FAB LAB ATHENS

Research, Invention and Making
Open Lab

Proposal *for creating a Fab Lab in Athens*

Athens/Barcelona
May 2011

VISION

Research, Invention and Making

FAB LAB ATHENS is interested in researching and take action in

1.current phenomenos, (global and local economical crisis, cities interventions etc)
2.science fields of production,designing,communication etc
3.allowing new inventions to happen by offering the infrastracture as well as the knowledge that is gained out of making, the goal is that we offer the tools and we allow creativity and experimenting to lead to specific results based on innovation.We constantly learn form the people we teach and vice versa. We are mainly interested in the knowledge through making and creating.

Research

FAB LAB ATHENS located inside a Polytechnic University (NTUA),therefore, within an academic environment seeks for developing new research programs both independent and connected with the University. Some of the topics of the reserach iniciatives are related with:
1.Cities
(how to use the new technology to produce new ways of mapping information,extracting existing data and logics,create interfaces able to interact with the users, propose new ways of inhabiting, performing, transforming the city into an adobrable living organism in equilibrium and direct interaction with its environment and their users)
2.Energy and Intelligent objects
(how to think of a new family of objects embaded with artificial intelligence that can collect and process data related with energy collection and saving through a series of principles of interaction)
3.New Materialities
(how to use advance fabrication and electronic techniques to create new materials with controled properties. Experimenting with forms generated by new intelligent materials, a step beyond existing rapid manufacturing techniques, self formed objects etc)

Invention and Making

FAB LAB ATHENS in the effort of promoting Invention and learning through Making proposes a series of actions such as:
-OPEN LAB Athens (Social events)
-Events/Sharing with Community/Diffusion
-FAB Academy Athens
-FAB LAB Workshops

OPEN LAB Athens

FAB LAB ATHENS objective is to transform a static laboratory into a dynamic, open and interactive environment. The goal is to show and explain to people that they can do almost everything by themselves, that technology allows us to design, produce, print, build, interact and invent almost everything one had imagined.

FAB LAB Athens will be open 2 days per week to the public, for everybody interested to visit, ask advise, imagine and eventually create and learn out of making.
The FAB LAB operators will be supporting the visitors interested even (visitors can be related with the design field or not). The main objective is to familiarize people with new technologies and provoke them to think, imagine and make, familiarize children and enhancing their potentials to invent and learn by inventing.

FAB LAB Athens will be also organizing weekly workshop sessions open to anyone interested with a symbolic fee. The workshops will be focusing in the fields of design, fabrication, new materials, casting, molding, making electronics and chips, producing interactive simple objects, generate energy, insert the thinking of sustainability within design and production etc...

Events/Sharing with Community/Diffusion

One of the FAB LAB ATHENS main objectives for the project is to create a **full activity center:**

-OPEN LAB ATHENS, Social events: the laboratory opens to all people interested twice per week
-FAB MAKE ATHENS: Workshops during the year aimed at students, profesioanls and plain citizens with the objective to familiarize people with the new technologies and allow them learn by making
-FAB SHARE ATHENS (2 annual exhibitions): will be a series of exhibitions organized by the FAB LAB ATHENS. Its objective will be to gather people together in an open event where simultaneous acts will take place. Exhibitions of the workshops,research and projects developed at the Lab as well as Open Markets with customized objects of the people attended the open sessions etc..
-**ATHENS FAB CONFERENCES** will be a series of lectures and debates with guests experts from different diciplines related with digital fabrication,personal fabrication, DIY thinking, interactive architecture etc.

FAB ACADEMY Athens

Fab Academy is the university of Fab Labs, its campus is the world and their classrooms are the Fab Labs in different countries: Iceland, Netherlands, South Africa, Ethiopia, Peru, Spain, among others. The Fab Academy is a model of distributed education in the principles, applications and implications of Digital Fabrication.
The Fab Academy was launched to provide access to advanced instruction for students in the fab labs exceeding the educational resources locally available to them. It links groups of students and instructors in fab labs, with online video collaboration and lectures by a global faculty. Unlike remote instruction from a central campus, the digital fabrication tools in a fab lab effectively allow the campus to come to the student, for distributed rather than distance education.
Fab Academy Certificates provide familiarity with technical options and capabilities, hands-on experience, and direction for further study. Each requires, and is evaluated by, developing and documenting projects. They are periodically renewed to reflect best practices. The Fab Academy consists of 16 certificates that make up a 9-month diploma in Digital Fabrication. The Fab Academy forms and trains new managers of new Fab Labs as well as new instructors for the existing Fab Labs.

Admission is limited by available space, and based on balancing the students' backgrounds, interests, and experience, as well as project portfolios. Fab Academy tuition is priced to cover the local costs of instruction, facilities, and materials, as well as global capacity. Where possible, support is sought for needs-based tuition assistance.

The Fab Academy is directed by Neil Gershenfeld, "produced" by Vicente Guallart and Sherry Lassiter, and coordinated by Tomas Diez.

FAB LAB ATHENS objective is to run a Fab Academy program in the academic year 2012-13 or in 2013-14.
For this objective FAB LAB ATHENS will arrange that 1 or 2 of the people that will be running the lab will study at the Fab Academy Barcelona during the academic year 2011-12 or 2012-13

Fab Academy Barcelona
Fab Academy Barcelona through Vicente Guallart and Tomas Diez support the FAB LAB ATHENS initiative and will be willing to accept 1 or 2 members from Greece to join the Fab Academy Barcelona program.

FAB ACADEMY
ATHENS

Fab Lab Workshops

Fab Lab Athens agenda includes a series of workshops offered to profesionals, students as well as all interested citizens

1.PROFESIONALS
from the field of enginnering,architecture,computer science,design etc
2.STUDENTS
form the field of architecture,engineering,physic,telecommunications, computer science, sociology, design etc
3.CITIZENS
plain citizens with no education in design, production or fabrication,children and others

Workshops are to be divided in the following main categories:
1. **Cities** (*new proposals for planning actions related with new ways of inhabiting)*
2. **Electronics /DIY Machines**
3. **Design Techniques and Digital-Personal Fabrication**

1.CITIES

1.1 Urban Kit Sensors

One of the key elements in any associative design model is the data to which it responds. This workshop will investigate several modes for interacting with real time, real life data using a combination of existing data libraries and prefabricated sensory nodes. The workshop will use a specific district as a data source as well as a testbed for spatial configurations generated from the recorded data. Participants will engage these topics through Grasshopper, a generative modeling tool for McNeel's Rhinoceros.
Software to be used:
Arduino, Grasshoper, gHowl + Processing or Firefly
Required machines for the workshop:
CNC Milling machine, Laser Cuter
Modela MDX-20 + Electronic Components
-Soldering machine, Plates, Chips, Connectors, etc.

1.2 Natural Logics

Research on natural structures leading to extract codes and logics to be applied in contemporary structures of housing and urban environments. We think of the home and the cities as an indistinct that fits itself symbiotically into the surrounding ecosystem. Nature, understood as a vast field for research, can be considered as the territory to develop any architectural process, thus requiring the recognition of its basic principles and functional logics, in order to be able to interact with it in a specific and precise manner.
Software to be used:
Rhino, Ecotect, Grasshopper, Scripting, GIS
Required machines for the workshop:
3D printer, CNC Milling machine, Laser Cuter

1.3 Multi scalar Sustainable Design

The objective of this research is to set up a logical structure that leads to approach a project starting from multiple layers which interact to create a town or a city.
This research is supporting the idea of the multiscalarity that is trying to test if the urbanity is working with the same logics in different scales. The research´s objective is to propose new way of inhabiting our houses,cities and finally our entire planet.
Software and techniques to be used:
Arduino, Processing, Internet 0
Required machines for the workshop:
CNC Milling machine, Laser Cuter
Modela MDX-20 + Electronic Components
Soldering machine, Plates, Chips, Connectors, etc.

Reference Projects: Hyperhabitat,...

2.DESIGN TECHNIQUES AND DIGITAL-PERSONAL FABRICATION

2.1 CNC Cutting – Introduction to Computer Numerically Controlled (CNC) machine tools

From 2D to 3D. Introduction to the generation of three-dimensional shapes from 2D designs and vice versa. Exploration about different ways of structuring models through modeling tools and the use of laser cutting. Generation of GIK games (great invention kit). Basic examples of stencils.

Software to be used:
Rhinoceros
Illustrator
Autocad
Required machines for the workshop:
CNC Milling machine, LaserCut, VinilCut

This workshop could be possibly divided in 2 parts:
2.1Design of three-dimensional shapes from 2D modeling. Design of complex shapes using the waffle structure. Lamps, sculptures, and others.

2.2 Development of stencils for making t-shirts, stickers or graffiti.

2.2 Molds

Make your own molds where you can experiment with different materials and shapes. 3D Modeling of an item to be reproduced as many times as you want, mold manufacturing, casting with different materials.

Software to be used:
Rhinoceros
Modela Player
CAD
Required machines for the workshop:
CNC Milling machine, LaserCuter, Modela

2.3 Bionic 3D Printing

Oriented to represent the human body and its modifications. Working with speculations in the human body, creating changes and modifications of our bodies or any elements that may be attached to it. The workshop is starts with a 3D scanning of a part of our body.

Software to be used:
Milkscanner
Processing
Rhinoceros
zPrint
Required machines for the workshop:
3D printer

2.4 3D Scanning

Through a 3D Scanner we analyze a physical object and we collect the data of its shape.
Once digitized, the object is modified and modeled so that it could later be 3D printed
through digital technologies.

Software to be used:
MeshLab
Rhinoceros
Milkscanner
Processing
Dr Picza
Required machines for the workshop:
3D Printer, Scanner Next Engine, Modela Scanner, Home made scanner

2.5 Architecture and 3D Printing

Develop models and prototypes of architectural projects. This workshop is dedicated to students of Architecture, architects and other professionals related with architecture.
The workshop consists in introducing the use of rapid prototyping tools in the field of
architecture and design.

Software to be used:
Rhinoceros
zPrint
Required machines for the workshop:
- 3D printer

2.6 Furniture design

Design and fabricate your customized furniture. Furniture that can be manufactured at a desktop, use of different properties of the materials to make our own table, chair or other household items.

Software to be used:
Rhinoceros
Autocad
Inkscape
Required machines for the workshop:
CNC Milling machine, LaserCut

2.7 Laser cutting+Vinil Cutting for Graphic Designers

This workshop is oriented in exploring the different options to go from two-dimensional means to three-dimensional objects. The workshop is aimed at graphic designers and any other type of professional of graphic arts, but as always is open to anyone with interest in the subject.

Software to be used:
Illustrator, Rhino, AutoCAD
Required machines for the workshop:
CNC Milling machine, LaserCuter, Modela

2.8 Hacker Lab

Change the properties of an object and adapt it to your needs. Participants will bring an object that will be modified or “hacked” with the Fab Lab tools

Software to be used:
- Whichever
Required machines for the workshop:
CNC Milling machine, LaserCuter, Modela, VinilCuter

2.9 Sustainable Design and Local Fabrication

Research on parametric design software (Ecotect, Grasshoper) and scripting techniques for producing prototypes of self sufficient solar buildings.
The production of prototypes will be based on testing the potentials of digital manufacturing techniques and local fabrication.

Software to be used:
Ecotect, Rhino, Grasshoper, Scripting
Required machines for the workshop:
3D printer, CNC Milling machine, Laser Cuter

2.10 Collaborative Design and Local Fabrication

This workshop will be based on open projects (such as the CCloud project) and will investigate the potentials of local fabrication and distributed design. The open projects in which the workshop will be based will give to all participants the access to contribute in their development. The objective is an attempts to produce a physical object based on participation that goes beyond the limits of physical proximity. Collaboration will be made possible based on interfaces which allow the participant to design and inform the open projects.

Software to be used:
Existing Interfaces, Monkey script, grasshopper
Required machines for the workshop:
Laser Cuter

2.11 Open Source Design

Worskhop towards the design of a platform where open source designs will be uploaded and modified constantly. Introduction to Creative commons license and development of individual designs based on modifications of already open source designs or made out of scratch.

Software to be used:
Web, Illustrator, Rhino, AutoCAD and others
Required machines for the workshop:
CNC Milling machine, Laser Cuter, Modela

3.ELECTRONICS/DIY MACHINES

3.1 Self-Replication machines

Fabricate your own machine in the FabLab and this machine will be able to replicate itself.
Commercial packages versus machines that make machines. Building a prototype machine able to reproduce itself (Makerbot and MTMM)

Software to be used:
Rhinoceros
CAD
Python
Required machines for the workshop:
Laser Cuter, Modela, Arduinos

3.2 Circuit Fabrication

Fabricate your own circuits! Design and manufacture of basic circuits. Electricity and basic electronics. Participants in this workshop will be able to develop their own electronic chips using software and hardware in the Fab Lab.

Software to be used:
Eagle
CAD
Required machines for the workshop:
Modela MDX-20 + Electronic Components,
Soldering machine, Plates, Chips, Conectors, etc.

PARTNERS

FAB LAB ATHENS counts with strategical partners for the development of the project:

NTUA, NATIONAL TECHNICAL UNIVERSITY OF GREECE, www.ntua.gr

The National Technical University (NTUA) is the oldest and most prestigious educational institution of Greece in the field of technology, and has contributed unceasingly to the country's scientific, technical and economic development since its foundation in 1836. It is closely linked with Greece's struggle for independence, democracy and social progress.

NTUA is divided into nine academic Schools, eight being for the engineering sciences, including architecture, and one for the general sciences.
The nine main Faculties (which are divided into 33 Departments), are the following:

1. School of Applied Mathematical and Physical Science
2. School of Electrical and Computer Engineering
3. School of Chemical Engineering
4. School of Architecture
5. School of Civil Engineering
6. School of Mechanical Engineering
7. School of Rural and Surveying Engineering
8. School of Mining Engineering and Metallurgy
9. School of Naval Architecture and Marine Engineering

NTUA counts with a fully equiped Fabrication Laboratory which will be used to host FAB LAB ATHENS project.
The laboratory consists in the following equipment:

1.CNC milling machine *(more details about model,date to be added)*

2.3d printer 01 *(more details about model,date to be added)*

3.3d Printer 02 *(more details about model,date to be added)*

4.3D Scanner *(more details about model,date to be added)*

5.Thermoforming Machine *(more details about model,date to be added)*

6.Flatbed Cutter *(more details about model,date to be added)*

7.Laser Cutter *(more details about model,date to be added)*

Image Source: www.ntua.gr

NTUA Fabrication Laboratory existing infrastructure

Views of the existing Fabrication Laboratory at NTUA
Images Source: www.ntua.gr/archtech/lab.html

NTUA Fabrication Laboratory existing infrastructure

3D Printer 01 (use of elastomeric material)
Image Source: www.ntua.gr/archtech/lab.html

3D Printer 02 (use of abs material)
Image Source: www.ntua.gr/archtech/lab.html

Flatbed Cutter
Image Source: www.ntua.gr/archtech/lab.html

Thermoforming machine
Image Source: www.ntua.gr/archtech/lab.html

3D Scanner

Laser Cutter

CNC Milling Machine

Images Source:www.ntua.gr/archtech/lab.html

EXTRA EQUIPMENT TO BE ACQUIRED

-CNC Modela MDX-20
-Vinyl Cutter GX-24 Camm Servo
-Electronics Equipment:
reprogrammed microcontrolers of several capacities,electronic components for the production of circuits, Oscilloscope for observation of constantly varying signal voltages and radioelectric signals, different types of sensors: light,temperature, proximity, sound etc, different kind of actuators: motors,servomotors, LEDs, loudspeakers etc,soldering stations, resistors, conectors, cables
-Molding and casting equipment (wax,rubber,plastic)

DIY EQUIPMENT TO BE PRODUCED WITHIN FAB LAB ATHENS

- Maker Bot, www.makerbot.com
- Rep Rap Mendel, www.reprap.org/wiki/Main_Page
- Fab@Home, www.fabathome.org

HARDWARE TO BE USED

- Policom system, High definition telepresence,video and voice or
- HD camera with a reducing environmental sound system microphone
- 1 PC per fabrication machine

SOFTWARE TO BE USED

FAB LAB ATHENS as every FAB LAB in the network will be using open source software such as LINUX and UBUNTU

PARTNERS
FAB LAB BCN, http://fablabbcn.org/

The Fab Lab Barcelona is a research and production center that uses
Digital Fabrication technologies for the production and the intervention of our reality. The Fab Lab Barcelona is located at the Institute for Advanced Architecture of Catalonia (IAAC) and belongs to the Fab Lab global network, a project leaded by the Center for Bits and Atoms at the Massachusetts Institute of Technology.
Within this network, the Fab Lab Barcelona promotes educational programs related to architecture, design, physical computing and digital fabrication.
Fab Lab Bcn consists of 2 laboratories.
1.IAAC and 2.Disseny hub Barcelona

Fab Lab Barcelona has the vision to become something more than a machine laboratory making things. Its objective is to become a laboratory of PEOPLE that make things, converting the relationship between machines and humans more fluid. The Fab Lab Barcelona seeks to make the process of design, manufacture and production methods more accessible in terms of knowledge, time and money.
The Fab Lab Bcn wishes to establish a closer relationship between technology, architecture and design, and discover ways of how these elements may have a greater impact and value in reality, not only from the economic point of view but also from the social, functional, energetic and human point of view.
The Fab Lab Barcelona aims to become a global reference in Digital Fabrication applications, as well as in spreading in different countries, through training programs and implementation of new laboratories.

FAB LAB BCN supports FAB LAB ATHENS and there is a common objective of future collaboration in reserach projects as well as academic and innovative programs.

Image Source: FAB LAB BCN

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