POLITECNICO DI MILANO

PhD in DESIGN - 39th cycle

PNRR 118 PC Research Field: AI FOR CULTURAL INDUSTRIES

Monthly net income of PhDscholarship (max 36 months)
€ 1195.5
In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity	
Motivation and objectives of the research in this field	Since the beginning of the 21st century, the introduction of digital technology has changed design, communication, and production processes, as well as the way of preserving and looking at cultural heritage (Bertola, 2021). The digitisation of cultural heritage makes it possible to preserve, revive, transmit, and valorise the tangible and intangible assets developed by the cultural industries, of which the fashion sector is an important example for both its sociocultural roots and economic spin-offs. The ability to digitally preserve artefacts and crafts-related gestures through 3D modeling and scanning technology can be augmented by AI by automating digitisation procedures. AI can extend the accessibility of fashion cultural artefacts to individuals with different linguistic/cognitive abilities but also increase knowledge, and promote the exchange between sectors and disciplines. AI could enable enhanced interaction with cultural heritage, playing a crucial role in its promotion and fruition: 3D modelling and simulation software, with the combination of advanced digital technologies such as AI, virtual-, augmented- and mixed reality, haptics, and sound technologies, can help multiply the narrative levels of cultural experience, hybridising the boundaries between the virtual and physical dimensions and enabling immersive, complex and hyper-sensory environments and experiences. A further feature of AI is its ability to support creative processes in the research and design phases to understand, analyse and define new patterns and correlations through large source data sets on fashion artefacts and practices, that would otherwise go unnoticed to support creativity.This PhD project proposal addresses

	the topic of AI in the fashion cultural heritage sector through a Human centered AI approach (Auernhammer, 2020) to analyse the interaction of humans and AI collaborating in the processes of archiving, coding, physical, digital, and virtual reproduction, through the generation of new data, information, and knowledge that offer new impulses to curatorial approaches in the field of conservation, preservation, restoration, valorisation, and fruition of tangible and intangible cultural heritage in the fashion sector.The research aims to investigate the limits and possibilities of AI systems (i) to support creativity in research and design processes in the fashion sector in relation to the use and curation of archives; (ii) to improve the digital and physical experience of fashion archives by designing innovative dissemination strategies that foster the interaction of different audiences with tangible and intangible cultural heritage; (iii) to reflect on the best use of AI in collaboration with fashion operators to investigate human and ethical.
Methods and techniques that will be developed and used to carry out the research	The PhD research aims to explore the human-technology interaction in creativity-related activities in the processes of research, design, development, and fruition of fashion archives towards a systemic and ethical innovation of the sector.Using a Human-Centred Artificial Intelligence (HCAI) approach,the research will be developed applying methods to make AI more understandable, transparent, and fair for users (fashion designers, practitioners and operators) on the one hand, and to support the collaborative activities between them and AI systems on the other hand.The PhD research has been proposed by two complementary research groups to investigate the topic of the use of AI in the fashion cultural heritage sector from different convergent perspectives. The interdisciplinary approach ensures the development of scenarios and experimental solutions for the use of technology that take into account the specific characteristics of the fashion sector and cultural industries, providing insights about the ethics in the use of technology, and at the same time, developing an understanding of the technological opportunities of AI for the cultural industry. In particular, the PhD research will

	be based on preliminary research on the topic of human-AI collaboration, investigating the opportunities and limitations of current human-AI collaboration and interaction in design processes related to the tangible and intangible cultural heritage of fashion archives (Grabe et al, 2022). On the basis of the initial analysis and synthesis, a series of human-AI collaboration scenarios will be identified, and, through in-depth experimental work on case studies, a new conceptual model of human-AI collaboration will be developed. Then, the candidate will use a research-through-design approach to validate the model by exploring different human-AI co-creation functions to provide guidelines for future designers of AI systems towards a human-centric, sustainable, and resilient innovation perspective in line with the Industry 5.0 paradigm (Huang et al. 2022).
Educational objectives	The educational objectives of this Ph.D. proposal will allow the students to: •focus on the role of design in driving a positive digital transformation through experimenting with AI to increase the fruition, preservation, and valorization of fashion archives; •develop substantial knowledge and expertise in the area of specialization of AI for cultural industries with particular reference to the fashion system, demonstrating the ability to make original and significant contributions to be disseminated at the scientific level and could be taught at university-level courses; •support the industries in the fashion and cultural heritage sector towards innovative and sustainable use of AI, providing toolkit and crucial insights and practices to define a collaborative model of co-creativity between humans and technology •to increase the possibilities of human creative intelligence while enhancing the dissemination of knowledge of fashion cultural heritage; •collaborate with interdisciplinary researchers from the domain of engineering and computer science,

	mathematics, philosophy, psychology, evolution, and neuroscience which could contribute to the enhancement of soft skills, demonstrating the ability to work effectively with other people from various educational, and work experience backgrounds; •extend subject-specific skills in the area of AI for cultural heritage with a logic of cross-fertilization, synergistic growth, collaboration, and mutual co-design between the tech industries and cultural industries; •master the analytical and methodological skills required to evaluate and conduct research in this area of specialization and related areas approaching through a Human-centred and HCAI perspective; •demonstrate a high understanding and concern for the ethical dimensions of AI development systemsimplications with the scope of enhancing the transparency of choices, the social acceptability of those technologies and therefore the adoption into creative processes.
Job opportunities	Eurostat 2020 estimates 7.2 million employees within Cultural and Creative Sectors (CCS), i.e. 3.7% of total employment in the European Union (European Commission, 2022). AI is becoming fully integrated into its value chains, impacting the creation, production, and distribution of cultural content in four main areas: (i) save costs / increase efficiency through translation, testing automation, and content generation; (ii) make decisions via business models and forecasting; (iii) engage audiences via personalised recommendations; (iv) inspire by expanding creativity and generating experimental content (European Commission, 2022). The Alan Turing Institute proposes a multidisciplinary vision that combines the field of cultural heritage and the domain of data science to explore innovative collaborative modalities of work between cultural operators and AI in different applications: (i) exploiting AI tools within cultural heritage for the investigation, preservation, and management of historical artefacts; (ii) analysing the application of AI for

	the production and enjoyment of cultural industry assets; (iii) providing an understanding of technological tools to set shared patterns of co-creation (Alan Turing Institute, 2023). The introduction of AI tools affects the professional profiling system's structure, burdening the sector's social sustainability and leading to the replacement of specific professional figures. Concurrently, AI tools open the way to new career prospects characterised by hybrid forms of professionals equipped with computer engineering and humanistic-artistic skills. Briggs and Kodnani (2023) claim that 26% of job tasks in the arts, design, entertainment, media, and sports fields can be automated due to generative AI. However, this will not concern the total job replacement but specific tasks. Therefore, the job market will be widened through an AI-enhanced cultural offer to open new professional horizons. Considering the fashion cultural heritage sector, there is a need of upskilling designers to interact with AI systems in terms of data management, algorithm engineering, and user interface design to remain competitive (European Commission, 2022). Generative AI could add $275 billion to the fashion and luxury industry in the next three to five years (Harreis et al., 2023).
Composition of the research group	2 Full Professors 2 Associated Professors 3 Assistant Professors 1 PhD Students
Name of the research directors	Paola Bertola; Marco Brambilla

Contacts
email: paola.bertola@polimi.it phone number: 0223995948 https://dipartimentodesign.polimi.it/it/staff/show/15916 https://bit.ly/3KNWS6T email: marco.brambilla@polimi.it phone number: 0223993651 https://www.deib.polimi.it/ita/personale/dettagli/108614 https://bit.ly/41d4JSm

Additional support - Financial aid per PhD student per year (gross amount)

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Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad	
Amount monthly	597.75 €
By number of months	6

National Operational Program for Research and Innovation	
Company where the candidate will attend the stage (name and brief description)	Centre for Fashion Curation, (CfFC) London
By number of months at the company	6
Institution or company where the candidate will spend the period abroad (name and brief description)	metaLAB, Harvard University
By number of months abroad	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
Educational activities (purchase of study books and material, funding for participation in courses, summer schools, workshops and conferences): financial aid per PhD student per year max 4.872,90 euros per student (total for 3 years) Teaching assistanship: availability of funding in recognition of supporting teaching activities by the PhD student there are various forms of financial aid both for research and teaching activities. The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations. Computer availability: 1st year, 2nd year and 3rd year: Each research group will supply PhD student with a computer, if necessary. Desk availability: 1st year, 2nd year and 3rd year: Each research group will supply phd student with a desk.