Development and implementation of a mobile application for announcing academic activities

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Abstract

Currently events or academic activities in the Multidisciplinary Unit Tizimin (UMT) are informed through social networks, posters and direct messages by the coordinators of the degrees offered there; however, this strategy has not resulted effective since students visually discriminate posters and social networks are forbidden by institutional policies, causing that students do not find out about those events or do so too late. Nowadays, the use of instant messaging on smart phones has resulted in an effective way to allow communication among people, which is why this paper proposes the development and implementation of a mobile application based on a design pattern known as publish-subscribe, to allow students to know in time about events or activities performed in the UMT, resulting in a greater attendance and participation. Likewise, a usability study is presented in which the prototype of the proposed system is assessed.

Keywords:, *Mobile application, Design pattern, Publish-Subscribe, Sockets*.

1. Introduction

The coordinators of the academic events carried out in the Multidisciplinary Unit Tizimin (UMT) of the Autonomous University of Yucatan (UADY), use posters and personal spoken announcements as communication means to inform students about the events' activities, however it was noted that not all students attend. With the advent of social networks, like Facebook, that medium began to be used for the diffusion, and although it was observed an increase in attendance, in a survey performed to a group of UMT students, they stated that in the majority of cases they did not find out about the events in a timely way. This suggests the need of a better strategy for spreading information about events.

A divulgation medium at hand are smart phones. We have witnessed how in a few years cell phones went from being a device to only make and receive calls, to being an intelligent device with functions like access to the Internet, GPS, document editing, handling of images, pictures, audio, video and games, among others. Besides it is expected that the access to the Internet from mobile devices overcomes, that if it has not been overtaken yet, the access from desktop PCs and Laptops [1].

The cell phone has become essential in many daily life activities, due to its cost reductions and the increase of its functionality. This technology tends to provide everything that users may need in a device, in particular, its objective is to provide "mobility", defined as "the ability to access information and services at any time, in any way and everywhere" [1,2].

In 2012 more than 70% of population had some kind of mobile device [3], and since then the number of available models, functionality, applications and number of users have increased.

The creation of mobile devices with more capacity and resources has led to the development of new applications that allow more effective and faster communications. Examples of the above are the Short Message Service (SMS) and the instant messages over the Internet (i.e. WhatsApp, Telegram, Viber, etc.).

This paper presents the development and implementation of a mobile application (Notifications-UMT), which will allow to the coordinators of events and activities to have a more effective option to disseminate their information, trying with this that the majority of students become aware on time about the events, probably increasing attendance and participation.

The organization of this paper is presented below. Section 2 discusses some works related with the proposed application; the development and implementation details of the prototype are shown in section 3; sections 4 and 5 describe respectively the methodology and the analysis of results of the usability tests of the application; conclusions correspond to section 6.

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2. Related works

The evolution of mobile devices technologies has been exploited in different fields to improve their processes, by example in education applications are used for the teaching process focused on children with special needs [4].

In the university school environment, smartphones were used to spread information to students and teachers [2]. In a case study carried out in 2013 at a university [5], it was observed that students can use their smartphone for academic activities, in addition to the traditional communication use (phone calls) and distraction. In 2005, at the University of Castilla La Mancha, it was developed a ubiquitous system that allows students to access information of interest from everywhere using only a mobile phone [6]. It is observed that universities and educative environments in general might be benefited with the constant evolution of mobile technology and the tendency to use them to provide mobility and access to information from everywhere.

With the above, can be confirmed the potential benefit of the use of mobile technology in universities, this is why it is proposed a mobile application to spread the information of academic activities.

3. Notifications-UMT

One of the main reasons why most of students do not attend academic activities and events carried out in the UMT, is because students find out about them when those have already begun, after those have finished, or even there are occasions in which students never find out. There are three ways through which students find out about the events: social networks (i.e. Facebook), posters and hearing about it directly from the organizers or coordinators. It is important to emphasize that in the intranet of the UMT, social networks are not allowed, so that the majority of students who find out through this medium, do it outside of school (i.e. House, Internet cafe, etc.) and often too late; likewise, posters go unnoticed for a large number of students, since few of them realize when there is a new notice in bulletin boards, walls or doors; It can be also mentioned a drawback for the third way and it is that despite coordinators try to give a personal notice to students, for reasons of time and schedule they fail to inform all students. That is why it arises the necessity to develop a mobile application, Notifications-UMT, as an alternative to announce the various activities and academic events.

The prototype development was on the Android Studio platform using the Java language, given that almost all the students use a mobile phone with Android, which is an operative system designed for mobile phones based on GNU/Linux, that allows its programming in a framework [7-9].

The prototype proposed in this work is based in the Publish-Subscribe pattern, in which clients are subscribed to communication channels within the server, and when there is new information this sends it to all subscribers. The publisher puts the new information but does not select to whom nor to how many the new information is sent; for its part, for subscribers it is not relevant the publisher or publishers of whom the information comes from. In this design pattern the messages are sent by broadcast, it means that when the publisher sends a message, the pattern design allows to send the message to all subscribers without exception. Figure 1 shows the Publish-Subscribe design pattern [10,11].
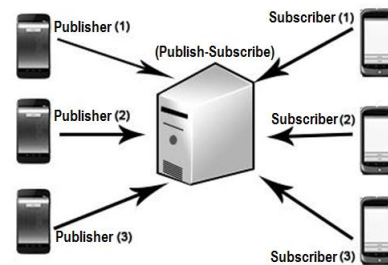

Fig. 1. Publish-Subscribe model

In order to achieve a communication between the application and the server, connections through sockets [12] are used. The server uses thread programming to allow the simultaneous connection of multiple applications.

The prototype denominated Notifications-UMT, consists of two applications, App1 and App2. App1 is used by the coordinators of events and allows them to send announcements to students; by counterparty, the students use App2, which receives notices of events. Both applications run in mobile devices and are connected to a server that is running the program *server.exe*, provided by Android Studio [9]. App1 sends messages to the server which in turn forwards those messages to all mobile devices running App2. The server and the mobile devices running App1 or App2 must be connected through Wi-Fi in the same local area network. Figure 2 shows the communication among the applications and the server.

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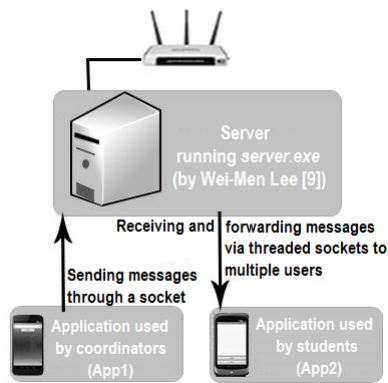ISSN (Print): 1694-0814 | ISSN (Online): 1694-0784
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Fig. 2. App1 sends messages, the server receives and forward them to all the users connected with App2.

App2 for its part allows to save all received messages, as well as to select one message in which the user is interested and save or schedule it through other applications. Figure 3 shows screen captures of the two applications of Notifications-UMT.
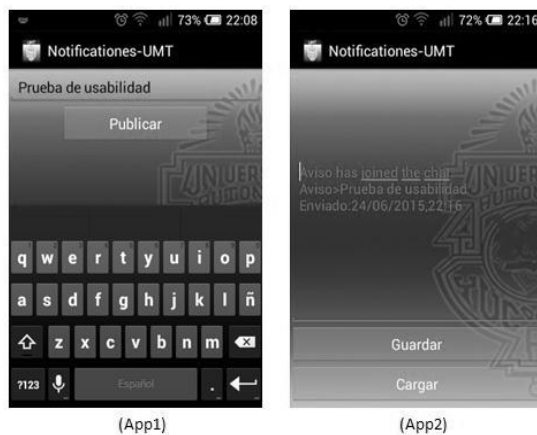

Fig. 3. App1 is the application that coordinators use to send notices, App2 is used by students

4. Design of the prototype test

For investigating about the usability and effectiveness of the prototype, an experiment was carried out, involving seven volunteer students: two men and five women, between second and eight semester of the Bachelor's degree in Computer Sciences of the Multidisciplinary Unit Tizimin of the Autonomous University of Yucatan. The student ages ranged from 18 to 23 years, and all of them had experience using both the operative system Android and existing instant messaging applications.

In order to perform the experiment, each student was assessed individually for 30 minutes. At the beginning of the assessment, a questionnaire was administered to the student in order to obtain information about how he currently finds out about academic activities, the same questionnaire helped to obtain information about their experience in using mobile phones with Android. After the questionnaire, a brief explanation about the functionality of the mobile application was given to the student. Each student was introduced to the graphic interface and given a training in the use of Notifications-UMT before to allow him or her to perform any activity by himself.

For the experiment, the participant was provided with a written list of actions, that he or she should perform using a mobile phone (i.e. to interact with other applications) with the aim of reproducing an everyday scenario where a user interacts with his phone. At some point during the experiment, the mobile phone received a notification from the proposed system, informing the participant about a particular notice, then that participant should schedule or save the information included, according to the provided indications in the list of actions. To perform the above each participant had between 5 and 10 minutes. Figure 4 shows a participant evaluating the proposed software. During this experiment there was always an observer who did not interfere in the realization of the instructions by the participant.
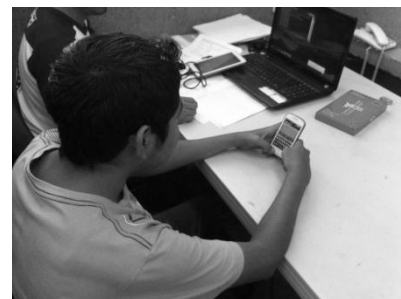

Fig. 4. User performing a usability test.

At the end, the user answered a second questionnaire to grade the usability of the application Notifications-UMT. That questionnaire consists of two sections, the first one consists of seven questions about the ease of use of the application (based on the Linkert scale to obtain information); and the second section was for the students to express their suggestions to improve the system.

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5. Results of the system test

The Figure 5 shows the obtained results of the usability questionnaires of the application. It is noted that the application is well accepted as an alternative to broadcast notices of activities or events. The majority of users said that Notifications-UMT has a simple and friendly user interface allowing them to use it easily and quickly.

The applied usability questionnaire also contained an open questions section, the answers of each participant were analyzed and classified. Figures 6, 7 and 8 show the results.
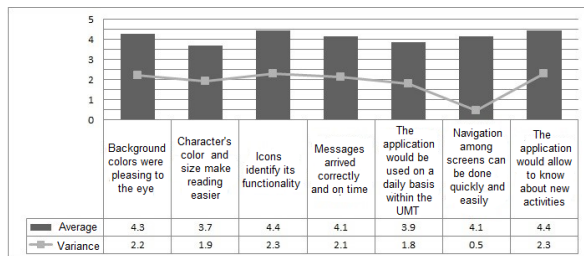

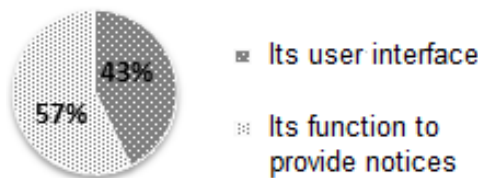Fig. 5. Average and variance of the mobile application's usability.

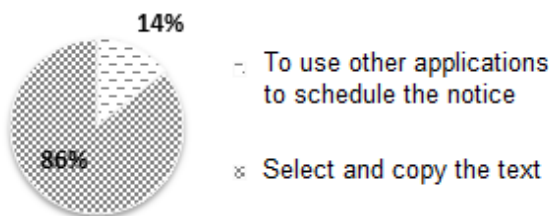Fig. 6. What they liked most about the application.

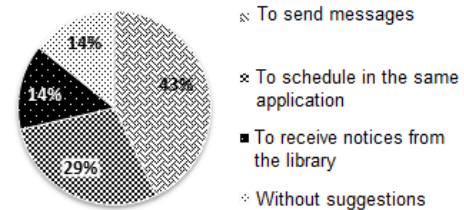Fig. 7. What they liked least about the application.

Fig. 8. User's suggestions to include in the application.

Participants expressed as an advantage of the proposed application that the students' attendance to academic events would increase, since with the application they would be timely aware of the date and time of those events, which previously was not the case. As obtained suggestions, the student's application should allow to answer notices to express questions about academic activities or events, as well as to be able to schedule the events in the same application. As a disadvantage they mentioned the fact of receiving information that might not be of their interest.

6. Conclusions and future work

Based on the obtained results it is concluded that Notifications-UMT would be helpful in the academic environment to provide timely notices of events or activities that are taking place in the Multidisciplinary Unit Tizimin. The use of the application was easy and agile because the users considered that the graphic interface of Notifications-UMT is similar to other interfaces that they have already used. As future work, the application Notifications-UMT will allow to schedule the event with an alert from within the application, without using external applications, as well as to improve its user interface.

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