



## The impact of augmented reality techniques on improving urban design effectiveness

Tahseen Ali Alazzawi  and Hala Abdulkarem Alsamer 

Department of Architecture, College of Engineering, University of Basra, Basra, Iraq

### ABSTRACT



Urban design evolves with socio-technical advancements. Digital ones had an important role in this evolution. One such digital technique that directly impacts urban effectiveness is augmented reality that based on integrating virtual elements into real environment and interacting with them in ways simulating reality. The effects of AR reflect in urban design on multiple levels, and the purpose of this paper is to define and determine these levels through measurable indicators in AR experiments. The research concludes to identify four indicators of AR impact on improving urban design: (1) Enhancing community participations in the design decision-making process. (2) Assisting designers in improving their design decisions. (3) Simultaneously, AR can serve as a task of designers and an output of design effectiveness when it focuses on enhancing the city's image. (4) Lastly, AR can serve as a fundamental input of design effectiveness when user experience is utilized to enhance urban sensing activities, collecting data. A general theoretical framework has been developed, consisting of key and secondary measurable vocabulary in terms of achievement, non-achievement and degree of achievement, through assigning one of five possible numerical values for each vocabulary and measuring them in four case studies, which involved four AR experiments published in previous studies. All indicators achieved good proportions, although the proportions varied among them and from one experiment to another due to the difference in time, place and objectives of each one. The community participation achieved the highest level of achievement, while the urban sensing achieved the lowest one.

**ARTICLE HISTORY** Received 27 April 2024; Accepted 23 June 2024

**KEYWORDS** Augmented reality; community participation; design decision-making; urban sensing; Enhancing City Image

### Introduction

Urban design plans and organizes urban environment to meet the residents' needs, depending on available expertise and knowledge. Its

**CONTACT** Hala Abdulkarem Alsamer  [hala.abdulkarem@uobasrah.edu.iq](mailto:hala.abdulkarem@uobasrah.edu.iq)  Department of Architecture, College of Engineering, University of Basra, Basrah 61001, Iraq

© 2024 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.  
This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. The terms on which this article has been published allow the posting of the Accepted Manuscript in a repository by the author(s) or with their consent.