The New York Times

OCTOBER 23, 2014

NEW RESEARCH CENTER AIMS TO DEVELOP SECOND GENERATION OF SURGICAL ROBOTS

By JOHN MARKOFF

With funding from the National Science Foundation and two private donors, scientists at the University of California, Berkeley, will establish a research center intended to help develop medical robots that can perform low-level and repetitive surgical tasks, freeing doctors to concentrate on the most challenging and complex aspects of the operations they perform.

"Our goal is to help surgeons focus on the critical aspects of surgery, rather than having to perform each tedious and repetitive subtask," said Ken Goldberg, a professor of engineering at the university and a founder of the new Center for Automation and Learning for Medical Robotics.

The center's other founders are Pieter Abbeel, a professor of electrical engineering and computer science, and Sachin Patil, a postdoctoral researcher.

Some surgical tasks involving bone can be performed robots on their own, including certain aspects of hip and knee replacement. But fully automated robotic surgery on soft tissues is beyond current technology.

In May, in collaboration with surgeons at the University of California, Davis, and the Center for Robotic Surgery in Singapore, the researchers presented a paper detailing what they described as the first example of a robot automating surgical tasks involving soft tissue.

Currently the da Vinci surgical robot, developed by Intuitive Surgical of Sunnyvale, Calif., is operated by surgeons at a workstation who remotely control instruments inserted through small incisions during minimally invasive procedures. The system currently does not automate surgical tasks, but it does give doctors high levels of precision.

Still, the da Vinci systems are controversial. A series of research reports have found that some doctors are not adequately trained to use the equipment and that the machines are not superior to conventional surgery.

A surgeon who is collaborating with the Berkeley roboticists said that the shortcomings are related to lack of training and experience, rather than any fundamental shortcoming in the technology. "There are no bad robots, there are just bad surgeons," said Dr. W. Douglas Boyd, a professor of surgery at the University of California Davis Health System.

Dr. Boyd, who was an early user of the da Vinci robot and the first surgeon to perform minimally invasive bypass surgery on a beating human heart, said that the fault often lay with hospital administrators who acquire medical robots for competitive purposes and neglect proper training.

Dr. Boyd and the Berkeley researchers tried a different approach: They tried to teach a da Vinci robot to learn from a human surgeon—Dr. Boyd himself.

In a series of experiments, they "taught" the equipment to cut away small fragments of cancerous tissue on its own and to make a circular incision without human guidance, a standard training task.

The robot was able to perform the jobs with accuracy, but roughly no better than half as fast as a human surgeon.

"I think this is a small but good step toward a hard-to-reach goal of enabling us to show a robot how to do something," said Kenneth Salisbury, a Stanford University roboticist who also focuses on medical robots.

Currently 14 research groups have versions of the da Vinci robot and are sharing software and data in an effort to make them into surgical assistants.

In addition to a system donated by Intuitive and a $3 million National Science Foundation research grant, Berkeley's new medical robotics center has been given $200,000 in seed grants by private donors.