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Intelligent Building Fire Evacuation Indication System Based on Edge Computing Devices

摘要

近年来,城市建筑呈现出数量多、规模大、内部结构复杂等特点,这些特征给建筑安防和消防安全带来 了重大挑战。特别是在火灾事故中,人员伤亡已成为主要的安全隐患。及时有效的疏散引导能显著降 低火灾造成的危害。针对这一问题,本文提出建立一种基于边缘计算设备、运用人工智能算法的集成 式火灾报警与疏散引导系统,兼具安防与消防双重功能。该系统在正常情况下主要发挥安防作用,实 时检测并追踪行人;当火灾发生时,可根据检测到的人员数量和火源位置提供火灾预警并计算最优疏 散路径。通过实际部署测试,验证了该系统的可行性。最后,本文讨论了系统当前存在的问题并展望 了未来工作方向。

关键词

建筑安全;火灾预警;火灾疏散;行人检测与追踪

Abstract

In recent years, urban buildings have exhibited characteristics such as a high quantity, large scale, and complex internal structures. These features pose significant challenges for both building security and fire safety. Particularly concerning fire incidents, casualties have become a major safety concern. Timely and effective evacuation guidance can significantly reduce the harm caused by fires. Addressing this issue, this paper proposes the establishment of an integrated fire alarm and evacuation guidance system based on edge computing devices and utilizing artificial intelligence algorithms for both security and fire safety purposes. This system primarily functions as a security measure during normal circumstances, detecting and tracking pedestrians in real-time. In the event of a fire, it can provide fire warnings and calculate the optimal evacuation routes based on the detected number of pedestrians and the location of the fire source. Through empirical testing, the feasibility of this system has been demonstrated. Finally, this paper discusses the current issues with the system and outlines future work.

Keywords

Building safety ; Fire warning ; Fire evacuation ; Pedestrian detection and tracking

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