

# Campus Memories: Learning with Contextualised Blogging

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**Abstract:** Combining the strengths of both mobile and context aware systems and applying them to educational systems can lead to contextualised learning support (Zimmermann, Lorenz, & Specht, 2005). Mobile blogging applications have become popular as an instant way of accessing and collecting personal memories and blog entries from mobile devices. In the following paper we will present an extension of current systems for blogging we call contextualised blogging. The described conceptual model and architecture allows users to create and manage blogs from a mobile device and combine them with identification tags and therefore leave “blog traces” in a physical environment.

**Keywords:** contextualised blogging, mobile learning, ubiquitous computing, informal learning, context-aware systems.

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## BACKGROUND AND INTRODUCTION

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Ubiquitous computing tries to provide a more intuitive way of human computer interaction, hiding the computer system as much from the user as possible (Abowd & Mynatt, 2000). Additionally, the increasing popularity and functionality of mobile devices in recent years has also paved the way for applications of mobile devices in education. Many mobile applications make use of sensors to capture and take advantage of the current context of use (Gross & Specht, 2001). Combining the strengths of both mobile and context aware systems and applying them to educational systems can lead to contextualised learning support (Zimmermann, Lorenz, & Specht, 2005). For identifying the user context a variety of new technologies are currently developed. Classical tagging approaches for objects found in, for example, early museum guiding applications (Oppermann & Specht, 2000) are nowadays again a hot topic with technologies, like RFID tagging, that are already available or partly built into mobile devices.

Furthermore, social software applications like educational blogs have recently become a popular way of collecting personal information and learning experiences (Oravec, 2002) and combine this with the reflection in a community. Mobile blogging provides an instant way of accessing and collecting personal memories. Mobile blogging applications for personal reflection or community building have been researched in research projects in undergraduate and higher education (RAMBLE-Project, 2006; Specht & Kravcik, 2006).

In the following paper we will present an extension of current systems for blogging we call contextualised blogging. The described conceptual model and architecture allows users to create and manage blogs from a mobile device and combine them with identification tags and therefore leave “blog traces” in a physical environment. The identification tags can be used by users to access connected blog parts or to create new blog entries with mobile authoring appliances.

The following paper presents (1) the pedagogical motivation for our work, (2) a conceptual model for contextualised blogging, (3) a software architecture based on standardised open source blogging systems, and (4) a specific application called “Campus Memories”, which will be used for empirical evaluation of our approach.

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## BLOGGING IN CONTEXT

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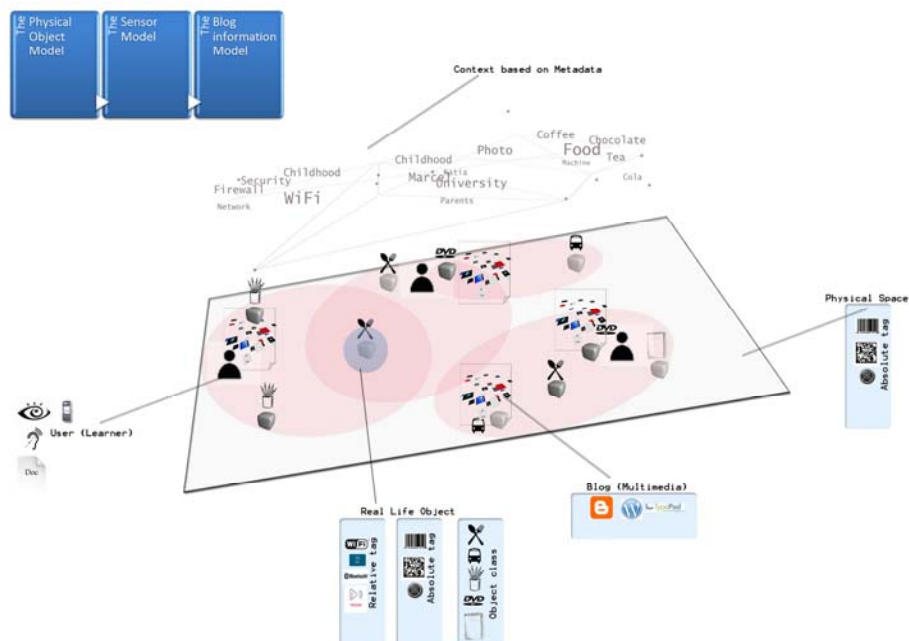
Mobile learning tools support the user in context, which allows embedding the learning experience in more authentic learning situations, share context-related experiences, present information cues triggered by contextual parameters and so on. Nesta Futurelabs (Naismith, Lonsdale, Vavoula, & Sharples, 2004) has identified a variety of mobile learning applications in use today and how they are related on different underpinning learning theories and their application. Situated Learning and communities of practice (Wenger & Lave, 1991) stresses the importance of embedding the learner in an authentic context and in a peer community to reflect about her learning. Furthermore, approaches like reflection in action and reflection about action describe the relevance of the context for enabling learning and self reflection (D. A. Schön, 1983; D.A. Schön, 1987). In our current research in the TENCompetence project we investigate the role of supporting informal learning activities and integrating them with formal and lifelong learning approaches in learning networks (Koper, 2005). From our point of view, the role of ubiquitous support for learning activities in learning networks is essential for embedding learning into every-day living and to support situated and informal learning in learning networks. Blogs are simple tools for supporting such long-term informal learning processes (Trafford, 2005).

Blogs offer learners a great degree of autonomy for structuring information and reflection while also embedding the reflection in a peer community (Williams & Jacobs, 2004). Mobile blogging approaches try to enable easy facilities to inject content into blogs, but only some approaches allow automatic recording of metadata and contextual information (Specht & Kravcik, 2006).

In (Zimmermann, Lorenz, & Specht, 2005) a basic architecture for connecting sensor information and content management systems is proposed, which allows for the combination of contextualised and personalised content recording and content delivery. In our research, we mainly identified three use cases, which should be supported by contextualised blogging tools:

- Construct and review new content or information,
- Connect this information to objects of locations in the real world,
- Access perspectives and filters on blog entries available on a variety of mobile and ubiquitous displays.

### A Conceptual Model for Contextualised Blogs



**Figure 1:** A conceptual model for contextualised blogging

For connecting information objects from a blog with physical objects we identified three main models necessary (see Figure 1):

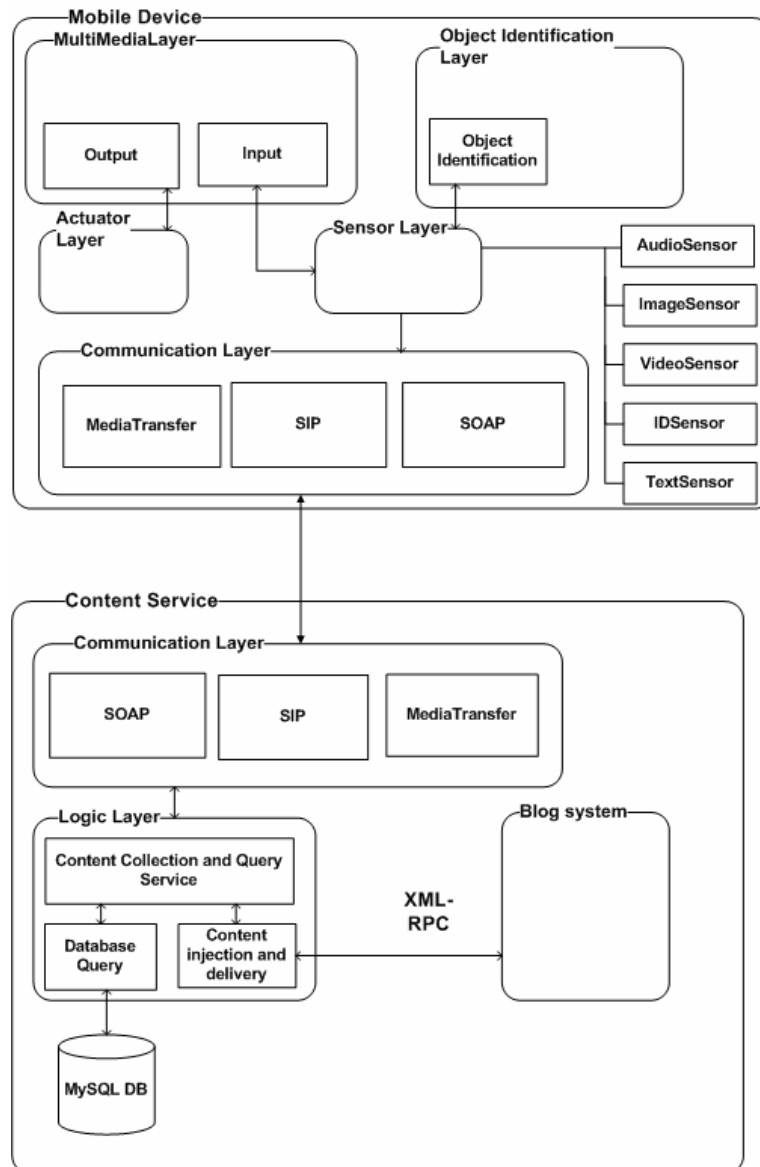
- The Physical Objects Model describes the interaction of the user with objects. The way of interaction with physical objects influences the sensors used in the sensor model. Furthermore, the physical object model defines object classes that will define the kind of the information that will be attached to the objects.
- The Sensor Model forms a bridge between the physical object model and the blog information model. It provides a way of getting information about context of physical object. The context can be used to couple the objects to multimedia information in a blog.
- The Blog Information Model contains multimedia information that can be used to enrich physical objects. Also, metadata information about each object is stored to make filtering and clustering objects according to contextualised and personalised criteria possible.

## A GENERAL FRAMEWORK FOR CONTEXTUALISED BLOGGING

Based upon the requirements a general architecture for contextualised blogging is suggested. **Figure 2** depicts the suggested architecture, which is comprised of two sub-systems:

- the mobile client subsystem to handle the mobile sensor and actuator services, and,
- the content service to facilitate contextualised content delivery and to handle the communication with the blogging services and the mobile services.

The two sub-systems will be described below. The suggested framework will be a mobile information system build on a service-oriented architecture (Rehrl, Bortenschlager, Reich, Rieser, & Westenthaler, 2004).



**Figure 2:** The functional components of the suggested architecture

### **Mobile client subsystem**

The mobile client subsystem consists of five layers. The first layer, the communication layer provides an abstract way of communicating with the content service via standard protocols. Furthermore, it handles the bidirectional transfer of multimedia from and to the mobile devices.

The sensor and actuator layers facilitate standardised capturing of input from the mobile device sensors and displaying of output to the mobile device's actuators. The type of sensors and actuators available depend on the mobile device features. Therefore, both the sensor and the actuator layers should be easily extendable.

The sensor layer is used by two other layers. First of all, the multimedia layer acquires multimedia information from the sensors. Secondly, the object identification layer uses the sensor layer to find a unique identifier for objects. After that, the content service is triggered using an object identifier.

### **Content Service**

The content service consists of three functional parts. The communication layer is similar to that running on the mobile device sub-system, but also handles communication with the content collection and query service in the logic layer. All services provided by the content service are accessible via the communication layer via two standardised protocols:

- The Simple Object Access Protocol (SOAP) (Box et al., 2000), which can be used to invoke all non-multimedia services of the content service.
- The Session Initiation Protocol (SIP) (Handley, Schulzrinne, Schooler, & Rosenberg, 1999), which is used to set up all multimedia communication and transfers with possible clients.

The content collection and query service retrieves information about the tagged objects by either (1) finding metadata about the object in the database or (2) retrieving blog entries attached to the object's identifier via XML-RPC (UserLand Software, 2003a). The content collection and query service is also responsible for creating new content and storing this in the weblog.

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## **CAMPUS MEMORIES: A CONTEXTBLOG FOR LANGUAGE LEARNING**

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One specific instantiation for the general framework suggested is presented in this paragraph. Campus Memories is a contextualised blogging system or ContextBlog. By allowing people to create and view content attached to objects, personal memories can be expressed. By also saving the created content using a weblog, the history for the object is retained and is accessible via a variety of user interfaces including desktop blogging clients and web interfaces.

Users of the system can access blog entries, blog categories, and blog entries related to special tags in the connected blog. Through that flexible combination of tags and different filters on the blog content, different educational effects can be achieved:

- Multiple perspectives on real world objects: by viewing the object's history, a certain category of blog entries, or using other filters people benefit through an indirect learning process (Efimova & Fiedler, 2004; Walker, 2005).
- Community generated content connected to relevant real world objects and locations: an example for the effect and importance of self-generated contents in a learning community is presented in (Brandt, Björqvinnson, Hillgren, Bergqvist, & Emilson, 2002) about learning to operate medical devices.
- Moreover, search filters give different views about objects, based on personal preferences. Objects can also be linked to each other to create what a so-called "internet of objects" (Mattern, 2004).

Campus memories will use, a specific form of matrix code tags, called semacodes (Semacode, 2006), to identify objects (Rohs & Zweifel, 2005). Semacodes are rectangular, printed tags similar to barcodes, easy and cheap to create using a normal printer (see **Figure 3**). Furthermore, a mobile phone camera can be used to scan the semacodes, which makes the technique accessible to a broad public.

For campus memories, we chose the open source Wordpress blogging software (WordPress, 2006), that supports the MetaWeblog API, based on the XML-RPC protocol (UserLand Software, 2003b). Via the standardised API extended manipulation of the blogger metadata, categories, and blog templates is possible. Furthermore, the metadata component of campus memories is a java subsystem built on top of a MYSQL database (MySQL-AB., 2006). The mobile device software has been implemented using the standardised Java Mobile Information Device Profile (MIDP 2.0 - JSR 118) and the Mobile Media API (MMAPI; JSR 135), supported by many mobile devices.



<http://campusmemories.wordpress.com/>

**Figure 3:** "CampusMemories weblog address" encoded in the DataMatrix 2D barcode using Semacode algorithms

#### **Planned evaluation**

The evaluation of the software will take place in a small scale experiment carried out in the Educational Technology Expertise Centre of the Open University of the Netherlands. A small group of people with different nationalities will be chosen and asked to play a language game. First of all, they can earn points by adding information in their native language to tagged objects. After most objects have been tagged with language specific multimedia content, the learners can improve their foreign language skills by exploring the tagged objects. Also, the acquired knowledge of the learners will be tested, by asking them questions. Correct answers to these questions result in more points for the game. Furthermore, every person involved in the experiment can only have access to languages they don't know well already.

The experiment will be used to evaluate:

- the campus memories system functionality,
- the use of a contextualised blogging system for learning,
- the motivational aspects of people contributing to a contextualised blogging system,
- the amount of words learned by the learners.

The evaluation of the Campus Memories will take place in December 2006.

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## CONCLUSION AND SUMMARY

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The paper described a contextualised blogging system that makes it possible to attach blog entries with multimedia information to uniquely identifiable objects. Tags can link physical objects with different views on the attached blog information. Informal learning takes place through the interaction with the objects and by reading and contributing information to the connected blog parts. Furthermore, we expect social effects by placing visible tags within the environment for accessing blog information. The ContextBlog “Campus Memories” system will enable a wide range of tagging techniques to be used via the standardised protocols and interfaces implemented. Along with the content, contextualised metadata can be stored and used for new forms of content access. The metadata makes it possible to filter information according to personalised filters to have a focused view on objects. Clustered zones of objects can be derived and displayed as object map based on metatags and keywords.

An evaluation of campus memories is planned for December 2006. The evaluation will take place in the form of an experiment in language learning. Moreover, in future work we are planning an extension of the system with a contextblog version for outdoor use.

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