

基于压电效应的人流量统计与能量回收系统

摘要：当前公共场所人流量检测系统存在效果不明显的问题；据此，设计了一种基于压电效应的人流量监测系统，先对人流量进行统计，同时通过踩踏压电元件区域进行电能的回收；系统硬件设备由压电元件重力传感装置、LED 计数显示板和信号灯装置组成；利用 MATLAB 软件技术，区分人口和非机动车的数量叠加，通过 PZT5H 压电材料电路板产生高频电流作为脉冲信号，采用 UWB 无线连接传感技术进行数据传输，实现人口数量的采集和电能回收；根据硬件结构分别设计了斑马线自动升降路障、信号灯延时装置系统、人员疏散路线设计系统；该系统降低了人流量计数对人工的依赖，避免了人工处理的误差，可为人流密集的公共场所管理与建设提出可行性方案。

本文通过模型实例运用证明了压电元件系统在公共场所统计人口进行管理与疏散具有一定的可行性，并且有一定发展前景。该系统能够明显提高行人过街的安全性，公共场所发生险情时的低风险性，促进节能环保发展。

关键词：压电效应；公共场所；人流量统计；踩压点阵式；能量回收；

Abstract: At present, the effect of the human flow detection system in public places is not obvious. Based on this, a human flow monitoring system based on piezoelectric effect was designed. First, the human flow was counted. At the same time, the electric energy was recovered by stepping on the piezoelectric element area. The hardware equipment of the system is composed of piezoelectric element gravity sensor, LED count display board and signal light device. MATLAB software technology is used to distinguish the superposition of population and the number of non-motor vehicles. High-frequency current is generated by PZT5H piezoelectric material circuit board as pulse signal. UWB wireless sensor technology is used for data transmission to realize the collection of population and the recovery of electricity. According to the hardware structure, the design system of automatic lifting barrier of zebra crossing, delay device of signal light and personnel evacuation route is designed. The system can reduce the dependence of human flow count and avoid the error of human processing, and put forward a feasible scheme for the management and construction of crowded public places. In this paper, the model example is used to prove that the piezoelectric element system is feasible to manage and evacuate the population in public places and has a certain development prospect. The system can obviously improve the safety of pedestrians crossing the street, the low risk when dangerous situations occur in public places, and promote the development of energy conservation and environmental protection.

Keywords: piezoelectric effect; Public places; Flow statistics; Step on the dot matrix; Energy recovery;

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