SurgTrak: Motion and Video Capture for Tracking and Evaluating Robotic Surgery

This technology offers the option to bypass da Vinci, a programming interface for robotic assisted surgery, and provides skill assessment and learning tools for surgeons. The system consists of a synchronized video and surgical tool motion recording unified by custom software. 3D Guidance trakSTAR magnetic tracking system records the tool position and orientation while wrist position measured by the angular position and tool degrees of freedom.

What is the Problem?

Robotically assisted surgery was developed to overcome certain limitations of minimally invasive surgery and enhance the capabilities of surgeons performing open surgery. Extensive specialized surgical training is needed to operate robotic surgery systems. It can be difficult to determine whether a surgeon has gained sufficient proficiency with robotic surgery techniques. Video and instrument movement data captured during robotic surgery are critical in objectively assessing surgical skill performance and creating training algorithms to speed learning. While video information can readily be captured, only a few research centers have access to the instrument data housed within the da Vinci robot's Application Programming Interface (API). There is a need for another system that enables skill assessment and speeds learning for robotically assisted surgery.

What is the Solution?

The invention is a hardware and software solution that removes the need for da Vinci API access during dry, cadaver, and animal lab training. This method achieves comparable data in all degrees of freedom of the tool and wrist and camera to the da Vinci API at a far lower cost and without the intellectual property agreements needed to license API access from Intuitive Surgical. The addition of this system does not put the robot at risk of damage or cause malfunction. The system consists of synchronized video and surgical tool motion recording unified by custom software. Video is recorded from the DVI output of the da Vinci master console, tool position and orientation are captured with a 3D Guidance trakSTAR magnetic tracking system, and the grasper and wrist position is recorded by measuring the angular position of the four spindles driving the four tool degrees of freedom. These data streams are united using the custom software.

What Differentiates it from Solutions Available Today?

Technology ID

BDP 6686

Category

Research Tools

Selection of Available Technologies

Authors

Thomas Lendvay

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Currently, da Vinci API is the only other option, which is expensive, and requires an intellectual property agreement to license API access from Intuitive Surgical This technology will enable the user to bypass da Vinci and provide skill assessment and learning tools for surgeons performing robotically assisted surgery.

References

1. Lee Woodruff White, Timothy Kowalewski, Blake Hannaford, Thomas Lendvay(40544) , https://www.researchgate.net/publication/262916056_SurgTrak_Affordable_Motion_Tracking_and_Video_Capture_for_the_Da_Vinci_Surgical_Robot, Conference: Society of American Gastrointestinal and Endoscopic Surgeons, Proceedings of the 2011 Meeting of the SAGES