EyApp & AndrEyA – Free Apps for the Automated Recording of Lessons by Students

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***Abstract*—EyA-inspired applications (to *"Enhance Your Audience"*) allow for easy automated recordings in the classroom. They also allow for a fast sharing of large amount of educational contents. We discuss on our two prototype apps: AndrEyA and EyApp for mobile devices running Android OS and iOS, with the ultimate goal of facilitating the recoding of academic lectures by individual students themselves. We show the strong differences in video size outputs with respect to video recordings using iPads and our app, without losing sources of information.**

***Index Terms*—Communications applications, Multimedia Information systems, User interface, Management of computing and information systems.**

I. INTRODUCTION

Rich-media video recordings of lectures, seminars, conferences, *etc* are now being produced world-wide by prestigious institutions, research centers, schools and others since the technology to implement video streaming and recordings is getting robust and cost effective. Another reason for this growth lies in the fact that access to the Internet is now available to all at affordable costs and at faster speeds throughout different means, including the new mobile devices. It is forecasted that in only few years ahead, on-line videos traffic will consume most of the bandwidth available for academia and entertainment [1].

Pioneering educational video archives such as the MIT OpenCourseWare [2], and the ICTP pre-PhD Diploma Courses On-line for Physics and Mathematics [3] are increasing their popularity with scholars around continents. New open educational programs for blended learning, mobile learning and others in different fields are being developed and made available at reasonable prices, giving the opportunity scholars to advance in their careers. Most recently, the implementation of Massive Open On-line Courses (MOOC) [4, 5] by EdX.org of MIT and Harvard are opening also new ways to offer excellence and free education for all. The technology needed to optimize these educational programs such as Coursera and Audacity are still under developments [6]. In this regard, our recent Pinvox algorithm [7] can be used to certificate self-study by the attentive vision by students of their assigned educational on-line videos by their Tutors.

There is little work for supporting and facilitating the easy recordings by the students themselves, especially now that they have easier access to computers, and a large variety of mobile devices to communicate with their peers and to participate in social networks activities or to use them during their academic activities. From the technological point of view, many efforts have been principally devoted to support the recordings by Institutions, and little support has been given to the possibly of developing tools for allowing students to carry out their own recordings, which should be optimized for long traditional classroom lectures of 45min or so.

Figure 1. EyApp icon on a iPhone

In this work we introduce our new prototype Apps for the automated recording of complete lessons, seminars, talks, *etc* using mobile devices running Android OS, and iOS (displayed in Fig.1). Our aim is to support the recoding of academic lectures by the students themselves. This paper is an enlarged version of our work presented at WAVe2013.

II. EYAPP & ANDREYA APPS

The releases of the applications for AndrEyA on Android OS and EyApp that can be used also on iPads and iPod touch, have been deployed to allow scholars to make their own recordings or Postcasts with just the press of a button, and to allow them to share their recorded courses immediately on the Internet soon after the lectures ends or save it for future reference and study.

These Apps are free for download and use, and are based on the experiences gained by the ICTP Science Dissemination Unit (SDU) in Trieste, Italy with its open source *"Enhance your Audience"* (EyA) recording system: www.openeya.org −with more than ten thousands hours of automated educational recordings in the fields of physics and mathematics (see: ICTP.tv).

EyApp is available on the iPhone App Store: https://itunes.apple.com/, and the AndrEyA App through the website http://www.andreya.org.

Like a small video camera, EyApp (shown in Fig. 2) and AndrEyA can simultaneously record the voice of the speaker and take pictures of the screen, which projects

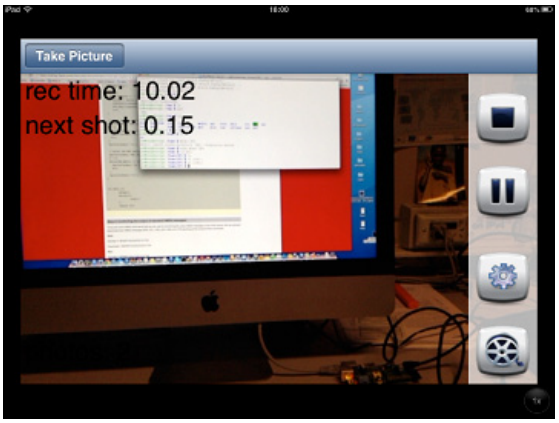

Figure 2. Control Panel with buttons for Manual Photo Shooting, Recording/Stop, Pause, Preferences and View

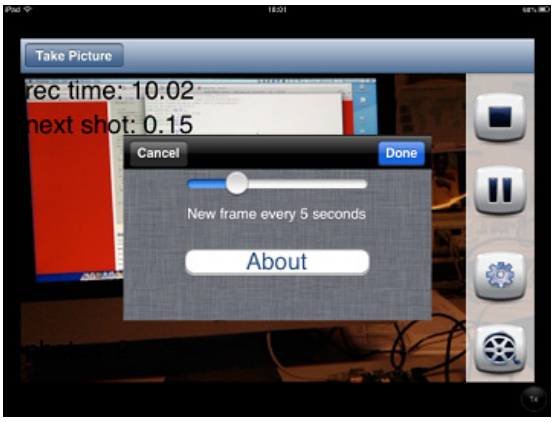

Figure 3. EyApp Frame Control from 5 to 20 seconds

digital presentations, or from a podium holding a traditional blackboard. As a main difference though, these Apps on an iDevice (iPhone, iPad or even an iPod touch) save students from the frustration of learning the art and science of video recording and the many options of conversion to multiple video formats.

With EyApp and AndrEyA Apps it is possible to create one's own photo-audio movies that are composed by still frames (*i.e.,* screenshots of what is projected or written by the speaker or lecturer) synchronized with a continuous audio signal. The result is a file of smaller size compared with a traditional video (HD or standard resolution) because the still frames can greatly benefit of the highly-efficient compression algorithms used by the H264 video format used by modern mobile iDevices.

Within EyApp and AndrEyA one can shot automatically, every 5, 10, 15 or 20 seconds, or the shootings can be controlled manually by the user as shown in Fig. 3, allowing for many different situations of usage. There is also the possibility to pause the recording by pressing a button and to re-start the recording again from the point at which was paused, saving in this way periods of silence or any breaks done throughout during the lectures.

To make the application even more engaging, EyApp outputs (and also next versions of AndrEyA −whose icon is shown in Fig. 4) can be saved on the device's photo/movie gallery, and from there it can be further edited with other Apps, shared by e-mail and rich-media messaging systems, or via social networking Apps, or transferred to a computer (*c.f.,* Fig. 5).

Figure 4. AndrEyA App icon for Android: www.andreya.org

Figure 5. EyApp Output files containing synchronized audio-photo recordings. These can be easily erased or transferred

III. DISCUSSION

Scientists and students doing physics and mathematics still use traditional blackboards. So one issue is how do you record automatically a lecture which uses a blackboard where even an small dot on the blackboard can make a huge difference. Hence we have developed a system called (open-)EyA as a system that records a video of the lecture and allows taking high definition images every few seconds in an automated way. These still images are then synchronized to the video with the facility of zooming areas of interest within the pictures to get a clear and close vision of the blackboard. Most recently, we have developed EyA-inspired Apps. The idea for these Apps is to record slides and audio simultaneously and synchronize them together.

A. Why students would want to record lectures themselves if institutions are doing it?

Institutions are not recording everything, or what could be also particularly important and of main interest for an student. With the easy use, and portability of AndrEyA and EyApp installed in their smart phones, students can increase and potentiate their own interest well beyond their classrooms and/or within a campus.

B. Are our EyA-based Apps actually useful for developing countries scenarios?

We have developed these EyA-inspired Apps to allow students to record particular seminars or just one lecture by themselves especially because of the incredible increase of mobile phones around the world and, specially, among young scholars. The 70% of such users come from the south of the world, with smart phones usage becoming the most popular.

For developing countries experiencing the so-called Digital Divide, there are now new opportunities to leapfrog "old" technologies such as wired phones and desktop computers. This is increasingly the case in Africa, as the costs of intelligent mobile devices continue to fall and the prices and availability for WiFi and cell phone coverage improve [8].

According to a recent report [9], Africa is the most dynamic e/m-Learning market on the planet. In the last two years, many African countries have embarked on new government backed initiatives to integrate learning technologies into education and training. The growth rate for self-paced e-Learning is above 15%. Senegal has the highest growth rate in Africa at 30.4%, followed by Zambia (27.9%), Zimbabwe (25.1%) and Kenya at 24.9%.

Many countries are adopting e/m-Learning programs as a way to meet the strong demand for higher education. For example, the pan-regional virtual University of South Africa (UNISA) has over 310,000 students (of which 3,500 come from outside Africa). A year ago, the African Development Bank Group (AfDB) approved a $15.6 million grant, "to help strengthen the capacity of the African Virtual University (AVU)", with the goal to use these funds to build out 12 e-Learning Centers.

On the other hand, the growth of mobile phone subscriptions world-wide in the last few years has been also tremendous. With 5.9 billion mobile-cellular subscriptions, today's global penetration reaches 87% and 79% in the developing world. Mobile phones have changed the way people access the Internet to study, work and search for information and knowledge.

Mobile-broadband subscriptions have grown 45% annually over the last four years, and today there are twice as many mobile-broadband as fixed subscriptions. This means that people, especially scholars at a young age, use the Internet via mobiles devices more than they do at home. Hence, it is foreseen that educational apps, like EyApp and AndrEyA −that aim to support students' work, will became more and more useful and popular.

C. *How much data or money can be saved by using this system?*

Our Apps are free and requires a very smal investment on time to install, because people should have already their smart phones for their communication purposes. What is also special about our system is the video size; as compared to recording a simple video with the smart phone devices pre-installed apps. In Fig. 6 we show a comparison between the video size when one records the video with the iPad full video and in the case one records with EyApp. The y-axis is in logarithmic scale and it corresponds to the video size in Megabytes. The x-axis is the video length in minutes.

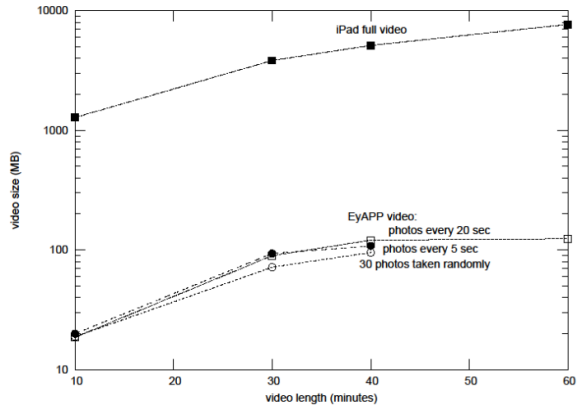

Figure 6. Video size comparison between EyApp and full iPad recordings

A 10 minutes recording with an iPad is of the order of one Gb, and with this time length it becomes already difficult to share this file via Internet with other colleagues, especially if one is in a low bandwidth environment. Using EyAPP instead, the video becomes 20 Mb in size for a 10 min recording, which is really small and which can be sent relatively easily, *e.g.,* via e-mail as attachment. It can be uploaded to YouTube also rather easily. For about 40, 50 min or so, the iPad video of a lecture carried out using blackboard become huge (of the order of 6 Gb). With our system one is always under 100 Mb even for a complete recording hour, so this means a more reasonable video size that one can share. And there is not much difference if one decides to take pictures every 20, 30 or more seconds automatically or in a manual way randomly. This is because of the compression taking place in the video encoding and processing. So the result in video size using EyApp is smaller than for the iPad. Most importantly, the main source of information and educational content stored in our videos is maintained.

D. *By using AndrEyA or EyAPP, do they allow students to switch focus from the digital projector to other things, like shooting an actual physics experiment happening?*

The recordings are done automatically with just the press of a button and without any extra human intervention. There is only the need to press the Start and/or Stop recording buttons. A Pause button is also available in case of particular lecture interruptions and, in case of a preferred manual mode to take the photos, this is available as an added feature.

E. *Copyright, privacy and control issues.*

The practical applicability of any of the many rich media tools available via Internet throughout, for example, Play Store under Android OS or Apple Store for iOS applies to our Apps too. Any problems relating professors being recorded without they even know, *etc*. is not related to our mobile applications in particular since these issues are valid even when using any opf the the video or audio applications incorporated with the smart phones or the Tablets being used. More and more lecturers today are allowing students to take recordings in their classrooms without any means of control of the recorded content. The reason is because such modern Teachers want their students to learn offering in this way more opportunities to do so.

F. *Is the quality of the audio-photo recordings is sufficient to allow students to recapitulate the lecture?*

The audio and photo quality achieved with our Apps, or any other similar tools, certainly depends on the hardware and OS characteristics of the mobile devices used.

IV. FINAL REMARKS

Our aim is to empower students, so they can come back home and revise their educational recordings again and again at their own pace. Most importantly, they can also share with their peers their open access material without having the limitations of an institutional video repository of limited resources. Our final goal is to facilitate the recording of seminars with Apps like EyApp and AndrEyA, either at an School, University, Conference or anywhere a

student could be present. Most importantly for the project at hand, is to allow students to record an event of their own interest at any time and for their own academic, scientific, cultural, *etc* purposes. In particular, our EyApp allows to create personal recording archives as well as to share them via popular self-video archives such as YouTube. Regarding copyright issues, these follow similarly any YouTube or analogous videos archives, *i.e.,* under the responsibility of the owner of the channel.

The main point in our paper is the possibility of easy recording by students of long lectures. The process and benefits of combining video, static images and audio in order to conserve memory resources has been discussed. We described the usage of our purpose-specific application for easy recording, easy viewing and easy sharing. The student can share his/her recording the same way students did share old-fashion written notes for so many decades. The recordings can be seen on the mobile devices themselves.

To our best knowledge, there are not similar solutions that allow saving space disk for continous video recordings of one hour or more. We explained our technical method and plotted the memory consumption side of our Apps against standard device recordings. For self-paced study, videos produced using EyAPP and AndrEYA Apps can be of great support.

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