POST PARAMETRIC | FUTURES OF COMPUTING AND DESIGN

David Benjamin (d@thelivingnewyork.com)
This class counts as a Tech Elective. Enrollment may be limited.

OVERVIEW

In February 2011, following six years of cutting-edge research on **artificial intelligence** at IBM, a computing system named Watson defeated two human champions in the game show Jeopardy.

In May 2010, after 30 years of steady growth in **algorithmic trading**, hundreds of unnamed computers ordered a flurry of trades without human input and caused the United States stock market to lose 9% of its value in five minutes.

Autonomous algorithms have steadily expanded their reach in the past ten years and they now influence numerous aspects of our lives, including architecture and our built environment.

At the same time, recent developments in other advanced algorithms—such as those for **cloud computing**, **directable simulation**, **self-modeling buildings**, **evolving robots**, **personal supercomputing**, **open source visual programming**, **real-time adaptation to sensor data**, **computer vision**, **predictive analytics**, and **bio-computing**—are forging new paths for our buildings and our cities.

In this context, Post Parametric aims to **question, broaden, and re-frame the way we think about computing and design**. It looks beyond the current moment and its ambiguous buzzwords—but not so far ahead as science fiction—and it explores how we might be using algorithms in the design of buildings ten years from now.

RESEARCH + DESIGN

This technology elective combines the seminar/research format and the workshop/design format. It will include **research and discussion** as well as **hands-on experimentation** with new algorithmic techniques and the creation of a final design project.

The research portion of the class will involve a close study of several next-generation computation tools and projects. Students will select an individual topic, make a presentation to the class, and lead a group discussion on the topic.

The design portion of the class will involve the application of next-generation computation tools to a design project. Students will work individually or in small teams to select a topic, identify a hypothesis, and test the hypothesis through an
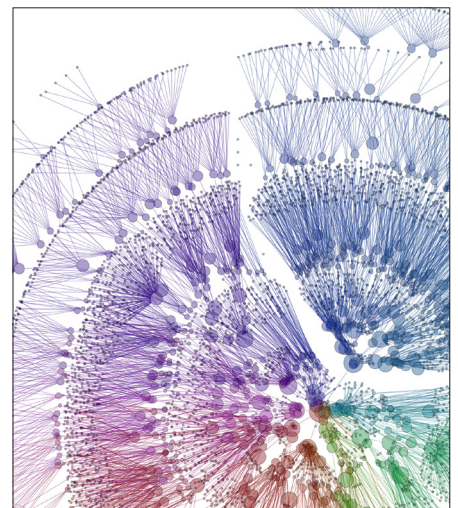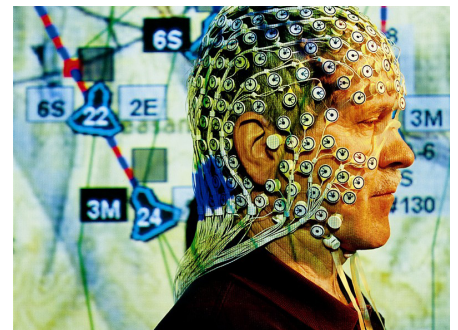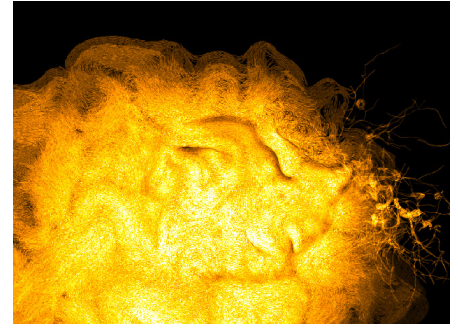
Images (top to bottom): Complex spatial patterns computed by a bacterial colony of Bacillus subtilis *(Tim Rudge, PJ Steiner, Fernan Federici, and Jim Haseloff at the University of Cambridge); Digital manupulation of mountains into the form of a stock market graph (*dow jones_80-09 *by Michael Najaar); Augmented cognition research into mind-reading computers (Boeing); Variable property 3D printing (*Fabricology *by Neri Oxman); Complex organizational chart visualization (Autodesk Research).*

immersive flash design project. The design project may be applied to a concurrent studio project, or it may be an independent exploration. Possible topics include:

+ **Evolutionary computing** (ModeFrontier, Galapagos, other)
+ **Microprocessing and robotics** (Arduino, sensors, Processing, other)
+ **Computer drawing** (Processing, Javascript, other)
+ **Information modeling** (Grasshopper, CATIA, other)
+ **Digital simulation** (Ecotect, Robot, SolidWorks CFD, other)
+ **Cloud computing** (Amazon EC2, Autodesk 360, other)
+ **Bio computing** (BSim, Formulize, DNA Origami/CADnano, other)

NOTES

For students who are interested in the **Living Architecture** class from the Visual Studies sequence, this class will allow for the opportunity to learn similar techniques and design similar interactive projects—but here they will be framed in a broader context of next-generation computation and design.

Work from this class will have the opportunity to be published in a **forthcoming book** alongside contributions by ground-breaking computer scientists and designers from the **MIT Media Lab**, **Columbia Department of Computer Science**, **Cornell's Creative Machines Lab**, **Autodesk Research**, **Bentley Systems**, **NVIDIA**, and **IBM**.

This class grows out of a series of events held over the past three years in Wood Auditorium and organized in collaboration between Columbia Graduate School of Architecture, Planning and Preservation, and Columbia Department of Computer Science. This series brought leaders and innovators in many fields to GSAPP to discuss the **next generation of computing in relation to design**, and the class will build off of the ideas and tools presented in this series.
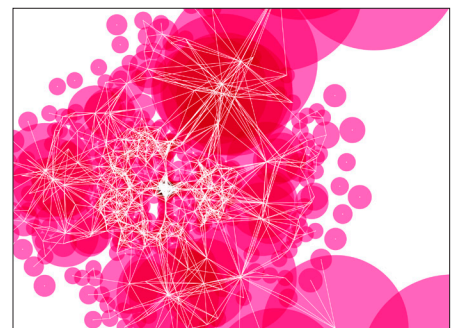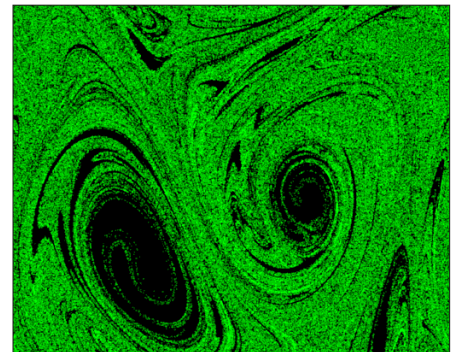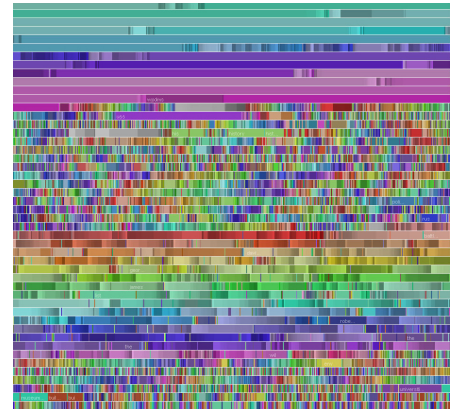
Images (top to bottom): Visualization of thousands of wikipedia edits made by a single software bot (Fernanda B. Viégas, Martin Wattenberg, and Kate Hollenbach); Self-assembling, adaptive building blocks (Molecubes by Hod Lipson, Creative Machines Lab at Cornell University); Computer graphics card used as a parallel processor to compute intensive calculations such as real-time fluid dynamics simulations (NVIDIA); Software programming language created by and for artists (Processing by Casey Reas and Ben Fry); Self-repairing, self-modeling robots (Hod Lipson, Creative Machines Lab at Cornell University).