A Cost-Effective Simulator for Minimal Invasive Surgery

Pakistan

Implementing Agency/organization	National University of Sciences and Technology (NUST)
Implementation Period	April 2011 - date
Location (City and Country)	Islamabad, Pakistan
Total Cost to implement the Project	US $ 412,000
Contact Person	Osman Hasan osman.hasan@seecs.edu.pk +92-3315721004

The Challenge

Minimally Invasive Surgery (MIS) allows performing surgeries using specialized instruments, which are inserted into the human body through small incisions rather than a relatively larger incision. MIS leads to quick patient recovery and less chances of postoperative infections and thus can play a vital role in reducing healthcare costs. However, these added benefits come at the cost of a more challenging and difficult task for surgeons since they have to migrate to this new surgical procedure while leaving behind their traditional open surgical skills. These psychomotor skills, required for MIS, cannot be acquired without hands on practice. However, practicing this new surgical technique on human patients directly is extremely unethical and can have dire consequences. Computer simulators greatly facilitate MIS training but their license costs are very high, which has in turn resulted in a very limited usage of MIS in Pakistan and other developing countries.

The Innovation

We have developed a cost-effective simulator, SmartSIM, by leveraging upon opensource software and the relatively cheap human resource cost in Pakistan. The cost of SmartSIM is 10% of the cost of other commercially available simulators and thus this smart invention can provide access to MIS all over Pakistan and other developing countries to facilitate the wellbeing of people. SmartSIM is composed of three main modules: Mechanical Interface (MI), Controller Circuit (CC) and Software Application (SA). The MI is a joystick like device that resembles MIS instruments and is required to interact with the simulator. The CC module is responsible for the communication between the MI and the computer. The SA module consists of the GUI with exercises, like camera navigation, hand-eye coordination, lifting, grasping and dissection, which are essential components of MIS, and advanced

procedures for general surgery and gynecology, which can be learnt and practiced without supervision.

The Impact

- The proposed low-cost solution will cater the issues of affordability by public sector organizations and small-scale hospitals and surgical training colleges and institutes.
- Surgeons can learn to perform innovative surgical techniques in a safe environment.
- The autonomous nature of the system allows junior surgeons to learn the skills without the need of expert surgeons.
- Patients being operated by MIS or laparoscopy are befitted with reduced trauma, lesser blood loss and faster recovery.
- Lesser hospitalization stay will save the recurring budget of hospitals.