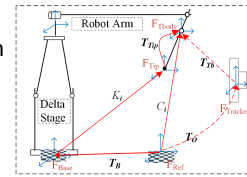


## Kinematic Calibration and Improved Accuracy for Galen Robot

- **Goal:** Perform kinematic calibration of Galen surgical robot and integrate results into software to improve its accuracy
  - **Background:**
    - Robot is very precise, but manufacturing tolerances reduce accuracy.
    - Prior work [1] successfully improved accuracy of REMS robot (predecessor to Galen)
  - **Significance:** Enable integration with surgical navigation & accurate virtual fixtures
- **What students will do:**
  - Place optical markers on robot end effector and base of robot
  - Move robot to multiple poses and record marker positions using optical tracking system
  - Apply methods from CIS I and previous paper on REMS calibration
  - (time permitting) incorporate results into Galen Research Software; Demonstrate improvement on virtual fixture



1 600.456/656 CIS2 Spring 2020  
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1

## Kinematic Calibration and Improved Accuracy for Galen Robot

- **Deliverables:**
  - **Minimum:** XYZ calibration; Accuracy assessment
  - **Expected:** XYZ+wrist calibration; Accuracy assessment
  - **Maximum:**
    - Integration of calibration results into research software.
    - Possible demonstration on virtual fixtures or similar task
- **Size group:** 1-2
- **Skills:** (short description or key phrases)
- **Mentors:** Prof. Taylor; Max Li; Consultation: Florin Neacsu (Galen Robotics); David Levi (Galen Robotics)

[1] L. Feng, P. Wilkening, Y. Sevimli, M. Balicki, K. C. Olds, and Russell H. Taylor, "Accuracy Assessment and Kinematic Calibration of the Robotic Endoscopic Microsurgical System", in IEEE Engineering in Medicine and Biology Conference (EMBC), Orlando, Aug. 16-20, 2016. pp. 5091-5094.

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2