

Sustainable Technologies for Experimental Media and Materials

Sustainable Technologies for Experimental Media and Materials [STEM]

This proposal re-purposes the exhaust area of the CNSI building (Elings Hall), transforming the utility parking lot into an environmentally aware media-and-materials garden. The project takes an ecological stance toward extending knowledge, by occupying research niches generated through the interactions of various disciplines.

The mandate of the project is threefold: to harness environmental data and energy, to process trans-disciplinary knowledge, and to produce low-power multimedia systems and works employing green materials and technologies.

Project Motivation

The Media Arts and Technology program (MAT) at UC Santa Barbara is a nexus for trans-disciplinary research. A partner in the California Nanosystems Institute (CNSI), MAT is home to visual artists, engineers, musicians, architects, and computer scientists. Together, the community is actively working to advance the state of the art through an engagement with discourse, research, and modes of production that are consciously open, hybrid, and laterally connected. It is within this context that the STEM project instantiates a line of inquiry foregrounding ecological considerations at all stages of research, drawing on the continuum of surrounding resources from the most fundamental (such as local energy flows) to the most highly evolved (such as local knowledge networks).

This requires a retooling of multimedia practice in terms of material and energy flow within a thermodynamic environment. Such practice extends beyond the usual considerations limited by the classical notions of 'lab' and 'building' and requires the formulation of a structure that is dynamically adapting to its ecological niche.



Satellite view of the STEM / CNSI ecosystem

Site Design

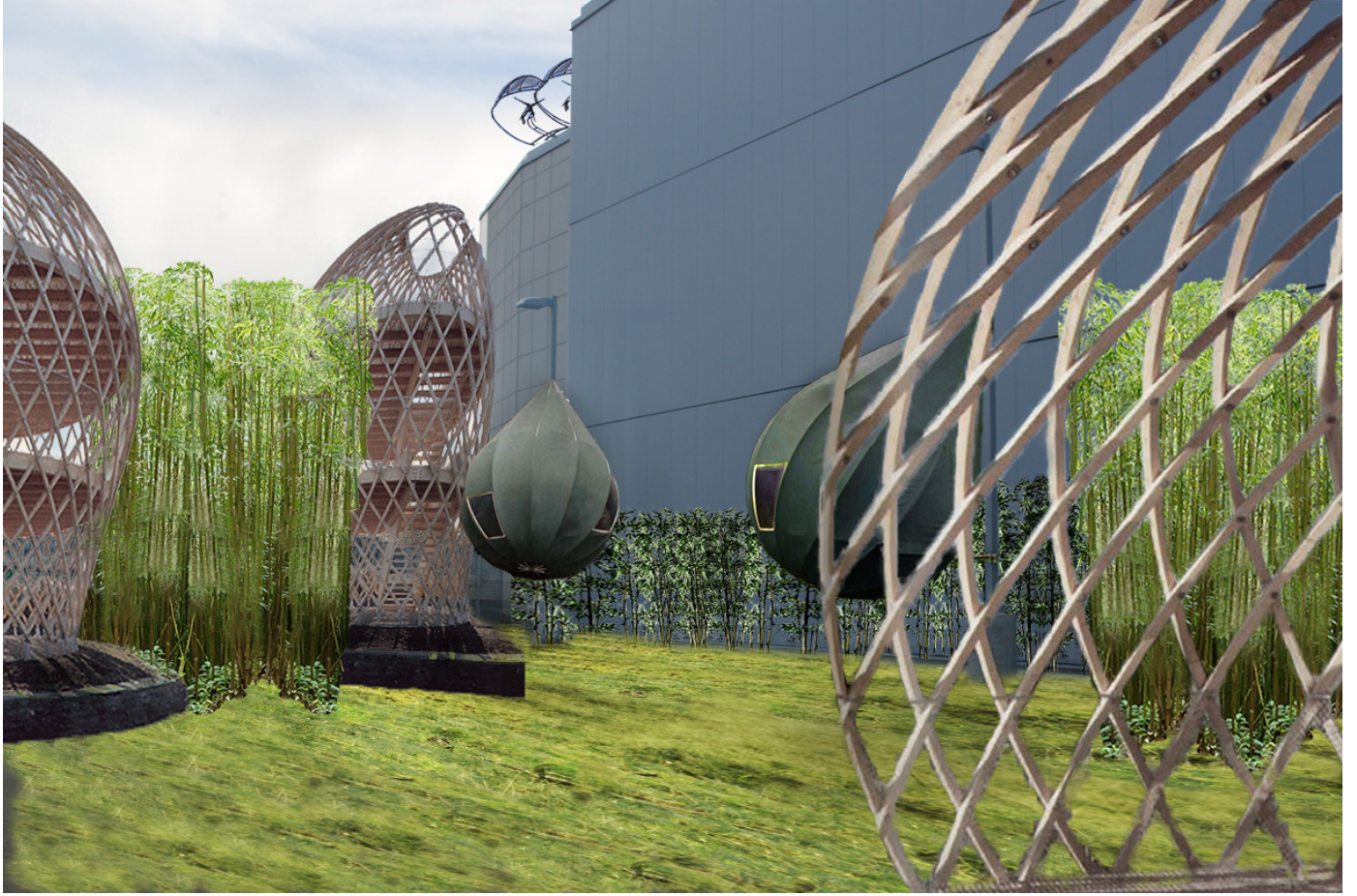
The site of the STEM project occupies a unique niche with proximity to the cutting edge of media arts, nanoscience, and quantum computation research, each of which is confluent in the research agenda of the initiative. Significantly, the site is not centrally located within the CNSI but exists on the fringes in terms of both its conceptual content and physical placement. The chosen site is precisely where the waste exhaust of the CNSI building is expelled. From the point of view of the STEM *organism*, this is actually advantageous as it propels forward in exploring sustainable multimedia spaces and the mutability of form and content through collaborative problem solving.

Harnessing the Environment

In constructing a sustainable media center behind the CNSI, identifying and harnessing renewable energy sources is key to forming the primary layer of material-energy support. On initial inspection, both solar and wind sources seem viable. In terms of recycling waste energy, the sizable air outtake system on site could potentially power another wind turbine system. A "power station" will enable visitors to learn about and contribute energy into the system by pedaling a stationary bike. Used vegetable oil from restaurants on campus will be collected and re-used as energy and insulation. In addition, the site will measure its own use of energy as well as any information available in its vicinity. This includes the exhaust generated by its neighbor, the CNSI building.

Specific research topics of the STEM project deal with the interplay between energy and resource consumption, computational infrastructure, and cultural engagement. Such topics include:

- Low-powered multimedia and low-energy software design
- Intelligent energy management through sensor technology
- FLOSS (Free Libre Open Source Software) software for a sustainable media lab
- Utilization of and experimentation with green materials in novel ways toward multimedia production (particularly with an eye toward making use of research done on campus)
- Use of renewable energy sources to power multimedia systems
- Production and dissemination of designs, art works, structures, and documents based on technological and conceptual research activities





Processing Knowledge

The core issues of the STEM project form a complex network of interconnected and recursively modifying research tasks that cut across the hierarchy of disciplines and practices involved. Comprehensively taking them on requires a multifaceted approach, each operating at multiple levels of cultural and technological production, and each being brought to bear on the others. The main categories of activity include a range of materials science, clean technologies, computational disciplines, and the synthetic disciplines of architecture and art, capped with a transdisciplinary critical discourse. Each of the various practices circumscribed can themselves be placed in a number of groupings such as materials-energy->sensor networks->software design->architecture or software design->architecture-art practice->critical discourse when looking at closely related items.

However, more provocative combinations can be generated when looking at second- and higher-order connections, especially when taking into account forces of downward causation.

Some possible examples include critical discourse->architecture->software design->computational hardware->materials or art practice->software design->energy. Questions of these particular groupings might include "How does a computational approach to architecture that makes use nano-materials at the human scale challenge the design strategies and methodologies of materials research in terms of computation and technique?" or "How do the creative goals of artistic practice, where the search for novel qualia is of central concern, induce a reconfiguration of sustainable energy technologies in the technological and cultural ecosystem?".

Producing Content

The space is both a working environment and a performance environment; a place to learn and a place to share that knowledge with an audience.

The work generated by researchers will help to reveal some of the mystical relationships that arise out of the confrontation between nature and progress. What emerges from the space will be the result of a metabolic processing of cross-pollinated communication. A garden of knowledge.

*TO BE DEVELOPED *MUCH* FURTHER*

Summary

The goals of this project are to:

- Advance the state of the art with respect to media arts and sustainable technologies
- Help to reuse and recycle waste products on campus and add to the sustainability of the research programs taking place in the CNSI
- Serve as a nexus of ideas and knowledge regarding the intersection of the Media Arts and Technology Program and other research programs in the CNSI and across campus.

Related Entities on Campus

Arch Lab

www.cs.ucsb.edu/~arch/

Computer Architecture research will define with the way that future generations of computing machines will be organized and designed. The UCSB ArchLab, directed by Professors Fred Chong and Tim Sherwood, aims to push the frontiers of computer architecture by taking an interdisciplinary and cross-cutting approach. Computer Architecture is not an island, but rather it sits between algorithms, operating systems, compilers, circuits, networks, and security; by looking at computer architecture through the eyes of it's application we can enact the biggest change. This is the basic philosophy of our lab.

CITS - Center for Information Technology and Society

<http://cits.ucsb.edu/>

Our research examines many aspects of the social and cultural transitions underway at present around the globe, but we have a particular focus on technological change and three topics: Social Collaboration and Dynamic Communities; Global Cultures in Transition; and Technology in Education. We are currently working on expanding our research initiative portfolio to include additional research initiatives on Social Computing and Trust, Reliability, and Information Security Online.

Environmental Media Research Focus Group

- part of the IHC

Solid State Lighting and Display Center (SSLDC)

<http://ssldc.ucsb.edu/>

- High efficiency lighting system for general illumination
- Solid-state light >80% theoretical energy efficiency
- Luminous efficacy of 200 lm/watt

applications

- mobile devices
- large displays
- lighting

Other technologies

- laser projection systems
- other ways of modulating visual-spatial domains