

Bioinformatics 2018: Tele-robotic systems in medicine: Challenges and potential- Sotiris Avgousti- Cyprus University of Technology, Cyprus

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Introduction: Telerobotics is viewed as a fundamental piece of the more extensive field of telemedicine. A definitive objective of telemedicine is to give particular medicinal services benefits over significant distances, viably dispensing with the need of physical nearness of both the doctor and patient in a similar area. The chance of interview finding, treatment, and clinical mediation from a separation, may incredibly affect the personal satisfaction of patients situated in segregated territories where access to particular clinical administrations is restricted. Telemedicine can for all intents and purposes carry pros to zones where clinical offices and specialists are not accessible. Essentially, an expert can look at or work on a patient at an alternate geographic area without both of them voyaging. Expenses and bother are maintained a strategic distance from while improved access to data gets conceivable. In addition, the doctor can offer types of assistance while at a progressively happy with workplace. This strategy likewise dispenses with the chance of transmitting irresistible infections among patients and medicinal services experts. Aside from restoratively secluded regions, telemedicine is additionally expected to assume a key job in evacuating obstructions to medicinal services arrangement in creating nations, in zones of catastrophic events, and combat areas where predictable social insurance is inaccessible or there is no an ideal opportunity to move a patient to a clinic. In telerobotic frameworks, the remote controller is controlled from the administrator's site by sending position orders while accepting visual and other tangible criticism data. The nearby and remote frameworks are ordinarily alluded to as "ace" and "slave" frameworks, individually, and the general framework is alluded to as an "ace slave framework". The remote controller is customized to follow the controls of the administrator. Figure 2 presents a regular structure of a telerobotic framework with extra data explicit to the MELODY framework for

mechanically helped tele-echography applications (introduced in "Significant distance worldview: the MELODY framework" area). Numerous clinical mechanical frameworks utilize teleoperation as the significant method of activity; however regularly the ace, additionally called the master site, and the slave remote controller, likewise called the patient site, are in actuality situated in a similar room [9, 10]. These frameworks will be alluded to as short-separation telerobotic frameworks; even for this situation, telerobotic frameworks are adequately part into two locales. First is the neighborhood site, which incorporates the human administrator and all segments expected to remotely work the framework (screens, consoles, joysticks, and other information/yield gadgets). At that point is the inaccessible site, which incorporates the mechanical control framework and the patient encompassed by the suitable help faculty. This methodology, when applied to careful intercessions, is alluded to as telesurgery.

Statement of the Problem: Medical robotic systems have been employed in various fields including general surgery, neurosurgery, and orthopedics. Tele-operated robots perform diagnostic and interventional tasks utilizing wired and/or wireless communication networks. A classification into short and long-distance tele-robotic systems has been adopted, depending on the distance from which they are operated. A representative paradigm of the short-distance case is the da Vinci surgical system. An example of the long-distance tele-robotics concept is the MELODY system for tele-echography. Challenges concern the key enabling technologies involved namely robotic manipulation, telecommunications and vision systems.

Methodology & Theoretical Orientation: A systematic review of existing systems identified the challenges as well as the potential of tele-robotics. Moreover, a tele-echography platform with a portable robot (MELODY system) for remote cardiac ultrasonography was set up.

Different video coding standards for cardiac ultrasound applications were compared in a real-time setup using 4G wireless networks and machine-to-machine communications.

Findings: Tele-robotics has already been employed for various applications in different medical disciplines. Even though some general-purpose tele-robotic systems have been developed the majority are application/anatomy specific. Moreover, manipulation systems used for tele-robotic applications are diverse in terms of kinematic structure, degrees-of-freedom and actuation methods. Despite remarkable achievements demonstrated by many tele-robotic systems only a few of them have been commercialized and adopted in clinical practice. Also, the majority of existing systems have been short-distance ones and the potential of operating them remotely remains largely unexploited. Based on the depicted experimental setup, mobile tele-echography using commercially available Long-Term Evolution (LTE) wireless networks and state-of-the-art video compression standards provide solid foundations for adopting remote long-distance examinations in standard clinical practice.

Conclusion & Significance: Further efforts are required to address both clinical and technological challenges before the full potential of tele-robotics can be exploited. Benefits of using long-distance tele-robotics will particularly apply to rural areas, emergency incidents, military operations and in developing countries, where specialized medical personnel is not available.