

People counting system for retail analytics

Introduction

People observation and counting is of great interests in many commercial scenarios. The number of people entering and leaving shops provide useful information to shop merchants and marketers. Since retailers spending time and money on marketing and advertising, they really need metrics to help understand the return on investment as the people counting data can be used as a KPI.

For non-commercial scenarios, people counting techniques are also useful in terms of security, event management and smart cities applications. Imagine you manage a large mall, these counting results would help you know how many people enter your mall, which paths they take, where they stop, and foremost, when does it all happen.

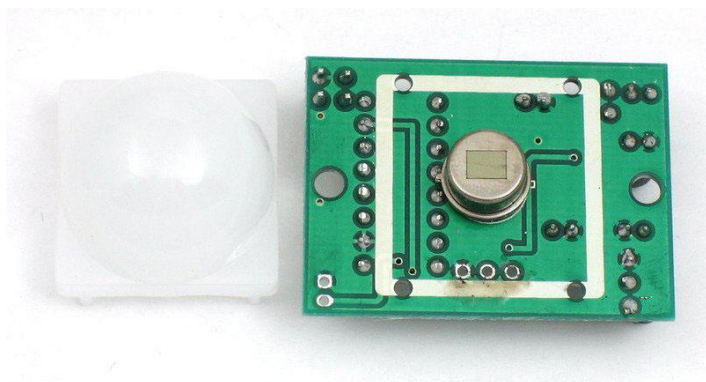


Customers in retail shop

People counting system and its sensors

WiiHey has developed a distributed people counting system, covering sensor nodes, wireless devices, algorithms, displays and some fancy extensions like camera-based computer visions. Most of the implementation is based on wireless sensor networks.

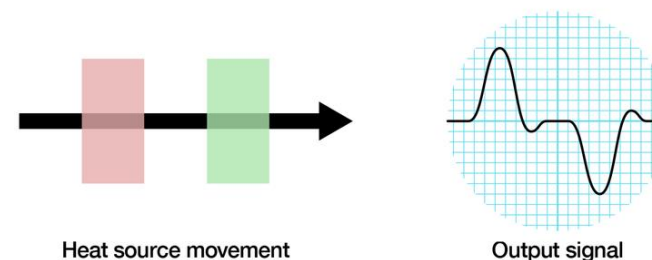
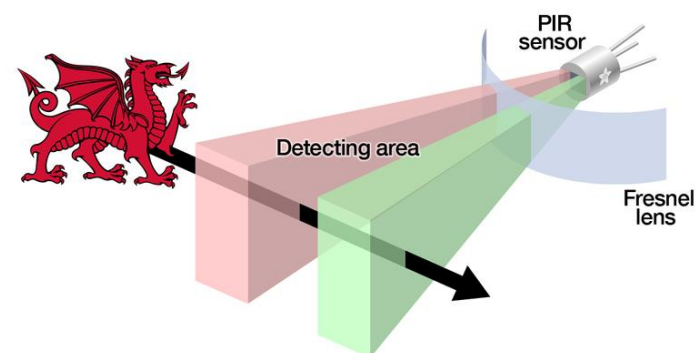
People counting sensors have been around for a while. One of the sensor technologies is called Passive Infrared Sensors (PIR sensor), which is commonly known as movement detectors. Such sensors measure the amount of infrared light radiating from objects passing in their view, a change in the measurement exceeding some defined threshold is considered a movement.



A PIR sensor

(The entire sensor node contains PIR sensor, MCU, battery and wireless connectivity module)

Dual-element PIR sensors connect two pyroelectric detector elements. The sensor signal is equal to the difference of the elements' voltages. Combined with Fresnel lenses, focusing infrared light coming from different angles, such sensors allow for the extraction of directional information of moving objects.



PIR sensors to detect people moving direction

Tech specs

- IR depth sensor - passive infrared sensor (PIR sensor);
- Most Accurate - 95%+ accuracy;
- Wireless Connectivity: 2.4 GHz Bluetooth Low Energy, sub-1GHz (868/915MHz);
- Centered above a door at height of 2.3m - 3m above the floor;
- 0°C to 50°C operating temperature range;

Benefits

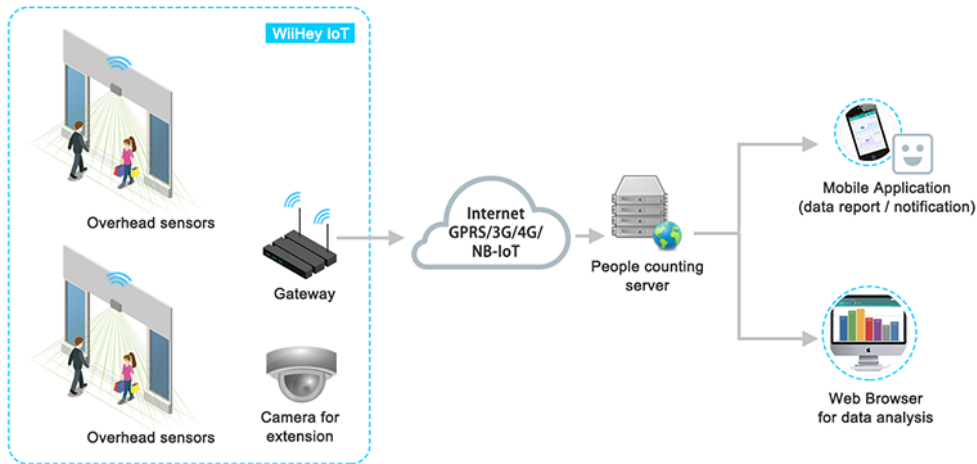
- Analyze customer flows and traffic trends;
- Evaluate impact of advertising and promotions;
- Improve staff planning and determine optimal opening hours;
- Assess the impact of weather on customer visits;
- Identify and reward high performing stores and employees;

Key features

- Provide great counting accuracy rate (~98%) and state of the art tracking algorithms;
- Equipped NB/UNB IoT wireless connectivities for data transmission and reporting;
- Hardware deployment with a simple setup process and straightforward self-installation;
- Scalable, reliable, cost effective sensor system for people counting analytics;
- Excellent combination of different technologies with strong extensibility (eg: video camera);

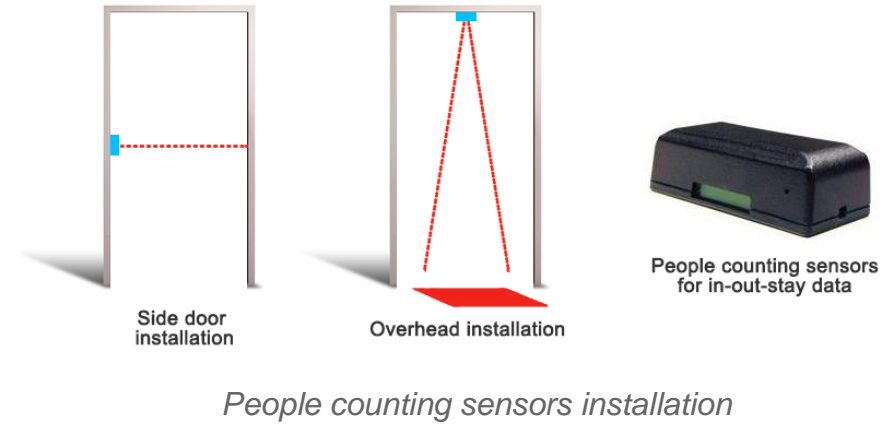
Architecture

A wireless sensor network is introduced to monitor the count values of each distributed sensor nodes and collect these data at a gateway. The gateway in turn transmits the data to a cloud server, where it can be made available for web-based applications and client terminals.



People counting system architecture

Hardware installation



People counting sensors installation

Summery

People counting system collects information about store traffic, in combination with the Smart shelf system, they provide crucial data, help you gain insights into customer behavior to evaluate merchandising and marketing efforts as well as to adjust daily operations and enhance optimal customer experience.