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Master Thesis Defense

Entitled

THE IMPACT OF OUTDOOR THERMAL COMFORT ON USERS' WALKABILITY: CASE STUDY IN AL AIN SQUARE, AL AIN CITY, UAE

By

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Abstract

Living in a hot dry arid climate limits the walkability of its inhabitants. The excessive heat and dryness of the weather undoubtedly make walking a less tempting, encouraging, and pleasant choice for getting around the city. For that reason, this master thesis analyzes the various strategies used to enhance outdoor thermal comfort. Outdoor thermal comfort is controlled by numerous factors, including street and building orientation, vegetation, shading devices, and water bodies. The purpose of this study is to examine the relationship between walkability and UTCI values (universal thermal comfort index) in the context of Al Ain Square, a neighborhood in Al Ain City, UAE. The study employed a mixed-methods approach to investigate the relationship between outdoor thermal comfort and walkability in Al Ain City. Firstly, ENVI-met simulations were conducted to model various scenarios, including the base case scenario, the addition of vegetation, the addition of water bodies, and a combination of both. These simulations helped assess the impact of different environmental factors on thermal comfort. Additionally, field measurements were conducted using HOBO sensors placed strategically across the neighborhood to gather real-time data on temperature and humidity levels. The collected data from both simulations and field measurements were then analyzed to draw correlations between outdoor thermal comfort and walkability. The results of the study indicate that integrating vegetation and water bodies in urban environments can significantly improve outdoor thermal comfort, thus promoting walkability. This research aims to identify effective strategies for enhancing outdoor thermal comfort in urban environments, specifically focusing on the role of vegetation and water bodies. Also, the study offers insights into the relationship between outdoor thermal comfort, pedestrian walkability, and urban design elements. This research will provide recommendations for architects, urban planners, and policymakers on integrating climate-sensitive design strategies into urban development projects, which will lead to a contribution to the promotion of sustainable transportation modes by creating more walkable and comfortable urban spaces, and enhance the overall well-being of city residents through improved outdoor environments that support physical activity and social interaction.

Keywords: Outdoor Thermal Comfort; Walkability; Hot Climate; UTCI; ENVI-met