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DESIGN SPACE OF INTERACTIVE PERSONA SYSTEMS: A SYSTEMATIC LITERATURE REVIEW OF THE EVOLUTION OF PERSONAS IN THE AGE OF GENERATIVE AI [ABSTRACT]

Amir Reza Asadi*	University of Cincinnati, Cincinnati, OH, United States	asadiaa@mail.uc.edu
Hazem Said	University of Cincinnati, Cincinnati, OH, United States	Hazem.Said@uc.edu

* Corresponding author

ABSTRACT

Aim/Purpose	The purpose of this study is to address the gap in methodologies, data sources, and validation frameworks for interactive persona systems as they evolve from static design artifacts to AI-driven simulators.
Background	Research on personas has traditionally focused on their use as static tools for communicating user requirements to designers. However, the evolution of Artificial Intelligence has transformed these narratives into dynamic systems that simulate real user behavior.
Methodology	The systematic search resulted in 1096 records, of which 985 abstracts were screened, reducing the relevant citations to 65 full-text papers assessed for eligibility. Ultimately, 42 studies met our inclusion criteria. They were analyzed for creation methods, domains, and interaction types, and graded using the Technology Readiness Level (TRL) assessment, a nine-point scale measuring system maturity from concept to deployment.
Contribution	This paper presents the first comprehensive mapping of the design space for interactive persona systems. To support applied settings, it introduces a Practitioner's Toolkit, featuring a Design Framework and a decision matrix, that provides a structured, evidence-based path to select, build, and validate interactive persona systems based on specific project constraints. Furthermore, the review

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	maps four core system types (Behavioral Simulation, Persona Management, Autonomous Personas, and Interface Personas) to distinct use cases and validation goals, providing guidelines to build personas that serve as a fundamental bridge for human-AI alignment.
Findings	The technology readiness assessment revealed that the field is still in developmental stages, with only 8.6% of systems achieving high and operational maturity levels (TRL 6-9). A critical gap was noted regarding empirical validation: 52% of systems lack any empirical validation. Interactive personas are most prominently applied in UX research, education, gaming, and social simulation, with web applications representing the dominant mode of user interaction. This validation gap directly undermines the reliability of human-AI alignment in design, as systems that have not been empirically tested against real users cannot be assumed to faithfully represent human behavior.
Recommendations for Practitioners	Practitioners are advised to utilize personas to humanize AI systems in human-AI collaboration, integrate personas as core interface components, and leverage them to advance Human-AI alignment.
Recommendations for Researchers	Researchers are urged to develop standardized validation frameworks to assess persona alignment with real users to advance Human-AI alignment.
Impact on Society	Interactive personas advance computing for social good, such as training and advocacy, by providing safe simulation environments. They enable privacy-preserving research through anonymized, aggregated population models.
Future Research	Future work must balance empirical validity with cost constraints and establish ethical metrics to ensure interactive persona systems authentically represent human behavior.
Keywords	HCI, personas, user stories, AI, large language model, human AI alignment

AUTHORS



Amir Reza Asadi is a Graduate Research Assistant at the University of Cincinnati, pursuing a PhD in the Information Technology program. With nearly a decade of industry experience, he helped startups use emerging technologies to solve problems. His main area of interest is human-information interaction for emerging technologies, including AI, and AR/VR. He is interested in design methods for new technologies. Currently, he is researching Human Digital Twin and Agentic Interactions. He has served as a reviewer for prominent HCI conferences such as CHI and CSCW.



Dr. Hazem Said is a Professor of Information Technology and the director of the School of Information Technology (SoIT) at the University of Cincinnati (UC). He is a certified Project Management Professional (PMP). Dr. Said founded the UC Information Technology Solutions Center (ITSC) in 2012, where he consults with government, public and private organizations, and leads teams of professionals, as well as graduate, undergraduate, and high school students, to investigate, develop, and support a variety of information technology solutions. In addition, Dr. Said is a co-founder and co-director of the Ohio Cyber Range Institute and the Justice, Law, and Information Technology

Institute. Dr. Said is the recipient of over 200 grants and contracts totaling over \$30 million and has authored over 27 articles on topics related to information technology education.