# iPad Mobile Surgical Console

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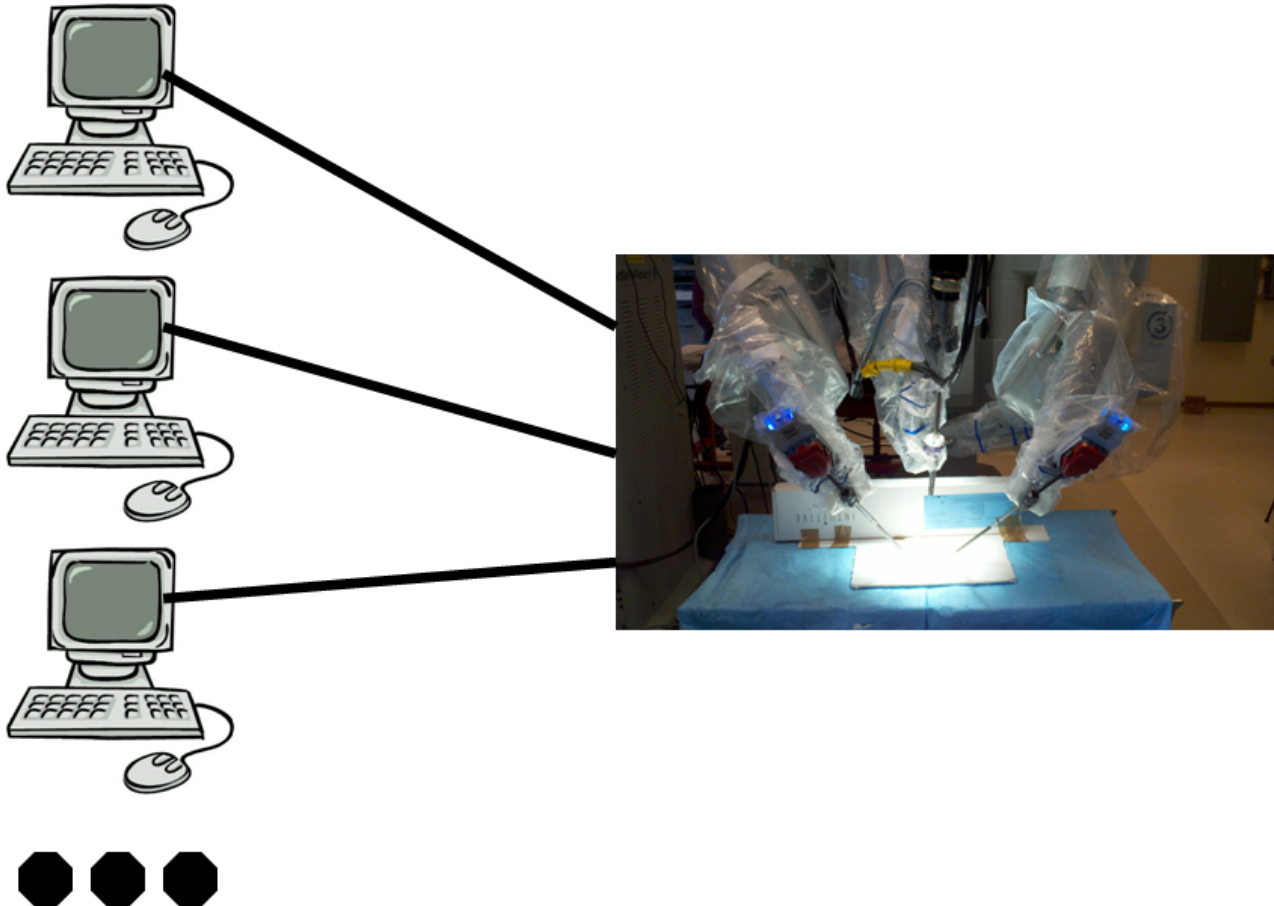
Dr. Russell Taylor

# Background & Motivation

- Multiple computers in surgical OR for configuration
  - Video, lighting, overlays, etc.
- Cluttered space
- Inconvenient operation
  - Mouse & keyboard input
  - Decentralized
- Sterilization concerns

# Current Scheme

# Project Goals

- Application for centralized control
- GUI for easy systems configuration
- Touchscreen ability - easy to use, easy to clean
- Ultimately, iPad application to control multiple consoles from a mobile unit
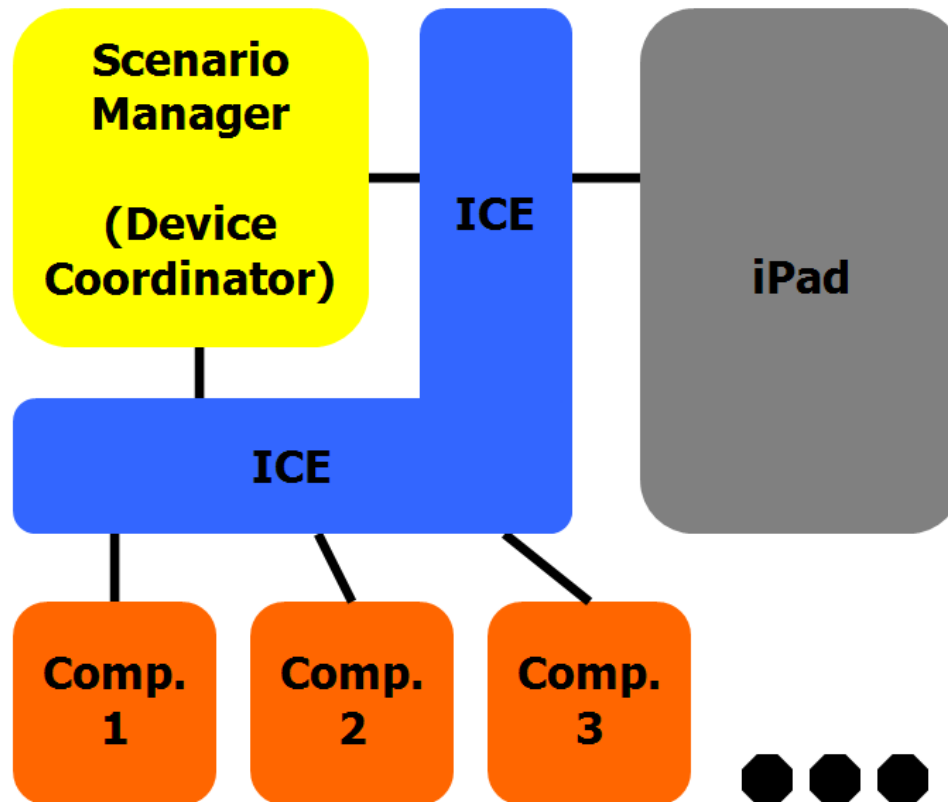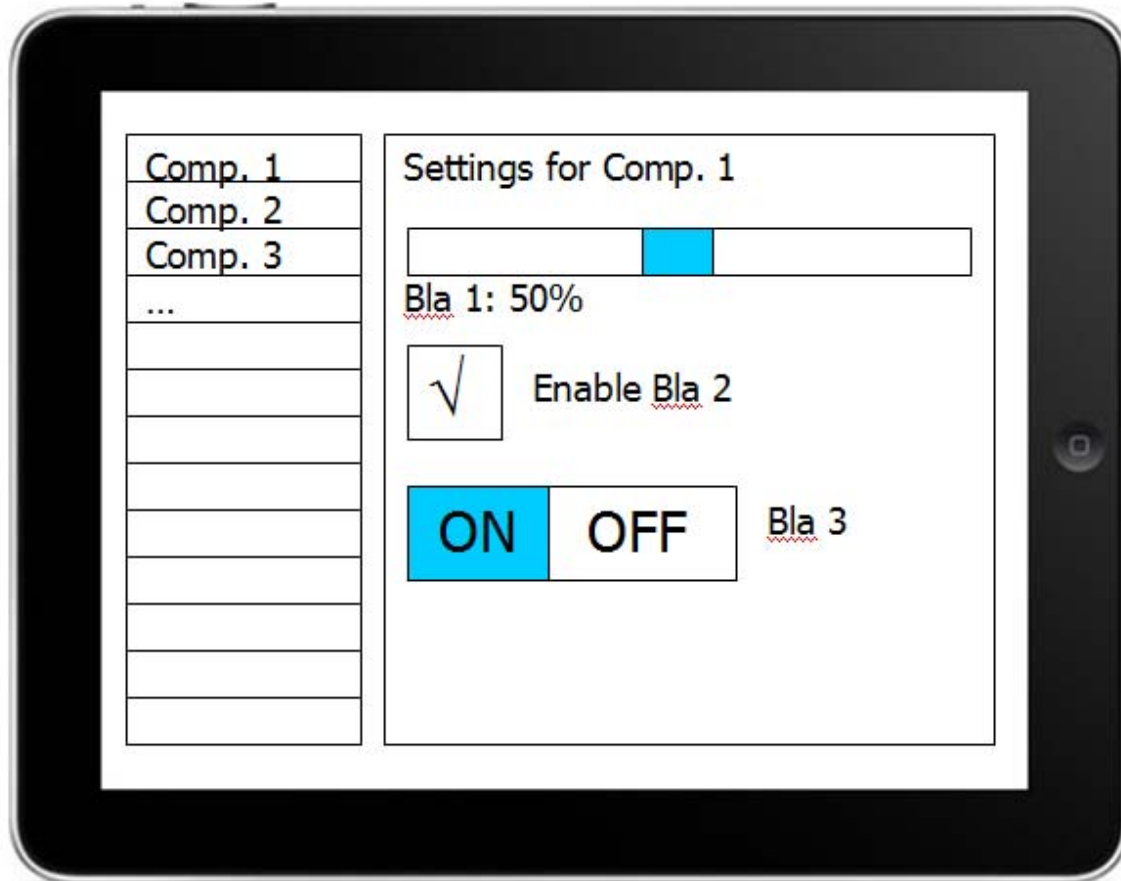
# Technical Approach

- Cisst library – backbone of entire project

- CMake – compile software onto iPad

- iOS – development platform

- Internet Communications Environment (ICE) – manages connections between computers

- Scenario Manager – controls interactions between components

# Future Schema

# iPad Surgical Console Concept

# Integration Challenges

Many technologies

- – Compiling the cisst libraries
- – CMake: cross platform make
- – ICE: Internet Communications Engine

…need to compile on iOS 4

# Deliverables

Minimum (develop iPad as dummy console)

   - Install VNC

   - Develop GUI for Scenario Manager

Expected:

   - Compile and build cisst library on iPad using CMake

   - Build GUI iPad application

Maximum:

   - Clinical runs - Mock OR

   - Revisions based on user experience

# Milestone 1 – Core Components

- Install CMake

- Compile CISST

- Install ICE

- Documentation for interface between iOS, CISST, and ICE

# Milestone 2 – GUI Component

- Become familiar with iOS GUI development

- Build a GUI for the various components

- Code interfaces between GUI and components

- Documentation for GUI design and interfaces

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# Milestone 3 – Testing

- Test device with EyeRobot
- Revise GUI based on feedback

# Timeline

| Task | February |  | March |  |  |  | April |  |  |  | May |  |
|------|:---:|:---:|:---:|:---:|:---:|:---:|:---:|:---:|:---:|:---:|:---:|:---:|
|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Install Cmake | 🟨 | 🟨 | 🟨 |  |  |  |  |  |  |  |  |  |
| Compile CISST |  | 🟨 | 🟨 | 🟨 |  |  |  |  |  |  |  |  |
| Install ICE |  |  | 🟨 | 🟨 |  |  |  |  |  |  |  |  |
| iOS Interface Documentation |  |  | 🟨 | 🟨 |  |  |  |  |  |  |  |  |
| Familiarize with iOS Development |  |  | 🟩 | 🟩 |  |  |  |  |  |  |  |  |
| Build GUI for Components |  |  |  |  | Spring Break |  | 🟩 | 🟩 | 🟩 |  |  |  |
| GUI/Components Interface |  |  |  |  |  |  |  | 🟩 | 🟩 | 🟩 |  |  |
| GUI Documentation |  |  |  |  |  | 🟩 | 🟩 | 🟩 | 🟩 | 🟩 | 🟩 | 🟩 |
| GUI Revisions |  |  |  |  |  |  |  |  |  | 🟥 | 🟥 | 🟥 |
| Mock OR Testing |  |  |  |  |  |  |  |  |  |  | 🟥 | 🟥 |
| Project Documentation | 🟦 | 🟦 | 🟦 | 🟦 |  | 🟦 | 🟦 | 🟦 | 🟦 | 🟦 | 🟦 | 🟦 |

Milestone 1 – Yellow

Milestone 2 – Green

Milestone 3 – Red

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# Management Plan

- Weekly meetings with Balazs

- Task leaders:

   Backend - Jon

   GUI/Frontend - Hanlin

- Mutual collaboration

# Dependencies

- Mostly logistical
- What's already resolved
  - Development platforms running Mac OS X (~$100)
  - iPads (at $499 each) x 2
  - Apple Developer Costs ($99)
- What needs to be resolved
  - Need 1 more Apple Developer Kit ($99)
    - Hopefully resolve by 2/25
    - Not urgent – have one already
- Total ~$1300

# References

1.  Apple, iOS Reference Library, <http://developer.apple.com/library/ios/navigation/>.

2.  A. Deguet, R. Kumar, R. Taylor, and P. Kazanzides, "The cisst libraries for computer assisted intervention systems," in MICCAI Workshop on Systems and Arch. for Computer Assisted Interventions, Midas Journal, Sep 2008.

3.  M. Henning, M. Spruiell, Distributed Programming with Ice, <http://www.zeroc.com/doc/Ice-3.4.1-IceTouch/manual/>.

4.  M.Y. Jung, G. Sevinc, A. Deguet, R. Kumar, R. Taylor, "Sugical Assistant Worstation (SAW) Communication Interfaces for Teleoperation.

5.  P. Kazanzides, A. Deguet, A. Kapoor, O. Sadowsky, A. LaMora, R. Taylor, "Development of open source software for computer-assisted intervention systems," In MICCAI Workshop on Open-Source Software, Oct 2005.