

Early Experiences with Interdisciplinary Design Studios

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Introduction

- Architectural and fine arts education has long employed the studio paradigm to foster creativity.
- We have created an (interdisciplinary) studio that partners students in the College of Computing Sciences with peers in the School of Architecture.
- This depends on
 - a design project that stimulates mutual interest;
 - an infrastructure that supports (interdisciplinary) work, through either physical proximity of the studios or broadband communication between them.
- We focus on Ubiquitous Social Computing as both a design topic and an enabling technology.

Architects-In-Action

Place = Behavior



Hierarchy



Lone Hero



Artifact



**Immersion
Casual Interaction**

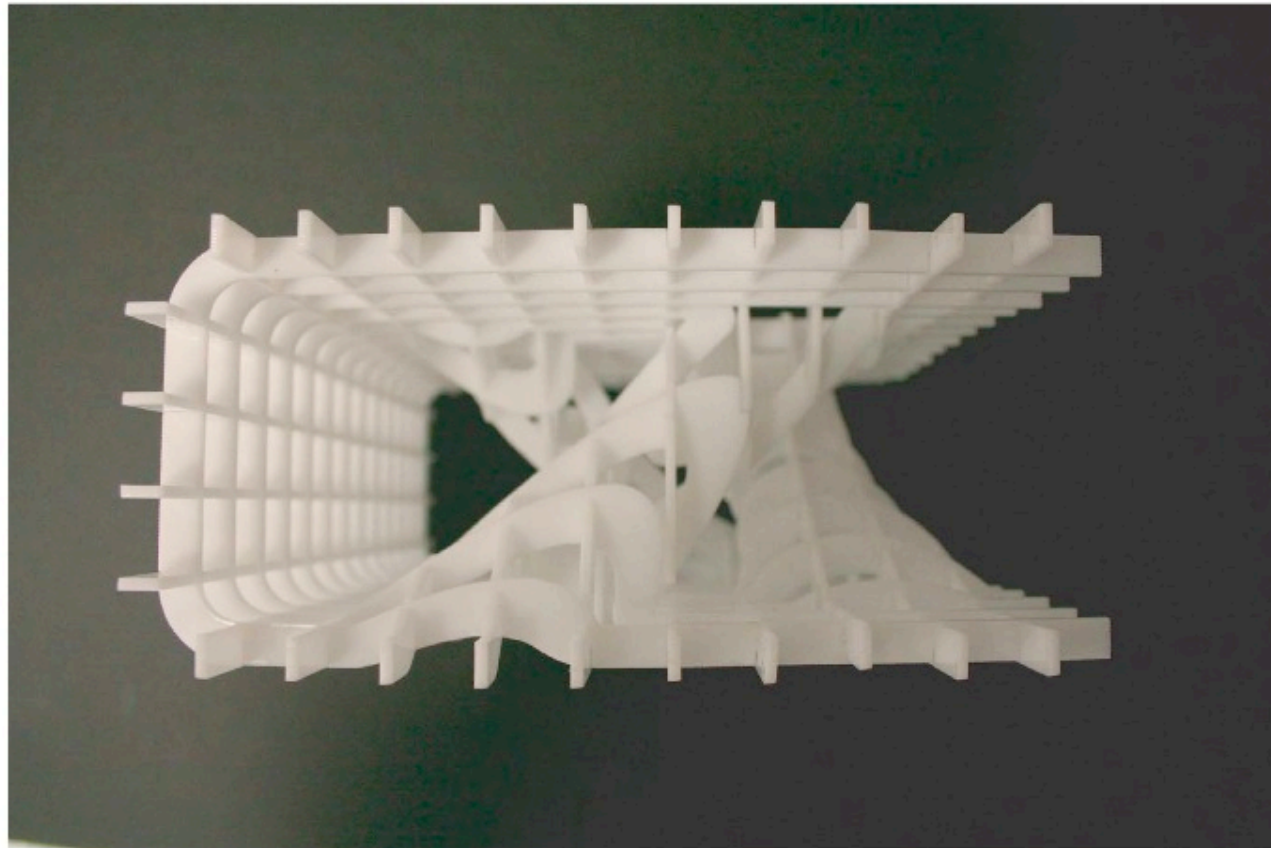


Gaze



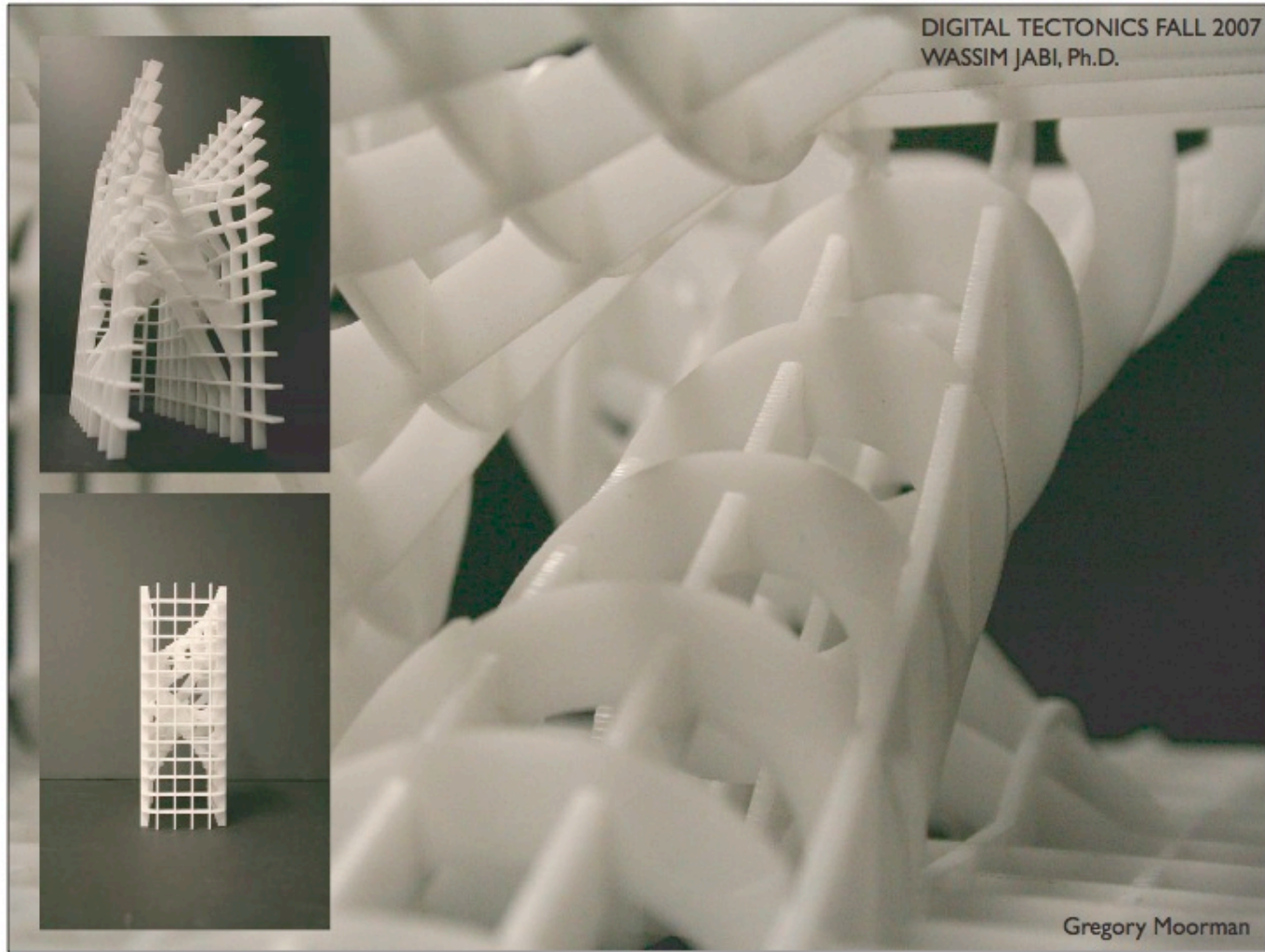
Creativity?

DIGITAL TECTONICS FALL 2007
WASSIM JABI, Ph.D.



Gregory Moorman

Creativity?



Creativity?



Ubiquitous Social Computing Design Studios

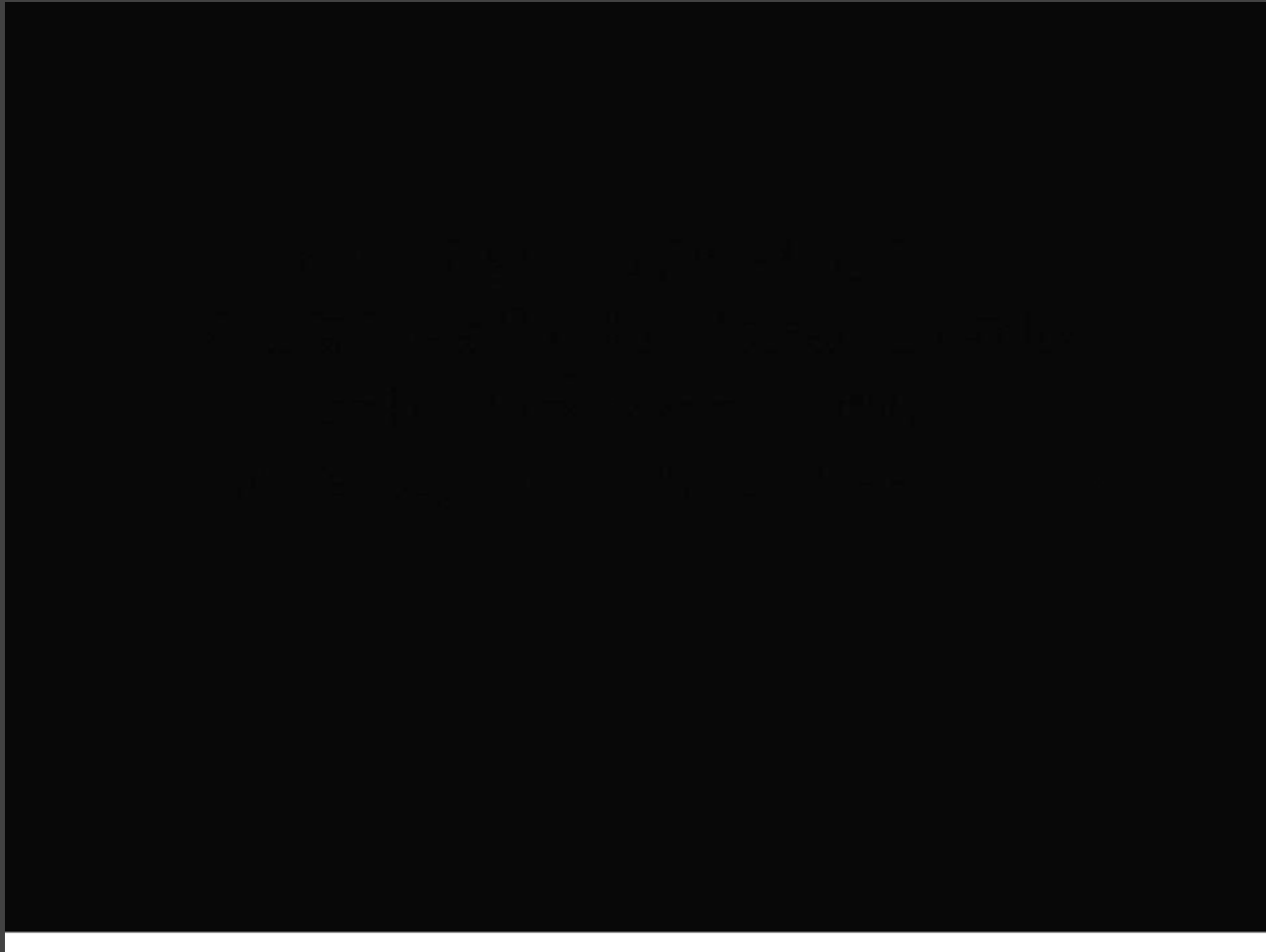
- We chose ubiquitous social computing (USC) as the topic of our studio because ubiquitous technologies blend the digital, physical, and social spaces into a single socio-computing learning space, which can fundamentally improve students' creativity.

(Inter-disciplinary?) Studio

- Computing science students and faculty can learn the studio culture in a very direct way through interactions with architecture students and faculty.
- Take into consideration broader issues such as the relationship of technology to physical context, ergonomics, and human behavior.
- Creativity is stimulated through semester-long interdisciplinary design projects and real-world problem solving in a more interactive environment where they can freely exchange ideas



Example Student Project



Studio Physical Settings

- We chose to have two physically separated studios, one for computing science and one for architecture.



Inter-Studio Communication

- The two studios are interconnected.
- We set up several formal design reviews throughout the semester.
- Students use both synchronous and asynchronous communication tools to maintain a continuous interaction.



Community-Studio Interaction

- Large-screen systems can be used to increase the informal community interactions through any of five basic approaches:
 - community notice boards
 - media-spaces
 - community awareness systems
 - walk-up-and-use personal interactive public surfaces
 - proactive displays

Studio Casual Interactions using Mobile Devices

- Casual interactions help designers solve problems collaboratively.
- Our SmartCampus infrastructure aims to use mobile devices, such as smart phones, to give students serendipitous community interactions with our USC infrastructure, and specifically with the public plasma posters.

Utopia vs. Reality

- Engelbart, Coons, and Sutherland set the research agenda for the next 40 years
- They dealt more with theories than with actual implementations and thus their solutions tended to be **utopian**
- They viewed design as a congruent set of problems that can be addressed with one system and one approach
- For example, Engelbart mistakenly believes that merging different solutions is an easy task and resolving conflicts can occur naturally
- Coons falsely believes that synchronicity and social-awareness are the only needed features in addressing the problems that designers face



Top: Sam dreams of soaring through the clouds. Bottom: Sam struggles for desk space.

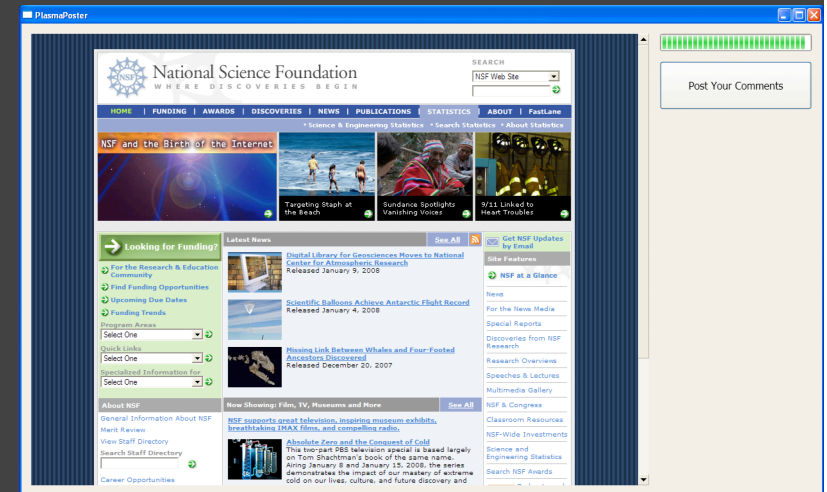
(Brazil © 1985 Embassy International Pictures NV. All rights reserved.)

Challenges

- The notion of solving problems using a design studio setting was not readily accepted or understood by those outside the field of architecture.
- The notion of a design approach to solving problems differed between architecture and computing science.
- Due to the scale and nature of the project and differing accreditation requirements, the two studios could not work on the same project semester-long.

Plasma Poster Network Implementation

- A dialog of ideas, both with peers and with a wider audience, is a critical part of the creative process.
- PlasmaPoster features:
 - freedom of expression
 - interaction
 - automation
- Implementing through HTML and PDF.



Plasma Poster Network Implementation

The screenshot shows a browser window titled "PlasmaPoster" displaying the National Science Foundation (NSF) website. The website features the NSF logo and the tagline "WHERE DISCOVERIES BEGIN". A search bar is located in the top right corner, with "NSF Web Site" selected in the dropdown menu. A navigation menu includes links for HOME, FUNDING, AWARDS, DISCOVERIES, NEWS, PUBLICATIONS, STATISTICS, ABOUT, and FastLane. The main content area is divided into several sections:

- Science and Engineering Indicators 2008**: A large banner with a blue background and white text.
- News Highlights**: Three small images with captions: "New Deep-sea Water Pathway", "Sundance Spotlights Vanishing Voices", and "9/11 Linked to Heart Troubles".
- Looking for Funding?**: A green sidebar with links to "For the Research & Education Community", "Find Funding Opportunities", "Upcoming Due Dates", and "Funding Trends". It also includes dropdown menus for "Program Areas", "Quick Links", and "Specialized Information for".
- Latest News**: A section with three news items: "Digital Library for Geosciences Moves to National Center for Atmospheric Research" (Released January 9, 2008), "Scientific Balloons Achieve Antarctic Flight Record" (Released January 4, 2008), and "Missing Link Between Whales and Four-Footed Ancestors Discovered" (Released December 20, 2007).
- Now Showing: Film, TV, Museums and More**: A section with a link to "NSF supports great television, inspiring museum exhibits, breathtaking IMAX films, and compelling radio." and a link to "Absolute Zero and the Conquest of Cold" (This two-part PBS television special is based largely on Tom Shachtman's book of the same name).
- Site Features**: A sidebar with links to "NSF at a Glance", "News", "For the News Media", "Special Reports", "Discoveries from NSF Research", "Research Overviews", "Speeches & Lectures", "Multimedia Gallery", "NSF & Congress", "Classroom Resources", "NSF-Wide Investments", and "Science and Engineering Statistics".

At the bottom of the browser window, the status bar shows "Loaded: http://www.nsf.gov/".

Plasma Poster Network Implementation

The screenshot shows a PlasmaPoster application window titled "PlasmaPoster" with a standard Windows-style toolbar. The main content area displays the National Science Foundation (NSF) website. The website header includes the NSF logo and the tagline "WHERE DISCOVERIES BEGIN". A search bar is visible with the text "NSF Web Site" entered. The main content area is divided into several sections:

- Looking for Funding?** (Green header)
 - For the Research & Education Community
 - Find Funding Opportunities
 - Upcoming Due Dates
 - Funding Trends
- Quick Links** (Dropdown menu)
- Specialized Information for** (Dropdown menu)
- About NSF** (List of links: General Information About NSF, Merit Review, View Staff Directory, Search Staff Directory)
- Latest News** (List of news items)
 - NSF Appoints New Director of Office of Integrative Activities** (Released December 12, 2007)
 - New Results Presented at Conference: Climate Change, Weather and Ecosystems; Urban Air Quality; Earth Observing Systems; Seafloor Drilling** (Released December 7, 2007)
 - Broken Homes Damage the Environment** (Released December 4, 2007)
- Now Showing:** (List of items: TV, Museums and More)
- Get NSF Updates by Email** (Form)
- Site Features** (List of links: NSF at a Glance, News, For the News Media, Special Reports, Discoveries from NSF Research, Research Overviews, Speeches & Lectures, Multimedia Gallery, NSF & Congress, Classroom Resources, NSF-Wide Investments, Science and Engineering Statistics, Search NSF Awards)

Handwritten red annotations are present on the screenshot:

- The text "SEE THIS" is written in red in the upper right quadrant of the website content.
- A red scribble is drawn over the "New Results Presented at Conference..." news item.

At the bottom of the PlasmaPoster window, the following text is displayed:

Loaded: <http://www.twhall.com/njit/PlasmaPoster/www.nsf.gov.pdf>

Evaluation

- Collected baseline data on the formal, informal and emergent interactions observed in the studios, both qualitative and quantitative.
- In Spring 2008, we will assess creativity and innovation in students' projects and artifacts, comparing them to artifacts submitted in Spring 2007.
- Students will be asked to rank order the artifacts in terms of innovation, effectiveness, aesthetics and novelty of the submissions.
- Compare these evaluations with those of other Subject Matter Experts (SMEs).
- Challenge students with the same assignments and projects assigned in first studio, with the expectation of improvement.

Conclusions and Future Work

- Challenges and opportunities in transferring the design studio paradigm from architecture to computing science.
- Procedures for assessing and comparing students' creative output.
- Developing supporting technology for ubiquitous social computing.
- Success depends not only on technology and instructor commitment, but also on developing shared understanding and acceptance at the institutional administrative level as well as among students.

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Thank You

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