

## Use of Robotics for Minimal Invasive Surgery

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Indeed, recent advancements in the field of science and technology saved precious life of many humans through minimal invasive robotic surgery which is most accurate and efficient than open and minimally invasive surgery. Earlier, computing was emphasized to carry out task in mathematical and physical sciences unfortunately, the impact and influence of medicine was minimal. Now things have been changed a lot and much focus and priority is given to medical field in order to obtain best accurate result through sophisticated tools and competent algorithms. i.e. more productive and information-efficient with the aid of current information technology. The progress of application tools related to medical field in enormous which helps many physicians to identify exact problem in correct time to rectify it. Moreover, the concepts of medicine are coupled with expert systems which enable the application user to diagnose particular disease and thereby providing suitable treatment either through medicine or by surgery. All most all clinical activities involving computations were greatly facilitated through the significance of mathematics and information technology.

Robotic surgery plays a vital role and has been a revolutionary step in improving most of the surgical procedures in real time. Moreover, employing robotics in medical procedures has become common place in recent years. With the extensive acceptance in robotic surgery, the drive to offer smaller, more efficient and less expensive instrument is driving researchers and physicians to reach unheard of heights. Due to successful results, robotic surgeries have been successfully implemented in medical field and has received world wide acceptance. Less operative time, less post operative stay, recovery time is lesser, lesser blood loss, lesser post operative pain, lesser scarring, lesser complications, lesser infection risk, and motion scaling etc are the advantages of minimal invasive surgery using robotics. For instance, during last decade Trans-rectal Ultrasound (TRUS) Prostate Robotic System, SRI's M7 Telesurgical Robot, The Raven-I, TRUS-Guided Brachy-Therapy, NeuroArm, Robotic Doppler Micro Probe, The MiroSurge Robotic Surgery System, Endo Stitch Automated Suturing Device, Amadeus Robotic Surgical System are some among major surgical robotic systems. Due to exponential growth in technology, forth coming days definitely provides promising results to bring even greater, more compact, versatile and precise surgical systems.

For instance, medical imaging has been undergoing a revolution in the recent past decade with the advent of faster, more accurate, and less invasive devices. Mathematical models are the basis of biomedical computing to extract data from images continues to be a fundamental technique for achieving sophisticated scientific progress in experimental, clinical, biomedical, and behavioral research. It is noticed that, mathematical problems in medical imaging, is undergoing rapid changes driven by better hardware and software. Much of the software is formulated with the help of novel techniques employing geometric partial differential equations in conjunction with standard image processing methods as well as computer graphics facilitating man / machine communications. As a part of this enterprise, researchers are focused on formulating biomedical engineering principles on rigorous mathematical basis for the development of software techniques to be integrated into complete therapy delivery systems. Therefore, these systems support the more effective delivery of many image-guided

procedures such as radiation therapy, biopsy, and minimally invasive surgery.

For instance, earlier advanced laparoscopic surgery has a technically more demanding learning curve as against open surgery. But recently, the da Vinci surgical robot has substantiated to be a breakthrough technology in real time and stood the test of time since its inception. In order to carry out minimally invasive surgery, the system has been designed for better use but, it can also be employed for open surgery as well. The robot has been employed until now mainly by urologists, general surgeons, cardiothoracic, gynaecologists and paediatric surgeons. In specific, the da Vinci robot is currently being employed in numerous diversified areas such as gynecology, cardio-thoracic, urology, general surgery, pediatric and ENT surgery etc. It provides a number of advantages to conventional laparoscopy such as 3D vision, motion scaling, intuitive movements, visual immersion and tremor filtration. The advent of robotics has increased the use of minimally invasive surgery among laparoscopically naïve surgeons and expanded the repertoire of experienced surgeons to include more advanced and complex reconstructions.

On the other hand, the advantages of minimally invasive surgery are now confirmed beyond doubt with regard to oncological safety, survival and recurrence rates for malignant diseases etc. The surgical robot can, hence, be intelligently employed in selecting proper indications to offer the patient with the benefits of minimally invasive colorectal surgery eliminating the pitfalls of conventional laparoscopy at the same time. In particular, it is best suited for mini-invasive surgeries, especially those which are seemingly impossible or very cumbersome to carry out with conventional laparoscopic techniques. Procedures like cholecystectomy, Nissens' fundoplication, adrenalectomy, rectopexy, cardiomyotomy, hernia repair and bariatric surgery were developed to perform with the help of standard instruments using recent robotic technologies.

Finally, it is pertinent to pin point out that both eminent physician and specialized sophisticated application tools are very much important in medical field to achieve very good successive results. Still challenges exist in all the fields but it is possible overcome through initiating, providing best infrastructure and executing up to date new notions in research and development. Furthermore, to conclude, robotic assisted surgery is an already well-established technology which can be employed by any eminent physician across the globe to perform safer and success operation.

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