

# iLIBRARY - AN INTERACTIVE INFORMATION SYSTEM FOR THE IMPROVEMENT OF VIRTUAL LIBRARY SERVICES

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# iLIBRARY - AN INTERACTIVE INFORMATION SYSTEM FOR THE IMPROVEMENT OF VIRTUAL LIBRARY SERVICES

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## Abstract

In this paper, the iLibrary system is introduced, which has been integrated and tested at the library of the Technical University of Applied Sciences in Wildau. The goal of this project is to develop an interactive information system for the improvement of virtual library services within the university's library and in this manner make users more aware of all the benefits the library provides. The system concentrates mainly on the development and implementation of new software applications for devices such as smartphones, tablets and a multi-touch screen, as well as introducing new back-end applications for the improvement of existing services and processes.

We will explain the features of this system, provide some practical experiences, and show how it can easily be adapted to any library.

**Keywords:** mobile information system, multimedia guide, 3D modelling, touchscreen, distributed system, RFID-based indoor positioning system

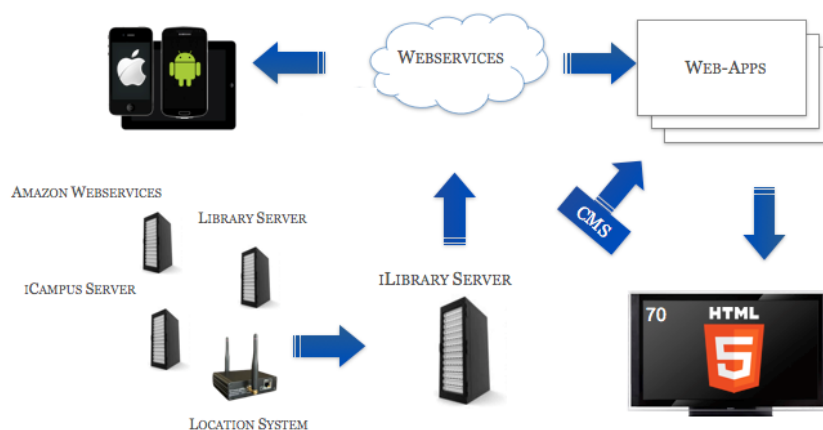
## Introduction

The *iLibrary* system is an independent extension of the existing *iCampus* Wildau project, which was introduced at the IATUL conference 2012 [1][2]. The project focuses on improving the current situation in the library of the Technical University of Applied Sciences Wildau: Many users are unaware of the diversity of digital services that their library offers because these are simply not visible at a first glance. Additionally, the user interfaces between services differ from each other making them less intuitive and more difficult to use. Library staff members try to announce new services by providing flyers and posters. They offer training courses for new users, publish news on the library's website, create web-links in form of two-dimensional codes and work with social web activities. However, in spite of that, the usage rate remains unsatisfactory - a fact, which is very frustrating and discouraging for those spending time and effort to develop these services. The main concern is therefore seeking modern alternatives for the visual representation of and access to the various existing services, a problem which certainly many other libraries have faced as well.

In view of the potential benefits of the introduction of new technologies and lack of existing standards the library of the UAS Wildau has started a project to research and develop a system designed to improve and expand the library services and processes, in order to ease their use and bring these closer to the users. Consequently, the main goal of the *iLibrary* project is to fulfil these objectives and provide a better access to all digital services of the university's library for students and faculty alike. In practice, *iLibrary* is an interactive multimedia information system, which offers library services via different modern devices such as smartphones, tablets and through a 70" multi-touch screen, which was set up in the library as part of the project. In addition, the development and implementation of new software and hardware components for *iLibrary* does not only enable the improvement of existing services and processes, but also allows the creation and integration of new ones, thus improving the overall user experience.

## System overview

Let us get an overview of the complete *iLibrary* system first. There are several systems in play for the creation, management and distribution of content and data required for the *iLibrary* project. In summary, these include components for the localisation of people, the navigation to physical literature, the library web services, external web services, *iLibrary* Content Management Systems (CMS) and *iLibrary* databases. Figure 1 gives an overview about all system components and their relationship.



**Figure 1: iLibrary System overview**

In order to provide the applications with the relevant information, the required data must first be retrieved from its source, either local or external. The system currently queries four external sources: Amazon's web services for book covers and other media information such as abstracts and short summaries; the library's own server, which contains the entire book catalogue and other library information; library content can also be retrieved from the services of the previously mentioned *iCampus* project; and, lastly, information of an indoor positioning system, which was also implemented during the *iCampus* project as an independent reusable system. The *iLibrary* system aims to function as a centralised management system and provides a single stable interface, which is not only beneficial in reducing the development effort, but also helps to avoid having to update applications unnecessarily every time incompatible changes in the interfaces' semantics are made. By serving as a funnel between all user-server interactions, the *iLibrary* system has the ability to intersect the flow of information and query additional services, in order to improve, extend and complement the data.

Based on the fact that nowadays many people own a smartphone or tablet (or even both) and handle quite comfortably with new technologies the *iLibrary* project aims at providing applications for said devices as well as in a multi-touch display for those who do not have one or prefer to use a larger display. A mobile application, available for both iOS and Android based operating systems, should hereby bring mobility to the users allowing them to access the library service anytime and anywhere, whereas a multi-touch display should function as a main information agent. Besides the services available through mobile devices, the multi-touch application offers further options such as a virtual tour of the library, which would allow users to inform themselves within few minutes how to use the several services of the library. By keeping the information visual (that is with few text) and making it interactive, users should enjoy learning by themselves and thus enhance their library experience. The application uses a web-based framework, since it provides a higher flexibility than Flash and other existing multi-touch frameworks. This does not only allow the inclusion of many existing so called software libraries (please see [5] for a detailed explanation), but also the enables librarians or administrators to

create and update independent modules through a content management system (CMS), that are then loaded through their web addresses.

## Mobile application

There are two versions of the *iLibrary* application for mobile devices, one for Apple (iOS) and one for mobile devices running the Android operating system. Both applications are available for smartphones as well as tablets. Even though there are several services available, the introduction of more are planned for the future. The main purpose of the application is to give mobility to the users whilst searching and locating media in the library. It also allows users to access book details by accessing them through the search module or by scanning the book's barcode. Said details include general information, such as author, title and eventually a short summary, as well as aggregated information, such as the book's current availability status and user given reviews. All services can be personalised by logging in using the user's own account. If done so, a user can manage for example a personal book card, extend a loan period of a borrowed media or let the application show him or her the shortest path through the library to select all books in the book card.

In Figure 2 you can see a selection of screenshots of the named services. These are from left to right the start screen providing a one-click access to all available services, the layout of the book management service as well as the barcode scanner function. Figure 2 Screenshots of the BookFinder, ExpertFinder, and Barcode Scanner service



Figure 2 Screenshots of the BookFinder, ExpertFinder, and Barcode Scanner service

The last screenshot in Figure 2 shows another service, which allows a library user to figure out what are the responsibilities of each member in the library team. If available, a picture of each staff member will be shown together with a telephone number, the office information and a short description of responsibilities. In the near future, it will be possible to locate different members of the library staff by using the localisation system, which is described in the next section of this paper. Naturally, this will be a service only available by choice paying attention to the privacy protection of each staff member.

Another useful service available so far, is the possibility to see an overview of the workroom reservations in the library, as well as the possibility to make a reservation for any room as show in Figure 3.



Figure 3 Screenshots of the RoomFinder service

## Indoor localisation system

The implementation of a 2.4GHz ISM-Band RFID based localisation system for the university's library started as part of the *iCampus Wildau* project [2]. Since this system is designed to work independently as a separate server application, it can easily be used by *iLibrary* applications as well. All system components are provided by the open software and open hardware project *OpenBeacon* [4] and adapted to be useful for localisation purposes.

The system works as follows: Each person who wants to be located in the library has to wear a special *OpenBeacon* tag, let us call it the user tag. Another kind of *OpenBeacon* tags, say the library tags, are distributed in the library continuously transmitting packets with a unique identifier (ID) that can be received by any user tag nearby. So, any user tag carried by a person in the library aggregates the packages received from the library tags, and combines them into a package statistics. These statistics are sent to the network infrastructure consisting of, so called *OpenBeacon* readers that are installed in the library as well. They forward the statistics to a centralised server via a Wi-Fi network. A server application, which knows the coordinates of each user tag ID located in the library, receives these information and calculates the position of each user tag (please see [2] and for more technical details [3]).

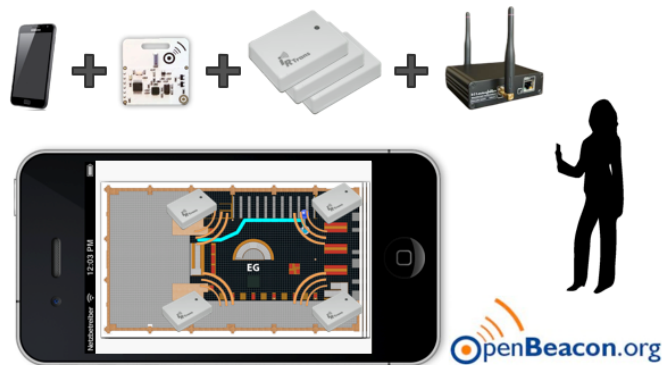


Figure 4: How to use the OpenBeacon localisation system

*iLibrary* applications can get these position information via a special web-service. Figure 4 gives a general overview about the installed localisation system.

## Multi-touch application

Another important component of the *iLibrary* system is a software application for a multi-touch display. This 70" multi-touch screen installed in the library as part of the project (see Figure 1) serves as a central information point for users and thereby replaces conventional information boards.



Figure 5: The 70" multi-touch display installed in the university's library

The application includes access to the same services as the mobile application, but includes other information as well. For example, a three dimensional representation of the library has been implemented, which allows users to have a better overview of the library's layout and provides location based services about the library. Other general information such as frequently asked questions, how-tos and photos, videos and audio recordings of past events are available as well. In Figure 6 two screenshots of this application can be seen: a screenshot of the book manager and a screenshot of the 3D representation of the library.



Figure 6: Screenshots of the multi-touch application

For a maximal flexibility, the application is implemented as a web-based application using HTML5, JavaScript, WebGL and CSS. Content is provided by existing databases of the library and by the *iCampus* system database [2]. Additionally, library staff members can add and administrate content using a content management system, which is especially designed and adapted for the *iLibrary* system.

## A short summary and future plans

In this paper, we introduce the *iLibrary* system, a multilingual and interactive information system for a university library. Its main focus is to make library services more present and accessible to all users by using modern technologies and devices familiar and indispensable for most new generation users of modern libraries. We introduce a mobile application for smartphones and tablets as well as a multiuser application for a 70" multi-touch screen. Making the applications

intuitive and fun to use is one big step for their acceptance among students and faculty. Moreover, it is important to guarantee an easy access to all information and services provided. Both facts could be established with the *iLibrary* applications as our first experiences with users have proven.

Furthermore, an adaption of the system to other libraries as well as adding new services is possible, because of the loose coupling of existing (and still to invent) library services with the *iLibrary* applications via web services.

A future plan is the installation of tablets and/or touch-screens in certain sitting places, in order to allow users who do not bring a mobile computer to still be able to use the named services and have access to the thousands of e-books made available by the library.

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