



Robert Howe

Abbott & James Lawrence
Professor of Engineering
Area Dean - Bioengineering
Harvard University

Host: Hicham Fenniri
h.fenniri@neu.edu

**“Heart Surgery
Planning: From
Imaging to
Mechanics”**

Friday, November 7
108 Snell Engineering
11:45 a.m. – 1:00 p.m.

*Refreshments will be
served*

ABSTRACT Surgical treatment of heart valve disease remains a subjective and qualitative process, despite the detailed quantitative information provided by medical images. For this reason, mitral valve repair has not been as widely applied as valve replacement, despite clear survival advantages for patients with repaired valves. We are developing mitral valve surgical planning systems to improve surgical outcomes by allowing surgeons to determine which repair approach will optimize valve function. In these systems, preoperative ultrasound images of patients' valves are processed to create patient-specific models of valve geometry and mechanics. Surgeons use specialized computer interfaces with haptic feedback to operate on these models to create a prospective surgical repair of the valve. Mechanical finite element calculations then predict the physiological function that would result from this reconstruction. By comparing the predicted results of different reconstructions, surgeons can select the best approach for each patient, and enter the operating room with a clear plan for producing an effective repair.

BIOGRAPHY Robert D. Howe is Abbott and James Lawrence Professor of Engineering and Area Dean for Bioengineering in the Harvard School of Engineering and Applied Sciences. Dr. Howe founded the Harvard BioRobotics Laboratory in 1990, which investigates the roles of sensing and mechanical design in motor control, in both humans and robots. His research interests focus on manipulation, the sense of touch, and human-machine interfaces. Biomedical applications of this work include the development of robotic and image-guided surgical procedures. Dr. Howe earned a bachelors degree in physics from Reed College, then worked as a design engineer in the electronics industry in Silicon Valley. He received a doctoral degree in mechanical engineering from Stanford University in 1990, and then joined the faculty at Harvard.