# RIT Global Collaboration Grid



Internet2 Member Meeting Raleigh, North Carolina Fall 2011

# RIT Global Collaboration Grid

A global infrastructure for
interactive multipoint collaboration

A connected virtual community
showcasing the innovation & creativity of
RIT, its partners and sponsors

A student research platform for innovative
technologies and advanced collaborative
applications

# Current Node Locations

**Public CyberPortals**

National Technical Institute for the Deaf  Video Wall

Wallace Center Library

Saunders College of Business Atrium

Alumni Relations Video Wall

American University of Kosovo

**Transmit-only nodes**

Global Village

Semiconductor Micro Fabrication Laboratory Clean Room

Computer Engineering VLSI Laboratory

**Departmental, Lab nodes**

Center for Student Innovation

Research Computing Laboratory

Golisano Computing College/NTID Laboratory

NTID Research Self-Instruction Laboratory

Golisano PhD Program

Biomedical Photography Laboratory

American College of Management and Tourism Overview Dubrovnik, Croatia

**Nodes in-progress**

Rochester General Health Systems

University of Rochester

Gallaudet University Washington, D.C.

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# Critical Features

Free software

High quality video and audio streams

Scalable participants from one to many (hundreds)

Open source for tailoring to individual requirements

# Showcases RIT Students

- Being built by students who are part-time, co-ops, international, and deaf/hard of hearing

- Being built by former students as temps and full-time staff

- Leverages the expertise of the Research Computing Lab

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# Showcases RIT's Partners

- University of Rochester



- Rochester General Health Systems



- Gallaudet University



- NIH/NLM

# Showcases RIT's Sponsors

# Enables Advanced Applications

- Telemedicine

- Global Education

- Cultural Exchanges

- Alumni Events

- Research Collaborations

- Music and Theater

- Business Meetings

- NTID Events

- Student Collaborations

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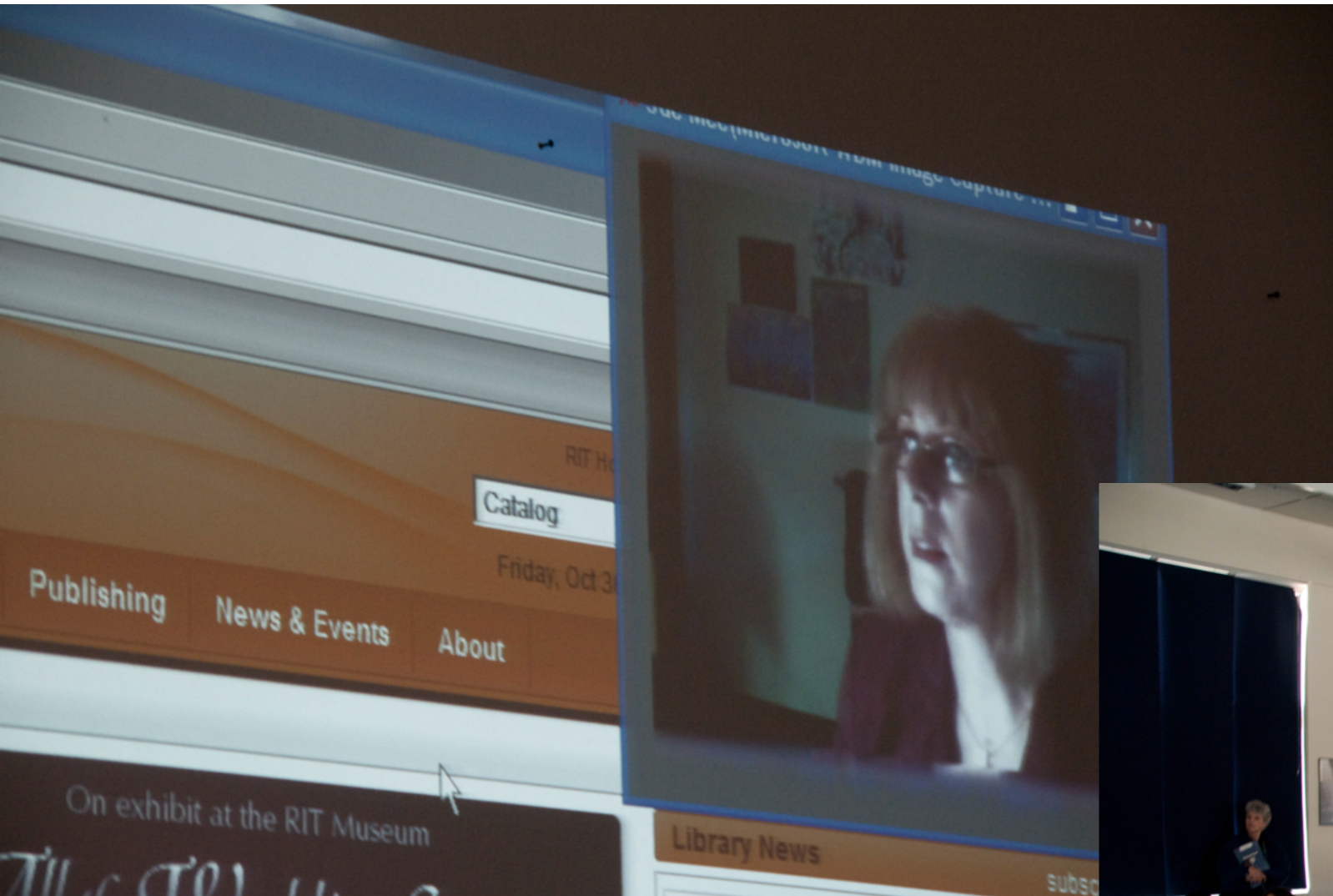# Telemedicine

University of Puerto Rico Medical School

Live Endoscopy Procedure

Transmitted to RIT, Johns Hopkins, University of Michigan

# Distance Learning

Librarian at the RIT Wallace Center

Students at the American University of Kosovo

# Research Collaborations

Live interview with RIT CS Faculty and Student to NSF Headquarters in VA
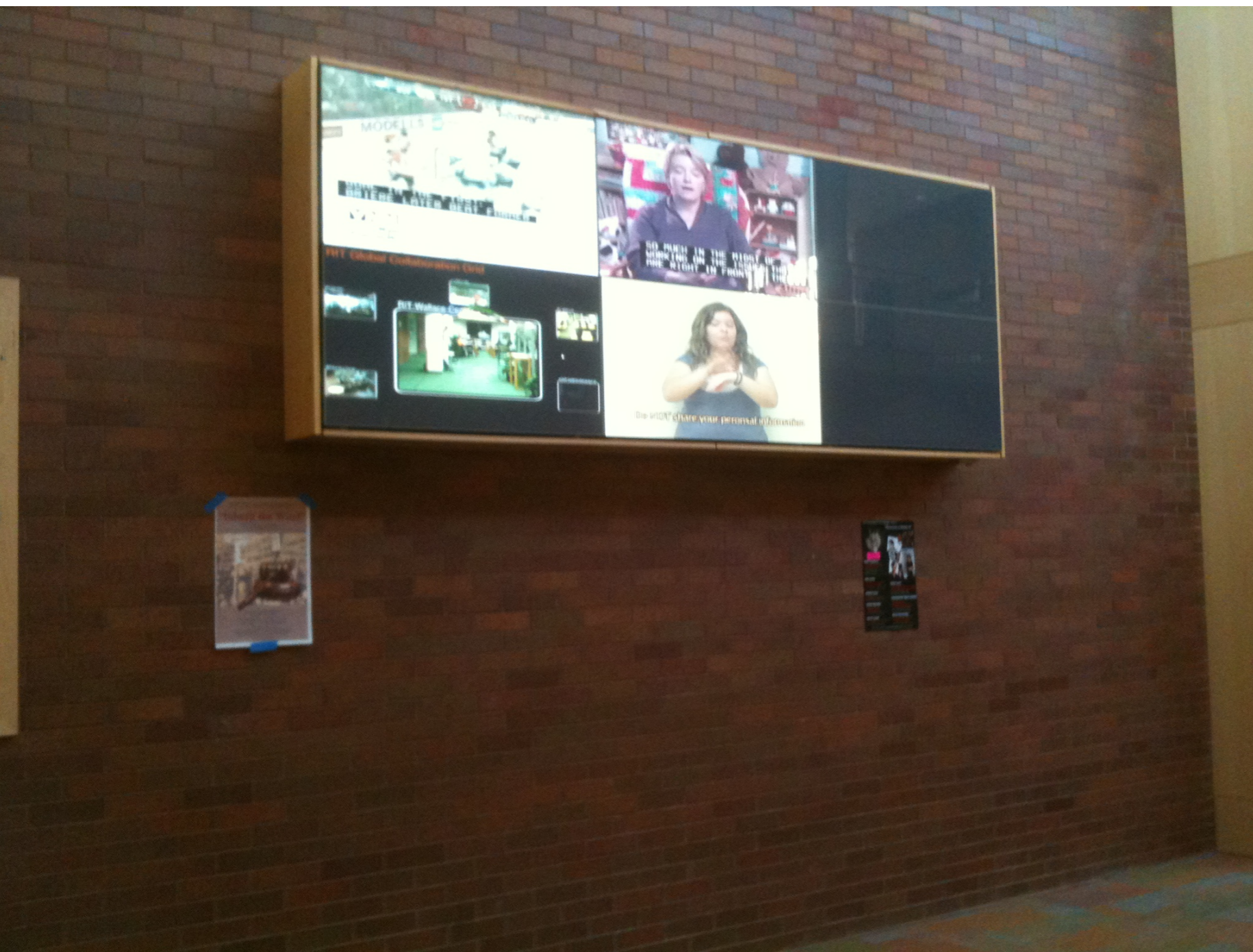
# Theatrical Performances

Backchannel control system for Virtual Theatre presentation (RIT CS, Design)

# Building Connected Communities



Connecting deaf/hard of hearing RIT students to Gallaudet University and other sites
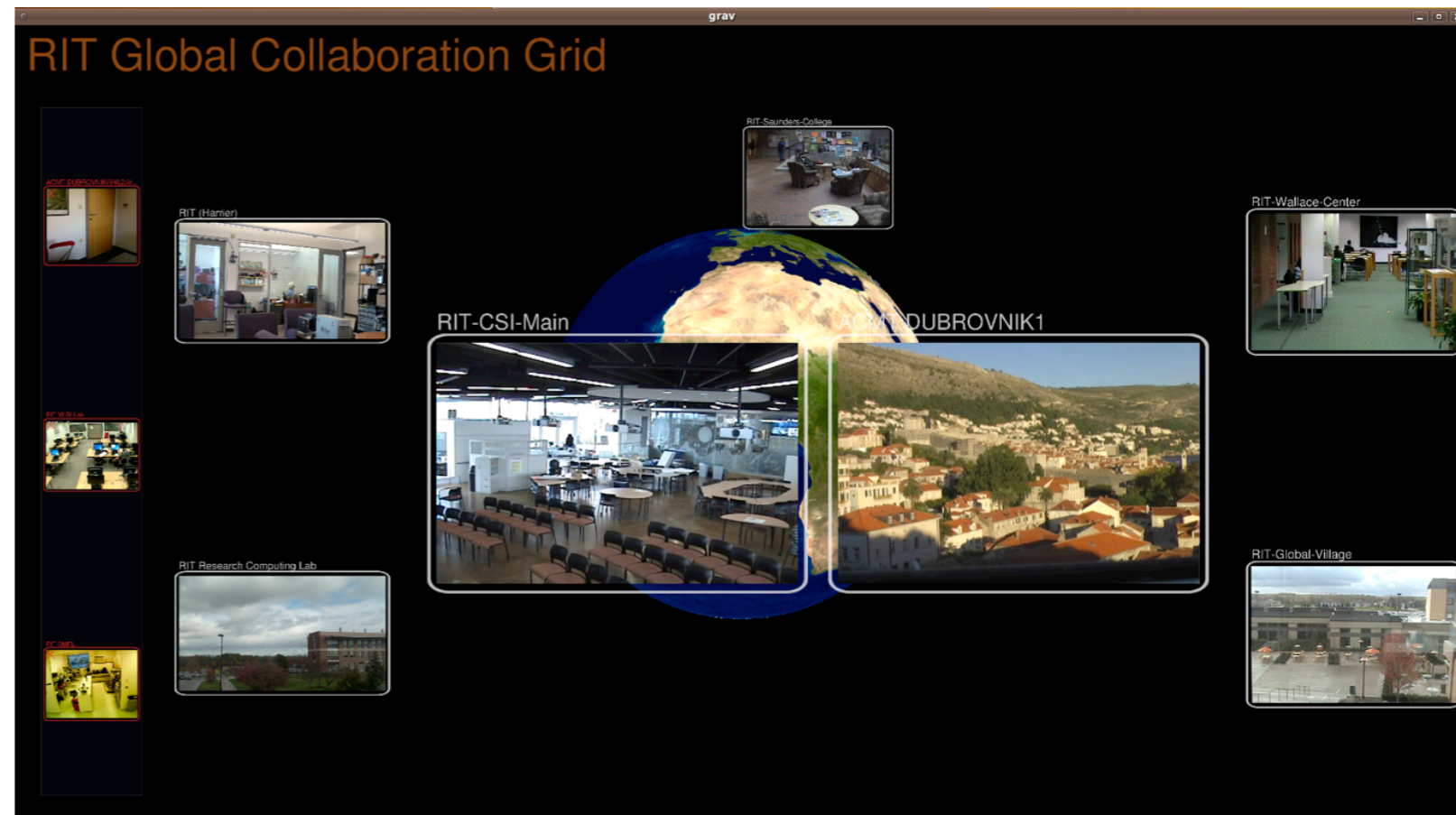
# Alumni Mentoring



RIT Alumna at IBM signing with RIT and University of Washington students and staff

# R & D Areas

- User Interface

- Compression Codecs

- Camera & Computer Hardware

- Network Transport

- Global Architecture

- Accessibility

# User Interface - software

- **grav**--original RIT code released as GPL

- GL based

- viewer for RTP streams

- multistream handling

- multivenue aggregation

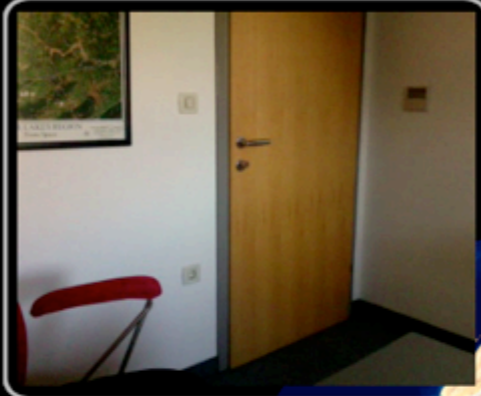- venue switching

# grav stream aggregation

# grav "telepresence"



HD (1920x1080) H.264 30 fps 5-50 Mbps

# User Interface - hardware

- Gestural user controls

- Multitouch user controls

- Video Wall systems

- Public Kiosk systems

- Telepresence systems

- Mobile systems

- Audio in public spaces

- Spatial Audio Privacy

# Video Wall Displays

- Tiled displays of many panels, either LCDs or Projection

- Able to scale to many streams while retaining quality

- Immersive experience is high impact

- SAGE video wall project

# Gestural and Multitouch Displays

- Gestural, multitouch, and kiosk interfaces

- Adaptation of 'grav' to multitouch control

- Kinect experiments with integration

- Display replication for kiosks, viewer devices

# Video Formats



- Uncompressed HD video and audio

- H.264 HD (1920x1080)

- Uncompressed 4K Video (3840x2160)

# Camera & Computer Hardware

- HD camcorder for high definition at 1920x1080i

- Blackmagic Design PCI capture card for HDMI input

- Octo core PC with DVI out

- Gigabit ethernet

- Ubuntu Linux

# Network Transport

- RTP
- Multicast
- Bridging
- Security
- Camera Output

- Packetization
- Performance
- Jumbo frames
- IPv6
- Fiber

# Global Architecture

- How to deploy & maintain

- Thin clients and HPC servers

- Head-end processing station

- Appliance-like clients

- International Networks

# Accessibility

esp. Deaf/Hard of Hearing

- Real-time captioning (automatic)

- Video specs for hand signing

  - frame rate

  - shutter speed

  - resolution

  - composition

  - color/sharpness

- Privacy

# Non-technical Challenges

- Space

- Equipment

- ISPs

- Support

- Accountability

- Priority

- Collaboration

- Funding

- Champion

- Applications

# Staff of the Interactive Collaboration Laboratory

Gurcharan S. Khanna, Director

Director of Research Computing
Office of the Vice President for Research

Andrew Ford, ICELab Manager

3 student co-op positions