

Nara Palace Site Navigator: A General Human Navigation System Using a Networked Shared Database

Vision and Media Computing Lab.
COE Promoted Researcher

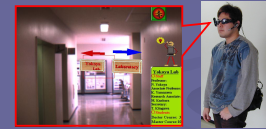
Ryuhei TENMOKU

Background -Human Navigation Systems

Presenting **location-based information** to users of mobile devices (wearable computers, PDAs, and mobile phones)



Pedestrian navigation system for mobile phones "EZ naviwalk" (KDDI)



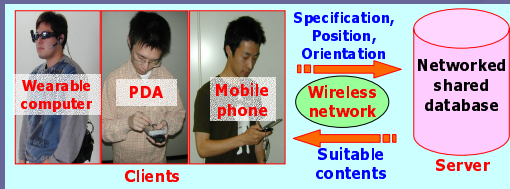
Wearable annotation overlay system "ARISE" (2003)

The specification of the user's mobile device is determined by contents.

Our Research Purpose

Construction of human navigation system for multi-devices : "Nara Palace Site Navigator"

- Managing contents data in a server using a **networked shared database**
- Sending contents data based on **the specification of the user's device and user's position**



The concept of Nara place site navigator

Nara Palace Site Navigator

- Assumed environment :**
 - Outdoor sightseeing sites including **some scattered sightseeing spots in wide areas**
 - Completing with a **wireless network system**
- Navigation between spots and presenting guide information for tour guide**



Nara palace site (Nara city)



Concept of tour guide

Tour Guide of Nara Palace Site Navigator

- Navigation** between sightseeing spots
 - Using **autogenerated Web maps**
- Presenting guide information** at sightseeing spots
 - Using **multimedia contents**



Example of autogenerated Web map



Movie content



Text and image (html) content



Augmented reality content

Examples of presenting guiding information using multimedia

Classification of Client Devices

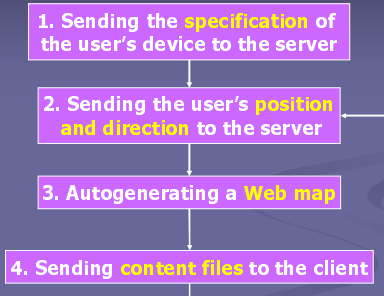
Assumed client devices

- Possible to **measure the user's position and absolute direction** and **send** them to the server
- Possible to **browse web pages**

Classifying client devices into following three device types

Device type	Contents				
	Augmented reality	Movie	Sound	Text and Image (html)	Autogenerated Web map
Wearable computer (WC) type	○	○	○	○	○
PDA type	×	○	○	○	○
Mobile phone type	×	×	×	○	○

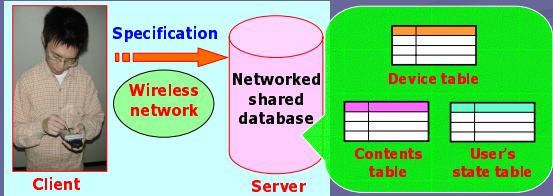
Flowchart of the System



Sending the specification of the user's device to the server

Adding new client data into the device table

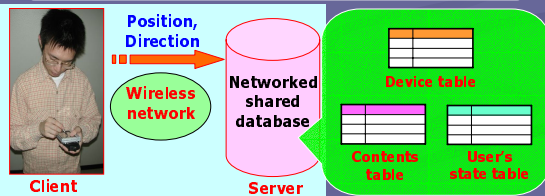
User ID	Device type
ID 1	WC type
ID 2	Mobile phone type
ID 3	PDA type



Sending the user's position and direction to the server

Renewing user's present position and absolute direction

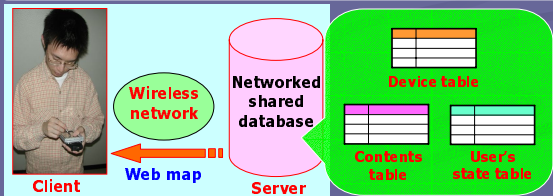
User ID	Lat.	Lon.	Dir.
ID 1	Lat.1	Lon.1	Dir.1
ID 2	Lat.2	Lon.2	Dir.2
ID 3	Lat.3	Lon.3	Dir.3



Autogenerating a Web map

Generating head-up-displayed map around the user's present position automatically

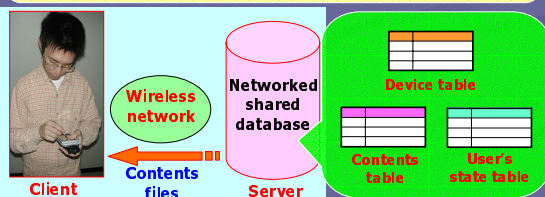
User ID	Lat.	Lon.	Dir.
ID 1	Lat.1	Lon.1	Dir.1
ID 2	Lat.2	Lon.2	Dir.2
ID 3	Lat.3	Lon.3	Dir.3



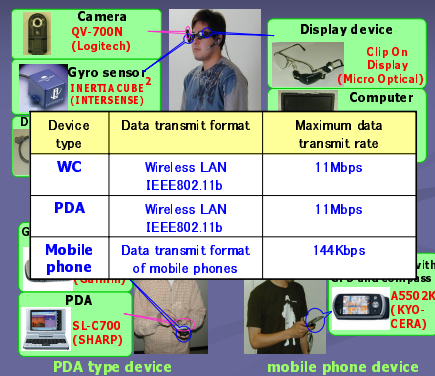
Sending content files to the client

Sending suitable contents files to the clients

File name	Lat.	Lon.	Device type
File1	Lat.A	Lon.A	WC type
File2	Lat.B	Lon.B	WC,PDA types
File3	Lat.C	Lon.C	All types



Experiments – Client Systems



Experiments - Results

The screenshot displays two examples of 'Autogenerated Web page' for different device types. The first example shows a high-resolution map with a detailed street grid. The second example shows a lower-resolution map with a simplified street grid. To the right, a mobile phone is shown displaying the map. Below the examples is a table with the following data:

Device type	Resolution of map	Renewal time
WC type	640 * 320	1 sec.
PDA type	320 * 320	3 sec.
Mobile phone type	230 * 230	7 sec.

Summary and Future Work

- **Summary**
Suggesting the human navigation system for multi-devices using shared networked database
- **Future work**
Classifying the user's devices more strictly
 - Network power
 - Rendering power
 - Resolution of the display