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Indoor Location Analytics System for Exhibition and Convention Industries (ILAS)

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OBJECTIVES

- The proposed system brings new opportunities to different stakeholders in the Exhibition and Convention Industry.
- The buyers and exhibitors will have their matchmaking costs reduced and thus their levels of satisfaction increased.
- The exhibition organizers, with the collected movement data stored at the backend analytics server, are provided with decision support for better booth arrangement of exhibitors as well as supportive information for promoting exhibitors at sub-optimal booth areas.

HIGHLIGHTS

Background

Hong Kong has been a unique convention and exhibition centre in the region. Different exhibition venues in particular the Hong Kong Convention and Exhibition Centre (HKCEC) and others, contribute altogether 160,663 square meters of exhibition space.

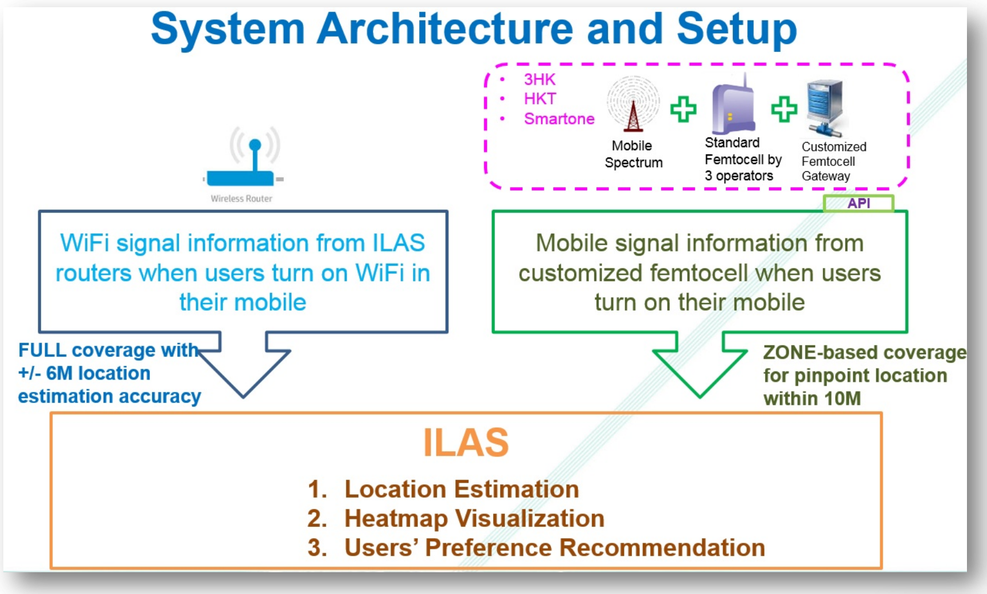
With the increasing demand, challenges of "limited space" and "tight schedule" are faced. To maximize the use of the available space of the exhibition halls, effective ways to

- Assign the booths in an exhibition hall to different exhibitors so as to increase the flow of potential visitors at different booths
- Direct potential visitors explicitly to the relevant booths for better matchmaking are both desirable for service enhancement

The key underlining information needed is the knowledge about the detailed flow of the visitors. This project proposes to address the challenges by developing an indoor location analytics system (ILAS) that

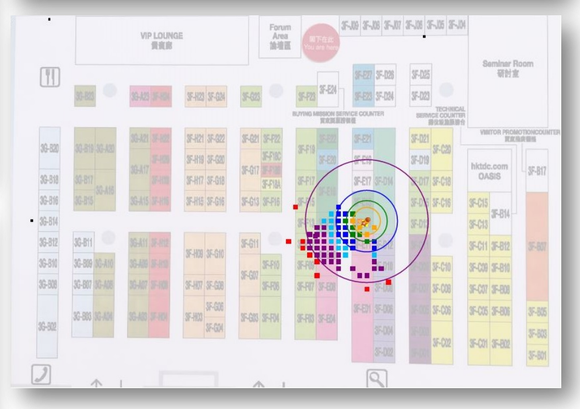
- Track the movement of the visitors via the WiFi and/or Femtocell technologies (location-based system), and
- Analyze the movement data for computing the visitors' preference profiles and recommending them relevant booths (location analytics)

System Architecture and the Functions of the Recommendation System for ILAS



Recommendation System

- Identify moving patterns of people, as well as their profiles
- Provide value-added services via location analytics
  - Buyers/Visitors
    - Personalized recommendation and guiding services
  - Exhibitors
    - Statistics on booths visiting rate
    - Dynamic promotion plans for booths at sub-optimal locations
    - Targeted promotion to potential visitors
  - Exhibition Organizers
    - Monitoring visitor flow within the exhibition hall
    - Targeted advertisement services
    - Decision support for assigning booths to exhibitors based on flow info



Pilot Tests at Exhibition Centers

- 2 Pilot Tests at HKCEC
  - ICT Expo, 13~16 Apr 2017
  - Watch & Clock Fair, 5~9 Sept 2017
- 1 Pilot Test at AsiaWorld Expo (AWE)
  - Gifts & Home Expo, 18~21 Apr 2017

SELECTED PUBLICATIONS

1. Kai Liu, Hao Zhang; Kai Liu; Feiyu Jin; Liang Feng; Victor Lee; and Joseph Ng, "A Scalable Indoor Localization Algorithm based on Distance Fitting and Fingerprint Mapping in Wi-Fi Environments" to appear in *Neural Computing and Applications*.
2. Hao Li, Joseph K. Ng, Victor C.W. Cheng and William K. Cheung, "Fast Indoor Localization for Exhibition Venues with Calibrating Heterogeneous Mobile Devices", to appear in *Internet of Things: Engineering Cyber Physical Human Systems*, Elsevier (2 September 2018 - Accepted)
3. Hao Li, Joseph K. Ng, and Shuwei Qiu, "A Practical Indoor Localization System with Distributed Data Acquisition for Large Exhibition Venues", in *Proceedings of The 12-th International Workshop on Advanced Distributed and Parallel Network Applications (ADPNA-2018),* Comenius University in Bratislava, Slovakia, 5-7 September, 2018.
4. Victor C.W. Cheng, Hao Li, Joseph K. Ng and William K. Cheung, "Fast Setup and Robust WiFi Localization for the Exhibition Industry", in *Proceedings of The 32nd IEEE International Conference on Advanced Information Networking and Applications (AINA2018),* Pedagogical Univ. of Cracow, Poland, 16-18 May, 2018.
5. Kai Liu , Hao Zhang, Joseph Kee-Yin Ng , Yusheng Xia, Liang Feng , Victor C. S. Lee , and Sang H. Son, "Toward Low-Overhead Fingerprint-Based Indoor Localization via Transfer Learning: Design, Implementation, and Evaluation", *IEEE Transactions on Industrial Informatics*, 14(3), pp. 898-908, March 2018.
6. Yaoxin Duan, Kam-Yiu Lam, Victor C. S. Lee, Wendi Nie, Hao Li, and Joseph K. Y. Ng, "Multiple Power Path Loss Fingerprinting for Sensor-Based Indoor Localization," *IEEE Sensors Letters*, vol. 1, no. 4, pp. 1-4 August 2017.