Accurate Indoor Localization Based on the inertial navigation and the I beacon – 3500

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Abstract- **In this paper, Indoor localization is an important primitive that can enable many ubiquitous computing applications. This paper improves the scheme of landmark and inertial navigation to address reliable and accurate indoor localization. We use the iBeacon as the landmark. To optimize the inertial navigation, we integrate exploit the calibration function of the iBeacon for step length and heading estimation. For tackling the challenges of eliminating the difference of mobile devices, we have developed reliable parameter learning algorithm. The results of extensive experiments on multiple devices show that our localization system performed well in terms of accuracy and universality.**

Index term- IBeacon, AT89S52, Accelrometer.

I. INTRODUCTION

The Global Positioning System (GPS) is commonly used for navigation in outdoor environments. However, it is not available for indoor positioning due to the obstruction of signals. As a result, various indoor navigation approaches have been extensively studied to achieve reliable and high accuracy positioning for a person or a device indoors. Researchers have proposed many solutions using radio beacons, inertial sensors, ultrasound, vision, etc. Most indoor positioning systems are classified into two types: non-infrastructure-based (e.g., DR scheme) and infrastructure-based DR-based method, also known as an inertial navigation system (INS), is a self-contained localization system that relies on inertial sensors such as accelerometer, gyroscope, and magnetometer without the assistance of the GPS and infrastructure.

Pedestrian navigation system (PNS) as an instance of DR technique estimates the location of the user by measuring the traveled distance and direction from a known location using the motion sensors. However, low cost sensors may have drift error and large bias. In addition, positioning errors in DR can be caused by an oscillation of user body during the walking.

Most non-infrastructure-based localization techniques adopt dead reckoning (DR) as the basic scheme for positioning. DR-based methods depend on an inertial measurement unit (IMU) that contains accelerometer, gyroscope, and magnetometer to calculate the position, orientation, and velocity of the object without the help of the infrastructure The fingerprinting-based techniques require no prior knowledge about infrastructure locations and no propagation model. The main idea is to create a fingerprint map (database) by fingerprinting the surrounding features at every position in the area of interest and then to estimate the associated position by mapping the measured feature against the fingerprint map.

II.BLOCK DIAGRAM

SENSOR SECTION

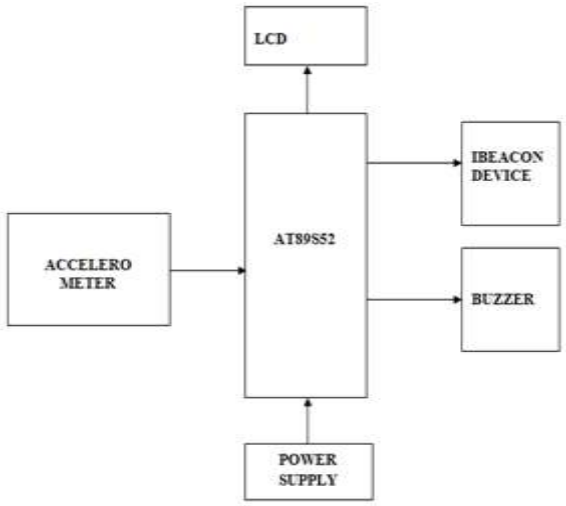

Fig: 1 Block Diagram

MONITORING SECTION

Fig: 2 Mobile as a monitoring Section

III. EXISTING SYSTEM

The Existing system for using Bluetooth &WI-FI wireless technology it's use of only data transfer the point to point. The growing popularity using location-tracking system leads to a large amount of positioning technology. This system high power consumption.

IV. PROPOSED SYSTEM

These system users encounter a landmark; this scheme can use the information of the landmark to calibrate the location of users. The iBeacon has the characteristics of easy to deployment, low power consumption and low cost. The positioning more accuracy of the system

V. HARDWARE REQUIREMENT

- POWER SUPPLY
- LCD
- AT89S52
- BUZZER
- IBEACON DEVICE
- ACCELEROMETER
- GYROSCOPE
- MOBILE PHONE

LCD

LCD (liquid crystal display) is the technology used for displays in notebook and other smaller computers. Like light-emitting diode (LED) and gas-plasma technologies, LCDs allow displays to be much thinner than cathode ray tube (CRT) technology. LCDs consume much less power than LED and gas-display displays because they work on the principle of blocking light rather than emitting it.

IBEACON DEVICE

iBeacon is a protocol developed by Apple and introduced at the Apple Worldwide Developers Conference in 2013. Various vendors have since made iBeacon-compatible hardware transmitters – typically called beacons – a class of Bluetooth low energy (BLE) devices that broadcast their identifier to nearby portable electronic devices. The technology enables smartphones, tablets and other devices to perform actions when in close proximity to an iBeacon

BUZZER

A buzzer or beeper is an audio signallingdevice,which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke

POWER SUPPLY

A power supply is an electrical device that supplies electric power to an electrical load. The primary function of a power supply is to convert electric current from a source to the correct voltage, current, and frequency to power the load.

ACCELEROMETER

An accelerometer is a device that measures proper acceleration. Proper acceleration, being the acceleration (or rate of change of velocity) of a body in its own instantaneous rest frame, is not the same as coordinate acceleration, being the acceleration in a fixed coordinate system.

AT89S52

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is

manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 instruction set and pinout. 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, a six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry

GYROSCOPE

A is a device used for measuring or maintaining orientation and angular velocity.It is a spinning wheel or disc in which the axis of rotation is free to assume any orientation by itself. When rotating, the orientation of this axis is unaffected by tilting or rotation of the mounting, according to the conservation of angular momentum.

MOBILE PHONE

A mobile phone, cell phone, cellphone, or hand phone, sometimes shortened to simply mobile, cell or just phone, is a portable telephone that can make and receive calls over a radio frequency link while the user is moving within a telephone service area.

VI. SOFTWARE REQUIREMENT

- KEIL IDE
- EMBEDDED C
- IBEACON APP

EMBEDDED C

Embedded C is a set of language extensions for the C programming language by the C Standards Committee to address commonality issues that exist between C extensions for different embedded systems.

IBEACON APP

The term iBeacon and Beacon are often used interchangeably. iBeacon is the name for Apple's technology standard, which allows Mobile Apps (running on both iOS and Android devices) to listen for signals from beacons in the physical world and react accordingly.

VII. CONCLUSION

In this paper, we proposed iBILL, an accurate indoor localization system that jointly uses iBeacon and inertial sensors in large open areas. iBILL consists of two modes, iBeacon localization mode and Particle Filter Localization (PFL) mode. iBeacon devices clusters can accurately localize users in their vicinity, and we show advantages and limitations of localization utilizing them. PFL mode provides real time localization for users walking in large open areas through an improved particle filter. We improve the algorithm of existing particle filters to cope with the fluctuations of magnetic field. As a result, iBeacon devices can prevent errors in PFL mode from accumulating with walking distance increase and guarantee the errors in an acceptable range. iBeacon devices can also be used to reduce computational overhead of particle filter and improve robustness of iBILL. Our experimental results corroborate that using iBeacon can improve the performance of inertial sensors based localization technologies in large open areas. Our future work is to further study how to use iBeacon and inertial sensors to improve the performance of location based services in user-centric commercial modes.

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