



**UNIVERSITY OF NOVI SAD
TECHNICAL FACULTY
"MIHAJLO PUPIN"
ZRENJANIN**



ITROCONFERENCE^{7.0}

INFORMATION TECHNOLOGY AND EDUCATION DEVELOPMENT



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Dragica Radosav, Ph. D, Professor, Dean of the Technical faculty „Mihajlo Pupin“, Zrenjanin, Republic of Serbia

Editor in chief:

Marjana Pardanjac, Ph. D, Assistant Professor, Technical faculty „Mihajlo Pupin“, Zrenjanin, Republic of Serbia

Technical treatment and design:

Ivan Tasic, Ph. D, Professor
Dijana Karuovic, Ph. D, Professor
Vesna Makitan, Ph. D, Assistant Professor
Erika Eleven, M.Sc, Assistant
Dusanka Milanov MSc, Assistant

Lecturer:

Erika Tobolka, Ph. D, Professor

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***INFORMATION
COMMUNICATION
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The Potential Use of Cross – Platform Mobile Applications for Educational Purposes

D. Serafimovski, A. Krstev, B.Panajotov

Faculty of Computer Science, University “Goce Delcev” Stip, Republic of Macedonia
serdalibor@hotmail.com, aleksandar.krstev@ugd.edu.mk, borispanajotov@gmail.com

Abstract - Today the modern world goes mobile. The world of mobile applications is achieving the rooftop very fast. Most of the functions and tasks that were performed by the computers just two or three years ago, today are being replaced by the smart mobile devices. The educational world is trying to follow this trend; universities around the world are working hard on implementation of smart information systems and solutions in educational purposes. This paper aims to give clear guidance of the process of implementation of cross-platform mobile solutions in educational purposes. This paper presents several cross-platform modules for active student monitoring, improving the quality of teaching and automation and acceleration of the processes being executed manually. We combined few developing methods and cross-platform oriented technologies to make a proposal model for implementation of this new generation technologies in educational purposes. The advantage of the proposed model is that the model is completely platform independent and leads to shortening of procedures and reduction of certain financial costs.

I. INTRODUCTION

The main purpose of this paper is to try to propose guidelines and to generate models for implementation of advanced technologies for educational purposes.

Today in the modern world most of all the activities people perform using a mobile phone via the Internet. Mobile devices represent an essential part of the everyday life of the modern men. Everyday life of modern man is based on the rapid exchange of information. You cannot imagine progress in any area without daily, timely and rapid exchange of information.

Computer age in the last two years completely overshadowed the era of mobile devices that change the game day by day. With the expansion of mobile Internet, mobile devices have become the number one choice for consumers when it comes to everyday Internet communication and information exchange. Reservation of hotels, airline tickets, travel plans, car rental and review of attractive tourist locations are just some of the activities that users perform with the help of their mobile phones. Just a few years earlier, all these activities were

conducted using a computer, but mobile devices have proven to be a much better alternative because they are much easier and handy for everyday using and above all their primary advantage is that they can be used on the go.

All this mentioned above motivated us to make a research about the potential and the possibilities of the mobile devices and their use in educational purposes. Through the implementation of the experiences of practical training which is carried out at our university, by combining multiplatform programming technologies we created several proposed models for implementation of mobile technology for educational purposes. Many researchers in the world in various fields are dealing with the advancement of the process of education through implementation of advanced technologies. Each classroom cannot have access to a computer or laptop, so, devices like mobile phones and tablets have become tools of great benefit to teachers and students.

For the purposes of this study we used a combination of Adobe technologies using Flex and Action Script 3.0 programming languages, we have created several modules for desktop computers and mobile devices in order to carry the process of interaction between students and teachers.

Within the framework of this research we used the advantages offered by social networks in order to gain an easier way of active registration of user accounts. In this paper we propose several modules. All modules are platform independent and can function equally well on all mobile devices and under all operating systems. The main goal is to offer a simple prototype system for implementation of cross-platform mobile technologies for educational purposes that would be completely platform independent, easy to use and financially tolerable.

II. REVIEW OF THE PROPOSED MODELS

As mentioned in the introduction, we offer several models for implementation of mobile devices in the medical purposes. These models are designed as part of a prototype of a multiplatform information system for implementation of mobile technologies for educational purposes. [1]

Each model that will be explained in the text below is previously tested virtually in a realistic environment. The models are based on multiplatform programmable modules developed using Flex technology. The models are working under Adobe Air executive environment.

Within the practical testing of the software tools, a separate testing was performed in order to check the functionality of software tools for each device separately. Tests showed approximately equal speed and functionality of software tools for all mobile platforms. It is important to note that these technologies put the students in the main role allowing them faster, easier and simpler way of communication with the professor.

A. Proposed model for implementation and integration with social networks

Social networks have made expansion in recent years and had completely changed the perception of the Internet as a platform for communication and exchange of data. Communication and data exchange between people rose to a higher and more sophisticated level. One of the practical functions of social networks is their ability to be used as systems for authenticating users from a third party. With this capability it makes it easier for developers to work and eliminates the need to create an additional security system for authenticating users and managing databases and user accounts. [2]

This approach is greatly simplified, more accessible and interesting to students. As part of this research, a practical experiment was conducted; it involved 120 students divided into three groups. For each of the students to be able to design a drill previously had to log in via their mobile phone account with the social network Facebook, Twitter or Google account. Once the student successfully completes the login process, our database downloads personal data of the student and generates a local account.

After completing the authentication process, the student on his mobile phone receives the task in the form of a mobile application that automatically installs with a click of his mobile phone. The

exercises were unified for each individual student with specified ID for each exercise separately.

For preparation of the exercises we used JQuery Mobile in combination with Adobe PhoneGap Build to compile the exercises. For each exercise is generated Specific ID tag depending on the account on the social network which the student used to log in to the system. The format of the ID value for each exercise is particularly shown in Figure 1.



Example in XML :

```
<!-- The application identifier  
<id>ugd.zadoca1.064898922</id>  
  
<!-- Used as the filename for th  
<filename>Zadoca1</filename>
```

Figure 1. Unique identifier components

From the experiment we concluded that students simplest and most reasonable social network for creating user accounts of other information systems is the social network Facebook, 75% of the announced students were announced from Facebook. Google took the second place. It is important to mention that these exercises in the form of applications are programmed for single use. After completing the exercise, students log out of the system, after checking the unique identifier becomes invalid and that exercise can no longer be used. The results of the realized exercise are saved in the local account of a student who was previously automatically generated in the database after the process of authentication.

B. Purposed model for using the built-in device camera

Build-in camera in mobile devices is the most popular and most used piece of hardware of all smart devices. Companies with each new model of smart device pay great attention to improving the camera. Built-in cameras in mobile phones have enormous potential for use for educational purposes, the use of the camera to achieve video conferencing

and distance learning, as a scanner to scan documents or identification of certain objects.

As part of our research we produced a prototype model for utilizing the built-in camera and use the mobile phones in educational purposes. The model consists of a programmable module that was developed using Flex technology in Java and Action Script 3.0 programming languages. The module is compatible for use on all mobile devices regardless of operating platform. The module was also tested on other tablets and has shown excellent functionality.

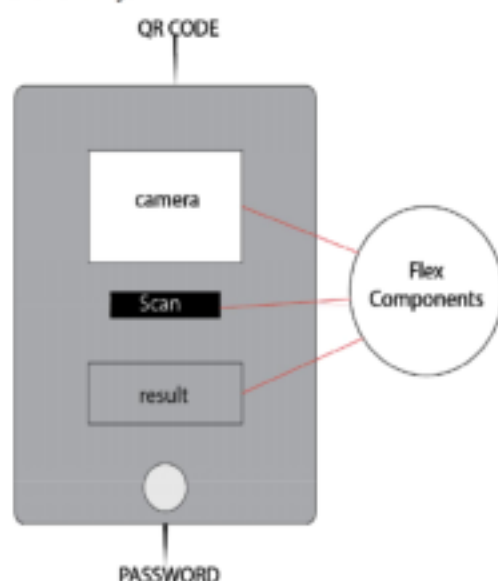


Figure 2. Visual representation of the proposed camera model

The module is consisted of integrated recognition system scan for QR codes, image recognition and text from image. As part of this research, a practical experiment was conducted in a classroom where students in the first experiment were logging using their accounts from social networks; in this experiment their task was to scan QR codes. Each student was given three images containing QR code.

By combining the content that is derived from scanned codes, students generated passwords that were used to check the results of the exercises that were developed in the first experiment. This module

is technically built from Flex components that are completely based on the multiplatform technology and do not depend on the platform on which you are pursuing. Thus, the module becomes available for every smart device and do not depends on the operating system that is currently running.

In the second part of the experiment students were tasked to scan text content of the image using the built-in module within the application that can recognize text content from previously scanned images. Detected textual content was saved in PDF format with the previously build additional module for capturing PDF content. At the end of the experiment, the generated PDF files, students exchanged between themselves using a local P2P connection. For the purpose of this research previously was made a P2P module for wireless communication between students in the same classroom. [5]

Functionalities of the model:

- Scanning and recognition of QR codes
- Communication with the database using the data service for any verification of the validity of a code, if necessary.
- Scan text content for assistance in learning and recognizing text from image.
- Local P2P communication in order to exchange files and creative learning during class.

C. Module for fast and efficient electronic registration of presence

The attendance record of students can present a problem especially in larger groups of students. One of the key objectives of this research was to generate a simple draft model for fast electronic registration of students using mobile devices.

As a final goal, the system should automatically calculate the points from attending classes for individual students. Benefits from the application of such a system primary would feel the teachers because the whole thing would be done electronically without the participation of the human factor.

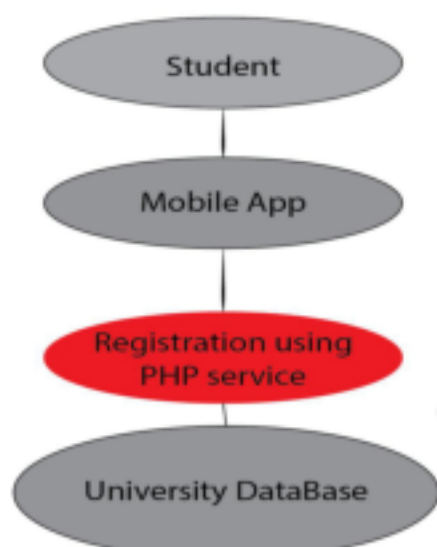


Figure. 3 Smart electronic registration of student attendance

It is important to mention that for each lesson, a new application is created with a unique identifier for that lesson. Before the beginning of the class, students by scanning the QR code are downloading the appropriate application for registration directly from PhoneGap Build cloud service and install it on their mobile phones. As part of the application that contains the module for the registration of students, additional programming module copies the IMEI code of the device from which is made the registration of attendance. For this purpose within this module is integrated data service that communicates over a P2P connection to the central database and record the attendance for each student and at the same time in the database records the IMEI code of the device from which the registration was made. After the student clicks the button presence, receives feedback message on its screen which informs that the record of attendance has been successfully completed. [3]

Within this module we implemented a possibility for electronic signature input from the student. As part of this research we were conducted an informal poll among students which was conducted electronically. The poll found 80% satisfied users from the application of these technologies in the educational purposes.

Administrative software model provides the following capabilities:

- Monitoring of students and electronic records of classes attendance.
- Generating statistics and reports in PDF format in real time.

- Importing files in XML format and update data for many of the students in real time.
- Generating electronic tasks in the form of mobile applications directly installed and valid for use only during class.
- Computer analysis and administration of the results of the exercises.
- Embedded system administration files.
- Ability to communicate directly via the built-in Chat.

D. Proposed Administration Model

Administrative work occupies a significant part of the daily activities of the professor. Electronic information and communication services nowadays provide quality and timely monitoring of student activities from anywhere at any time of day. The last proposed model in this paper is the administrative model. By combining Adobe's technologies we have created a prototype of an administrative system that is fully compatible with previous multiplatform models mentioned in the paper that were intended for students and their smartphone devices.

Administrative model should include all the above functions and collect them in a sophisticated software system that can generate electronic reports of the activities of each individual student. For the purposes of this research we have created a prototype of such software system that is intended for desktop computers. The advantage of this model is that it is completely independent of any operating system. The software was tested on a Windows operating system and the computer with Mac OS X operating system. On both computers the software showed equal efficacy.

Екран на нов запис во бази

Име:

Презиме:

Индекс бр.:

Студентска програма:

Колоквиум 1:

Колоквиум 2:

Креирај Запис Обриши Види Запис

Figure. 4 Part of the administration module

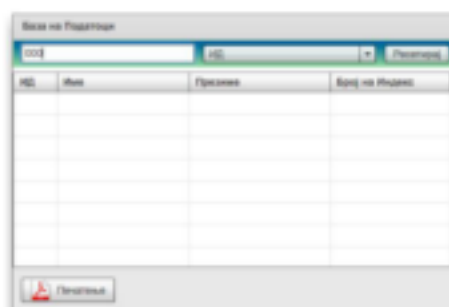


Figure. 5 Administration module: SearchBox

III. CONCLUSION

Within this short research in this paper we presented four proposed models for the implementation of advanced multiplatform technologies for educational purposes. All models are tested virtually in a realistic environment and provide excellent initial results. For implementation and repeated use of these proposed models, is needed further testing and upgrading. The main advantage of all the proposed models is that they are completely independent of platform, device and operating system on which they run. With the implementation of these proposed models, a complete information system can be created which would be used for educational purposes. At the same time this system would be acceptable and

compatible with all scientific institutions and each information infrastructure. The application of this model, significantly reduce financial costs because of the use of one platform for all devices and it can be adapted to the existing infrastructure.

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