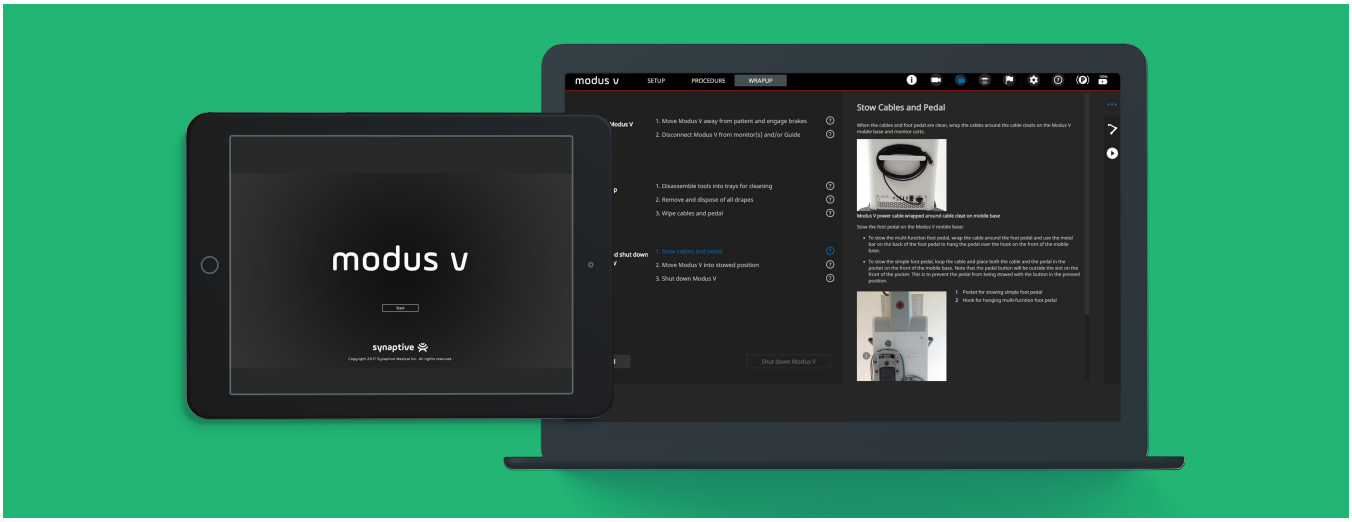

Paving the Way for Future Innovation Through a Component Architecture

"This engagement was all about setting Synaptive up for long-term success," says Kelly Dyer, Synaptive's director of software. "The project's first half built a library of components; the second half built the application consuming the library. Rangle's team worked side-by-side with our product designers throughout the project, with Rangle building the component library while our internal UX team led the user interface."

Through this approach, Synaptive and Rangle established several components and development practices that Synaptive can apply to future software applications and medical devices. Since Synaptive's brand positioning relies on its suite of interconnected products that give surgeons the right information about their patients at the right time, a component approach empowers the company to customize its future offerings. Rather than developing and maintaining numerous applications with best practices, a library approach centralizes information and data, which is crucial in regulated industries like medical devices and healthcare.

Delivering a Complex Application in Five Months

Despite the complexities inherent in developing cutting-edge medical software, the teams completed the UI updates in just 24 weeks. The library components were built in approximately 12 weeks, followed by an additional 12 weeks to build the application consuming the library. Rangle would not have been able to deliver so quickly without Synaptive's trust in Rangle's partnering process — based on Agile practices and continuous delivery — and Angular expertise.

Transforming Neurosurgery for Surgeons, Hospitals and Patients

While neurosurgery is a highly competitive and sophisticated industry, a handful of companies are deeply curious about exploring ways to bring expertise and technology developed to solve deep challenges in other disciplines to rethink how neurosurgeons operate. Synaptive Medical is among the companies leading this sea change in automation, robotics, digital platforms and optics as the industry shifts from traditional, analog methods to those developed with the needs of 21st century patients in mind.

By creating software as intuitive and user-friendly as their hardware, Synaptive seeks to make a real difference for neurosurgeons, their surgical teams, and the patients they treat.

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