Iaac

Institute for advanced architecture of Catalonia

BARCELONA

THE INSTITUTE

The Institute for Advanced Architecture of Catalonia (IaaC) is a leading centre in research and education in the field of Advanced Architecture, with a project of digital fabrication and self-sufficiency considered a reference in Europe, as well as contributing to making Barcelona become the world's first Productive and Self-Sufficient city.

The Institute offers multidisciplinary Master Programs and Postgraduate programs, developed in close collaboration with companies, and a global network of select faculty, all specialised in their diverse fields.

IAAC PROGRAMS

MASTER IN ADVANCED ARCHITECTURE

- INTELLIGENT CITIES
- SELF SUFFICIENT BUILDINGS
- DIGITAL MATTER
- DESIGN WITH NATURE
- ADVANCED INTERRACTION

OPEN THESIS FABRICATION

- INTELLIGENT BUILDING CONSTRUCTION
- SMART URBAN ELEMENTS
- 3D PRINTING IN ARCHITECTURAL CONSTRUCTION

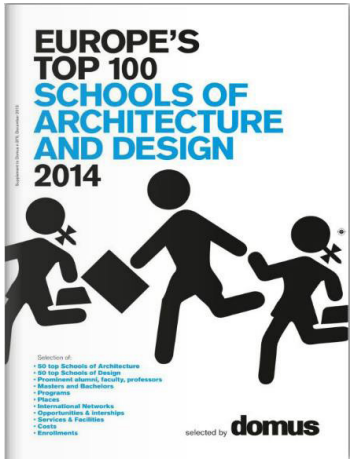
FAB ACADEMY

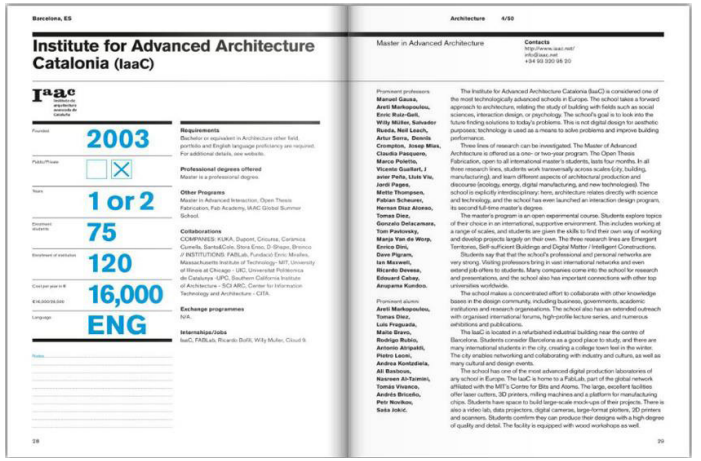
For more information visit:
www.iaac.net

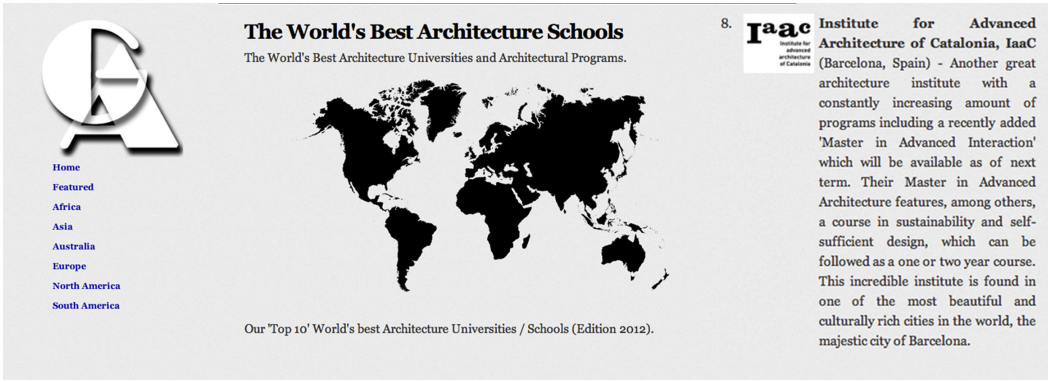
Or contact:
applications@iaac.net

IAAC INTERNATIONAL RANKINGS

The past 10 years of research and development in the Academic field have been rewarded with **global recognition**. IaaC, as an educational centre, is featured in several international rankings, being considered among the best graduate schools in the world.
Among these: **Domus Top 100 Schools** in 2013 and 2014, by **Obras** in 2013, by **GA Graduate Architecture** in 2013, and many more.







@22 CAMPUS

The Barcelona 22@ campus is located in the of the Poblenou neighbourhood, an innovative district offering a strategic concentration of intensive knowledge-based activities. The neighbourhood is near the historic centre of Barcelona and the seafront. IaaC is housed in an old factory building, with 2,000m2 of space dedicated to research and production. In this way the space itself is a declaration of principles, embodying an advanced, experimental and productive approach to architecture.

Iaac | Institute for advanced architecture of Catalonia | BARCELONA

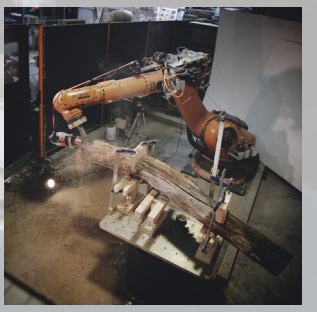
For more information visit:
www.iaac.net

FAB LAB BARCELONA

The IaaC premises also include the , an architecture and design-oriented fabrication laboratory which is part of the global network of Fab Labs set up by at MIT. The Fab Lab is equipped with a series of flexible computer controlled tools that cover several different lengths, scales and various materials, allowing students to build prototypes, also in 1:1 scales. The machines include: Laser cutters, a 3-axis computer-controlled subtractive milling machines, robotic arms, rapid prototypers such as 3D printers, microprocessors, digital electronic equipment and more.

FAB LAB BARCELONA

For more information visit:
www.fablabbcn.org



VALLDAURA LABS

The is a research center for self-sufficient habitats, located on an historic 130 hectare farm in the 20 minutes from downtown Barcelona. As part of IaaC's commitment to promote habitability on the basis of ecological principles, making the fullest use of all available technologies and resources, IaaC has created a research centre focused on the idea of self-sufficiency. Valldaura Labs is a testing ground allowing to learn directly from nature in order to apply this understanding to the regeneration of XXIst century cities.

valldaura Self Sufficient Lab

For more information visit:
www.valldaura.net

VALLDAURA LABS

VISION
To be an international centre of education and research on the self-sufficient human habitat in order to bring influential technologies and solutions to bear on the production of energy, food and things and contribute our territorial vision to the transformation of Barcelona and the cities of the world.

MISSION
Make a centre financially self-sufficient, from educational, research, and events, developing the full potential of the property functional related to the core of the farmhouse, the restaurant, the palace and the whole natural system.

VALUES
IaaC's Valldaura Self Sufficient Labs campus and its three laboratories — Food Lab, Energy Lab and Green FabLab — allow to research the production of key elements involved in self-sufficiency: food, energy and things, combining ancestral knowledge that connects us to nature with the latest advanced technology.

Wind Energy Machines
We5
Alejandro Martinez del Campo, Alessio Salvatore Verdolino, Hriday Siddarth Saini, Ricardo Perez Borbolla, Tobias Grumstrup Lund Øhrstrøm

ENERGY LAB
The Energy Lab of Can Valldaura is intended to develop a new model for the management and distribution of energy in buildings from renewable resources; biomass, solar, wind, working in partnership with Endesa.
Using this system we will be able to evaluate energy use, timing, intensities etc in order to effectively reduce overall consumption.

Permaculture Workshop
Mariano Bueno

FOOD LAB
Humans need the energy we get from food. Valldaura was an agricultural area in the early twentieth century and now recovers an activity that generates biodiversity in Collserola Park. Food production is based in different culture formats, including organic gardens, orchard plantations, edible forest products that come from farm animals, and is run entirely by students and researchers.

Kuka Chainsaw Workshop
Tom Pawlofsky

GREEN FAB LAB
Valldaura´s GreenFabLab subscribes to the same open and enabling philosophy to explore the frontier between technology, environment and people. Creating a local manufacturing hub involved in providing products and solutions to all aspects of humans daily needs from the materials that can be found only on site; and propose to add the ancestral knowledge of crafts to new technologies bringing together artisans, artists and artificers, working together to investigate, improve and innovate the tools required to build a self-sufficient community within the Collserola national park of Barcelona.

VALLDAURA LABS
A IAAC PILOT PROJECT

"Valldaura is a current testbed for further research and development on Self Sufficiency, Internet of Energy, Internet of Water and Digital Fabrication"

ENERGRID

Energrid project aims to develop a distributed infrastructure for buildings energy management. The project is funded by Endesa and developed by IAAC in partnership with i2Cat Foundation. Energrid integrates an ecosystem of wireless intelligent plu gs, sensors and energy generation systems on a single platform allowing to create logics that manage buildings energy consumption, generation and storage.
Valldaura is the main laboratory where the Energrid project is currently being tested in order to become a show room of the technology.
Each building energy consumption point is equipped with an intelligent node capable of measuring and actuating. Buildings are linked in an electrical network being able to produce, consume and store energy while sharing it with the other buildings.

HYDROGRID

HydroGrid is a project that promotes the development of a new holistic concept of water management, considering unitlevel solutions, with a multi scalar applicability.
In relation to the current management system, Hydrogrid proposes the combination of four innovative concepts: First, management is proposed based on the diversification of water sources from the fact that not all applications require the same quality water. Second, it is proposed the concept of recycling and reuse of water, similar to the current management model in the field of waste. Third, treatment and reuse in-site. Instead of gathering all the different water flow rates and lead as a unit to centralized treatment facilities, this concept provides treatment site reuse. Fourth, provisioning intelligence in each of the scales of the water cycle to allowing the active management of consumption.
The project aims to develop a test-bed in Valldaura where to put in practice all the project concepts and technologies in a single system.

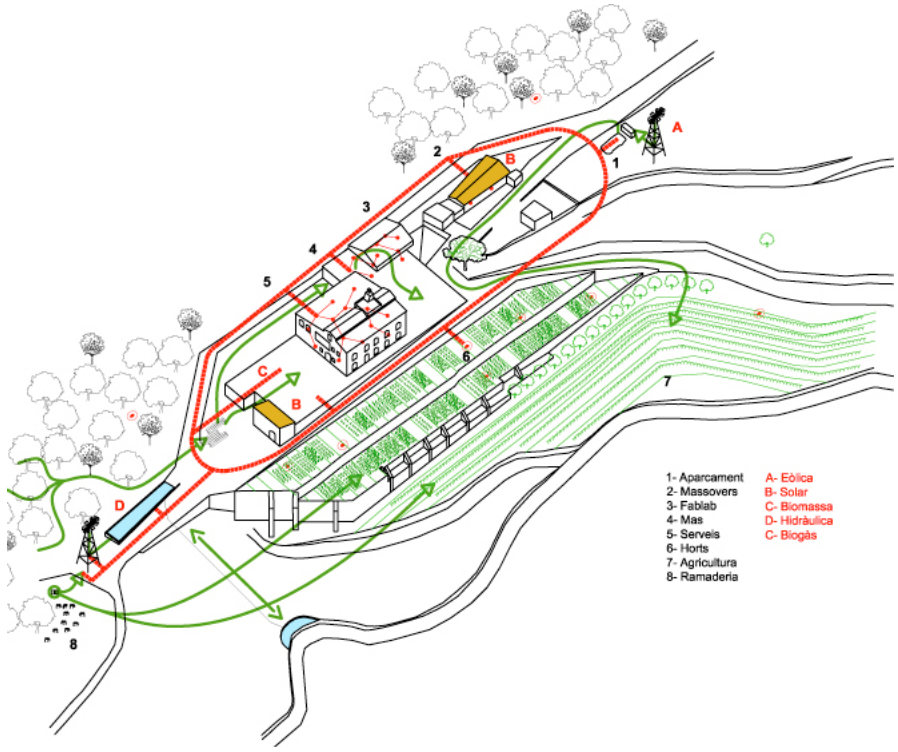
VALLDAURA SELF SUFFICIENT LABS: A SELF-SUFFICIENT TERRITORY.

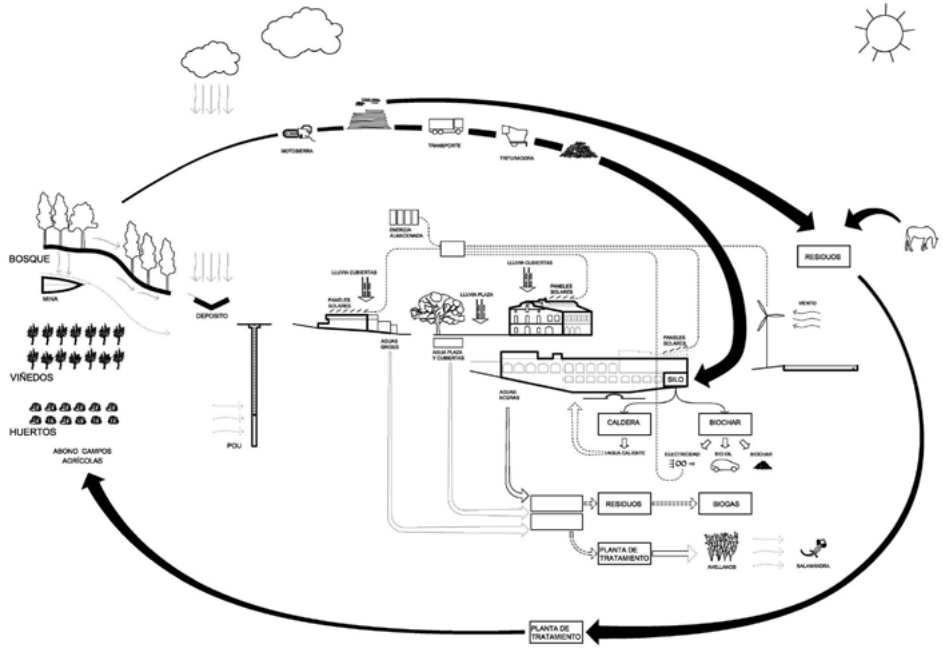
energrid

Sponsored by: endesa

Tech partner: i2cat

hydrogrid





OTHER IAAC PILOT PROJECTS

As part of IaaC's commitment to investigate less-explored areas of the Architectural discipline, pilot projects are launched on a yearly basis.

These projects operate in the field between academia, architecutal practice and information technologies, and are designed and fabricated entirely within the premises of Iaac in 22@ district, by Iaac faculty. The projects completed to date include the Fab Lab House, Endesa Pavilion, Hyperhabitat, Smart Citizen Kit to name a few and operate in a number of scales, from 1:1 architectural interventions to pocket-sized microprocessors, all sharing a common vision of investigation towards a more sustainable and socially empowering design approach. All projects have been welcomed with considerable success, with various distinctions in events such as the Solar Decathlon and the Venice Biennale.

In the process, Iaac collaborates with a network of partners from various disciplines, including leading universities and innovative companies.

For more information visit:
www.iaac.net/projects

ENDESA PAVILION

ENDESA Pavilion is a self-sufficient solar prototype installed at the Marina Dock, within the framework of the International BCN Smart City Congress. At the moment it is used as control room for monitoring and testing several projects related to intelligent power management.
The pavillion is actually the prototype of a multi-scale construction system. A facade composed by modular components, much like solar bricks, that respond to photovoltaic gaining, solar protection, insulation, ventilation, lighting. The same parametric logic helps adapt façade geometries to the specific environmental requirements for each point of the building. It is is a single component that integrates all levels of intelligence that the building needs.
From "form follows function" (classic XX century statement) to "form follows energy". The facade opens reacting to the solar path, being active and becoming permeable towards south, while becoming closed and protective towards north. The behavior of this skin makes the environmental and climatic processes that surround the prototype visible.

photos by Adrià Goula

FAB LAB HOUSE

The Fab Lab House Project lead by the Institute for Advanced Architecture of Catalonia, the Center for Bit and Atoms, MIT and a world wide network of fab labs was part of the Solar Decathlon Europe competition.

The 1:1 prototype is parametrically designed based on the parameters of longitude and latitude of the geographical place where it is to be implemented. The parametric digital model is able to generate the most optimum form based on that parameters so that the building could capture the maximum of solar energy during the whole year. The design goes beyond aesthetics and designer decisions and introduces the information of solar path and energy capturing as the base for the final design. Form follows energy.

Furthermore, the prototype has been entirely fabricated in the IaaC premises within the digital fabrication laboratory manifesting the capability of small scale workshops to contribute into the local fabrication not only of small objects but of entire buildings as well.

This enhances principles of sustainability referring to the construction process or material transportation promoting efficiency in all levels of a self sufficient building construction.

photos by Adrià Goula

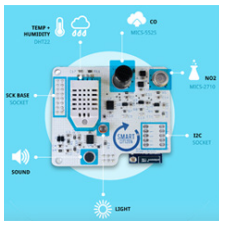
IN COLLABORATION WITH:

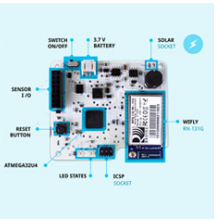
Massachusetts Institute of Technology

THE CENTER FOR BITS AND ATOMS
Massachusetts Institute of Technology

SMART CITIZEN

Smart Citizen is a platform to generate participatory processes of people in the cities. Connecting data, people and knowledge, the objective of the platform is to serve as a node for building productive and open indicators, and distributed tools, and thereafter the collective construction of the city for its own inhabitants. The Smart Citizen project is based on geolocation, Internet and free hardware and software for data collection and sharing (Smart Citizen Kit - SCK , RESTful api, Mobile App and, the web community), and the production of objects; it connects people with their environment and their city to create more effective and optimized relationships between resources, technology, communities, services and events in the urban environment. Currently it is being deployed as initial phase in Barcelona city.





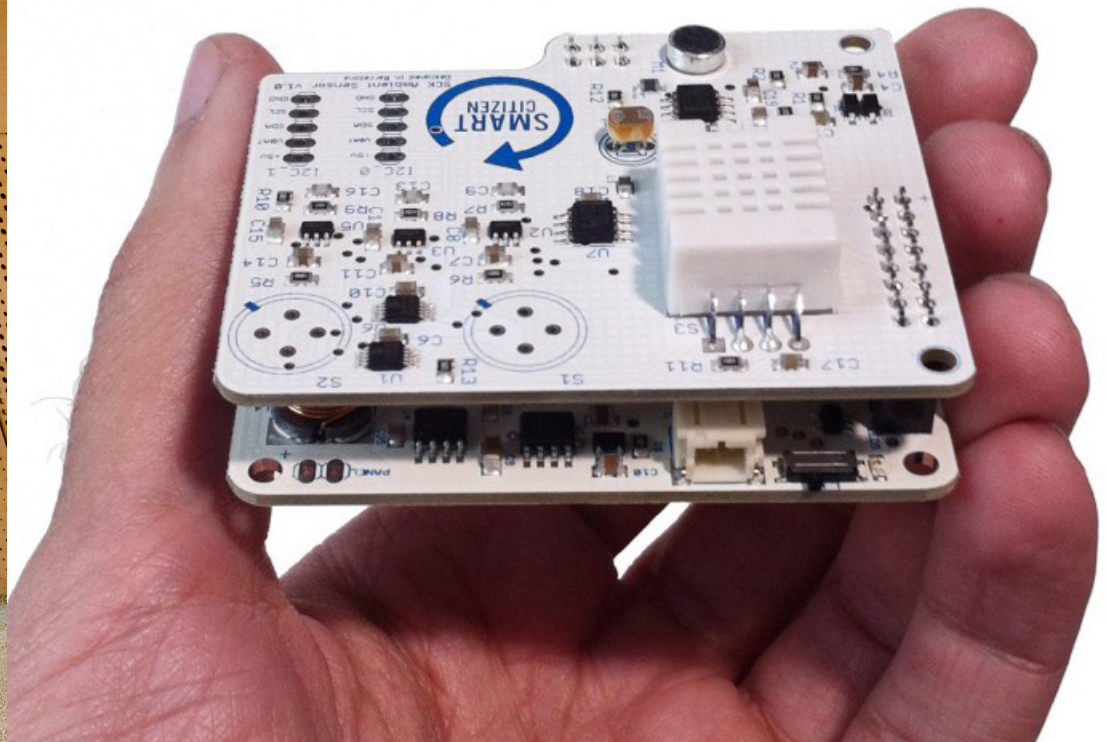
IN COLLABORATION WITH:

MID Media Interactive Design

HANGAR.ORG

GOTEO

ACROBOTIC Industries



HYPERHABITAT

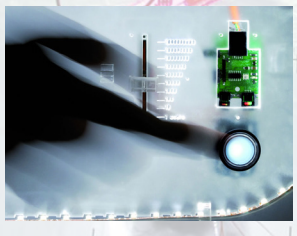
Hyperhabitat is an IaaC project for the 2008 Venice Biennale 'Out There: Architecture Beyond Building', curated by Aaron Betsky. IaaC's participation consists in a project in collaboration with Guallart Architects, The Center for Bits and Atoms at MIT and Bestiario. The project entitled 'Hyperhabitat: Reprogramming the World', sought to take the idea of the multiscale habitat to the limit. Hyperhabitat is a model for defining the physical world and its compatibility with the digital world using the principles of a network. The project defines a multiscale structure that can use the same principles to link any element of the physical world capable of having a digital identity, so that the world can be re-programmed by identifying new relational systems composed of local and global systems. Hyperhabitat uses the technology of Internet 0 (internet of things) developed at the MIT, CBA and it is the largest-ever installation using this microcomputer technology.

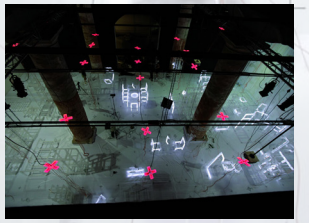
IN COLLABORATION WITH:

The Center for Bits and Atoms, Massachusetts Institute of Technology · {b.} bestiario

FOR:

la Biennale di Venezia di Architettura





DATA NET

In the courtyard of the Museu Frederic Marés DATA NET is born, another tree next to the existing ones. This new tree forms an interactive mesh covering the patio of the museum.
You see the installation illuminated but you also find yourselves, as a visitor, participating in the project. The intensity of light of the installation reacts to the location and the density of the visitors through a series of sensors that track people´s movement.
Visitors are not only observers of a space but participants in its creation, definition and variation.
DATA NET is reflecting a living organism that moves and evolves according to the data generated by the public.

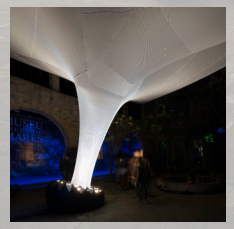
photos by Filippo Poli

IN COLLABORATION WITH:

Relco Lighting

FOR:

Ajuntament de Barcelona · Museu Frederic Marés · LLUM BCN 7, 8 i 9 de febrer de 2014 · Festes de Santa Eulàlia

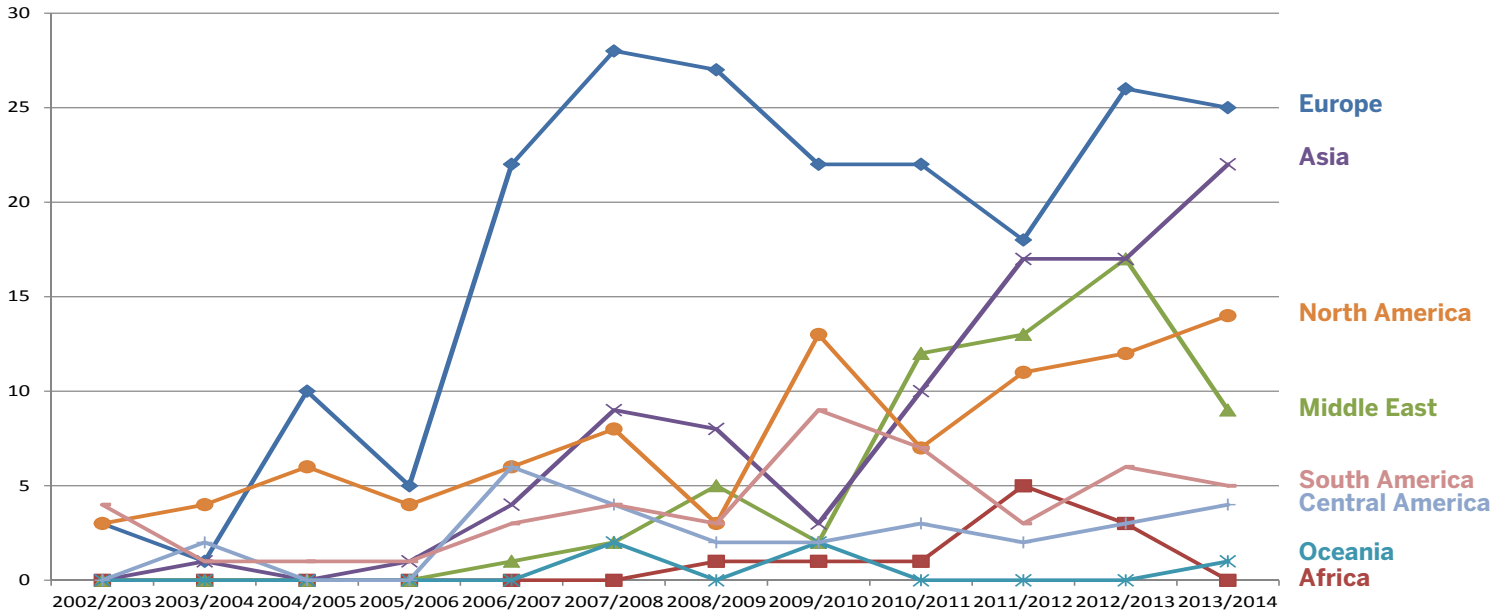


IAAC ALUMNI
A GLOBAL NETWORK

The Institute and Master Program Directors, together with the teaching staff, are committed to a long-term prospectus of creating an international research and academic network, on a global scale, centered in Barcelona. This network brings together international students, tutors and researchers from different fields of expertise materializing experimental forms of communication, inhabitation and planning.

In this way IaaC becomes the centre of a global Networked Hub, promoting collaboration as well as the exchange of knowledge, for Research and Innovation for the Habitability of the XXIst Century.

In this sense, over the last ten years, IaaC has received and been home to over 500 students from more than 60 countries, including China, the UK, the USA, Australia, the Dominican Republic, Mexico, Argentina, Puerto Rico, Ecuador, Peru, Germany, Iran, Thailand, Turkey, India, Poland, Cyprus, Portugal, Italy, Greece, Spain, Guatemala, Bangladesh, Colombia, Korea and more making it an exceptionally international and multicultural place.



IaaC Students and Alumni
2000-2014

MASTERS IN ADVANCED ARCHITECTURE

The IaaC's Masters in Advanced Architecture (MAA) focuses on new ideas for Future Cities and Buildings, Self Sufficiency, Digital Manufacturing Techniques, Advaced Interaction and Information Technologies.

In order to allow highest quality and applied research, the Masters in Advanced Architecture proposes a multi-disciplinary approach, considering architecture as a transversal field, for which it is imperative to integrate all research and applications with the knowledge of specialits from a diversity of fields of expertise.

Hence the 14th edition of the MAA emerges as an Innovative Structure focusing on 5 select Research Lines (Intelligent Cities, Self Sufficient Buildings, Digital Matter, Design with Nature, Advanced Interaction) all led by internationally renound experts, and mixing students and faculty from different disciplines and origines, towards the creation of a Networked Hub for Research and Innovation for the Habitability of the XXIst Century.

For more information visit:
www.iaac.net
www.iaacblog.com

When Energy Becomes Form
Hygroscopic Morphologdy // Kaleigroscope
Valldaura Labs
Students // Niel Parekh // Stephanie Bashir // Rodion Eremeev // Rodolfo Parolin Hardy

RS1 - INTELLIGENT CITIES
Senior Faculty: Willy Müller in collaboration with SCI-ARC, Hernán Díaz Alonso
Intelligent Cities Studio works on projects that range from territorial scale to the neighborhood scale. This is based on 2 premises: the understanding that countries and cities with emerging economies and cultures - by virtue of their regional or economic position - can contribute in great value to the planet as a whole; and the creation of intelligent territories that function in a multiscalar way, creating relations between nature, networks and nodes, while promoting the 'emergence' of an urban intelligence.

RS2 - SELF SUFFICIENT BUILDINGS
Senior Faculty : Enric Ruiz Geli + Mireia Luzárraga
Self Sufficient Buildings Studio works on scales that range from urban blocks to individual buildings developing principles and techniques for homes, that serve to organize the materialization of programmatic nodes of activity based on natural rules and principles.
As a result, the building goes beyond being a mere interface for the economic activities it houses to being an environment that stimulates its inhabitants and functions as an active part of the ecosystem in which it is inserted.

RS3 - DIGITAL MATTER INTELLIGENT CONSTRUCTIONS
Senior Faculty: Areti Markopoulou in collaboration with CITA, Mette Ramsgaard Thomsen
Digital Matter Studio explores how intelligent constructions in architecture go beyond traditional materials, working with digital content, information and fabrication for the generation of new techniques towards the production of non-rigid, responsive and multi-functional material and construction systems. Focusing on smart materials, able to adjust their properties to different environmental conditions, we study the possibilities of programming buildings from a nanoscale, and opening a new series of applications from architectural to industrial scale.

RS4 - DESIGN WITH NATURE
Senior Faculty: Javier Peña in collaboration with Collserola Metropolitan Parc.
Design with Nature Studio is based on the principle of "learning by doing", centering its studies in the sustainable habitat, it approaches four central aspects: food production, energy production, objects production and social interaction. The studio will use the case study of IaaC's Valldaura Self Sufficient Labs campus and its three laboratories — Food Lab, Energy Lab and Green FabLab — allowing to research the production of key elements involved in self-sufficiency: food, energy and things, combining ancestral knowledge that connects us to nature with the latest advanced technology.

RS5 - ADVANCED INTERACTION
Senior Faculty: Xavier Gonzalez & Carlos Gomez in collaboration with diverse ICT companies
Advanced Interaction Studio focuses on the use of technology within the boundaries of the human habitat exploring this context's potential. Based on the analysis and design of devices and systems, this research studio generates creative uses of technology for experimental and practical purposes. The learning-by-doing research metho integrates techniques used in design, programming and social sciences towards projects, prototypes and products that define the outer limits of what is possible to do imaginatively with technology today.

OPEN THESIS FABRICATION

The course is open to students and professionals who would like to develop a specific research agenda within the field of digital design and fabrication. The program focuses on the development and completion of full scale prototypes using advanced CNC machinery, applying experimental materials and testing smart energy solutions. The researchers' projects will be monitored by experienced tutors, and regularly discussed with external guests and consultants with specific expertise in the field. The program takes place in partnership with companies, offering advisory pannels every two weeks discussing further development of these projects.

IN COLLABORATION WITH:

CERÀMICA CUMELLA
Gres per a l'Arquitectura

KUKA

SANTA & COLE

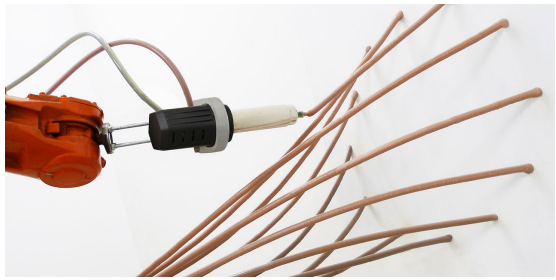
DUPONT

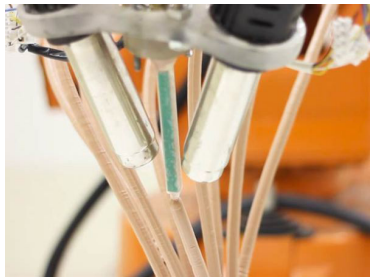
breincobluefuture

CRICURSA
Inspiring Glass Solutions

storaenso

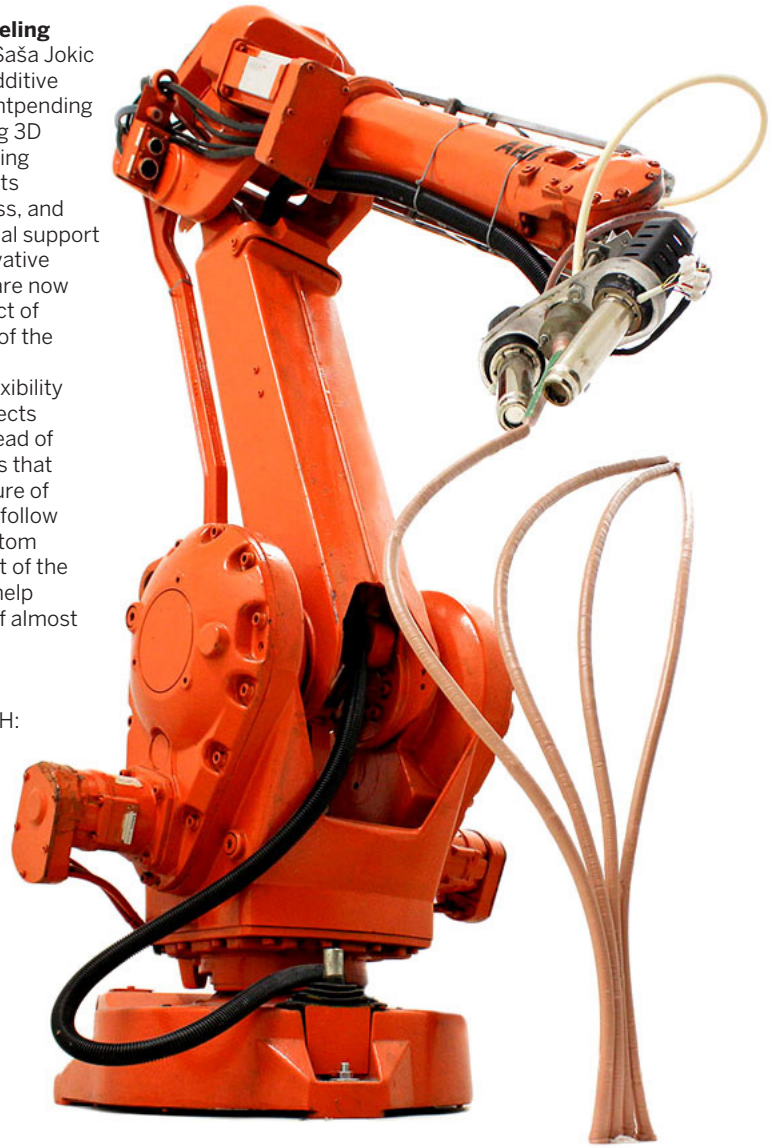
For more information visit:
www.iaac.net
www.iaacblog.com/openthesis/





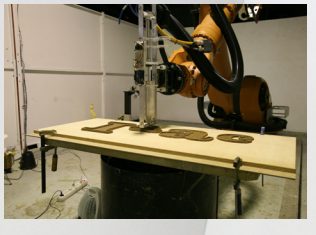
Matearial
Anti-gravity Object Modeling
OTF 2012 -Petr Novikov, Saša Jokic
A brand new method of additive manufacturing. This patentpending method allows for creating 3D objects on any given working surface independently of its inclination and smoothness, and without a need of additional support structures. By using innovative extrusion technology we are now able to neutralize the effect of gravity during the course of the printing process.
This method gives us a flexibility to create truly natural objects by making 3D curves instead of 2D layers. Unlike 2D layers that are ignorant to the structure of the object, 3D curves can follow exact stress lines of a custom shape. Finally, our new out of the box printing method can help manufacture structures of almost any
size and shape.

IN COLLABORATION WITH:
Joris Laarsman Lab



Pylos
OTF 2013 - Sofoklis Giannakopoulos
Pylos explores the possibilities of Robotic-aided 3D Printing with clay. Such a technology would open new possibilities to In-Situ clay construction, both in an urban and in a rural setting.

IN COLLABORATION WITH:
D-Shape and Monolite
Enrico Dini



VISITING PROGRAMS AND WORKSHOPS
GLOBAL SUMMER SCHOOL

IaaC develops a series of short visiting programs, under the form of workshops, opening the educational and research developed in IaaC to outside users interested in learning and participating in these processes. In doing so IaaC consolidates its already strong Global network.

One of these is the Global Summer School, a 3 week program, investigating multiscalar strategies for the (re) construction of our inhabiting environments (home, city, planet). The last few years of technological, social, political, economic and cultural changes (at both the global and the local scale) demand that we rethink what kind of habitat humanity will live in in the coming decades, given that space in all its aspects (landscapes, cities, places, buildings and bodies) is undergoing dramatic transformations. of the evolution of the city and architecture.

DISTRIBUTED EDUCATIONAL MODEL
IAAC GSS is an initiative which seeks to generate a dynamic network based on distributive knowledge and collective actions. As part of this initiative the Global Summer School takes place in different cities at the same time in Australia, Asia, Europe, Africa, South America, and North America.

For more information visit:
www.iaac.net/educational-programs/workshops-28
www.iaac.net/educational-programs/global-summer-school-21

HelioCELL, Global Summer School 2012

VISITING PROGRAMS AND WORKSHOPS

FAB LAB WORKSHOPS

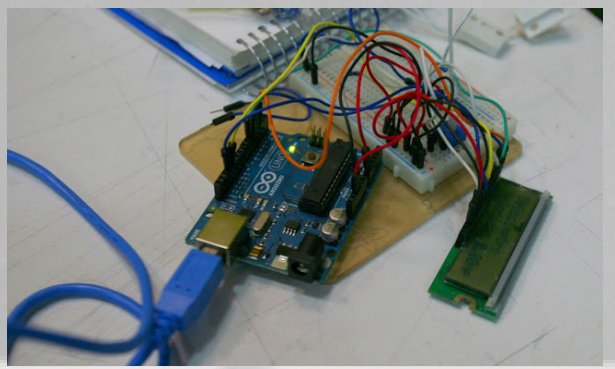
Digital Fabrication workshops oriented to professionals and non-professionals that want to anlargen their knowledge base regarding the diverse fabrication technologies.

OPEN WORKSHOPS
The workshops are open to participants without previous knowledge or required diploma.
There is no limitation in the age of the participants. Those workshops give the opportunity to all users from whichever dicipline to get familiarized with technology and learn-by-doing.

Some of the most relevant of these experiences:
DIY Lights, Scanning and 3D printing, Furniture Fabrication and Object Production, Arduino: electronics and programming, Fab Kids, Fab Skate, Fab Textiles, Smart Citizen, and much more.

For more information visit:
www.fablabbcn.org
www.fablabbcn.org/category/workshops/

Images from various Fab Lab Bcn Workshops



FAB 10

FAB10 Barcelona is the tenth international conference and annual meeting of the Fab Lab network. Fab10 Barcelona will gather the international Fab Lab community from more than 150 laboratories based in more than 40 countries, who share tools, projects, programs and processes in an open and collaborative philosophy.

DIGITAL FABRICATION
Additive Manufacturing / New Materials / Bio Fabrication / Subtractive Fabrication / Self-Assembly Structures / Codes into Materials / Material Computation

PRODUCTIVE CITIES
New Manufacturing / Cities Infrastructure for Citizen Innovation / Public Policy in the Making / Emergent Economies / Reindustrialisation of Cities

EMERGENT COMMUNITIES
Crowdsourcing Knowledge / Crowd-Funding Projects / Co-working / Collaborative and Sharing Economy

For more information visit:
www.fab10.org

Interested in sponsoring the event?
Contact: **fab10@fablabbcn.org**

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