Works in Progress

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A Survey, Cloud File Sharing, and Object Augmentation

SURVEY ON INDOOR POSITIONING SYSTEMS

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In partnership with Pervasive Media Studio Bristol (www.pmstudio.co.uk), I'm conducting a survey on the suitability of indoor and local positioning systems for interactive/locative audio applications (iLAA).

The findings of this user-requirements survey will help develop iLAAs, and locative content-driven media in general, and will be submitted to the 2012 Conference on Indoor Positioning and Indoor Navigation in Sydney (www.surveying.unsw.edu.au/ipin2012). I welcome contributions from workers with an interest in pervasive media, interactive audio, spatial music, audio for games, or music technology in general.

Discussions with professionals and academics at Pervasive Media Studio Bristol confirmed the need for quantifiable data on user requirements. In addition to an interest in solving privacy issues—for example, what to do if an iLAA requires ubiquitous microphones—this preliminary forum highlighted a need for a loosely classifying iLAAs' reach (local or global), density (tracked instances per area), and mobility. The link between the nature of the application and the requirements for the specific localization system emerged as well in discussions about acceptable levels of user input (regarding calibration, for example) for iLAAs.

EDITOR'S INTRO

In this issue's Works-In-Progress department, we have three entries. The first is a request for community participation in a survey on indoor positioning systems for interactive, locative audio applications. We welcome you to participate in the study. We'll present the results in a future issue of *Pervasive Computing*. The second entry presents a decentralized, peer-to-peer-based approach to cloud file sharing with encryption and data de-duplication. The final entry proposes an architecture for augmenting objects in the environment with visual icons and tags based on RFID, NFC, or QR Code technologies.

— Anthony Joseph

The survey, which takes approximately 15 minutes to complete, asks respondents about acceptable limitations, the nature of their application, and privacy concerns. It's part of my MSc dissertation in audio production for the University of the West of England, Bristol, UK. For more information, see www.creativemusictechnology.org.

To take the survey, see www.surveymonkey.com/s/6X86DJL.

MAIDSAFE: SECURE DISTRIBUTED NETWORK STORAGE

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MaidSafe.net
James Irvine
University of Strathclyde
Mario Kolberg and Jamie Furness
University of Stirling
Swee Keow Goo
University of Abertay

Secure data storage with ubiquitous access poses a serious problem, particularly in enterprise environments. Hierarchical services, such as Dropbox or iCloud, lack scalability and require trust in the provider. MaidSafe offers a different approach—a scalable, distributed, secure storage mechanism that shares data storage between the users themselves.

Data is stored on peer nodes (called *vaults*) and accessed via a distributed hash table. MaidSafe splits the data into self-contained chunks and encrypts it at the source, removing the trust requirement. Data integrity can be validated against the hash without knowing the contents. Figure 1 depicts the main parts of the system.

MaidSafe can replicate data on multiple nodes, significantly enhancing robustness. Encryption is independent of the user's credentials, so identical files of different users map to identical secure data chunks. Between 75 and 90 percent of data on corporate networks is duplicated, so even with replication, MaidSafe reduces storage requirements.

Because it's a P2P system, each user provides a vault, and operation is checked by neighbors using the chunk hash values. When a user retrieves data, the neighbor of the requesting node stores a cached copy. In addition to offering improved performance, this makes the network resistant to distributed denial-of-service attacks.

Furthermore, MaidSafe is as simple to use as traditional centralized solutions, with the encrypted files represented as a virtual file system providing application-independent access. MaidSafe is currently undergoing extensive testing with a leading healthcare provider. For more information, contact David Irvine at david.irvine@maidsafe.net.

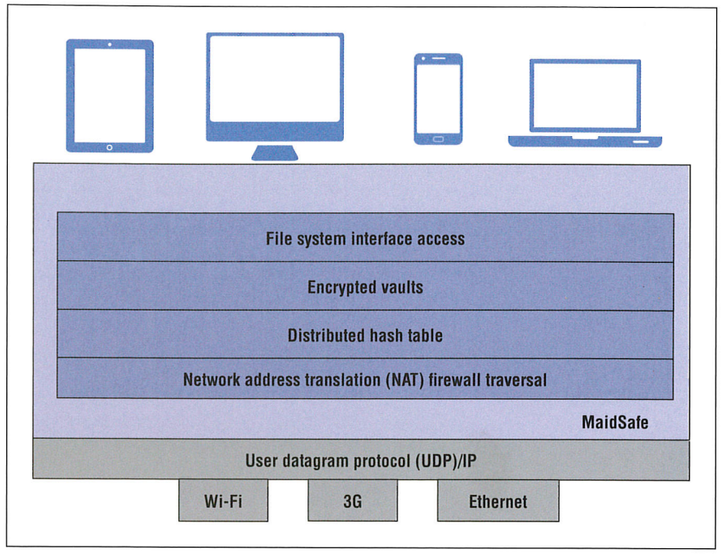

Figure 1. MaidSafe's secure network system, which can be used with many types of devices.

AUGMENTING OBJECTS FOR ENHANCED LEARNING

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In the Socrates research group at the University of Córdoba Colombia, we're researching an architecture for ubiquitous computing environments that would integrate physical objects with various learning applications. Our context-aware system supports audio and video learning and has also storage capabilities. It augments physical objects in a classroom environment with visual icons using RFID, near-field communication (NFC), and QR Code tags. Each tag uniquely identifies the resource. The system can then integrate the RFID, NFC, and QR Code data, so users can see and interact with the objects with all three technologies.

For example, a student can point his or her mobile device at an object tagged with RFID, NFC, or QR Code, and the student selects the type of reader required to identify the object's tag. If the student uses an RFID reader, then the system switches its mode to read the ISO 14443A Mifare tags, which contain data about learning activities related to that object. The high-level ISO 14443A protocol works in the 13.56 MHz frequency and has a reading distance of 10 cm, so the device must be close to the tagged object. After the reader decodes the tag information, the interface displays the learning resource, which the user can access online or download from the database for later, offline use (see Figure 2).

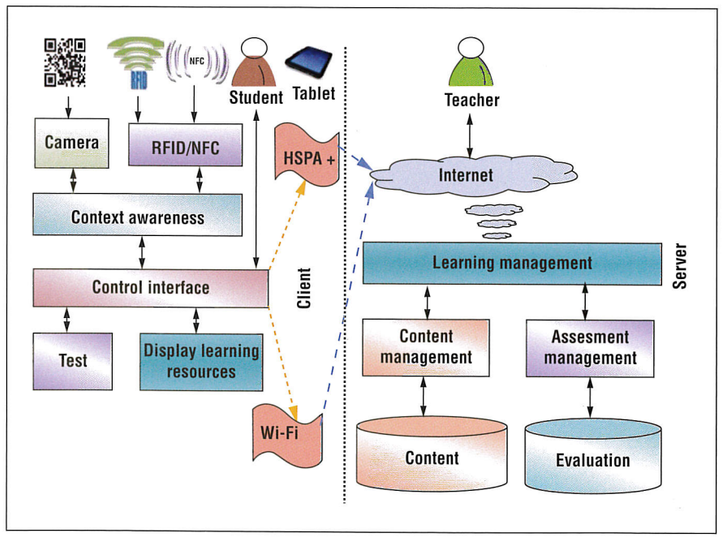

Figure 2. An architecture for ubiquitous computing environments that integrates physical objects with various learning applications.

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Published by the IEEE CS ■ 1536-1268/12/$31.00 © 2012 IEEE