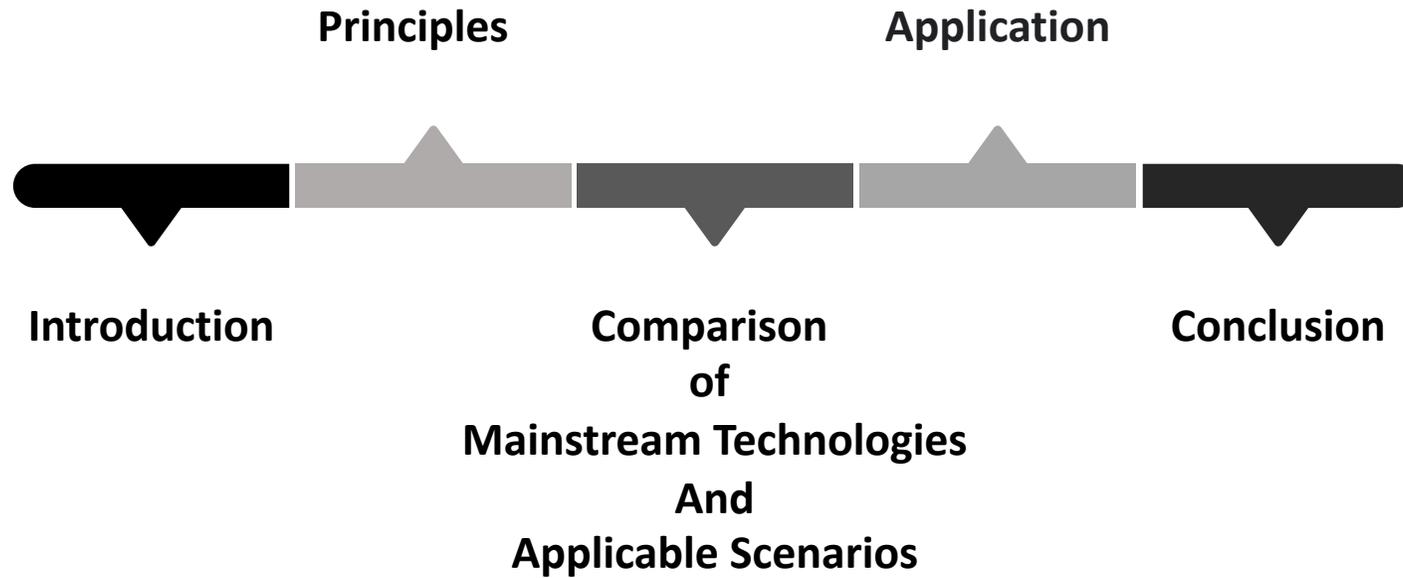




Indoor Positioning System

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Content



Part A

Introduction

Indoor positioning system

A system which is able to locate one or more people and objects in an indoor environment where GPS and other satellite technologies lack precision or fail entirely.

- . Anchors
- . Location Tag

Part B

Principles

Indoor positioning technique

- ✓ Trilateration
- ✓ Proximity
- ✓ Fingerprinting
- ✓ Motion

Trilateration

- The specific coordinates of three known points in a given space.
- The distance from an unknown point to three points.

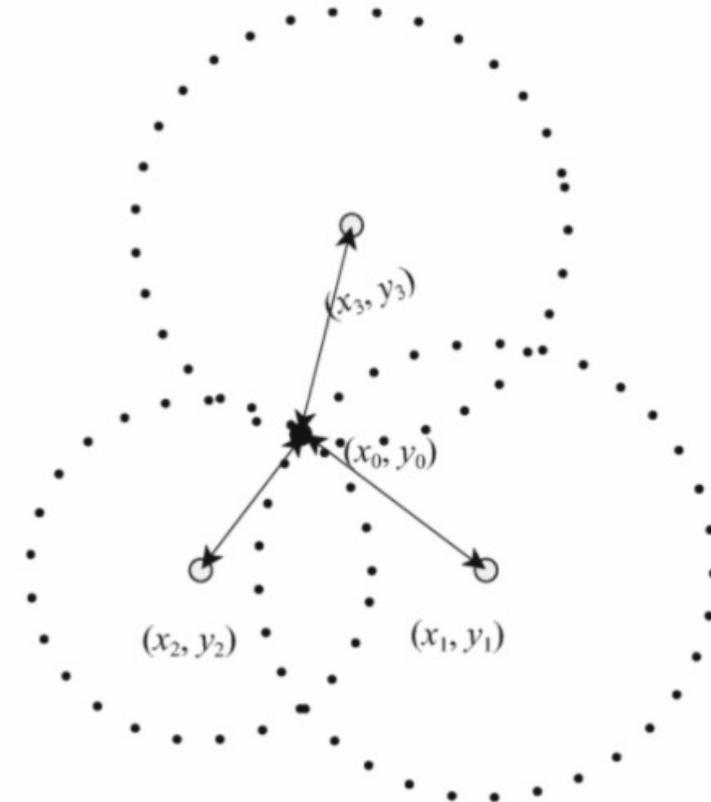


Figure 1: Trilateration principle

Part C

Comparison of Mainstream Technologies and Applicable Scenarios

Types

- ① Indoor positioning systems based on Computer Vision Technology.
- ② Indoor positioning systems based on Wireless Communication Technology.
- ③ Indoor positioning systems based on LED Visible Light technology.
- ④ Indoor positioning technology based on Geomagnetic Matching.

WiFi-based Positioning System

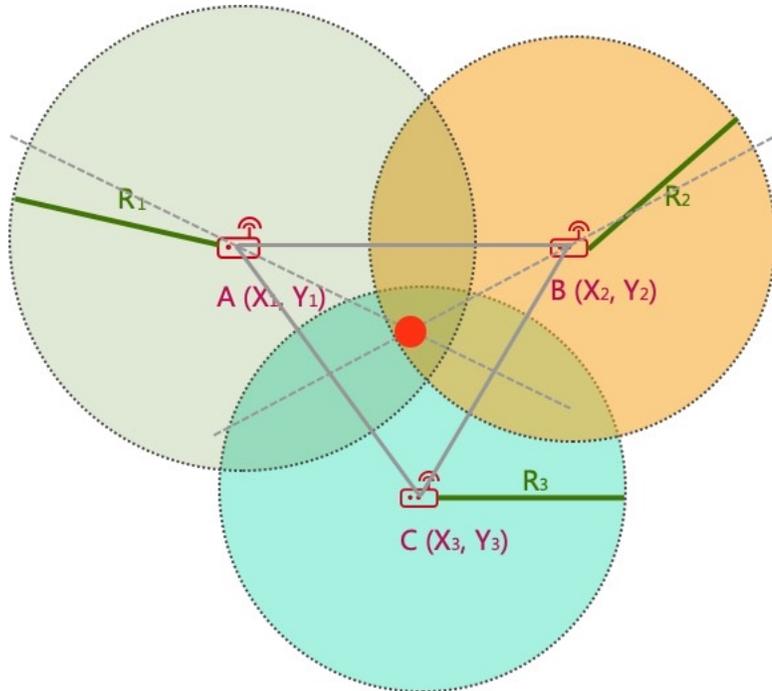


Figure 2: Triangulation method.

- ⊙ **Tags:** WiFi transmitters. At least 3 access point.
- ⊙ **Advantages:** high overall accuracy, easy expansion, automatic data update, low hardware cost, and high transmission rate.
- ⊙ **Disadvantages:** short transmission distance and high power consumption. May produce shadowing and multipath effects.
- ⊙ **Applicable scenarios:** Positioning and navigation of people or vehicles can be used in medical institutions, theme parks, factories, shopping malls and other occasions.

Radio Frequency Identification (RFID)

- Tags (on object): carries data and needs to be transmitted.
- **Advantages:** can get information accurate to the centimeter level within a few milliseconds. The size of the tag is small and the price is low.
- **Disadvantages:** No communication capability, poor anti-interference capability, and not easy to. Not perfect in user safety and privacy protection.
- **Applicable scenarios:** Positioning by the user in a specific area. E.g. emergency rescue, asset management, personnel tracking.

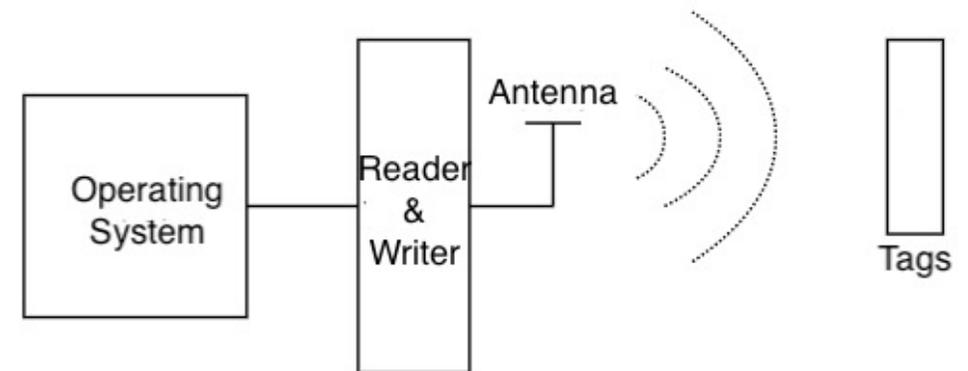


Figure 3: RFID System Framework.

Ultra-Wideband (UWB) Positioning

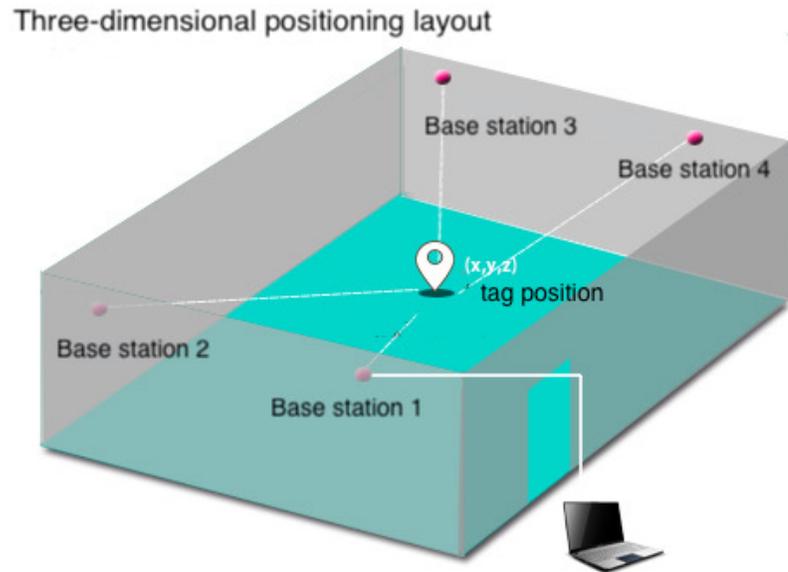


Figure 4: Accurate 3D positioning arrangement: A positioning base station is arranged every 50-100 meters, so that four base stations can receive the pulse sent by the tag at any time.

- **Three layers:** management layer, service layer and field layer. The scene layer is composed of anchor and tag.
- **Advantages:** strong penetrating power, good anti-multipath effect and high security.
- **Disadvantages:** Because the newly added blind nodes also need to actively communicate, the power consumption is high.
- **Applicable scenarios:** radar detection, as well as indoor precise positioning and navigation in various fields.

Part D

Application

Application

- ✓ VR theme game park
- ✓ Fire station
- ✓ Airport
- ✓ Drones and robots

Part E

Conclusion

Conclusion

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Computer Vision Technology.
Wireless Communication Technology.
LED Visible Light Technology.
Geomagnetic Matching Technology.

Future:
Improve accuracy
Reduce the consumption
Easier to use



Thanks