

Proposal of Location Information Platform on the Internet

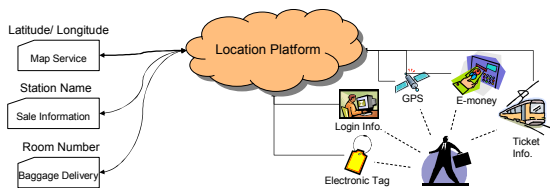
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Presentation Overview

- The motivation of this study
- The present state of positioning devices and location-based services
- Our approach
- Sample implementation
- Future Work
- Summary

Motivation

- Deal with location information in various expressions from multiple devices uniformly.



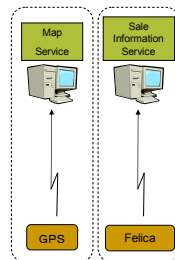
Existing Positioning Devices

Device	Accuracy	Service Area
GPS	1-5m (95-99%)	outdoor
Active Badges	room size	indoor
Active Bats	9cm (95%)	indoor
Wireless LAN	IEEE802.11 cell size	indoor, outdoor
RF-ID	several cm ~ several meters	indoor
Cellular Phone	several meters ~ several hundred meters	indoor, outdoor

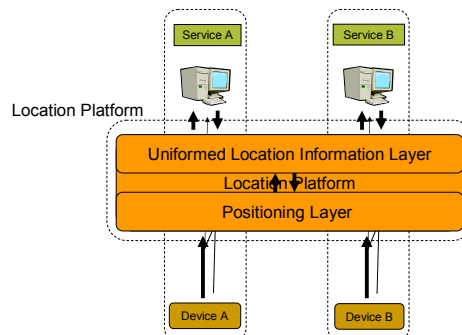
In ubiquitous computing, various positioning devices should be chose according to users' circumstance.

Existing Location-Based Services

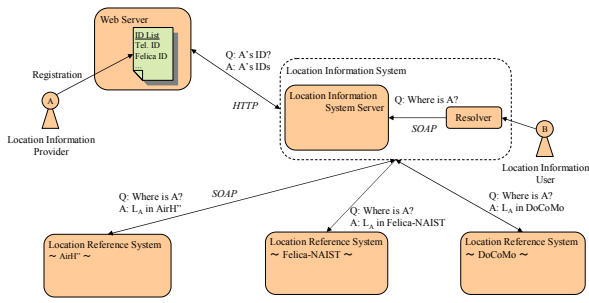
- Each service uses its own positioning device.
 - Each service is designed to be dependent on its target device.
- How location-based services can be independent on positioning devices?



Our Approach



Web-Based Location Information Platform

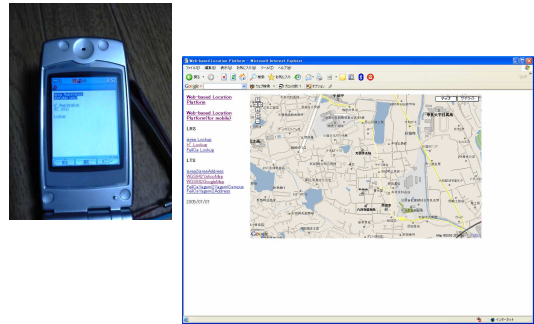


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Sample Implementation Demo



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Future Work

- Converting location expression
 - e.g. Latitude / Longitude \leftrightarrow Address
- Privacy controls
 - Access control
 - Accuracy control
- Reverse resolution
 - Area \rightarrow IDs ("Who is there?")

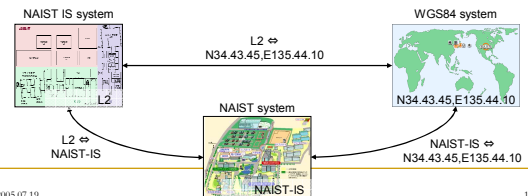
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Converting location expression (1/2)

- One position can be expressed by various systems.
 - L2, NAIST, 〒630-0192, N34.43.45,E135.44.10, ...
- If the relationship between each expression system can be defined, one expression can be converted to another.



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Converting location expression (2/2)

- The most important issue is the error in converting.
- No error case
 - NAIST \rightarrow Ikoma-shi
- Error case
 - Osaka Intl. Airport \rightarrow Itami-shi
 don't cover all of the location
 - L2 room \rightarrow NAIST-IS \rightarrow N34.43.45,E135.44.10
 - L3 room \rightarrow NAIST-IS \rightarrow N34.43.45,E135.44.10
 Converted to the same location

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Related Work

- Universal Location Framework (Intel)
 - A framework that allows aggregating multiple location technology
- OASISS (Aoki et al. : Keio University)
 - A positioning middleware for heterogeneous sensor environment
- Universal Locator (Konishi et al. : Tokyo University)
 - A platform that can estimate one's position by integrating different types of sensor devices and geographic data.
- The diversity of location expression is unconsidered under these works.

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Summary

- Location Information Platform is the model to deal with location information in various expressions from various positioning devices uniformly.
- I showed the sample implementation of this model.
 - The location information from i-mode, AirH[®] and Felica can be obtained at once.
- The following view points should be considered.
 - Converting expression in low error.
 - Privacy Controls
 - Reverse resolution