

# Cyber-Physical and Embedded System Design Group

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## Overview

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Research topics in this group are specially focused on:

- **Application-Driven Embedded System Design:** The Application-Driven Embedded System Design (ADESD) method guides domain decomposition towards families of scenario-independent system abstractions that can be reused to build a variety of run-time support systems. Environmental dependencies observed during domain decomposition are separately modeled as scenario aspects, which can be transparently applied to system abstractions with the aid of scenario adapters. The assembling of such software components to produce a functioning system is assisted by component frameworks, which capture elements of reusable software architecture identified in the course of domain engineering. Usability is improved by inflated interfaces, which export whole families of abstractions to users as if they were single macrocomponents, passing the responsibility of selecting appropriate family members to the system.
- **Design Space Exploration and Optimization:** Design Space Exploration is one of the most important steps of an embedded system design and exists to solve this problem. During the earlier parts of the design, the designers define which families of components are going to be used in the system. The design space then comprises the used families of components and all their members. The exploration compares different aspects of these members in order to determine which components are better based on system requirements. Therefore a solution for the problem is a set of components that meet the system's requirements. Each requirement is an objective in the design space exploration.

## Current Research Activities

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- **Multi-objective Design Space Exploration:** We are aiming at multi-objective design space exploration based on quality-related functions. We have mathematical equations that describe the system in terms of its requirements. Each set of variables for these equations represents a set of characteristics that affect the exploration's objectives and each equation can describe any type of system behavior. Hence, designers become able to define different goals. For example, designers may define market availability or stage of development as objectives; then components available in the market would be used instead of unavailable components, or validated components could have higher priority than recently implemented components. An already developed tool would optimize the equations to find the better solutions. This allows the final system to be mostly determined by the design space exploration.
- **Design Tools for Embedded and Cyber-Physical Systems:**

If you want to join us, please refer to available [work plans](#) and send us an email.

## Publications

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<http://www.lisha.ufsc.br/pub/index.php?key=ESG>

# People

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## Professors

- [Prof. Dr. Antônio Augusto Fröhlich](#)
- [Rafael Luiz Cancian](#)

## Ph.D Candidates

## Undergraduated Students

### Former Members

- Davi Abreu Wasserberg
- [Bruno Martins Crocomo](#)
- [Ruan de Oliveira](#)
- [Victor Manuel Gonçalves Martins](#)

## Meetings

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The meetings take place on Mondays at 13:30 in room INE519