Title: Neuro-Ergonomy and Computational Model of Minimally Invasive Surgery Training.

advisors:

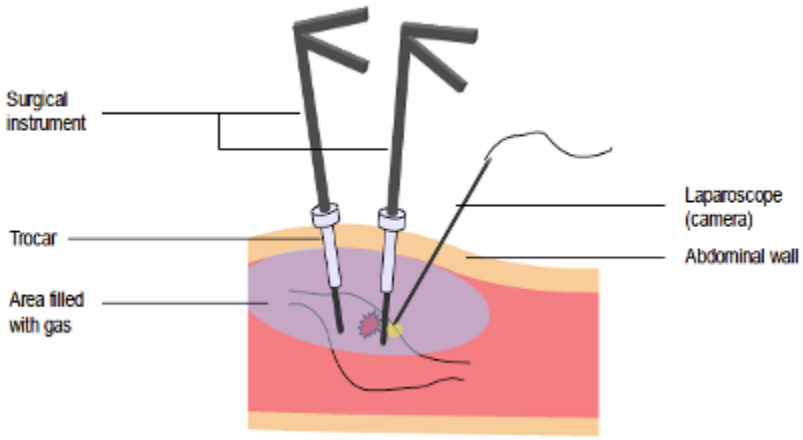
Marc Garbey
Scientific Director of the Center of Computational Surgery
And the NSF Industry Academic Center
The Houston Methodist Research Institute and Department of Surgery
http://www.houstonmethodist.org/health-professionals/departments-centers/center-for-computational-surgery/cybhor/

and

Pr. Ahmet Omurtag
Department of Biomedical engineering
University of Houston
http://omurtaglab.bme.uh.edu/

Keywords: neuro-ergonomy, laparoscopy, signal processing, feature recognition, data mining, machine learning.

Topic of the internship:



Implementation of laparoscopic surgery has had a significant impact on surgical outcomes, mainly by increasing the speed of postoperative recovery and subsequent discharge from the hospital. As a minimally invasive procedure, however, it does require a great deal of surgical skill. The surgeons must, therefore, undergo skills and procedure-specific training to obtain the level of proficiency that allows them to safely operate. To achieve this "*the Fundamentals of Laparoscopic Surgery*" (FLS) have been developed. These encompass several deconstructed surgical tasks which need to be completed within the allotted time span and without any mistakes for the trainee to be considered proficient.

Time and quality of the completed product are therefore measures of proficiency. Significant research efforts have been made to identify other possible measures of proficiency not only to be able to assess it but mainly to be able to measure the ongoing progress of the trainee throughout their practice sessions.

We have developed a standalone mobile work station that we can bring to the user in order to test his/her technical skills and response to external stress in the context of laparoscopy. We synchronously monitor:

- Gestures, via our smart trocar technology
- Metabolic indicators of the user such as heart and breathing rate, via high quality smart cloth.
- Cognitive indicator based on eye tracking, microEEG and near infrared.

The goal of this internship will be to develop a multimodal analysis and an efficient signal analysis chain to link minimally invasive monitoring with performance indicators and competence level.

The work will be done with an interdisciplinary team of surgeons, computer scientist and applied mathematician. The internship will be responsible to continue the data acquisition in our IRB approved protocol as well as to complement our current construction using state of the arts methods and best software practices.

For further information, please contact Pr Marc Garbey, garbeymarc@gmail.com

Support: the internship will be eligible for a support of $1400 per month for the duration of the six month internship,