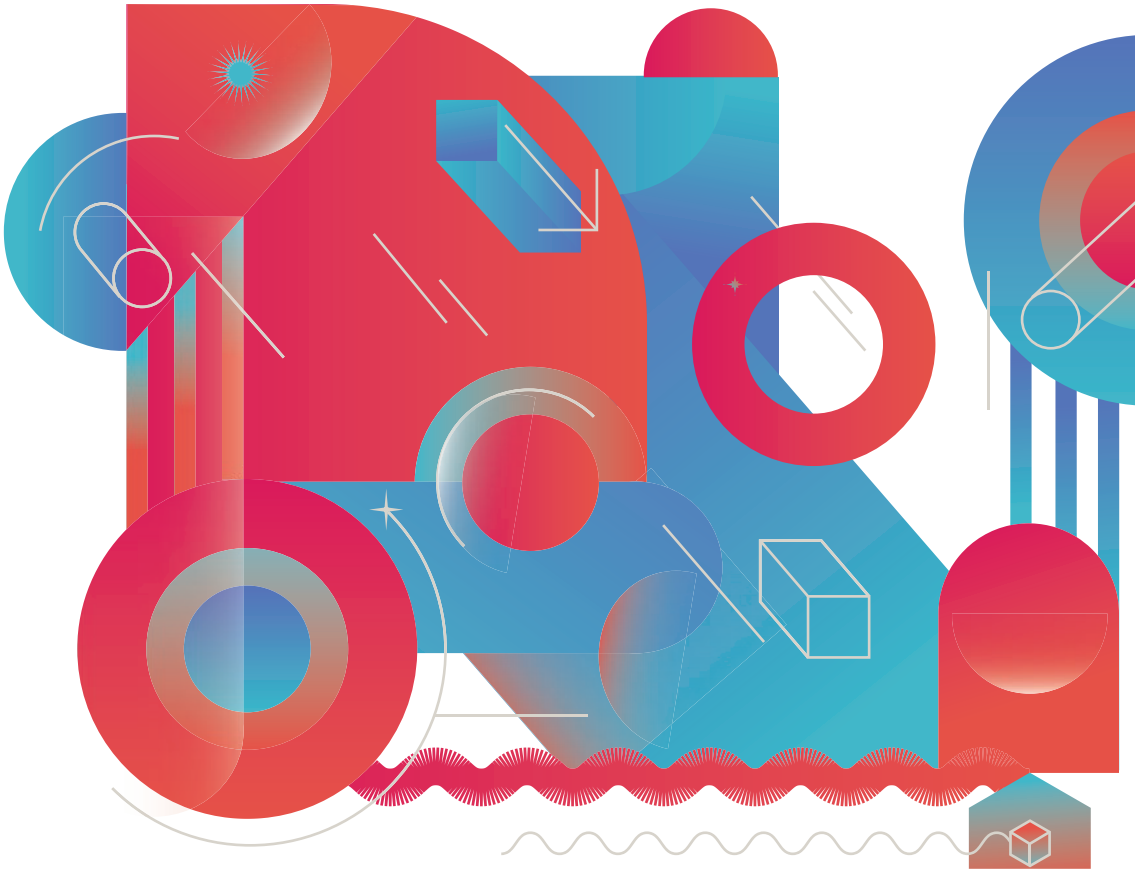
EMBEDDING INTELLIGENCE

Designerly reflections on AI-infused products

edited by Davide Spallazzo, Martina Sciannamè



D.I. FrancoAngeli
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 ISBN 9788835141914

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D.I. FRANCOANGELI DESIGN INTERNATIONAL OPEN ACCESS

 ISBN 9788835141914

Cover image by Sara Sciannamè

ISBN e-book Open Access: 9788835141914

Date of first publication: September 2022

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Forewords

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Artificial Intelligence – AI – is not new. Though, today it is living a moment of great hype. We now realize that AI permeates industrial products, services, and interfaces for public use, whether at home, at work, or in the public sphere.

The examples of AI-infused systems are uncountable. They range from smart thermostats – which adapt to their users' habits and optimize energy consumption while maintaining a high level of environmental comfort – to the most pervasive yet ephemeral systems that augment tools we use daily, such as Netflix or Amazon's recommendations.

These systems are characterized by a continuous learning process based on a statistical analysis of massive volumes of data. Accordingly, they learn and adapt their behavior over time.

Smart assistants, now permeating our domestic landscape, can be considered the first evident manifestation of AI-infused systems in our life. They represent a frontier edging closer to the notion generally associated with artificial intelligence: sentient robots capable of replicating human behavior.

Furthermore, these applications illustrate the dual interpretations of AI that have long enlivened the scientific debate: on the one hand, McCarthy's position emphasizes the development of a super-brain capable of simulating human behavior; on the other hand, Engelbart's position emphasizes the augmentation of human potential through AI (Winograd, 2006).

Engelbart's concept of augmentation views AI as a tool capable of augmenting rather than replacing human intellect and potential (Engelbart, 1962). This perspective is much more akin to that histori-

cally expressed in the field of Human-Computer Interaction (HCI) (Grudin, 2006), which placed a greater emphasis on the user than on the machine.

Winograd characterizes these two opposing positions as two distinct approaches to the subject of artificial intelligence. A rationalistic approach predicated on the conviction that fundamental aspects of thought can be captured in a formal symbolic representation. A design-oriented approach centered on people's interactions with their surrounding environments rather than modeling the mechanisms within intelligent systems (Winograd, 2006).

These concepts bring the realm of AI closer to Interaction Design, a discipline that takes a holistic and comprehensive view of interaction. It is defined as the mutual effect of individuals, artifacts, and the situations in which they exist; it involves discourse, connection, and social interaction (Kolko, 2011).

Given that Interaction Design is defined as the art of promoting human-to-human interaction through goods and services (Saffer, 2009), it is easy to see how AI looks to belong squarely within the purview of designers.

Moving from these premises, the edited book represents one of the first systematic studies on the design implications connected to the empowerment of industrial products with AI capabilities. It aims at providing a multifaceted view of AI-infused systems from a design standpoint. Far from being comprehensive and exhaustive of the subject matter, it is structured into five essays that problematize the embedding of intelligence within products.

The essays represent the point of view of the researchers involved in the Meet-AI research project, aimed at better understanding the nature of AI-infused systems from a design standpoint and their implications in terms of user experience.

Chapter 1 analyses smart assistants from a pure design/interaction design standpoint. Going through systematic reading of these devices' main characteristics, the chapter underlines a still immature embodiment of their potential and the need to enter a more mature stage of development, at least from a design standpoint.

Chapter 2 shifts the attention to the user experience – UX – enabled by AI-infused systems and its evaluation. It conducts a critical analysis of current UX evaluation methods against the peculiarities of

AI-infused systems and suggests the need for a specific method for such systems. It further advances the necessity to reconsider traditional UX dimensions.

Chapter 3 moves from these results, reporting the preliminary study conducted in the Meet-AI research project to elicit novel UX dimensions to better frame and assess the experience enabled by AI-infused systems.

Chapter 4 focuses on one of the most common characteristics of such systems: conversational interfaces. It contextualizes the potential disciplinary role of design in defining the peculiarity of these interfaces.

Chapter 5 concludes the book by opening the debate on the concept of meaningfulness. It problematizes the role of AI-infused systems in the lives of their owners not just as functional tools but also as relational mediators which shape the long-term aims, objectives, and behaviors.

References

Engelbart, D. (1962). *Augmenting human intellect: a conceptual framework*. PN.

Grudin, J. (2006). "Turing Maturing: The Separation of Artificial Intelligence and Human-computer Interaction". *Interactions*, 13(5), 54-57.

Kolko, J. (2011). *Thoughts on Interaction Design*, Second Edition (2 edition). Morgan Kaufmann.

Saffer, D. (2009). *Designing for Interaction: Creating Innovative Applications and Devices* (2nd edition). New Riders Pub.

Winograd, T. (2006). "Shifting viewpoints: Artificial intelligence and human–computer interaction". *Artificial Intelligence*, 170(18), 1256-1258.

Authors

Marco Ajovalasit. Associate Professor in Human-Centered Design in the Design Department at the Politecnico di Milano, Italy, where he teaches modules in User Experience Design, and Digital Interaction Design. His research expertise is in the field of design for meaning and human-centred design methods leading to products, systems and services which are physically, perceptually, cognitively and emotionally intuitive to their users. Research focuses on the "design for meaning" approach defining human-centered design methods for designing products, systems and services based on new meanings for the consumers, including the use of data, designing ethnography, real fiction and co-creation. A particular emphasis of the research is on the development of a toolkit for designers for organizing the consideration of the intended meaning of the designed artefacts. Focus is placed on the thinking process, dialogue and use of semantics consumers typically associate to the understanding of the designed artefact. He has been the Principal Investigator (PI) (2013-2016) of a £3.2M FP7 EU Grant funded project "Light.Touch.Matters: Design-driven development of touch sensitive luminous flexible plastics for applications in care & well-being", which put together a multi-disciplinary team of designers and material scientists and industry leaders involving four Universities and thirteen SMEs designers from 9 different countries. Within the EU project he has developed design guidelines for meaningful interactions for the consideration of the effects of product properties on the perceptual experiences which occur at a product interface.

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Alice Paracolli. Ph.D. student in Design at Politecnico di Milano. She is specialised in User Experience, and her research focuses on Sustainable UX applied to AI-infused Objects. Ubiquitous computing elicits an endless range of internet-enabled devices, offering the potential to the user to be more diligent in energy use, except that it creates an ever-growing web of data-consuming objects that stay on forever. The Ph.D. aims to set design guidelines for sustainable, connected objects, proposing a framework to build continuously incremental sustainable innovation in technology.

Martina Sciannamè. Ph.D. student in Design at Politecnico di Milano. She investigates how AI and ML can be meaningfully included in Design education with a multidisciplinary approach. Her aim is to produce theoretical knowledge and practical tools to enable designers to exploit the opportunities offered by this technology and to communicate with ML experts, being aware of its actual capabilities and limitations. Her hope is that the intersection of Design and ML, within the frame of Ethics, will finally steer the development of ML systems towards real-world problems and responsible innovation for the flourishing of humans.

Davide Spallazzo. Ph.D. in Design and Associate Professor at the Department of Design of Politecnico di Milano. Active in Interaction Design and Human-Computer Interaction, his main research interest is the human-centred approach to digital innovation and meaning-making, applied to diverse fields of inquiry. Over the years, he coordinated and took part in several national and international research projects concerning digital technologies in the Cultural Heritage field, serious gaming, and AI. He is now coordinating the

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Ilaria Vitali. Product designer and Ph.D. in Design, with honors, at Politecnico di Milano with a thesis titled "Conversation on conversational smart products", graduated with a Master's degree in Product Design for Innovation and a dual honors degree from Alta Scuola Politecnica. Her research focuses on smart connected products and devices with conversational interfaces and explores how to design them, creating guidelines and tools for didactic and professional activities. In particular, she developed the Mapping the IoT Toolkit (mappingtheiot.polimi.it), an accessible kit to aid in the design of IoT devices.

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Artificial intelligence is more-or-less covertly entering our lives and houses, embedded into products and services that are acquiring novel roles and agency on users.

Products such as virtual assistants represent the first wave of materialization of artificial intelligence in the domestic realm and beyond. They are new interlocutors in an emerging redefined relationship between humans and computers. They are agents, with miscommunicated or unclear properties, performing actions to reach human-set goals.

They embed capabilities that industrial products never had. They can learn users' preferences and accordingly adapt their responses, but they are also powerful means to shape people's behavior and build new practices and habits. Nevertheless, the way these products are used is not fully exploiting their potential, and frequently they entail poor user experiences, relegating their role to gadgets or toys.

Furthermore, AI-infused products need vast amounts of personal data to work accurately, and the gathering and processing of this data are often obscure to end-users. As well, how, whether, and when it is preferable to implement AI in products and services is still an open debate. This condition raises critical ethical issues about their usage and may dramatically impact users' trust and, ultimately, the quality of user experience.

The design discipline and the Human-Computer Interaction (HCI) field are just beginning to explore the wicked relationship between Design and AI, looking for a definition of its borders, still blurred and ever-changing. The book approaches this issue from a human-centered standpoint, proposing designerly reflections on AI-infused products. It addresses one main guiding question: what are the design implications of embedding intelligence into everyday objects?

FrancoAngeli
La passione per le conoscenze