

## ACS 2022 Surgeons and Engineers: A Dialogue on Surgical Simulation Meeting

### Research In-Progress

#### Laparoscopic Surgery Telementoring as a Teaching Tool for Surgeons in Low- and Middle-Income Countries

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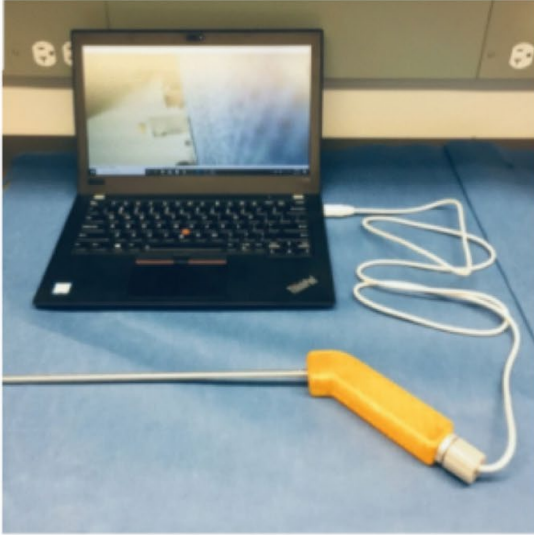
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**Introduction:** Laparoscopic surgical education in low- and middle-income countries (LMICs) has been hindered by the limited presence of surgical mentors and basic equipment challenges. Our multidisciplinary team of surgeons, engineers, and global health experts designed the KeySuite laparoscopic system with telementoring functionality, costing < \$200 suitable for surgical education and patient care in LMICs. KeySuite can be used for in-person and remote laparoscopic training of LMIC surgeons through a telementoring approach.

**Methods:** The KeySuite system includes a low-cost, durable single-unit laparoscope (KeyScope) and variable-sized mechanical retractors (KeyLoop) for gasless lift laparoscopy. The KeyScope has an integrated camera that can be powered by and displayed on a laptop computer. Our custom KeyScope software has video functionality for image/video capture, and the ability to allow for internet-based communication in real-time during surgery to allow for mentoring in LMICs.

**Preliminary Results:** KeyScope has comparable image quality to a commercially available laparoscope at shorter working distances. The custom software is designed to permit real-time, peri-operative telementoring for LMIC surgeons through interactive video sharing that can be used to observe procedures and provide feedback. The software also facilitates post-operative image and video saving and sharing for educational discussions.

**Next Steps:** Surgical education in LMICs is limited by the lack of infrastructure and paucity of available mentors. Hence, KeySuite-based telementoring is a viable alternative that connects surgical mentors in the United States to surgical trainees in LMICs. Through continued device testing, we aim to commence telementoring and education of surgeons and residents in Uganda. The portable low-cost KeySuite system is well-suited to educate future laparoscopic surgeons in low-resource surgical operating rooms.



**Figure: Components of KeySuite system - KeyScope connected to a laptop (left) and the KeyLoop retractor (right).**