Politecnico di Torino

DARC program

developing architectural education in response to climate change

An EU/AUSTRALIA ICI Education Cooperation programme Joint Mobility Project
RMIT University, University of Technology, Sydney, Queensland University of Technology in Australia;
Escola Tecnica Superior d’Arquitectura de Barcelona UPC Spain, École Nationale Supérieure d’Architecture de Toulouse,
Politecnico di Torino in Europe

Politecnico di Torino team research about sustainability

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The research project aims to develop innovative thermal insulation systems to elevated technological end environmental sustainable character, to be used both in case of new construction, both in the case of upgrading existing buildings, even historic.
Diagram of the corncob manufacturing process, useful for LCA experimental Insulating systems
A innovative active building envelope system that uses solar energy through gains and air-changers. A demonstration box is built up to test different envelope elements. Each component is equipped with a roll-bond, a passive system that uses a fluid as a thermal vector to produce heating and cooling in connection to a heating pump.
Energy Skin system
En_E_As: Environmental and Economic Assessment of building products

The research aims to compare building components integrating LCA and LCC for the development of sustainable design practices. Stakeholders involved in the design process (owners, suppliers, designers, etc..) can make decisions on the base of price / quality ratio, including environmental aspects into the "quality" concept.
Designing a new world: developing architectural education in response to climate change

Gabriella Peretti

Toulouse 21-23 November 2012
It is an active natural wall system based upon the sciences of: bio-filtration, phytoremediation, microclimate, energy needs as well as indoor air quality.

Green wall, both free-standing and part of a building, covered with vegetation and recycled materials.
Designing a new world: developing architectural education in response to climate change

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PROMA: Plan and design maintenance of innovative envelope components

The topics of research are: maintainability, sustainability in the whole building process. Criteria and procedure.

The research results are aimed to develop codes of practice.
Definizione del sistema

Il sistema è conosciuto sul mercato con la definizione 'cappotto esterno' ed è definito in ambito CE con l’acronimo ETICS External Thermal Insulation Composite System.
È un sistema composto, costituito da:
- parete di supporto (1)
- collante (2)
- materiale termoisolante fissato sul lato esterno della parete di supporto attraverso collante e/o tasselli, profili o altri dispositivi (3)
- primo strato di rasatura (4)
- rete d’armatura in fibra di vetro (5)
- secondo strato di rasatura (6)
- strato di finitura su eventuale primer (7)

Fig. 4.2.1 - Esploso assonometrico che evidenzia gli strati funzionali del sistema a cappotto esterno.

Fig. 4.2.51 – Sbalzo in c.a. con dispositivo a taglio termico gettato in opera, sezione verticale.

Fig. 4.2.52 – Giunto di dilatazione, sezione orizzontale. Il sistema a cappotto non necessita di giunti di dilatazione, occorre tuttavia realizzarli se presenti sulla parete di supporto.
The research is related to experiences carried out within SUPER aimed at manufacturing building materials and systems put into practice some guidelines included in the concept of “poor architecture”.

SUPER “Super Use of Products for Ecological Reclaims”: experiments on recycled & reused building materials and systems
Industrial research aimed to experiment the design and production of a stiff panel for building insulation, using only wasted wool. As outcome of a thermal and chemical process the new CARTONLANA panel keeps the main characteristics of a wool panel (fire resistance, porosity, conductivity and hygroscopicity) but with an improved performance in term of mechanical properties.
Energy and environment conscious refurbishment of small historic towns by testing a methodology for assigning specific energy retrofit measures related to the characteristic of local architecture.

The research supports local administration and inhabitants in retrofit designing for public and private buildings of the historic village.
ACHIEVED RESULTS
Classification of the built environment

<table>
<thead>
<tr>
<th>Table 4.4 Matrix of transformability of the built environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detached buildings</td>
</tr>
<tr>
<td>High cultural value</td>
</tr>
<tr>
<td>All volumes included</td>
</tr>
<tr>
<td>Reduced transformability</td>
</tr>
<tr>
<td>Average cultural value</td>
</tr>
<tr>
<td>Volume, openings, facades, roofs, technology</td>
</tr>
<tr>
<td>Low/No cultural value</td>
</tr>
<tr>
<td>Materials, skyline, proportion</td>
</tr>
<tr>
<td>Significance transformability</td>
</tr>
</tbody>
</table>

A well-known technique in the process of studying the built environment, the classification of buildings into categories based on their cultural value and transformability helps to understand the potential for improvement.


donnot display classification

Definition of specific retrofit measures for historic architecture


donnot display definition

ON GOING RESEARCH

- Installation of energy efficiency and RES measures on public and private buildings
- Support to local administration in management of retrofit activities in the historic village
- Monitoring of energy performance and indoor comfort on retrofitted buildings
The research is aimed to develop new guidelines for health care building design, based on users’ needs (patients, families, medical staff, etc.)

The guidelines highlight the relationship between some hospital environmental factors (art, nature, music, light and colour, etc.) and their influence on the healing process, stress levels and well-being.

A multidisciplinary approach is adopted: several experts, of different scientific sectors, are involved in the survey (architects, interior designers, medical staff, psychologists and sociologists).
1. SCIENTIFIC AND CULTURAL EVIDENCES

2. PERFORMANCES

- sketch
- shape
- walls and floor
- furnitures

3. EVALUATION

<table>
<thead>
<tr>
<th>Livello di soddisfacimento</th>
<th>Sufficiente</th>
<th>Buono</th>
<th>Ottimo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tecniche di:</td>
<td></td>
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<tr>
<td>- caratteristiche morfologiche che garantiscono l’immediata identificabilità/riconoscimento della postazione infermierna</td>
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<tr>
<td>Elenchi tecnici e attrezzature di tipo esplicito per agevolare l’identificabilità/riconoscimento della postazione infermierna</td>
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<tr>
<td>Presenza di:</td>
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<tr>
<td>- caratteristiche morfologiche che garantiscono l’immediata identificabilità/riconoscimento della postazione infermierna</td>
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<tr>
<td>- elementi tecnici e attrezzature di tipo esplicito ed implicito per agevolare l’identificabilità/riconoscimento della postazione infermierna</td>
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</tbody>
</table>

L’umanizzazione degli spazi di cura
prof. arch. Gabriella Peretti
Roma // 00.00.2012
<table>
<thead>
<tr>
<th>SPACES</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PATIENT ROOM / DAY HOSPITAL ROOM</td>
<td></td>
</tr>
<tr>
<td>OUTPATIENT ROOM</td>
<td></td>
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<tr>
<td>STAFF ROOM</td>
<td></td>
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<tr>
<td>RECEPTION / INFO POINT</td>
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<td>WAITING ROOM</td>
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<td>LIVING ROOM</td>
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<td>MEETING ROOM</td>
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<tr>
<td>HALL / CORRIDORS</td>
<td></td>
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<tr>
<td>OUTDOOR SPACES</td>
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</table>
CONCERTO AL-PIANO, is an european demostrative project which aims to regenerate a urban district in Alessandria, combining building retrofit on existing buildings, construction of new eco-building and integration of new services.
The research group uses parametric and algorithmic architecture and scripting for optimizing shapes and architectural technologies. It works on the relation between reality and models for elaborating data using open platform (hardware and software). It focus on the modeling and materialization phases both on architecture and urban planning.
Keyword: smart city, platform, digital city, real time data, flexibility, adaptive, optimization, parametric architecture.
Biomimetic Lab

The research studies the theoretical implementations of biomimetic and biomimicry on architecture and urban planning. A thesaurus of existing biomimetic solutions, technologies and methodologies is under development. Moreover, the research group helps master student with their final dissertation both theoretical and laboratory based (in collaboration with the department of materials science).