

# A Solution of Indoor Positioning System

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**Abstract**—This paper describes the use of ultra broadband indoor location technology within the area of the unified all personnel and equipment in planning, scheduling solution, realize the full view of the systematic monitoring sites, coherent continuous tracking and track the extraction. Realize the visible and invisible target can be effective management and scheduling.

**Keywords**—Positioning system; Reader; Electronic tag; Monitor.

## I. INTRODUCTION

With the rapid development of electronic information technology, how to intelligent management staff and equipment working condition, how to identify cross the border state, how to intelligent identification personnel or equipment close or leave the important area, etc. With traditional monitoring establish means and management method has can't satisfy the requirements of the development of modern management. We need to establish an automatic, intelligence, visualization, electronic, and networked intelligence comprehensive management monitoring system, the entire system also have controllable, adjustable, can be recorded etc. Functions.

Typical indoor positioning system including the main part of the identification, receiver, control center. Identification with a transmitting circuit, attached to a person or object need positioning, has unique code configuration, transmits a signal to the receiver. The receiver is arranged on the building around or ceiling, a plurality of receivers are connected with each other, forming a network. Control center data obtained by each receiver, signal processing, data fusion positioning of the logo, the tracking system can use the logo positioning information at different times to draw trajectories, speculated that the future trend, but also according to the marking area, resource distribution map query known, helps the user to find the required equipment.

In recent years, the developed countries such as the United States, Canada, Japan have invested a lot of manpower and material resources for research and development of relevant technologies and products. Our country is in the key period of the development of the information industry, we should seize the opportunity, strive for a breakthrough in indoor positioning system has great practical significance and broad application prospect.

At present there are a variety of wireless technology can make indoor positioning, including indoor GPS, RFID, IR, WLAN, Bluetooth and UWB, they are using the location network, through the signal parameters are received, according to the specific algorithm to measure the person or object in a position. In the application of precision can be divided into two categories, one is target detection, it does

not need the characteristics of position coordinates or object is very accurate, only need to know is targeting the absence or area; another kind is the "smart space", its application can provide very high positioning precision and real-time monitoring

## II. THE SYSTEM FUNCTIONS

### A. Main Features

1) *Personnel Positioning*. In the lobby and the conference room set up the complete coverage of accurate two-dimensional localization system, positioning accuracy of 15 cm. In the office established within the complete coverage of zero-dimensional positioning system. When the person carrying the tag come into the detection range, the system can read out the information of the person and send back to the management center. Location information generated through processing personnel management software, distribution and personnel distribution table, which can be visually in real-time view to the distribution of all staff.

2) *Path Tracking*. The system can track the trajectory of personnel, records all the locations they visited and their residence time in each location.

3) *Staff Searching*. This system can be positioned up to 8,000 employees or equipment, so in case of emergency, it can easy to find the specific personnel or equipment in the shortest period of time.

4) *Data Storage*. The system has the long-term preservation data ability, stored the location information into the database, generate historical video data, and can easily inquires historical information to the localization.

5) *Data Backup*. The system has a convenience of data backup and data recovery functions.

6) *Network Share*. The system has network sharing function, location information can be accessed through the LAN, provide timely information real-time monitoring and historical information for higher levels of management and leadership, as they provide an important basis for supervision and command decision-making.

### B. Function Extension

1) *Alarm*. When some special person or equipment near or leave sensitive area, can send a warning to the management system, convenient system management personnel to deal with.

2) *Video Monitoring*. Because PLUS positioning system has high precision, the precision positioning system and video monitoring system combined, by personnel or equipment moving track driven video equipment, not only can get personnel or equipment

coordinate information, but also through the video screen view employees or equipment working condition.

### III. INDOOR PERSONNEL POSITIONING SYSTEM SOLUTIONS

#### A. Overview

PLUS indoor personnel location system uses 7.3GHz UHF technology, compared with the similar products, this system has deployed simple, cost-effective, high accuracy label placement stability does not drift, signal anti-jamming ability, and frequency tags can transmit status dynamic updating of the salient features.

Figure 1 shows the structure diagram of ultra wide band indoor positioning system.

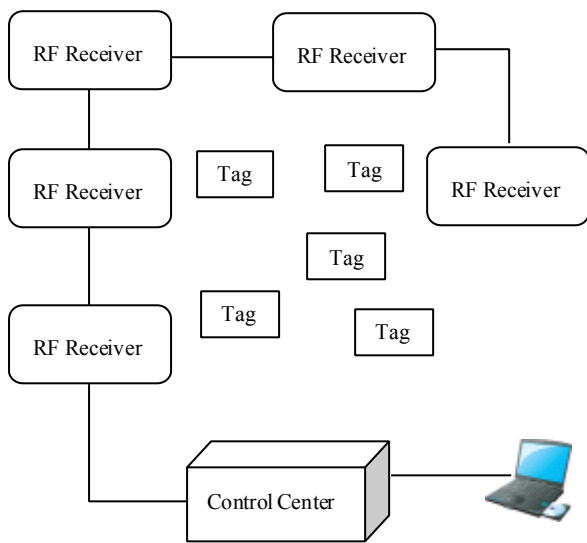


Figure 1. Structure diagram of ultra wide band indoor positioning system

The system can make the management of the real time control of each area personnel detailed information and number, can realize the automatic count the number of designated areas, within the area personnel for the whole dynamic monitoring, greatly reduce the management personnel working strength, in meet emergencies or emergency, but through the personnel positioning system quickly positioning related personnel's position, which can improve the work efficiency.

The system can also be used in combination with the intelligent monitoring system, for management work started to provide more system, convenient and efficient modern means. Figure 2 is the schematic diagram of working hall floor flat.

#### B. Solution Composition

The system includes five parts, such as the active E-tags, antennas, readers, synchronous splitter and servers.

Active E-tag is made by highly integrated micro power single chip, it has small size and low power consumption advantages, each tag has a unique identification number. The antenna use the 7.3 GHz band of free no need to apply, the band has good anti-disturbance performance, can operate in complex physical environment.

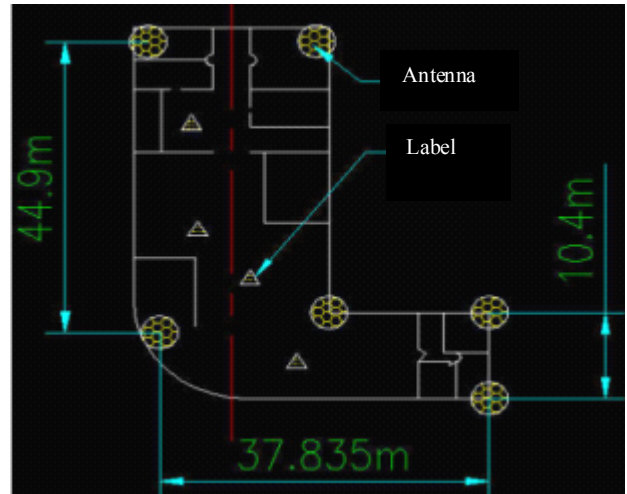


Figure 2. Schematic diagram of the working hall floor flat

#### C. Main Functions

From the personnel and equipment management point of view, different responsibilities for staff and scope of activities, through the analysis of people or equipment moving situation, grasp the status of activities, supervision and implementation of management systems to achieve the office area, the environment tracking and management system of the three supervision and management.

The main features of this software are as follows:

Perfect foundation information management. Classified by person type, for the convenience of foreign visitors into the office area, opened up a temporary personnel information management system, need to be monitored within the region and location of personnel or equipment to match the label, the full completion of the trinity type of supervision and management tracking.

Comprehensive real-time monitoring of work. Can realize office area and number of distribution, staff overtime, the illegal for situation, specific position abnormalities, temporary workers fixed path group activities, an inspection group work, an abnormal condition monitoring; At the same time, you can display the current area in all the staff, the distribution of the equipment, check history, let the management work in time to know the state of many situations.

Easy map management. In order to let users can directly convenient monitoring office area personnel distribution situation, the system adopts the advanced maps show that technology, combined with the office layout diagram of the actual situation, the image of the dynamic for the user to employees or equipment that distribution. Completed the track for the supervision and management of environmental management system, allow users to directly map management to achieve closed set. It has some advantages such as easy to use, quick operation. Through the map can be directly display the current office area operations or historical position of the distribution of data, also can be displayed the history of personnel activities track.

Convenient query. Queries through the LAN network, the network of any one computer can understand the current office staff of all distribution operations, according to various query check out the current / historical data and results orientation, or illegal data and print reports in a timely manner.

Various reports. Depending on the user concerned about the different results obtained for different users of a variety of reports, printing or network printing can also be exported to Excel, Word, PDF to modify any of a variety of styles after printing.

Comprehensive systems management. The system use large database platform to support multiple users simultaneously operating the system; strict rights management operator can only operate within the competence of the operation. The system uses the B / S, C / S architecture of the combination of the development, to facilitate the installation of the system and maintenance, and facilitate user involvement.

#### IV. SUMMARY

The system through the use of PLUS indoor locating technique within the area of all personnel and equipment in planning, scheduling, can realize the view of the systematic monitoring sites, coherent continuous tracking and track the extraction. So as to realize the goal of all the effective management and scheduling to constitute a powerful intelligent monitoring system.

#### ACKNOWLEDGMENTS

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