Track: Self Designed Theme

Background:

Medical students must accumulate clinical experience in their training, encompassing skills like diagnosis and treatment. During their clinical training, some tasks are led by professional doctors, while others are performed by the students under the supervision of those professionals. However, in critical treatment scenarios, such as surgeries, inexperienced students may inadvertently cause avoidable harm due to their lack of proficiency. To prevent such risks, students are strictly barred from direct involvement in live patient operations until they have completed extensive practice on animals, cadavers, or simulation devices.

The challenge remains: how can we enhance the realism of these simulation-based training methods so that students are better prepared before engaging in real surgical procedures?

Proposed Solution:

Surgeries conducted by professional doctors are invaluable resources that can serve as learning templates for medical students. However, the techniques and insights students can glean from simply observing these procedures are quite limited.

We propose using augmented reality (AR) technology to replicate successful surgeries as comprehensively as possible. This replication would rely on advanced sensors attached to surgical instruments during the procedure to capture critical details, including incision depth, handling of individual patient complications, timing, and precise techniques. These captured processes would be transformed into simulation modules, enabling students to repeatedly practice and refine their skills using these realistic models.

Currently available simulation systems may provide basic training capabilities, but their material libraries are often limited, and they lack the ability to account for patient-specific variability. AR-based simulations can address these shortcomings.

Advantages Compared to Current Systems:

Real Surgery Data: Training is based on real procedures, offering a stronger sense of immersion and applicability.

Expandable Library: The case library can continually grow, including successful and failed surgeries, allowing for greater variability and complexity in training.

Improved Methodology: The ability to capture minute techniques and nuanced reactions during surgery represents a significant upgrade over traditional methods.

Challenges:

Precision in Data Capture and Conversion: Developing sensors and algorithms capable of accurately recording and translating surgical details into a usable training format.

Legal and Ethical Compliance: Ensuring patient privacy and data anonymization, while adhering to ethical and legal standards in the use of surgical data.

Replication of Failed Surgeries: Achieving a high-fidelity reproduction of unsuccessful procedures to create controlled environments for emergency response training.