SPECIES Scholarships Proposal

Department of Informatics Engineering
Faculty of Science and Technology
of the University of Coimbra, Portugal

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Advisory Team

The scholarship will be supervised by Sérgio M. Rebelo and Tiago Martins.

Sérgio M. Rebelo

Sérgio M. Rebelo is an Invited Assistant Professor at the University of Coimbra and a researcher at Centre for Informatics and Systems of the University of Coimbra (CISUC), working at the intersection of human-centred computing, computational creativity, and AI-assisted design. He recently completed his PhD in Informatics Engineering with a focus on how co-creative AI systems and computational methods can support and transform graphic design and typography practices. His research combines evolutionary computation, human-computer interaction, and design. His work has been published in international journals, magazines, and conferences, and has been presented at multiple cultural events and venues, including the *Aesthetica Art Prize, RADAR Media Art Festival,* the Portuguese National Museum of Contemporary Art (MNAC), Círculo de Artes Plásticas de Coimbra (CAPC), Convento São Francisco, and the *Golden Bee Design Biennale*. Sérgio has been actively involved in the scientific community through conference organisation, editorial roles, and interdisciplinary collaborations, including the *International Conference on Artificial Intelligence in Music, Sound, Art and Design* (EvoMusArt) and the *International Conference on Computational Creativity* (ICCC).

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Tiago Martins

Tiago Martins is an Invited Assistant Professor at the University of Coimbra and a researcher at the CISUC, specialising in computational design, computational creativity, and artificial intelligence. He holds a PhD in Information Science and Technology, where he focused on evolutionary computation methods to generate creative design artefacts, including typographic systems, visual identities, and generative art. His work bridges AI and artistic practice, with a strong emphasis on evolutionary algorithms and automated creative systems, leading to

numerous international publications, awards, and exhibitions. Tiago has been actively involved in the scientific community through conference organisation, editorial roles, and interdisciplinary collaborations, including the *International Conference on Artificial Intelligence in Music, Sound, Art and Design* (EvoMusArt) and the *International Conference on Computational Creativity* (ICCC).

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Description of Research Centre

The Centre for Informatics and Systems of the University of Coimbra (CISUC) conducts research in computer science and information and communication technologies, bringing together 150 integrated researchers, including 72 PhDs, organised into six groups: Adaptive Computation (AC), bio-inspired Artificial Intelligence (bAI), Cognitive and Media Systems (CMS), Networks, Communications and Security (NCS), Information Systems (IS), and Software and Systems Engineering (SSE).

To promote cohesion, gain critical mass, and foster inter-group synergies, the groups cluster into 3 thematic strands: *Resilient Software* and *Internet Services* (SSE, NCS, IS), which focuses on internet architectures and technologies, cloud infrastructures and software services, and service oriented architectures; *Intelligent Systems* (AC, CMS, bAI), which concerns the research and development of computational methodologies for search, modelling, optimisation, learning and visualisation; *Human-Centric Computing* (IS, CMS) encompasses computer-enabled, individual and social phenomena, leading to new emergent extensions of human capabilities and organisational models.

The work associated with these scholarships falls within the scope of the CMS group. The goal of the CMS group is to provide context for specialised team research on Artificial Intelligence (AI), Information Visualisation, Computational Creativity, Ambient Intelligence, and ICT for Education, stimulating theoretical and empirical study, the design and development of models and tools, and the use of research results in innovative applications with high social and scientific relevance.

Within the context of CMS, the Computational Design and Visualization (CDV) Laboratory plays a key role in advancing research on computational design, generative systems, and AI-driven creative practices. The CDV Lab develops interdisciplinary approaches that combine artificial intelligence, data visualisation, and design research, fostering new forms of human-AI collaboration and contributing to the broader goals of CMS in integrating computational intelligence with creative and human-centred domains.

cdv.dei.uc.pt
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03 Description of the Work

Evolutionary Computational Design for Graphic or 3D Creative Systems

We welcome proposals that align with our broader research interests in computational, generative, and interactive approaches to design. We are particularly interested in proposals that explore the use of evolutionary computation as a flexible and open-ended paradigm for supporting creative practices in both graphic and three-dimensional design. Rather than focusing on a single predefined outcome or application, this perspective treats design processes as search spaces, guided by a combination of computational strategies and human input. In this context, the goal is to contribute to the development of co-creative systems that extend the role of designers, enabling them to explore richer, more diverse, and less predictable design possibilities.

In the context of Graphic Design, we are interested in research that examines how evolutionary approaches can be applied to the generation of layouts, typographic systems, and visual identities. This includes integrating aesthetic, functional, and semantic dimensions into the evolutionary process, as well as investigating how these criteria can be balanced and adapted across different design problems. At the same time, we maintain an open perspective toward alternative representations and evaluation strategies, including data-driven, user-driven, and hybrid approaches that can evolve in response to different contexts and design needs.

Parallel to this, we are also interested in exploring evolutionary methods for three-dimensional design, where generative and parametric models can be evolved to produce complex geometries and structures. This direction includes the study of multi-objective optimisation processes that balance aspects such as structural feasibility, fabrication constraints, and aesthetic qualities. The proposal remains deliberately open to different types of artefacts and methodologies, allowing for the investigation of new representations, evolutionary operators, and interaction paradigms that support creative exploration in 3D spaces.

04 Other Relevant Information

The University of Coimbra, founded in 1290, is one of the oldest universities in Europe and a leading Portuguese public institution in education, research, and innovation. It comprises multiple faculties and research units spanning a wide range of disciplines, supported by extensive infrastructure distributed across three campuses. Recognised as a UNESCO World Heritage site, UC demonstrates a strong commitment to internationalisation, offering a broad portfolio of undergraduate, master's, and doctoral programmes, and maintaining collaborations with prestigious institutions such as MIT and the University of Texas at Austin. Its research ecosystem includes numerous centres and laboratories, complemented by an active innovation network that connects hundreds of partners and has fostered the creation of successful technology spin-offs.

The city of Coimbra provides a rich historical and cultural environment that reinforces the university's academic identity. With roots extending from Roman times through the medieval and early modern periods, Coimbra served as Portugal's first capital and developed as a major centre of learning following

the establishment of the University. Over time, it has evolved into a dynamic urban space where historical heritage coexists with modern infrastructure, including dedicated campuses for science, technology, and life sciences. This unique combination of tradition, academic excellence, and innovation creates a stimulating setting for research, education, and interdisciplinary collaboration.