TECHNISCHE UNIVERSITÄT DRESDEN

Redesign and unification of the web view of AMCS

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Auditorium Mobile Classroom Service (AMCS) is an Audience Response system that is actively developed by several individuals at the TU Dresden since 2012. In the educational context, speakers and docents use it to enhance and manage their lectures during the semester. One of the main goals of AMCS is to improve the way knowledge is presented and transferred to the audience by offering interactive polls that students can participate in before, during and after a lecture. Several standalone front end applications for platforms like iOS, Android and web are provided that enable usage of the system. However because of its ease of access, a majority of students use the system via their web browsers on different mobile devices such as laptops, tablets and smartphones. Regarding usability, design and consistency, the challenge lays in providing a unified and responsive user interface across all supported platforms that is intuitive to use. DUDE

1 Introduction

1.1 Motivation

AMCS (Auditorium Mobile Classroom Service) is an Audience Response System (ARS) currently under development at the TU Dresden. Several members of the Faculty of Computer Science initialized the project in 2012 and since then, the system and its community have grown continuously and countless features were added over the years.

In general, the system's main objective is to improve the way knowledge is transferred from a speaker to their audience. By providing interactive polls and evaluation mechanisms, AMCS hopes to increase the audience's engagement before, during and after a lecture takes place, overall strengthening the interaction between speaker and audience.

On the one hand, several features of AMCS are designed to support speakers in their role. Regarding the educational context, docents at university use it not only during their lecture to get immediate feedback from participating students. Furthermore, it is used during the whole semester to prepare and manage lectures, to analyze learning progress and to evaluate feedback given by students. More specifically, a speaker can gain insight on the understanding of their audience by evaluating answers to their polls. For example, poor results to a poll covering a certain topic might suggest that the topic was misunderstood or badly explained. AMCS enables the speaker to use precisely this information, helping to identify parts of their lectures that students might struggle with. Speakers can focus more easily on repeating and emphasizing these topics in the future.

On the other hand, AMCS provides a set of features to the audience that aim at increasing their engagement. The system aims at supporting a student's learning process by providing interactive polls, question pools and self-evaluation mechanisms that work on saved answers. While the polls are often used during lectures, the latter two tools can be used afterwards to identify and repeat difficult questions, to prepare for the next lesson or to study for the examination.

Several standalone front end applications for different platforms such as iOS, Android and web are provided to the audience. However AMCS is used by the majority of students via its web page across different mobile devices such as laptops, tablets and smartphones, likely because it is very easy to access.

Regarding the web page being the most common way AMCS is used, the challenge lays in

providing a unified and responsive web-based user interface across all aforementioned device types. The motivation of this work is to analyze the application's state in terms of usability, design and consistency, identify weaknesses in each category and provide a set of proposals that hope to improve the design currently in place.

1.2 Objective

The main objective of this work is to provide a redesign strategy that - when implemented - improves the mostly used web view of AMCS that is currently in place. Each proposal for itself is focused at improving usability of the application while all proposals as a whole aim at keeping a consistent and recognizable interface across all supported platforms.

In order to reach this objective, an analysis of the current state of the application is conducted in section , identifying weaknesses and inconsistencies that the design can be improved on. [add section here]

Additionally, section covers relevant existing applications and work are analyzed to identify strategies that can be transferred and applied to AMCS. [add section here]

Finally, in section the strategy it is implemented as a prototype that uses the existing back end system. In section An evaluation of the prototype concludes this work. [add section here]

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2 State of the art

At the time of writing, AMCS offers front end applications for iOS, Android and web that students can use. As already mentioned in NSERT HERE this work will focus on the web view / web page of AMCS. This section elaborates the current state of the system by identifying and analyzing all views that allow for access to the different functionalities of AMCS.

2.1 Landing Page

When accessing the website https://amcs.website, users will be shown the landing page of AMCS. In order to use the system, users have to create an account by providing credentials. Additionally, users have to subscribe to lectures by typing in an optional PIN code. From thereon, students gain access to the system.

2.2 Main View

After successfully logging in, the user is presented with the main view of the system. It can be scrolled in the vertical direction and is divided into header and body. On top, the header comes along with corporate branding on the left side and a burger menu on the right side. Below it, the view's body organizes information in different sections as follows:

2.2.1 Lectures

This section lists all lectures that the user subscribed to. It is organized in subsections that indicate the temporal context of each lecture. These include:

Upcoming lectures - Lectures that will take place in the future are shown here.

Active lectures - Lectures that take place right now are shown here.

Past lectures - Lectures that have already taken place are shown here.

Poll Type	Explanation
Slide Poll (SP)	Active when a specific slide is shown. Commonly used for pop quizzes after a difficult section in a lecture to make sure that students understood everything correctly.
Preparation Poll (PP)	Active before the lecture takes place. Is commonly used to instruct students to prepare for a certain topic
Lecture Poll (LP)	Active during the life time of a lecture.
Post Processing Poll (PPP)	Active after a lecture has taken place. Commonly used to check gained knowledge.
Course Poll (CP)	Active during the whole lifetime of the course (commonly during the whole semester)

Tabelle 2.1: Different poll types that the user might encounter when using AMCS.

Rendering of lectures Each of these subsections is organized as a vertical list that contains all corresponding lectures (see Fig.1). A lecture is rendered in a box that uses all horizontal space available to it. The box consists of a blue header with the lecture's name, a white info/detail area and a light blue footer that contains the course this lecture belongs to. A color-coded badge on the top right of the boxes additionally serves as an indicator for the temporal context of the lecture.

2.2.2 Enrolled Courses

This section serves two purposes: Primarily, it provides a way to enroll into a course. An enrollment form is shown that consists of a text field to enter the course PIN and a blue button to trigger the enrollment (see Fig.1). When provided with a valid PIN, pressing the button redirects the user to a course overview on successful enrollment. Secondly, the view shows all courses the student is currently enrolled in. They are rendered as light blue buttons in a vertical list. A trash can icon on each button provides a way to leave the given course.

2.3 Poll View

Answering polls is the main functionality of the system that users will engage with. Polls can be reached by clicking on a lecture box as described in . Each poll consists of a set of questions the user can give an answer to. They are rendered in a view that is reused by the system depending on the situation and context. This means that the view might only be accessible under certain circumstances, for example when the lecture reaches a specific point in time, making it a slide poll (SP). SPs are shown when a specific slide is on display and can only be answered in this very moment. Other types of polls include "global" course polls (CP) that are always accessible during the semester and lecture polls (LP) that can only be answered during the life time of a lecture. The different types of polls that occur in AMCS are further summarized in Table 2.1.

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2.4 Menu and Navigation

Besides by using the main view, additional functionality can be reached by navigating the burger menu that is shown on the top right of the screen. It reveals a sub menu that expands vertically on the view, offering three additional sub menus. In the following, these sub menus and their functionality are briefly explained.

2.4.1 Student

This is one of the most important buttons that offers access to a subset of main functionalities of AMCS. Upon pressing this button, the menu expands again vertically, showing a list of further sub menus. Most of the functionalities shown in this list will be touched by the proposals for improvement that are presented section . The functionalities in questions are:

1. Question Pool

2. Evaluation of answers

3. Edit account

2.4.2 How it works

Pressing this button will redirect to a page that shows tutorial instructions on how to use AMCS. This help page is rendered identical on all mobile devices and therefore falls out of the scope of this paper.

2.4.3 Logout

As the name already states, pressing this button will logout the user and end the session. If the logout was successful, the landing page of AMCS is shown.

2.4.4 Question Pool

By selecting this option from the burger menu, the student is offered the possibility to create collections of already answered questions. The intent is to provide a way for the students to identify and repeat questions that they had difficulty in answering. Similar to 2.1.2, the student is prompted with a drop down menu to select the course they are interested in. After selection, the student is presented with a list of all lectures and their polls respectively. All questions of each poll are grouped and shown to the student in a vertical list. From this list, the student can select all questions that they might be interested in to create a pool of questions. These pools are composed into polls that the student then can answer again. These polls are rendered in the same manner as stated in 2.3.

2.5 Related Systems

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3 Concept

This chapter will cover identified problems that occur when using AMCS via a web browser on mobile devices. To narrow down the extend of this work, the system is analyzed from the point of view that an audience member like a student has while using AMCS on their smartphone. When doing so, students will interact mostly with the Main View and the Navigation, which are the components that this work will focus on.

3.1 Problems of the mobile view

The web page of AMCS reacts on requests coming from mobile devices such as smartphones or tablets by providing a responsive mobile view to its clients. However, in some aspects AMCS struggles to offer a UI experience that guarantees high usability and uniformity across all end user devices. One challenge lays in the fact that the system has to deal with limited screen space to visualize information as effectively as possible. Additionally, users might approach the application with different ways of interaction and navigation in mind that are typical for mobile devices. For example, a smartphone user might expect to be able to use swiping gestures to navigate a menu or that information is organized in views consisting of separate tabs. This section lists key issues that lower usability or might cause confusion to users when using the system on a smartphone.

3.1.1 Main View

As already described in section , the main view relies on a vertically scrolling list view, consisting of different sections. The general vertical layout causes problems with regard to the usability of the application.

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General Visualization Problems

Section covered the fact, that lectures are rendered by displaying the title of the lecture in the top section of the box in white letters on a solid blue background. It is followed by detail information about the lecture such as time, duration and a textual description, visualized in grey letters and icons in a white screen. Finally, at the bottom of the box, the title of the course is shown in grey letters on a light blue background. The alignment of lecture title, details and course title can cause confusion to students, as the hierarchical order of the information displayed is mixed up. The most coarse grain piece of information - the name of the course - is displayed at the bottom of the box rather than at the top. Generally, when seeking information

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about active lectures, a student will most likely remember the name of the course rather than the name of a single lecture. Therefore, this out of order display of information might cause confusion and students take longer time to find the pieces of information that they are looking for.

Indirection Problems

The boxes that represent each course claim a lot of screen space in relation to the information that is displayed to the student. The layout causes a lot of indirection, because per default, the section for upcoming and active lectures are expanded fully. This might be handy when quickly gathering information about lectures that are active or soon will be active, but in every other case it slows navigation and overall use, because the course enrollment form that follows is pushed down to the bottom of the page. A list of only four of these boxes can cause a scrollbar to appear on the very common screen resolution of 1920x1080 pixels. A student that navigates to the main view to enroll into a new course therefore always has to scroll to the bottom of the page before he reaches the enrollment form. The same problem likewise occurs when seeking information about what courses a student is enrolled in or when trying to leave a course altogether, as this functionality is offered only at the bottom of the view. If a student looks for information regarding a specific course, no filter or search functionality is offered by the lecture list. Instead, they have to scroll down to the bottom of the list, find the course in the list of enrolled courses and click on the corresponding item. Then, he is redirected to the course view that is is essentially reusing the lecture list along with the sections "Upcoming lectures", "Active lectures" and "Past lectures". This level of indirection is only further increased the more courses the student is enrolled in.

Redundancy

A lot of visual noise and redundancy is added by the badges that are displayed on the top right corner of each lecture. These badges are used to visualize the temporal context of the lecture for each item in the corresponding section. Furthermore, the badge's names do not match the section's name, e.g. an upcoming lecture's badge reads "BEFORE" instead of "UPCOMING".

Additionally, for each enrolled course, a box is shown with the title of the course along with the disenrollment button, represented by a trash can icon. The redundant rendering of the boxes adds noise to the overall look of the view and uses much of the vertical screen estate.

3.2 Poll View

3.2.1 Rendering

Section describes the rendering of questions as boxes that are aligned in a vertical scrolling list. This introduces similar problems as already described in section 3.1, namely the extensive use of vertical space on the screen. Bigger polls that consist of multiple questions unnecessarily take a lot of vertical screen estate. The view also lacks of basic information such as number of questions in total or number of remaining questions that might be useful in bigger polls if students want to gain an overview of how many questions are left. Answering one question usually does not require to see the neighboring questions, but most of the time, two to three questions are in view simultaneously. This might be distracting to some students.

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3.2.2 Navigation

The vertical list is difficult to navigate as it requires scrolling between questions. If a student wants to jump from the first to the last question, or vice versa, several swiping gestures are needed to reach the top or the bottom of the list. Similar to the lecture list described in , the question list is also segmented into different sections. Lecture and course questions are similarly appended to the bottom of a slide poll. This means again, that a student that wants to view these questions has to scroll all the way to the bottom of the list. Again, this layout introduces a lot of indirection and is not intuitive to the user.

3.3 Proposals for Improvement

.1 Appendix Title

This is the text of the appendix, if you need one.

Literaturverzeichnis

[Smith et al.(2009)Smith, Jones] P. Q. Smith, and X. Y. Jones. ...reference text...