Interfacing APL-Snake End Effector to the LARS

Computer Integrated Surgery II – Spring 2013
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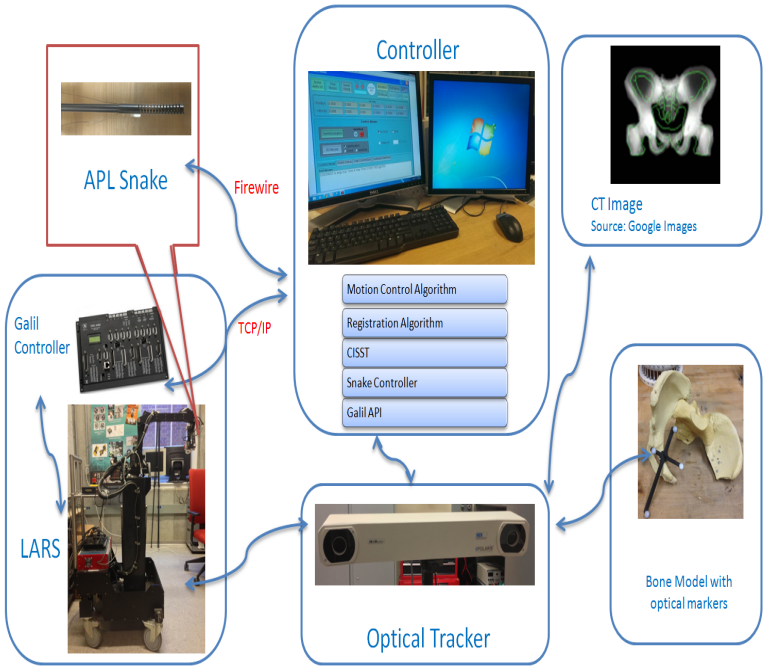
Introduction

- One of the goals of our project is to interface the APL Snake end effector to the LARS.
- The primary aim is to have a controlled motion of the end effector along a specific axis and reach the precise location of coordinates of action point.

Problem Statement

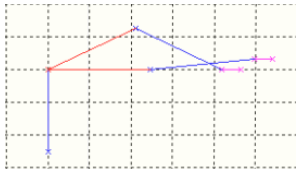
- The JHU-APL Snake can be used for performing medical invasive surgeries.
- Since initial stages, it is being constantly upgraded to be a self sustained surgical tool.
- The ***Laparoscopic - Assisted Robot System*** (LARS) is an ideal platform for achieving the same due to its mobility, dexterity, and versatility of use with various end-effectors.
- Treating the LARS and APL Snake as one system, registration should be done between the CT image and actual points of action on the patient body.
- Using vectorial entry method of the LARS, the Snake should be made to precisely insert along a specific axis.



Process Block Diagram

Results

- End Point control of the LARS with Snake.
- 3D registration of the action point coordinates from the CT coordinates.
- Simulation of forward kinematics of the LARS.
- Verification of existing kinematics of the LARS.
- Alignment with the insertion axis.



MATLAB Simulation Of Forward Kinematics

Future Work

A reasonable continuation of the work shall be carried over by us in summer. Updating of existing work in similar lines and meeting our own maximum deliverables set for this course shall be achieved including demonstration on a cadaver.

Lessons Learned

Calculating and verifying Kinematics using RCM mechanism proved to be a useful, intuitive developing exercise. Considerable amount of time was spent on repairing a LARS with mechanical as well as electrical problems.

References

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