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ENGR 213 (Thursday Class)

**da Vinci Robotic Surgery, Computer Science in Biomed**

The da Vinci Surgical System is a robotic surgical assistant that was approved in July 2000 the is manufactured by Intuitive Surgical. As far as other companies' involvement is concerned, the FDA cleared the da Vinci Surgical System for pediatric and adult use in multiple types of surgeries, including urologic, laparoscopic, gynecologic, and non-cardiovascular thoracoscopic surgical procedures. Numerous other companies are involved, because many different hospitals have implemented the use of this robot to aid their doctors during surgery. In fact, the Sierra Vista Regional Medical Center right here in San Luis Obispo is registered as having one or more of these machines in use (<http://www.davincisurgery.com/>).

This robot assisted surgery technology is extremely state of the art and helpful for many reasons. By using the da Vinci robot, the surgeons are able to do minimally invasive surgery, sometimes only needing to make a one-centimeter keyhole incision to perform complex operations. There are also a number of other medical benefits to being able to use a very precise robot to perform the surgery. According to the Brown Biomed webpage (<http://biomed.brown.edu/Courses/BI108/BI108_2005_Groups/04/davinci.html>) the average blood loss while using the da Vinci robot is less than 100mm, while in a normal surgery it would be around 900mm. Also, the number of cases with complications is cut in one third, going from 15 with normal surgeries to only 5 with the da Vinci. However, there are some issues with using this robot for surgeries. According to the New York Times (<http://www.nytimes.com/2010/02/14/health/14robot.html>) the robot-assisted surgery costs a significant amount more, about $1500 to $2000 per patient. They also state that there has not been a significant amount of research done on whether or not the overall outcomes of robot assisted surgeries were better, worse, or the same as with normal surgeries.

Some of the critics of the robotic assisted surgeries say that studies don't clearly show that long-term results from robotic assisted surgery is superior to that of laparoscopic surgery, a common practice. Also, the robotic system is expensive, and takes a while to learn. Critics also say that the increased costs have not been shown to be justified. They also say that just taking results from medical literature is somewhat biased, because usually only very well experienced surgeons publish their results, so it is not accurate of surgeons with lesser experience.

This all applies to my major (computer science) because in order for the robot to function correctly, a computer scientist or software engineer needs to write the software to interface between the doctor's hardware controls and the actual robot. Without proper software, the robot could be prone to make errors from bugs in the program, and with very precise surgeries at stake, that could be a devastating turn of events. In addition, technology is slowly working its way towards having nearly fully automated robots performing surgeries. This is even more based on computer science than having the robotic assisted surgeries. Writing the software that tells the robot what to do, where to cut, and what part of the body is what will be a very challenging task, and computer science plays a huge role in making it all come together.

References:

<http://www.nytimes.com/2010/02/14/health/14robot.html>

<http://www.davincisurgery.com/>

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