

# PhD program in Experimental Work to develop, improve and facilitate the use of 3D printing in construction through the development of multimodal human-machine interface

## Research laboratory

ESTIA-Research, Bidart, France  
<https://www.estia.fr/recherche>

## Keywords

Ubiquitous Computing - Human-Computer Interaction-  
Augmented Reality – Vibrotactile Language

## Position

PhD Candidate - Funding from *Communauté d'Agglomération Pays Basque* and *Conseil Régional Nouvelle Aquitaine* Involved in Doctoral School of Bordeaux University: *Mathématiques et Informatique* ED n°39.

## Expected dates of employment

01/09/2024 – 31/08/2027

## Qualification requirements

Master's degrees in computer science or mechatronics with strong interest for Human-Computer Interaction. You have excellent written and oral communication skills, and excellent software and/or hardware skills. Curiosity toward cognitive sciences, statistics, and fabrication are not mandatory, but will be appreciated.

## How to apply?

Applications for this position are open until the position is filled. Applicants should submit a full CV, copies of their university degree and/or study transcripts, name and contact information of at least one reference, and a brief description of their research interests. We will contact the selected candidates for an interview.

## Research project

*EcoBetonnaire4.0* Project: the aim is the additive manufacturing with building materials with low environmental impact (concrete with reduced clinker content, raw clay). Additive manufacturing produces parts by solidifying materials in slices. A computer system calculates the filling paths slice by slice from a 3D model of the part. The problem arises of controlling the process in real time at each point of the part, checking that the process parameters are compliant at each point, to guarantee the mechanical strength of the part in service.

## Position description

The PhD's objective is to imagine novel ways to interact with the building additive robot and develop real-time monitoring of material properties with appropriate instrumentation and improved human-system interaction. The aim is to follow the principles of interactive fabrication introduced in 2011 by Willis Gross et al as new interfaces for digital manufacturing. These interfaces help the operator to make what they imagine more efficiently, by giving them access to new tools to design more freely and closely to the manufacturing process. The PhD student will explore how users' expertise can be combine with the printer-mixer. In this context, the PhD student will conduct user studies, design interaction techniques, prototype them, compare their performance to existing technique, write scientific papers and present results in national and international conferences.

## Contact

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