A Wearable Interface for Visualizing Coauthor Networks:

An Integration of Ubiquitous Computing and Social Networking

10th COE Postdoctoral and Doctoral Researchers
Technical Presentation

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Background

- There has been a considerable amount of attention surrounding the integration of ubiquitous computing technologies and social networking in the last few years.
- Two types of researches.
  - From virtual worlds to the real world:
    Augmentation of user experiences in virtual worlds (i.e. social networking services) based on social interactions in the real world.
  - From the real world to virtual worlds:
    Enhancement of face-to-face communications and creation of social networks in real world by using information on common interests or friends which is preserved in virtual worlds.

Related Work: Real to Virtual

- Trace [1] exploits physical co-presence at social events for creating social networks in virtual worlds, and supports follow-up activities after events.
- iBand [2] motivates users to exchange information about users based on the common gesture of the handshake, that results in expanding users' social networks.

[1] S. Counts and J. Geraci. Incorporating physical co-presence at events into digital social networking. In CHI '05: CHI '05 extended abstracts on Human factors in computing systems, pages 1308.1311, 2005.
[2] M. Kanis, N. Winters, S. Agamanolis, A. Gavin, and C. Cullinan. Toward wearable social networking with iband. In CHI '05: CHI '05 extended abstracts on Human factors in computing systems, pages 1521.1524, 2005.

Related Work: Virtual to Real

- SpotMe [3] helps users meet people they are searching at conferences by using information from people databases. Our study is categorized into the later type.
- Sparks [4] facilitates users' conversations by projecting words related to shared interests on the floor close to users' feet.

[3] SpotMe. http://www.spotme.com/
[4] A. Chew, V. Leclerc, S. Sadi, A. Tang, and H. Ishii. Sparks. In CHI '05: CHI '05 extended abstracts on Human factors in computing systems, pages 1276.1279, 2005.

Objective

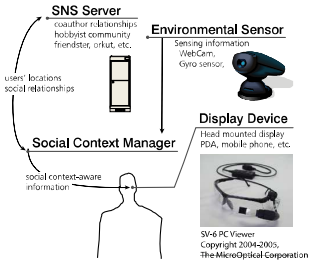
- Face-to-face communication enhancement by using the integrated technologies of ubiquitous computing and social networking.
- Face-to-face communication especially between old-timers and newcomers in a research community.
  - Newcomers apt to hesitate to talk to old-timers.
  - Old-timers are also difficult to talk to newcomers because they are not sure of having shared common interests or background with newcomers at the time.

Approach

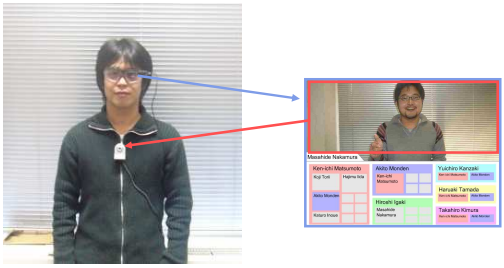
- In order to help old-timers and newcomers understand their research backgrounds and social relationships among them.
  - To provide visualizations of coauthor relationships of conversational partners through a wearable interface
  - To transform complex social network graphs into tree maps so that they can be easy to understand.

The SCAI (Social Context-Aware Information) System

- Toward building a communication enhancement environment in a research community, I have been developing a prototype system called the SCAI (Social Context-Aware Information) System
- SCAI serves as *icebreaker*— facilitates face-to-face communications between old-timers and newcomers in a research community.

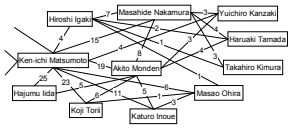


A wearable interface as a display devise and an environmental sensor



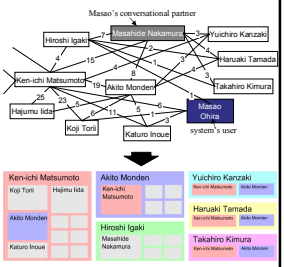
A Visualization of a coauthor relationship

- A coauthor relationship can be represented as an undirected network graph (i.e. social network) in common.
- Social network analysis (SNA) is useful to understand normally invisible relationships between people.
- However, a visual representation of social networks is often too complex to understand what they mean at a glance.



The tree map visualization[5] for representing *social networks*

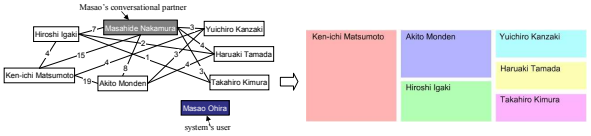
- The tree map visualization is alternative to the traditional visualization for complex hierarchical tree structures but not network structures.
- By incorporating the *viewpoint*, which settles "who sees whose social networks," into tree map visualizations, social networks can be represented as tree maps.



[5] B. Shneiderman. Tree visualization with tree-maps: 2-d space-filling approach. ACM Trans. Graph., 11(1):92.99,1992.

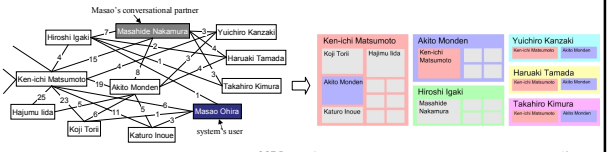
A representation of coauthor relationships using the tree map technique (1)

- Masahide has 6 coauthors (i.e. 6 nodes with one degree of him) and 40 papers in total.
- The 6 nodes into the two dimensional space as the top level of a tree map .
- The ratio of the rectangle size corresponds to the ratio of number of coauthored papers.

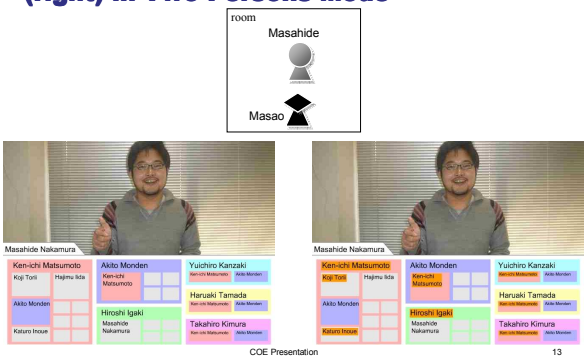


A representation of coauthor relationships using the tree map technique (2)

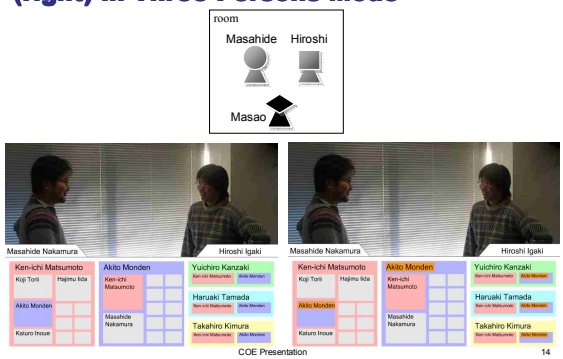
- The colors of rectangles are used for indicating people's identities in a consistent manner.
- Finally, based on the same procedure above, the system arranges coauthors of top-level coauthors into the each area of top-level coauthors.



Public View (left) and Private View (right) in Two Persons Mode



Public View (left) and Private View (right) in Three Persons Mode



Conclusion and Future Work

- I introduced the SCAI (Social Context-Aware Information) System, an example of the integration of ubiquitous computing and social networking.
- SCAI uses the tree map technique to represent complex coauthor relationships (i.e. social networks) in order to help old-timers and newcomers in a research community understand their research background.
- I hope the system will served as *icebreaker* for enhancing face-to-face communications.
- I need to test the system through actual use in academic conferences in near future.