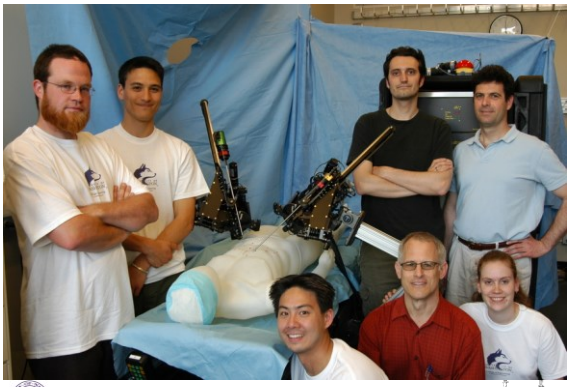
Raven

RAVEN Goals (2002)

- Portable and robust surgical telerobot research platform
- Minimize mechanism size
- Maximize [redacted] (workspace/total volume)
- Enable field use
- Support open software development
- Support Interoperable Teleoperation



Raven Adventures

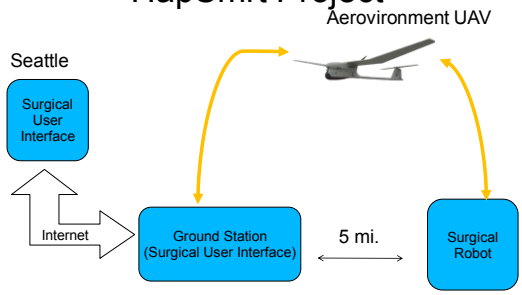
HAP/sMRT

- Tim Broderick MD, U. of Cinncinnatti/TATRC
- University of Washington Biorobotics Lab
- AeroVironment Inc.
- HaiVision Inc.
- June 5-9, 2006

Goals

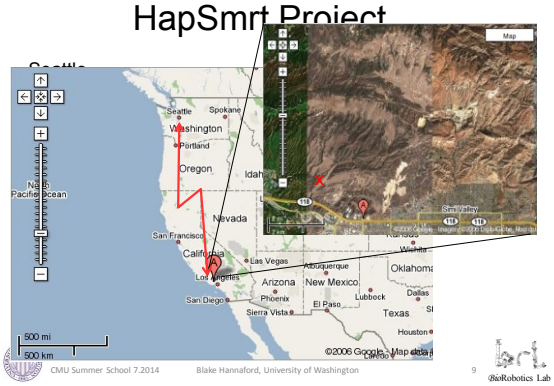
- Demonstrate Field operation of a surgical robot
  - -Generator Power
  - -Radio Internet Links
  - -Desert Conditions
- Demonstrate Internet + UAV local link for telesurgery.

HapSmrt Project



Simi Valley, CA

HapSmrt Project



Site and UAV photos

Console

Project Neemo-12
May 2007

People

- Univ of Cincinnati: Tim Broderick, MD / Chuck Doarn PI
- Mitch Lum, Diana Friedman
- Tom Lendvay MD
- SRI – Pablo Garcia, Tom Low

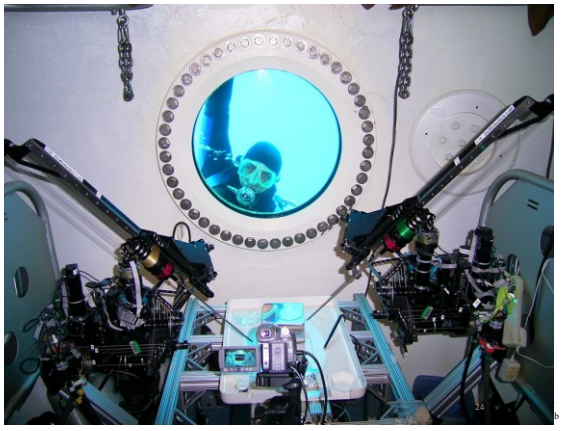
Goals

- Test RAVEN in extreme environment.
- Measure performance of telesurgery over Internet.
- Further harden RAVEN for field conditions and experimental use.

Aquarius Underwater Habitat

- 20m under water
- 5 mi off Key Largo
- 2 atm pressure
- NASA/NOAA

Down goes the RAVEN

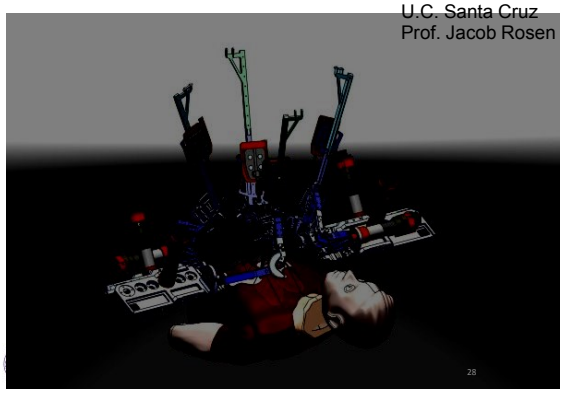


Raven II

Raven II Project (2010-12)

- UW and U.C. Santa Cruz (Rosen)
- National Science Foundation
- Harvard,Hopkins, Nebraska, UCLA, Berkeley

U.C. Santa Cruz
Prof. Jacob Rosen



Goals

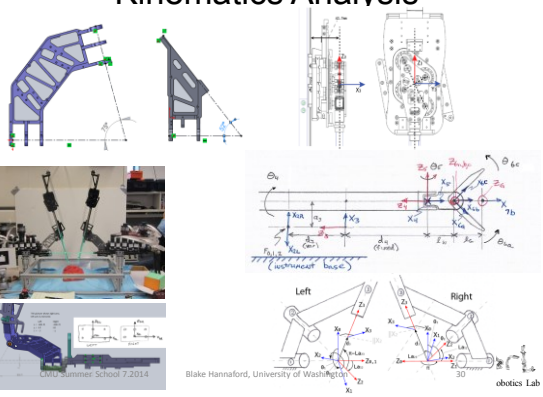
Set up a *network* of open research telerobots for medical applications

Build seven “Raven-II” systems

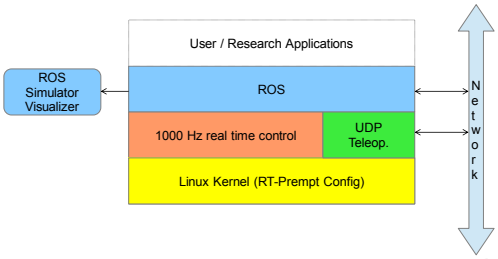
Improve the electronics

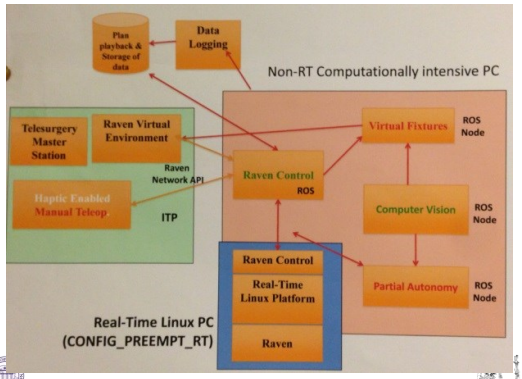
Adapt software for easy collaborative development.

Kinematics Analysis

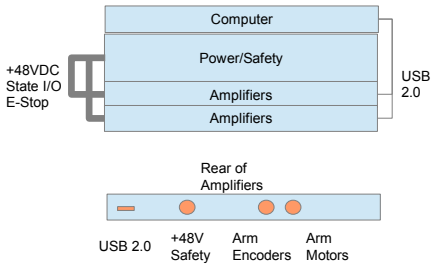


Raven II Software APIs



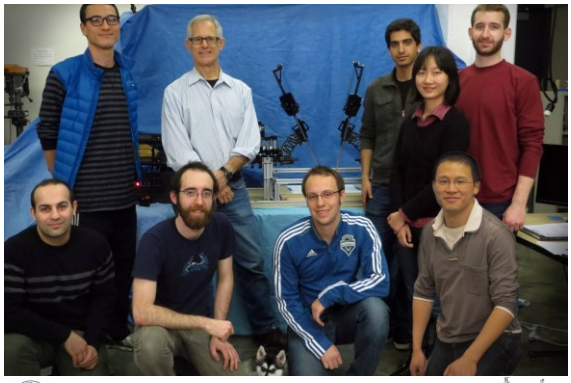


Electronics Stack



Power/Safety

Completed Electronics



	University of Washington	**Prof. Blake Hannaford**	
	U.C. Santa Cruz	**Prof. Jacob Rosen**	
2012	Harvard	Prof. Rob Howe	Beating Heart Surgery
	Hopkins	Prof. Greg Hager	Human-Machine Cooperation
	Nebraska	Prof. Shane Farritor	Deployable surgical robots
	UCLA	Prof. Warren Grundfest	Tactile feedback to surgeon
	U.C. Berkeley	Prof. Ken Goldberg & Pieter Abbeel	Machine Learning of surgical autonomy
2013	Stanford University	Prof. Allison Okamura	NRI Large Project
	Montpellier University (Fr)	Prof. Philipe Poignet	
	U. of Central Florida	Prof. Xu	
	U. of Western Ontario (Canada)	Prof. Rajni Patel	(four-arm system)

Raven Sites

Raven Sites

Raven Sites