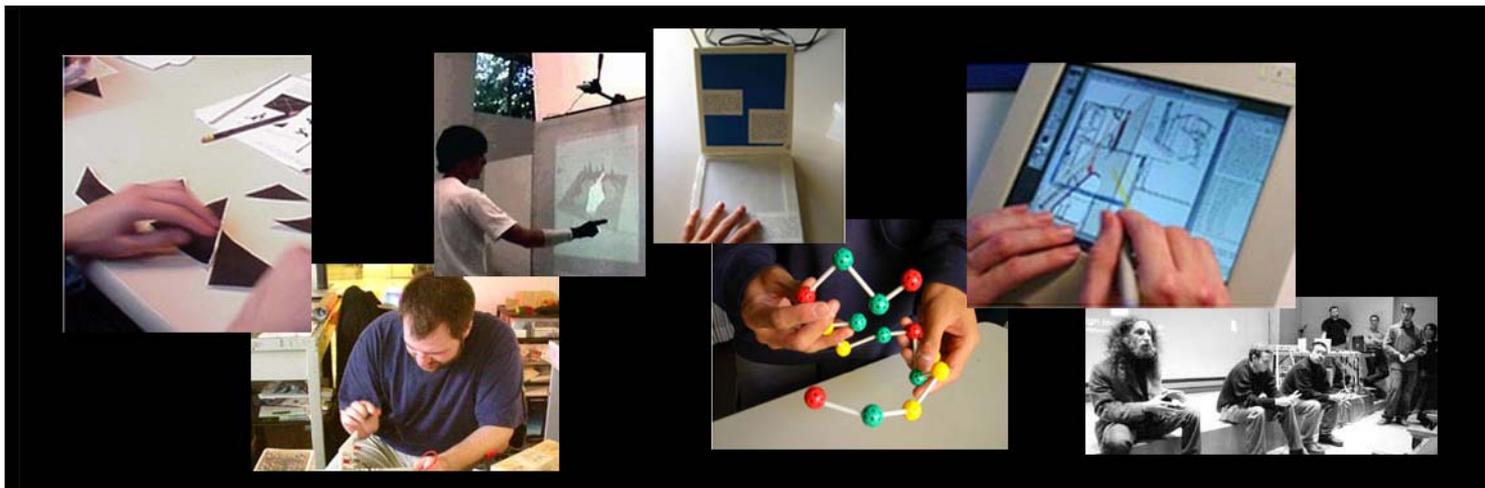
A technical drawing of a human figure, possibly a mannequin or a stylized human, overlaid on a grid. The figure is shown from the waist up, with a red rectangular box highlighting the torso area. To the right, another red rectangular box highlights a hand. The background consists of a grid of lines, with some curved lines suggesting a larger, possibly room-sized, interaction space.

Physical Computing: Hand, Body, and Room Sized Interaction

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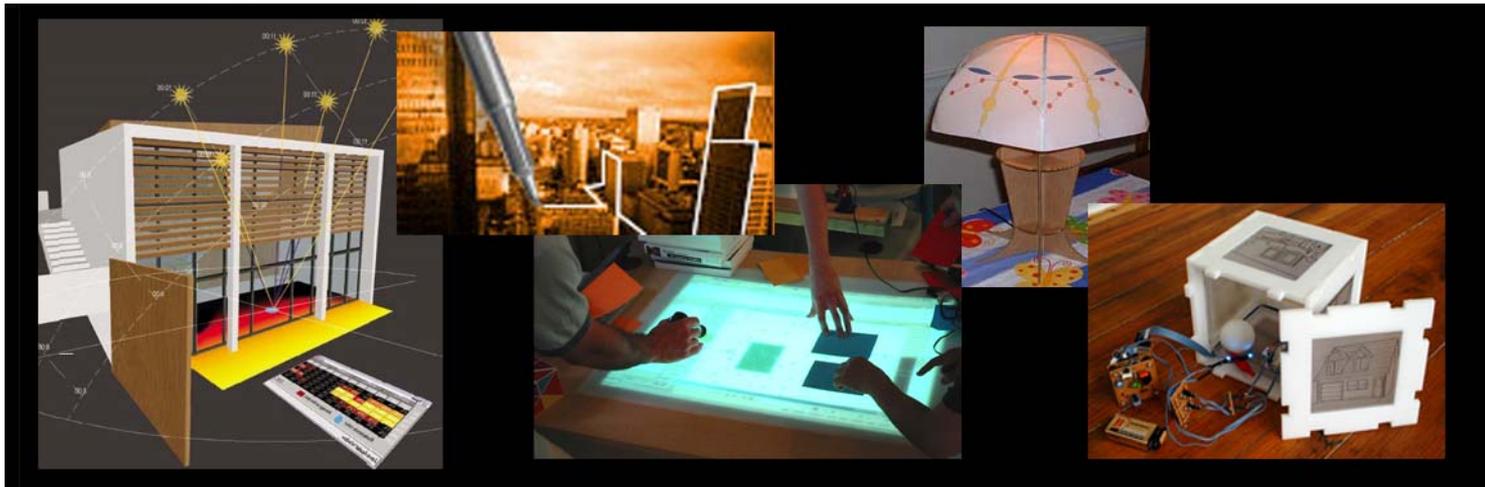
CoDe Lab

- Computational Design Research Laboratory
 - School of Architecture, Carnegie Mellon University
- Build Working Experimental Systems
 - Explore Ideas, Research Activity, Learning by Making
- A Community
 - Share Ideas and Resources, Learn from each other



CoDe Lab

- Design and Simulation
 - Sketch, Constraint, Knowledge
- Collaboration
 - Annotation, Multi-User Interfaces and applications
- Physical Computing
 - Tangible, Ubiquitous, and Interactive Art



The Physical Computing Studio

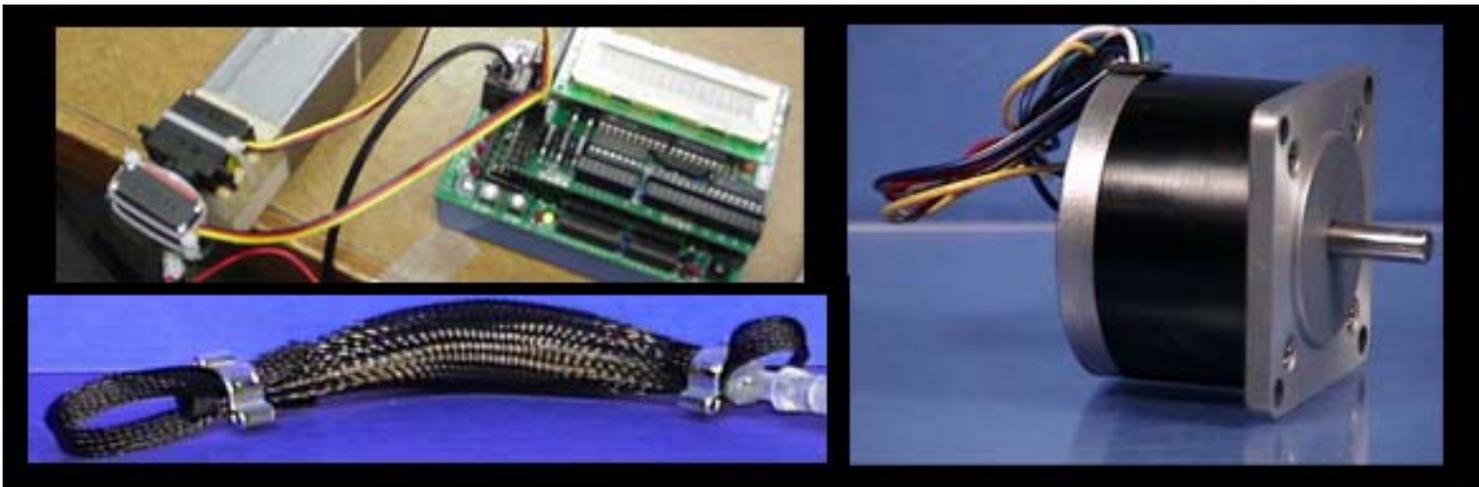
- Explore Computationally-Enhanced Artifacts and Environments
- Interdisciplinary Collaborative Design Studio
 - Artists, Architects, Computer Scientists, Engineers, Information Scientists
- Hands-On, Learn-by-Doing



The Physical Computing Studio

4 weeks of skill building exercises

- Readings
- Sensing and Actuating
 - Microcontrollers, Programming, Electronics, Sensors, Actuators
- Mechanical Movement
 - Automata
- Collaboration and Communication
 - Team Projects



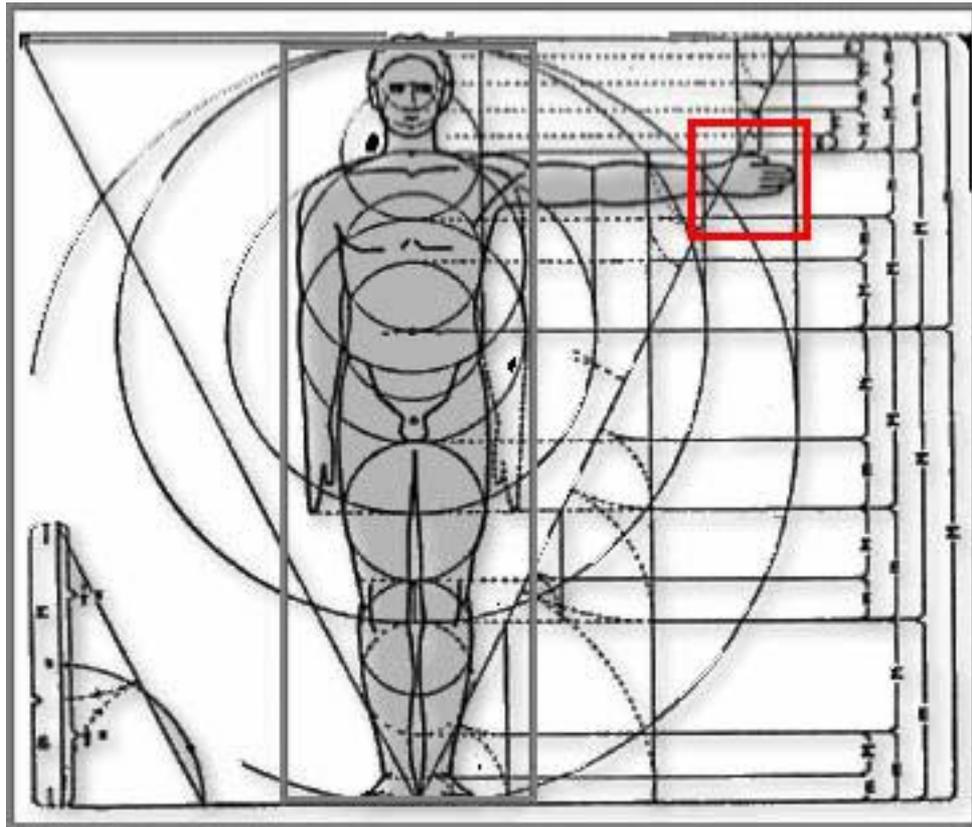
The Physical Computing Studio

6 week team project

- Seed Topic
 - Learning and Children
 - Interactive Furniture
 - Energy Displays
- Brainstorm and Story Telling
- Proposal
- Build, Present, and Document it



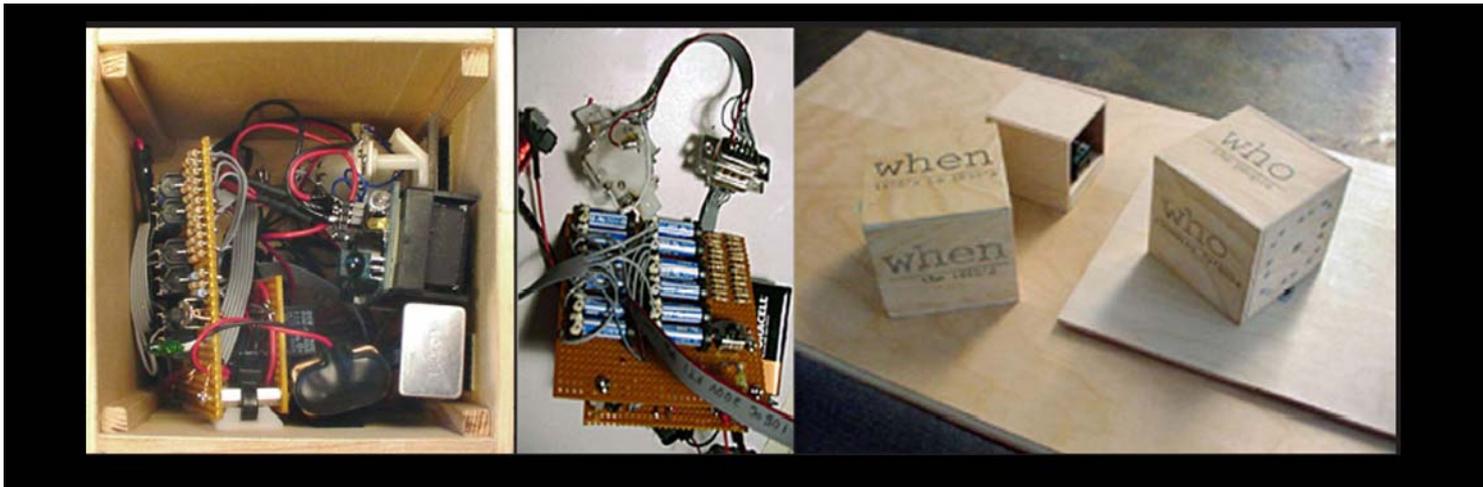
Hand-Sized Interaction



Hand-Sized Interaction

Navigational Blocks

- Tangible Query Interface for an Information Kiosk
- A Set of Physical Blocks
- Each Block Represents a Category of Information
- Each Face of Each Block Represents a Topic within the Category



Hand-Sized Interaction

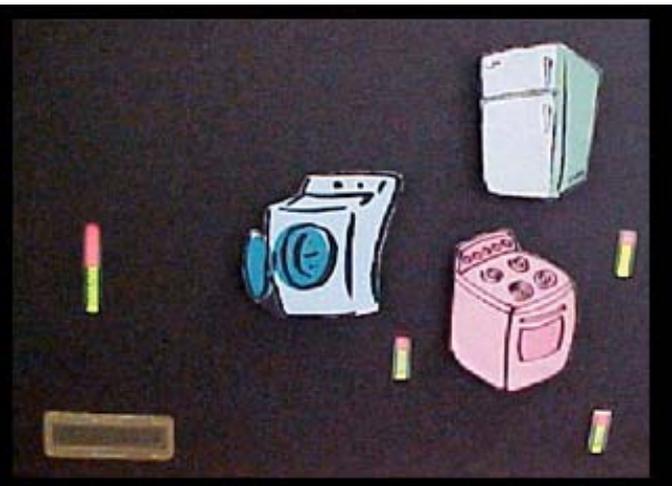
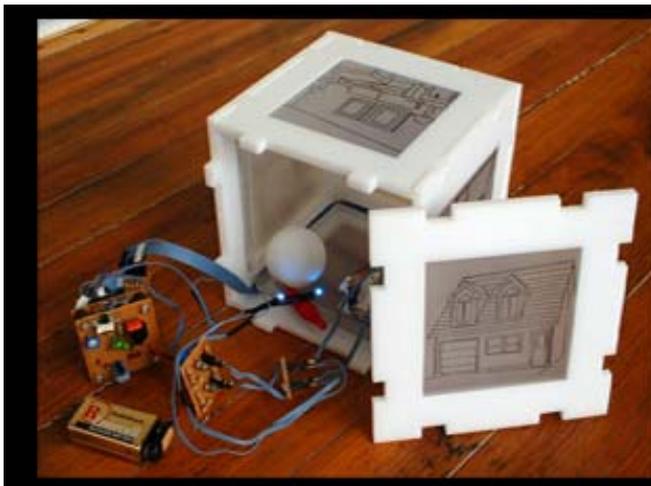
Navigational Blocks



Hand-Sized Interaction

Energy Displays

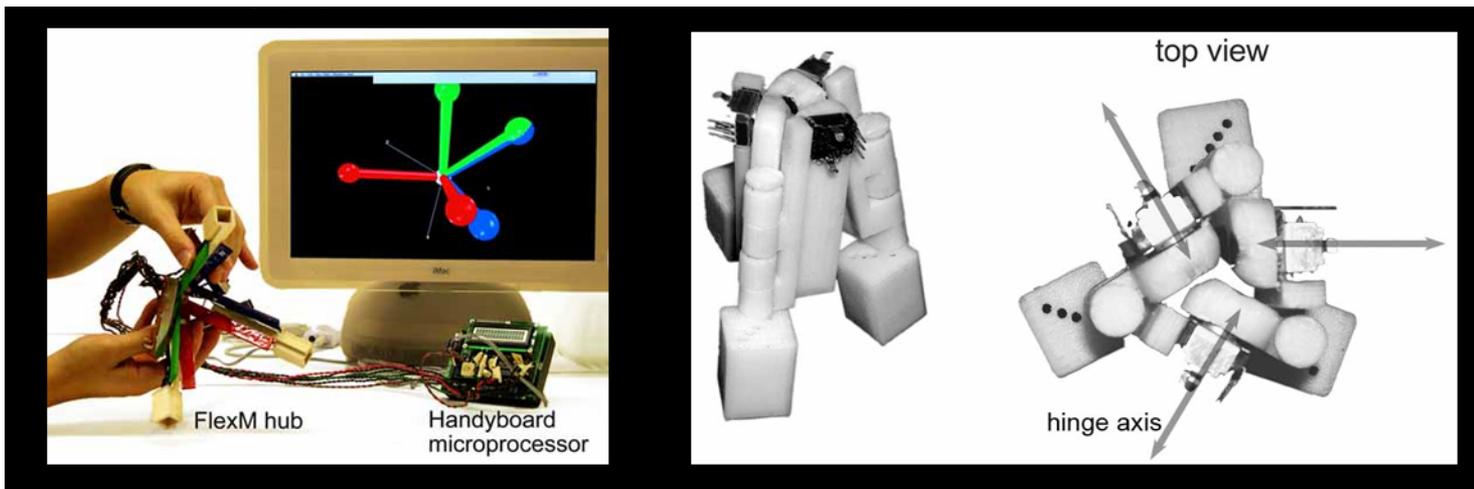
- Home Energy Tutor
 - Wireless Sensor Network
 - Ambient Energy Displays
 - Easily Deployed and Configured Kit
- Energy Cube
 - 6 Sided Ambient Display
- Energy Magnets
 - Refrigerator Magnets
 - Query an Appliance



Hand-Sized Interaction

Flexy (aka FlexM)

- Flexible Hub and Strut Construction Kit
- Senses Topology, Strut Angles, and Object Orientation
- Geometric Modeling, Molecule Kit, Structural Design



Hand-Sized Interaction

Pop-Up Book

- Paper Book Augmented with Audio and Video
- Traditional Pop-up Elements as Triggers
- Embedded Photocells Sense Interaction



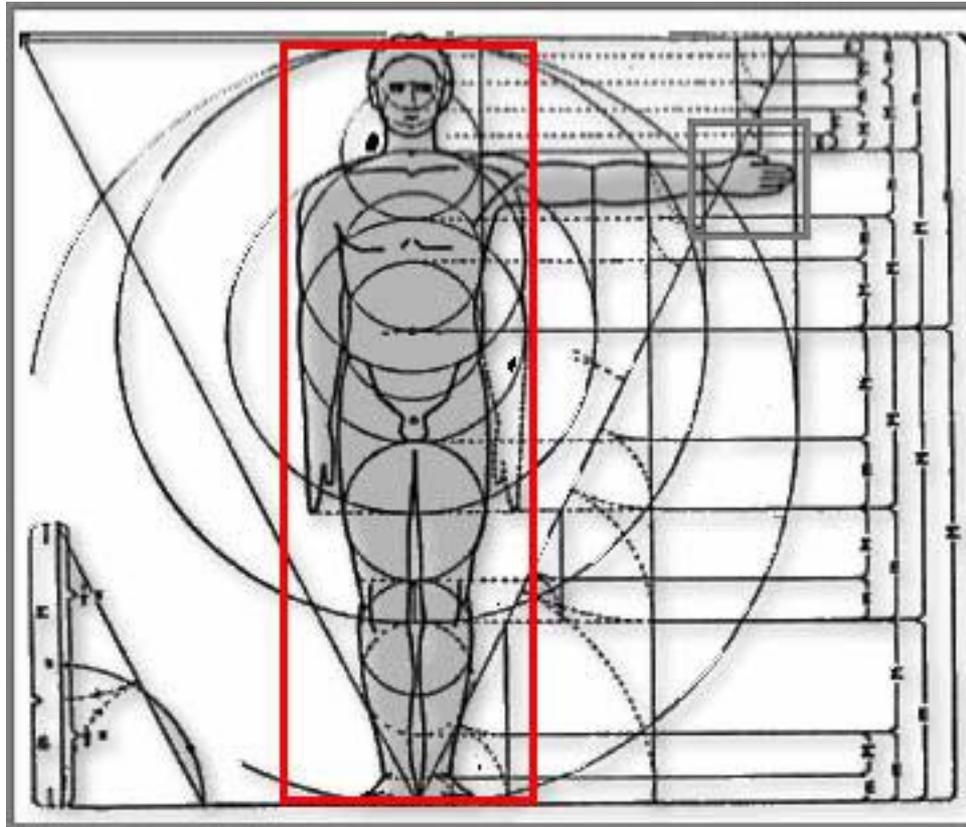
Hand-Sized Interaction

Stud Sketch

- Making the Invisible Visible
- Rubbing as a Metaphor
- Sketch the structural components in a wall onto its surface.
- Combines a studfinder with a mimio pen and projector.



Body-Sized Interaction



Body-Sized Interaction

People Pretzel

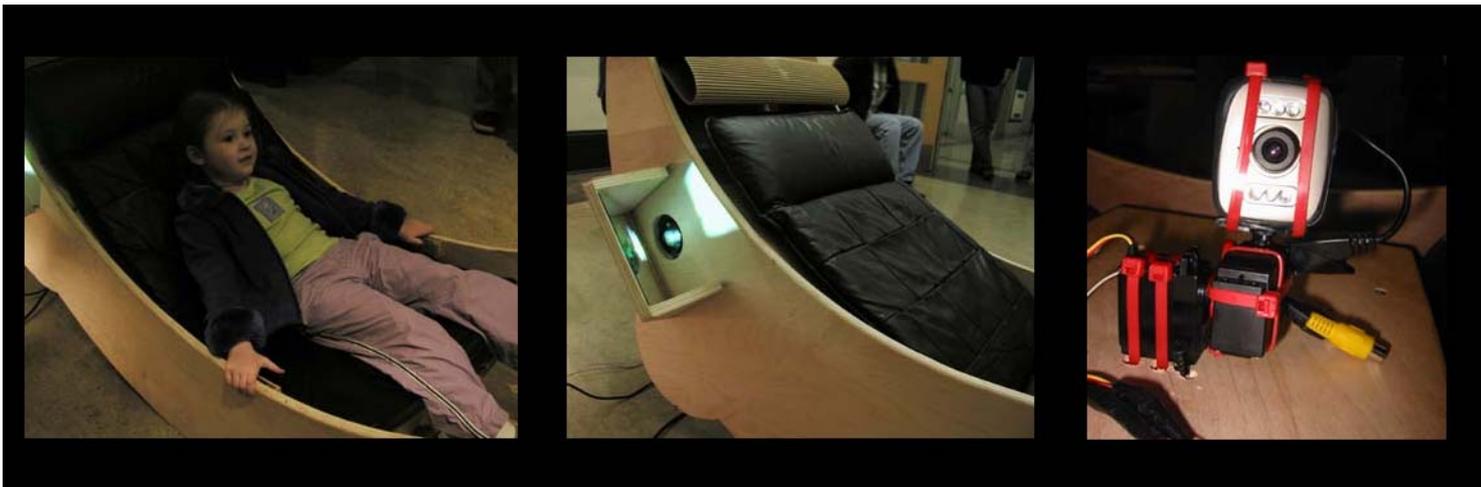
- Computational Play Board for Group Interaction
- Public Interface
- Audio, and Video Feedback



Body-Sized Interaction

Window Seat

- Controls the Pan and Tilt of a Remote Camera
- Embedded Projector - Wall as Display
- Architectural Model, Virtual Environment



Body-Sized Interaction

Musical Couch

- Couch as Musical Instrument / Experience
- Embedded Sensors Mapped to Midi Sounds
- Pressure Sensors, Infrared Rangefinders, Tap Sensors

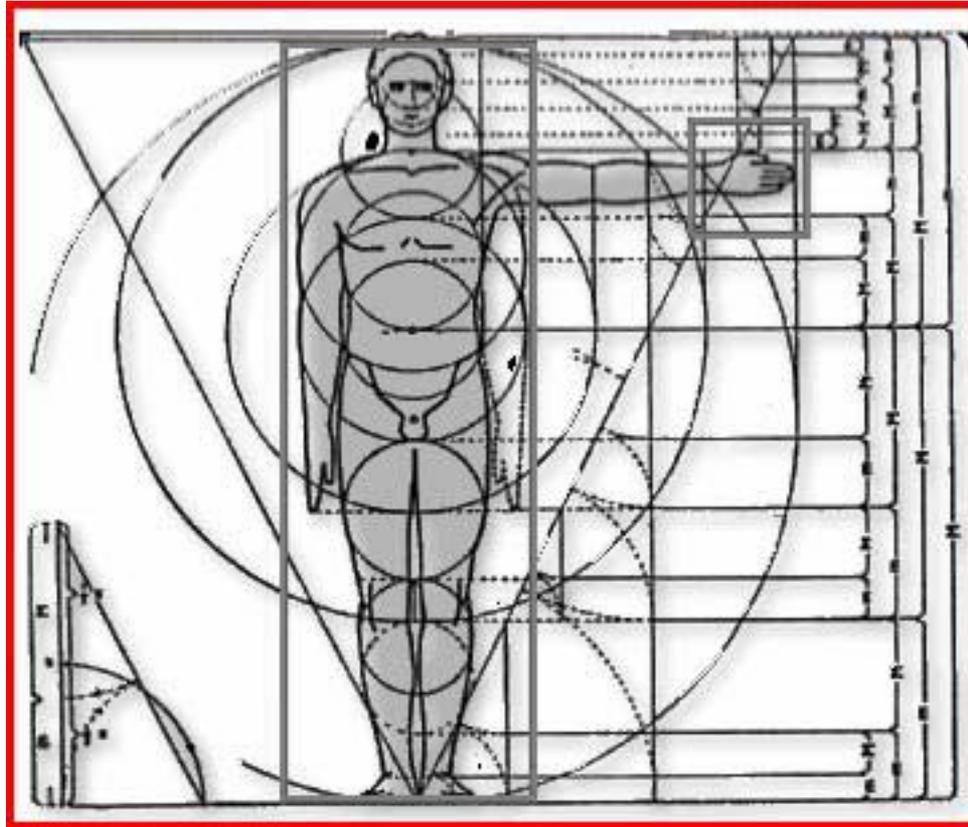


Body-Sized Interaction

Musical Couch



Room-Sized Interaction



Room-Sized Interaction

Plant Tiles

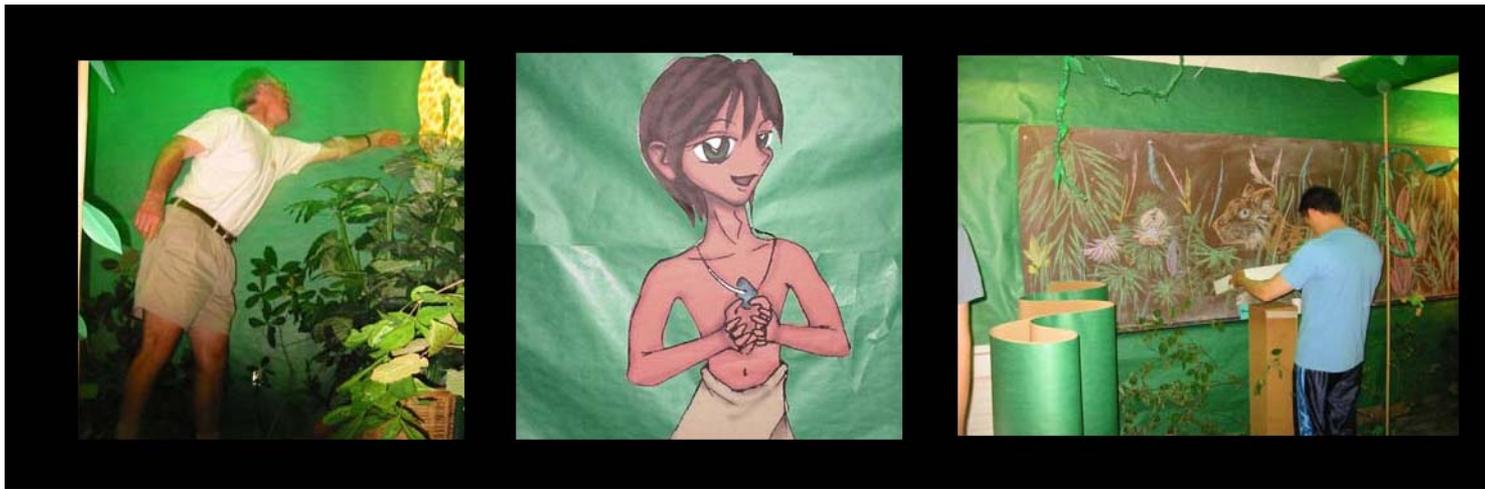
- Cycles of Growth in Plants
- Pressure Sensitive Floor Controls 3 Video Segments
- Occupants Control the Growth of the Plants



Room-Sized Interaction

Jungle Room

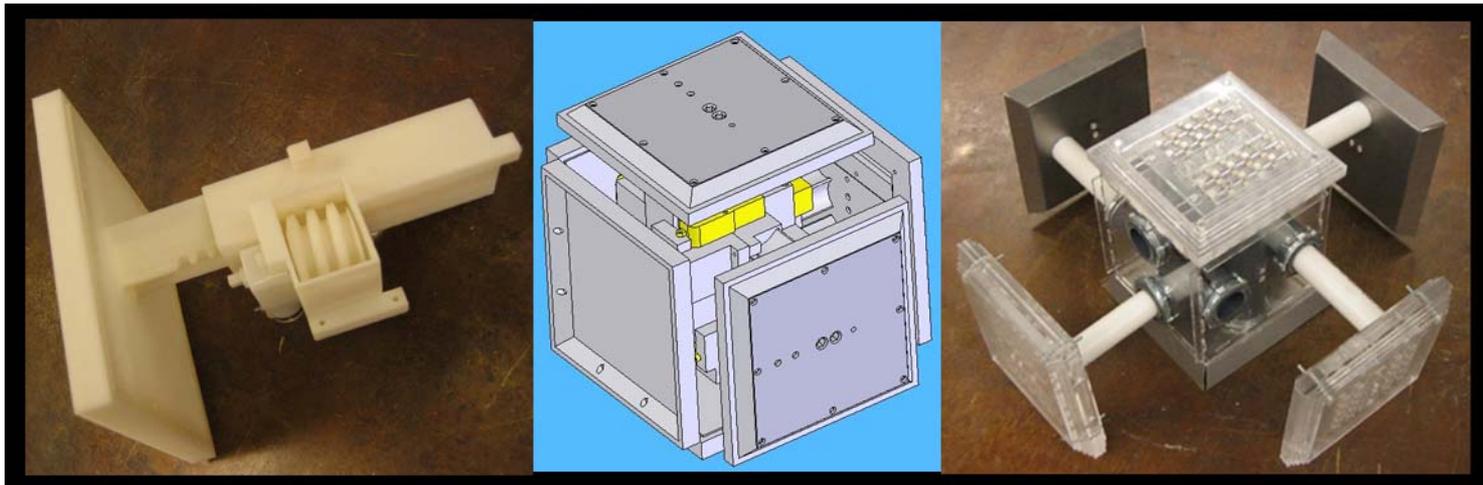
- Help the Jungle Boy Find His Toy
 - An Educational Riddle Room
- A Non-Linear Narrative



Room-Sized Interaction

Espresso Blocks (Architectural Robotics)

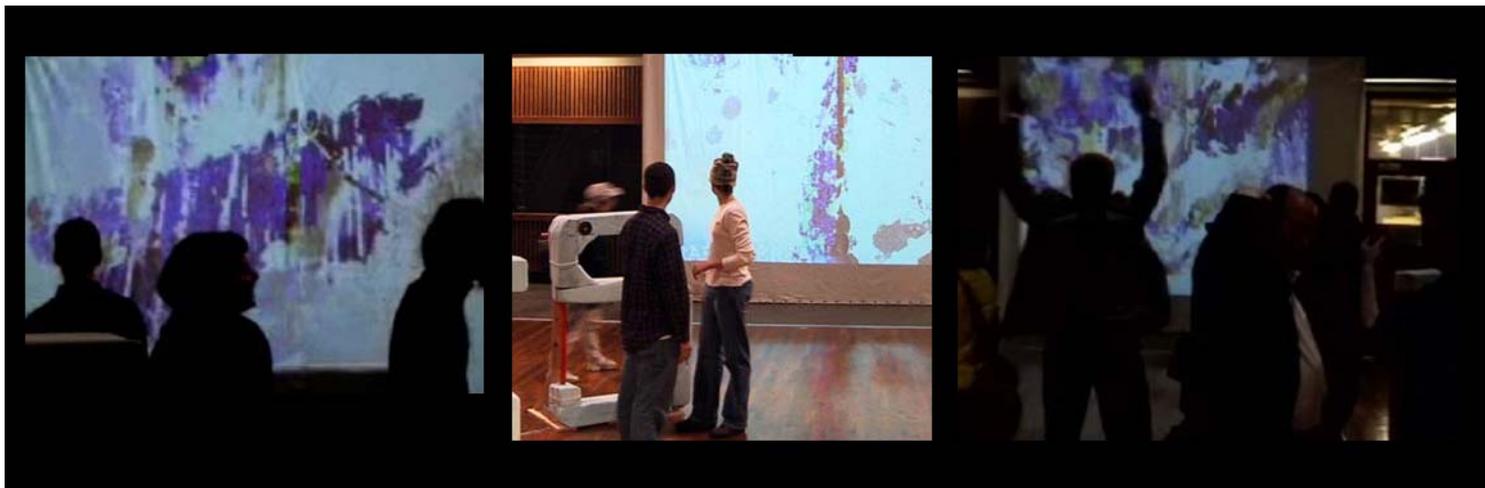
- Self Assembling Building Blocks
- Expanding and Contracting Arms Make Moving Possible
 - Like a 3d Nine-Tile Puzzle
- Temporary Shelters, Self Transforming Space



Room-Sized Interaction

Alphabet Paint Space

- Interactive Mural
- Body as Paint Brush, Movement as Stroke
- Overhead Web Cam and Computer Vision



Room-Sized Interaction

Alphabet Paint Space

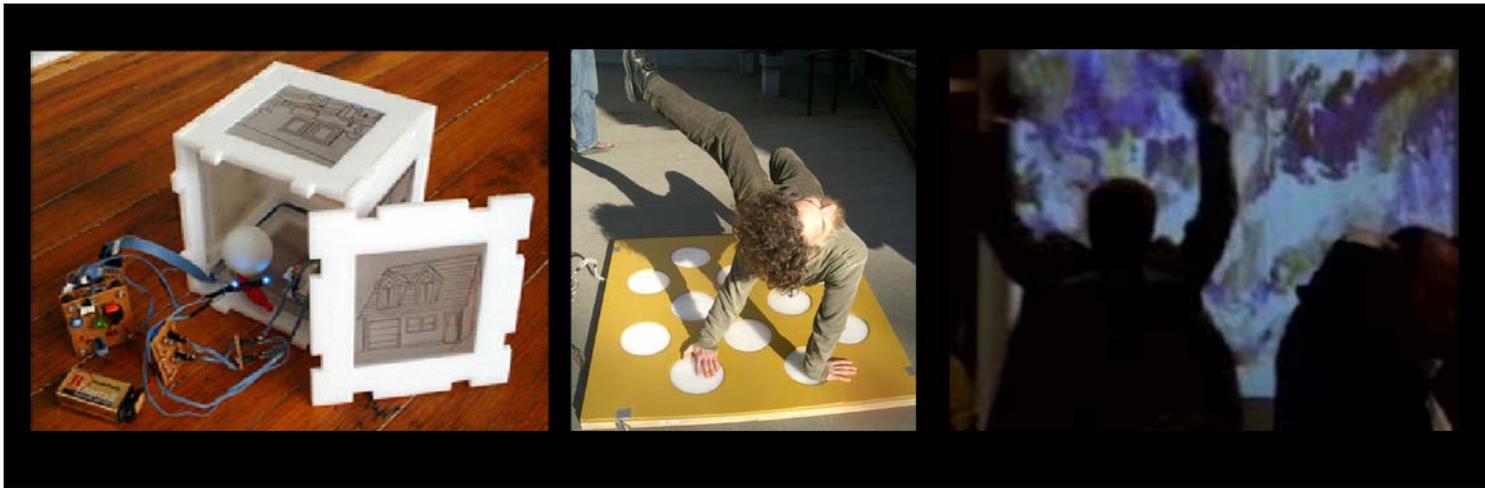


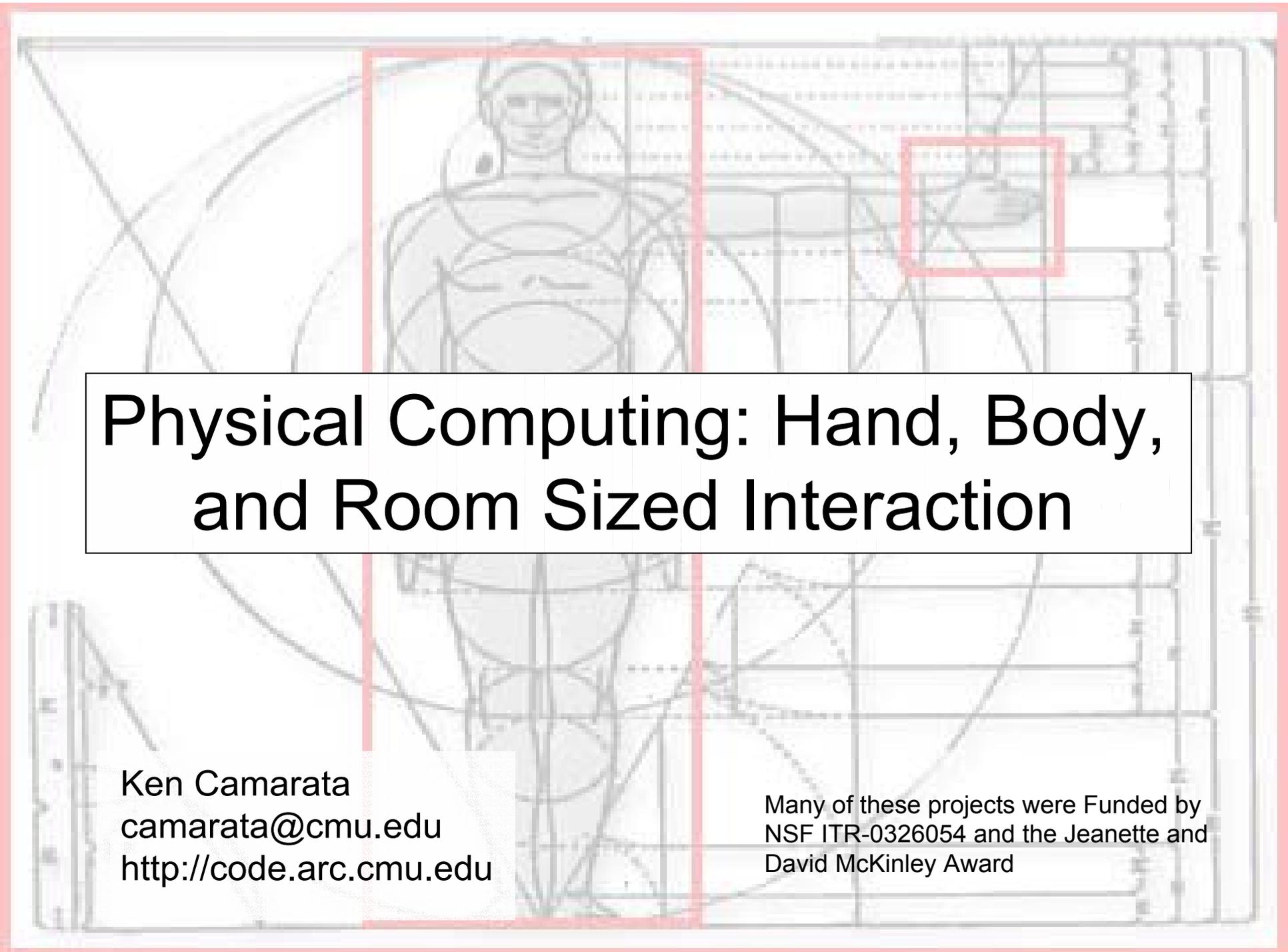
Summary

Introduced the CoDe Lab and our Physical Computing Studio

A lot of Computationally-Enhanced Artifacts and Environments

Organized them by a Human Scale: Hand, Body, Room





Physical Computing: Hand, Body, and Room Sized Interaction

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David McKinley Award