Samuel Au â?? Founder & CEO, Cornerstone Robotics

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Professor Samuel Au, Founder and CEO of Cornerstone Robotics, recounts his journey from business to academic research to building one of Asiaâ??s most promising surgical robotics ventures. He explains how the SentireÂ® Surgical System is redefining precision, access, and training in operating rooms worldwide, combining Hong Kongâ??s innovation ecosystem with the manufacturing power of the Greater Bay Area (GBA). As Cornerstone expands across Europe and Asia, Auâ??s vision is clear: to make advanced robotics a standard of care rather than a privilege.

What motivated your transition from academia to founding Cornerstone Robotics, and what core challenge were you aiming to address?

Teaching and research had always been intellectually satisfying, but I began to feel that academic work alone could not achieve the impact I envisioned for healthcare. Robotics had reached an advanced stage in theory and laboratory development, yet real clinical adoption remained very limited. Globally, the penetration rate of robotic surgery is still under five percent, and in China, it barely exceeds one percent. The technology works, but access does not. The cost of acquisition, maintenance, and disposable components makes robotic systems unattainable for many hospitals.

This imbalance drove me to act. I wanted to transform academic innovation into something tangible, bridging the gap between discovery and delivery. Founding Cornerstone Robotics was about building accessible, efficient systems that could make robotic surgery part of standard clinical

practice rather than an exclusive capability of a few institutions. My guiding idea was simple: a technology has no meaning until it reaches patients and improves their care. That conviction shaped our mission to design systems that combine reliability, precision, and affordability, ensuring that surgical robotics can become a genuine tool for healthcare equality rather than a luxury for a select few.

Leaving academia was not abandoning science; it was extending it. I saw this as a natural continuation of research, translating ideas into products that have a measurable impact. This decision was less about stepping away from teaching and more about teaching through example, showing how knowledge can evolve into something that truly changes outcomes in the operating room.

How did you navigate the shift to entrepreneurship, and what guiding principles defined Cornerstoneâ??s early development?

The transition was not easy, but my prior experience in industry gave me a practical foundation. Before returning to Hong Kong, I spent seven years working on advanced robotics at MIT, followed by eight years at a leading surgical robotics company in the United States. These years taught me how to balance academic rigour with clinical safety, how to translate abstract engineering concepts into tools that surgeons can depend on.

When I moved back to Hong Kong, I saw an opportunity that combined strong research capacity with proximity to the Greater Bay Areaâ??s manufacturing ecosystem, one of the most sophisticated in the world. That environment made it possible to pair deep academic talent with rapid industrial execution. Yet founding a medical device company demanded an entirely new mindset. In academia, leadership revolves around mentoring and experimentation; in business, it requires coordination across disciplines, from engineering to operations, finance, and regulatory affairs.

The most difficult yet rewarding task was connecting the worlds of engineering and medicine. Surgeons express needs intuitively, while engineers need measurable parameters. To bridge this divide, we built two complementary teams from the outset: a clinical engineering team focused on converting surgical insight into quantifiable requirements, and a systems engineering team ensuring those requirements were translated into design and execution. This dual structure created a constant dialogue between clinicians and engineers, forming the backbone of what we call our â??clinically drivenâ?• development model.

The scale of complexity demanded precision. Our surgical robot consists of over 13,000 components, nearly ten times more than a standard industrial robotic arm. In the early stages, we had to decide which hundred components to design ourselves and which to source externally. Those decisions were guided by strategic priorities, available funding, and long-term scalability. Leadership in such an environment means keeping perspective, defining architecture before diving into detail, and maintaining clarity while encouraging innovation.

From the beginning, safety was the principle that governed everything we did. I asked every member of the team to apply what I call the â??motherâ??s testâ?•: would you trust this robot to operate on your own mother? That question defines our culture. It fosters accountability, humility, and care at every level, from design and assembly to software validation and clinical testing. After six years of development, we completed the system, obtained approval from Chinaâ??s NMPA, and are now preparing for CE certification in Europe. That journey has been about building more than technology. It has been about building trust, connecting disciplines that rarely speak the same language, and ensuring that innovation in robotics remains grounded in patient benefit and clinical purpose.

How does robotic surgery enhance both the quality and efficiency of surgical care, and what advantages does it offer over conventional approaches today?

Many people mistakenly believe robotic surgery operates without human involvement, when in fact the surgeon remains entirely in control. Todayâ??s systems follow a teleoperative model consisting of two key components: a console where the surgeon sits and controls the instruments, and a patient-side robot that precisely mirrors every movement. This setup allows the scaling of motion, elimination of tremor, and far greater stability and precision than manual techniques can achieve.

The superiority of robotic systems lies in their ability to combine minimally invasive access with enhanced dexterity and visualisation. The instruments are smaller and articulated, enabling complex movements through incisions only a few millimetres wide. Combined with high-definition, three-dimensional imaging and up to tenfold magnification, these systems give surgeons a clear view of fine vessels and deep tissue structures, allowing them to perform intricate manoeuvres safely and consistently. Radical prostatectomy is a clear example: two decades ago, few surgeons could perform it laparoscopically, but today it is routinely conducted with robotic assistance thanks to the improved visual and ergonomic control.

These benefits translate directly into clinical and operational impact. Procedures that once lasted four hours can now be completed in half the time, reducing anaesthesia exposure and improving recovery. Surgeons experience less fatigue since they operate seated rather than standing for long hours, maintaining concentration and precision across multiple cases. Hospitals gain in efficiency as operating rooms turn over more quickly, allowing higher patient throughput without compromising safety or outcomes.

Globally, around twenty million laparoscopic procedures are performed every year, and demand continues to rise. Robotics helps close the gap between surgical capacity and patient need by enhancing productivity and maintaining quality at scale. It represents not a replacement of human skill but its amplification, an evolution that enables surgeons to perform complex procedures with greater accuracy, comfort, and reliability, ultimately improving both patient care and healthcare system efficiency.

What distinguishes the SentireÂ® Surgical System in terms of clinical performance and usability across different specialities?

In comparative clinical studies conducted in China, the SentireÂ® Surgical System achieved outcomes equivalent to the worldâ??s most advanced robotic platforms. Across a range of procedures, parameters such as operating time, blood loss, and overall safety matched international standards, and in certain urological surgeries, SentireÂ® delivered even stronger results in both efficiency and precision. These findings were corroborated by independent investigators with extensive experience in robotic surgery, confirming the systemâ??s reliability and clinical maturity.

SentireÂ® also brings unique advantages that distinguish it from its peers. Its five-millimetre instruments allow surgeons to operate safely in narrow or complex anatomical regions, offering a clear edge in paediatric and ENT procedures where precision and minimal tissue disruption are critical. Its high-definition, three-dimensional imaging ensures excellent visibility and depth perception, essential for delicate surgical manoeuvres.

While objective metrics remain central to assessment, surgeon feedback is equally important in shaping usability and ergonomics. Many have highlighted the intuitive control and responsiveness of the system, which enhances both technical accuracy and comfort during long procedures. Taken together, these qualities position SentireÂ® as a clinically proven, finely engineered, and versatile platform that combines performance, precision, and practicality in the OR.

How is Cornerstone Robotics aligning affordability, scalability, and sustainable adoption as it moves into commercial deployment?

Affordability and scalability are fundamental to our mission of making robotic surgery truly accessible. We have designed our systems to significantly reduce the total cost of ownership â?? including acquisition, maintenance, and disposables â?? compared to current global benchmarks. Yet accessibility cannot be achieved through pricing alone; it also depends on how effectively surgeons can be trained and supported in mastering the technology. Even the most advanced system will remain underutilised if adoption barriers persist.

To address this, we developed a remote training framework that connects hospital-based consoles directly to our animal and cadaveric laboratories in Shenzhen and Hong Kong. This creates an immersive, realistic training experience with full visual and tactile feedback, without requiring surgeons to travel. They can schedule sessions on demand and progress at their own pace, making training as convenient as logging into an online course. The model has already proved highly effective in regions such as Inner Mongolia, where surgeons have reached proficiency after just a few remote sessions.

This approach goes beyond initial certification. While formal authorisation remains the domain of government-approved centres in China, our platform reinforces skills through continuous, accessible training. It allows surgeons, especially experienced practitioners with demanding schedules, to refine specific techniques whenever time permits. In doing so, it turns training from a periodic requirement into an ongoing, adaptive process. By combining affordability with scalable, on-demand training, we are creating more than a product; we are building an ecosystem. Our long-term vision is for robotic surgery to become as integral to hospitals as MRI or CT imaging; reliable, widely available, and supported by a network of well-trained professionals committed to advancing surgical excellence.

What strategies are you pursuing to strengthen Cornerstoneâ??s presence in China while preparing for global expansion?

Our current priority remains consolidating our presence in China, where we are generating early revenue through training programmes that also strengthen clinical adoption. Over the next few years, this foundation will evolve into a broader commercial model as we expand internationally. From the outset, our ambition has been global. Headquartered in Hong Kong, we benefit from its unique position at the intersection of East and West, combining world-class research infrastructure with proximity to the GBAâ??s manufacturing and supply-chain ecosystem.

We have already made significant progress in Europe. A clinical trial is underway in the United Kingdom at Portsmouth Hospitals University NHS Trust, led by Professor Jim Khan, one of the countryâ??s most experienced lower gastrointestinal robotic surgeons. In parallel, we are collaborating with Imperial College London on advanced remote-surgery research, conducting live cadaveric and animal studies between Hong Kong and London using our full system. These initiatives have not only validated the technical robustness of our platform across continents but also

laid the groundwork for clinical partnerships with leading European surgeons.

Our next milestone is obtaining CE marking, expected next year, which will allow us to introduce the Sentire$^{Â®}$ Surgical System to European markets. Alongside this regulatory progress, we are advancing a structured product pipeline with new systems planned every one to two years, each designed to enhance surgical precision, efficiency, and accessibility. Commercially, we are following a hybrid model, developing local sales teams in key markets while collaborating with established distributors elsewhere.

Beyond China and Europe, Southeast Asia has become a strategic focus. We have partnered with Singaporeâ??s National Healthcare Group and the Lee Kong Chian School of Medicine at Nanyang Technological University to conduct research and clinical trials on the cost-effectiveness of robotic-assisted surgery. This initiative builds on the success we achieved in Hong Kong and reflects growing regional demand for high-quality yet affordable robotic solutions. Our vision is to establish Cornerstone Robotics as a global enterprise rooted in Hong Kong, delivering advanced, reliable, and accessible surgical technologies that enhance both clinical practice and patient care worldwide.

How do you envision the companyâ??s long-term trajectory as it grows from its Hong Kong base into an international player?

We aspire to build a truly global enterprise anchored in Hong Kong. This city has been central to our journey from the beginning and remains the ideal base for a technology-driven organisation with international ambitions. We have benefited immensely from Hong Kongâ??s supportive ecosystem, including targeted government initiatives, access to leading research institutions, and a highly skilled pool of engineering and medical professionals. Its proximity to the Greater Bay Area adds another decisive advantage, offering one of the worldâ??s most integrated manufacturing and supply-chain environments, which has enabled us to accelerate both development and deployment.

From this foundation, we are extending our reach across Southeast Asia, the Middle East, and Europe. It is premature to discuss future outcomes such as an IPO or acquisition, but our direction is clear. We aim to continue advancing surgical robotics by enhancing accessibility, precision, and efficiency. When that mission is achieved, the opportunities will follow naturally.

How would you describe Hong Kongâ??s evolution as a hub for deep technology and innovation in the medtech field?

When I first arrived over a decade ago, Hong Kongâ??s innovation landscape was still developing, yet its fundamentals were compelling. The cityâ??s universities consistently produce exceptional talent in both engineering and medicine, and a growing number of graduates now move fluidly between Hong Kong and Shenzhen, creating a dynamic innovation corridor. The cityâ??s international orientation also makes it uniquely appealing to global professionals, including many returning from leading institutions such as Johns Hopkins and Imperial College London, who bring valuable experience and global perspective.

Having spent nearly two decades in the United States before returning, I saw Hong Kong as a natural bridge between East and West, a place where overseas Chinese and international experts can adapt smoothly while gaining proximity to Chinaâ??s vast innovation and manufacturing ecosystem. The Greater Bay Areaâ??s industrial infrastructure, with suppliers and production facilities within driving distance, allows for rapid prototyping, real-time collaboration, and agile

problem-solving, crucial capabilities for deep-tech development.

Government investment in innovation and technology has created real momentum in recent years. Building a mature ecosystem takes time, but Hong Kong is moving in the right direction. I believe that within the next five years, we will see its full potential unfold, positioning the city as a leading centre for medtech and advanced engineering in Asia.

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