

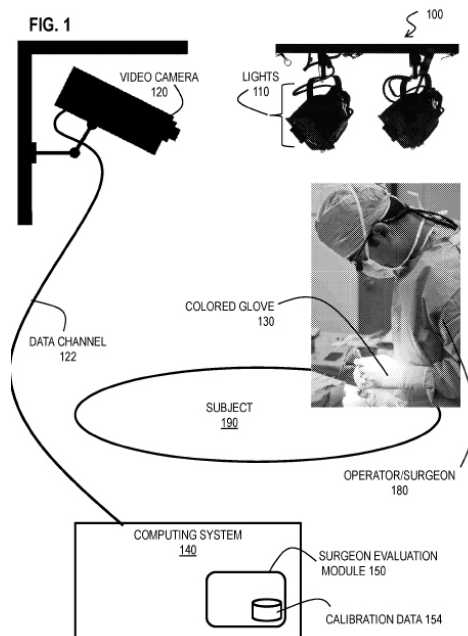
TECHNOLOGY

Automated evaluation of surgeon technical performance

OVERVIEW

The technical skills of a surgical resident are typically evaluated by experienced mentors during training. However, this process is time-consuming, labor-intensive and may involve evaluator biases. In an effort to standardize such technical evaluations, UMB researchers developed an automated, sensor-free method using select parameters such as hand-motion entropy, the time to complete procedures, ratio of idle to active time, and instrument changing.

The system monitors the hands of a surgical operator using a video camera and software to track various parameters. The operator would wear sensor-free gloves of opposing colors to allow automatic tracking of each individual hand during a surgical procedure. Proof of concept studies conducted on cadavers demonstrated the system's ability to distinguish between experts versus resident surgeons. Experts scored the lowest entropy values, with less idle time and shorter time to complete the procedure (i.e., dividing pectoralis minor), using fewer instruments. Improvement with training for resident surgeons was demonstrated, as well as the deterioration of proficiency 12-18 months later. This technology promises to enable the automated & objective assessment of technical skills.



APPLICATIONS

The most frequently used surgical performance evaluation is the objective structured assessment of technical skills (OSATS). While useful, this examination may be prolonged and costly due to additional staffing requirements and use of surgical facilities. In addition, the OSATS assessments are conducted by different evaluators, which may introduce variance in scoring techniques. An automated system to evaluate technical performance would undoubtedly be useful as an objective assessment tool for surgical trainees, including for determination of military surgeons' readiness prior to deployment.

ADVANTAGES

- Objective
- Automated
- Less labor intensive

STAGE OF DEVELOPMENT

Published proof-of-concept studies demonstrated system's effectiveness as tool for the objective assessment of technical competency.

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LICENSING POTENTIAL

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Additional Information

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PATENT STATUS

U.S. Patent 10,692,395

LICENSE STATUS

Available for licensing

CATEGORIES

- Software + Algorithm
- Education/Training/Multimedia

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ATTACHMENTS

-  [Download UMB Market Summary \(CM-2016-014; update Aug 2022\).pdf](#)

EXTERNAL RESOURCES

- [Head-camera video recordings of trauma core competency procedures can evaluate surgical resident's technical performance as well](#)
- [Development and validation of trauma surgical skills metrics: Preliminary assessment of performance after training.](#)
- [Performance of Vascular Exposure and Fasciotomy Among Surgical Residents Before and After Training Compared With Experts.](#)

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