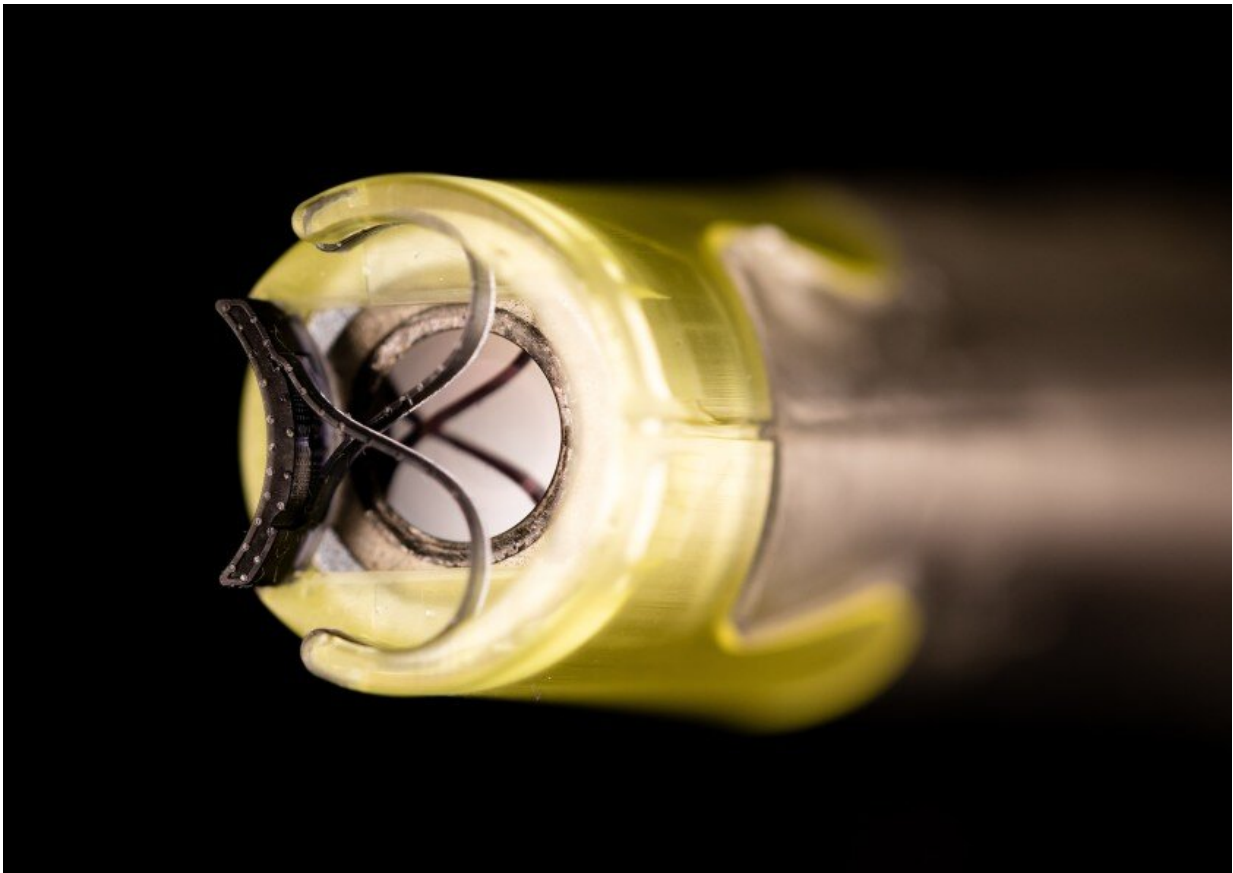


Student-created, origami-based windshield wiper solves laparoscopic surgery conundrum

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Engineering grad student Jacob Sheffield won the Student Innovator of the Year Award for this windshield-wiper device he created for laparoscopes. Credit: Jaren Wilkey/BYU Photo

One of the coolest modern medical innovations is the laparoscope, a

slender rod with a camera tip that allows doctors to see inside a body during surgery. Laparoscopes have made surgery easier for surgeons and patients, but the device does have a problematic drawback: it must be removed, cleaned, and reinserted multiple times during surgery.

BYU student Jacob Sheffield hopes to change that. The recent grad and now engineering [graduate student](#) has created a tiny origami-based device that serves as a miniature windshield wiper for laparoscope camera lenses. When installed, the device will eliminate the need to remove and reinsert laparoscopes every five or so minutes during [surgery](#), allowing surgeons to focus on the patient without disruptions.

"It's like driving the car in the rain," Sheffield said. "If you can focus on driving and not on reaching out the window to wipe off the windshield with your hand, you can keep your focus on what's important."

His technology, developed with mentoring from BYU professor Larry Howell in the Compliant Mechanisms Research Lab and help from ME undergrad Amanda Lytle, is called LaparoVision. The disposable mechanism snaps on to existing laparoscopes and features a one-piece curved wiper that conforms to the cylindrical walls of the medical tool. The wiper, which is so small it can rest on the end of a finger, is actuated by a trigger outside of the body.

The innovative concept was impressive enough to earn Sheffield the title of 2021 Student Innovator of the Year at BYU. The BYU award provides kick starter money to help with the journey of taking a device to market, as well as connections to potential investors, mentors and business partners. (The Student Innovator of the Year Competition is one of several hosted by BYU to foster entrepreneurship at BYU. Sheffield also won the BYU student Entrepreneur of the Year competition four years ago for unrelated work.)

"It's extremely helpful to get that funding through BYU awards programs and the feedback you get from judges is invaluable," Sheffield said. "My advice for future applicants is even if you don't win or get money out of it, use the deadline of the competitions to drive progress for your idea."

Sheffield's idea actually came about when he was meeting with surgeons across the country on other medical technologies being tested in the CMR lab. The issue of laparoscope removal and cleaning kept popping up in their conversations. The tool is used in 5 million surgeries annually in the U.S. alone, and the device is removed in roughly 90% of those procedures.

According to many surgeons and studies, Sheffield said, every five to eight minutes the device has to be pulled out and the lens wiped clean. With operating rooms costing \$62 a minute, those fairly regular removals prove costly and frustrating. But more importantly, withdrawing the scope during a critical time can also pose real risk to the patient.

"There is a high correlation in keeping the scope clean, maintaining surgical focus and ensuring timely and safe patient outcomes," Sheffield said. "But it's not just about improving efficiency during surgery; every time you lose vision it could be a critical part in the surgery where you make an incision and get blood on the lens and you can't see what's going on."

Sheffield is currently in discussions to license the technology and, thanks to the Founder's Launchpad program through the Rollins Center for Entrepreneurship and Technology, has now formed a startup (Bloom Surgical) to take the [device](#) to market. His current focus is on proving the technology is reliable and safe, and working to receive FDA clearance for the tool.

Provided by Brigham Young University

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