Hindawi Publishing Corporation
International Journal of Antennas and Propagation
Volume 2014, Article ID 197437, 8 pages
http://dx.doi.org/10.1155/2014/197437

Research Article

RFID Presenter: A New Way to Feel a Talk

Jonathan Ruiz-de-Garibay, Jon Legarda, Szilárd A. Kados, and Xabier Eguiluz

Deusto Institute of Technology, DeustoTech, University of Deusto, 48007 Bilbao, Spain

Correspondence should be addressed to Jonathan Ruiz-de-Garibay; jonathan.garibay@deusto.es

Received 15 November 2013; Accepted 16 January 2014; Published 10 April 2014

Academic Editor: Yuan Yao

RFID is a key which enables technology for the Internet of Things paradigm, allowing the virtualization of the physical objects into the Internet. There are uncountable applications whereby these connected objects can be a breakthrough for new business models, and this work shows a good example of that. We present the RFID Presenter as the evolution of a classical consumer electronic product to a novel connected Internet product with the addition of the RFID technology. It supposes a new way to manage the conference talks in a personalization way, improving the end-user interaction and providing services that were impossible before. The design, implementation, and validation of a real gadget are well explained in order to give a real example of how the Internet of Things can be integrated into daily objects and enhance the end-user experiences.

1. Introduction

This work introduces the design and validation of the RFID Presenter, a new concept of presenter that integrates the radiofrequency identification (RFID) technology into a traditional remote wireless controller for conference and lecture talks. The aim is the addition of new services to the basic presenter functions, keeping the same ergonomic performance without decreasing the usability and enhancing the end-user experience.

The system consists of a conference manager (CM) installed in a personal computer that runs typical desktop applications and the wireless RFID Presenter. It identifies the end-user with a RFID conference card and the CM immediately launches the desktop applications associated with the documents or the multimedia that each user has previously remotely uploaded. The remote file allocation allows the end-user to manage until the last time the required documents and their sharing with the conference audience if it is necessary.

The RFID Presenter controls every action needed for the execution of the applications, the switching between applications, and the end-up of the conference presentation.

The conference manager will be usually installed in a personal computer that makes the gateway between the video projector, the files repository, and the RFID Presenter.

The proposed system architecture is simple and flexible, as it requires a minimum number of elements to maximize the user experience and it is designed to work together with the CM application.

This paper is organized as follows. Section 1 introduces the main scope of the work and the basic characteristics of the proposed solution. A brief related work shows the current presenters and their typical functionalities in Section 2, before describing the system architecture in Section 3. Section 4 goes deep into the hardware, software, and mechanic design of the RFID Presenter and Section 5 does the same with the conference manager application. Finally, Section 6 shows the system validation and the final result discussion, before presenting some conclusions and the proposal of some future work.

2. Related Work

The radio frequency identification emerged as a new contactless identification technology mainly focused on logistic processes, in order to improve their efficiency and cost reduction [1], but it has become the seed of the Internet of Things concept as it has facilitated the presence of the physical world into the digital world [2, 3].

The Internet of Things covers a wide range of applications and technologies, but all of them need some communication

Figure 1: Genius ring presenter.

capability to upload, at least, their ID to the Internet [4]. In the recent years, there have been a large number of gadgets based on RFID that try to break the market, and their acceptance by end-user becomes a priority requirement. The addition of new functionalities to any existing or new gadget must not compromise its usability; otherwise it will not succeed. That is why the design [5] and interaction [6] aspects have become relevant for the research community. Some examples show how to increase the added value of a product personalizing it to the end-user with the use of RFID technology but keeping the usability equal or even improving it [7, 8].

2.1. Presenters. The market offers a wide range of presenters, most of them based on a specific radiofrequency receptor. The complexity of these devices has evolved from multibutton and multifunction gadgets to more simple and user-friendly devices, whereby only the most used actions are available [9–13]. Some curiosities can be found, like the control of the scrolls, the display of the presentation time, or more ergonomic shapes, like in Figure 1.

However, all of them work with traditional presentation tools (i.e., Microsoft PowerPoint), they cannot be configured by the end-user, they have to be launched directly in the computer and above all, and none of them identifies the end-user who holds it.

3. System Architecture

The RFID Presenter is based on the system architecture described in Figure 2 in order to fulfill the functional requirements defined by the use cases described in Figure 3.

The presenter is wirelessly connected to the CM that is allocated in a personal computer (PC), which in turn is connected to a video projector. The document that is going to be used in the presentation can be both in a local or in a remote repository, whatever suits better, despite the fact that this work is validated only in the local use case.

3.1. RFID Presenter. The RFID Presenter is the physical user interface for the execution of the conference/lecture talk; it

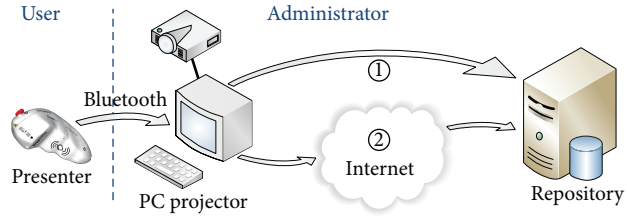

Figure 2: System architecture.

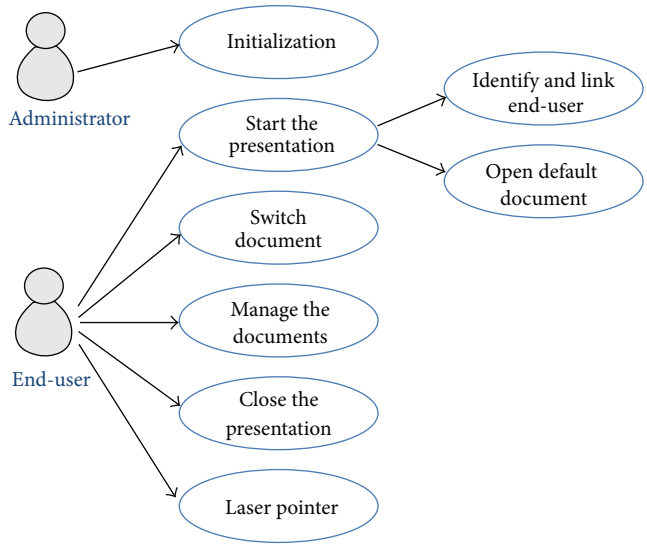

Figure 3: Use cases.

identifies the user ID and transmits all the instructions to the conference manager thorough a wireless link:

(i) identify the user ID with a RFID reader;

(ii) open documents;

(iii) switch between different documents;

(iv) move forward or backward in PowerPoint documents;

(v) play or pause a video file;

(vi) close a presentation.

The aim of the RFID Presenter is the total substitution of the interaction with the personal computer for a conference speaker or a lecturer, and it has to be design accordingly.

3.2. Conference Manager. A personal computer holds the conference manager application that is paired with the associated RFID Presenter. The application is installed and associated once and after that nobody has to interact with it; it runs as a transparent gateway between the RFID Presenter, the project, and the repository.

In the local use case, an administrator has to do the pairing setting and the file association, but in the remote use case the latter can be done by the end-user itself.

3.3. Bluetooth. Selection of wireless communication technology is one of the keys in the system architecture. Two different options have been considered: Wi-Fi and Bluetooth.

Wi-Fi can provide a direct access to the documents in the repository and even to a Wi-Fi Projector. Instead, Wi-Fi transceivers have high energy consumption, it is complicated to set the Wi-Fi settings without external keyboards and screens, and it is necessary high computer capacities for document management.

Bluetooth, however, does not allow a direct access to the documents in the repository and a personal computer is necessary for its connection with the projector, but it has other important advantages like the following:

(i) the ease paring with a PC;

(ii) low price ($10 versus $30);

(iii) the low power performance (30 mA versus 200 mA);

(iv) the low computing requirement;

(v) the high level software libraries.

3.4. Repositories. The document repository can be local or remote. Local documents are saved on the hard disk of the PC, it is the more common use case, and it has been used as the validation scenario.

When documents are saved in a remote repository, all the cloud technologies can be used, like FTP servers, Dropbox, or Google Drive tools. It brings more control for the end-user, more flexibility for last minute changes, and even better diffusion options once talks, conferences, or lectures have been finished.

4. RFID Presenter

This chapter describes the design of the RFID Presenter, the functional and nonfunctional requirement description, hardware and software considerations, and the 3D printing of the mechanical packaging.

The main and novel goal of this project is to integrate the RFID identification to a remote presenter. In any conference, talk or lecture, all speakers can be identified with an identification card, so let us consider that those cards are RFID cards in order to personalize each end-user talk regarding their presentation documents (slides, videos, PDFs, etc.). This is possible integrating a RFID reader to the presenter and transmitting the ID to the CM application.

The system requirements can be described as follows.

(i) The prototype has to be as close as possible to a commercial product: the working group has to make a hard effort in the definition of the requirements to create a prototype that can be compared with other real products.

(ii) The device has to be user-friendly: the presenter is the only input interface between end-user and the projector so the physical design has to be ergonomic but with extended capabilities.

(iii) A presentation can have several documents: the end-user has to be able to switch the document shown to the audience.

(iv) The system has to be able to work continuously during one conference's session: in the worst case, a conference starts in the morning at 8 AM and finishes before the lunch at 2 PM; and in the afternoon it usually spends less time. We specified 12 hours autonomy as the minimum time that it has to run without interruptions.

All of these requirements have been taken into account in the design process. Now they are developed more in depth as the description of the design process.

4.1. Functional Requisites. Analyzing a typical presentation, the main actions that speakers do during a presentation are as follows: to start the presentation with one document, to switch to other documents, to navigate through the document content, and finally to close all the documents. The use of the laser pointer is also very welcome.

On the other hand, the system administrator is the person who has to turn on and initialize the presenter device.

Following the same order of Figure 3, the first function is the *initialization*. This is a function done by the administrator and it pairs the presenter with the PC in the first time; it opens the wireless connection and checks the link between them. In this moment, the system is ready to work.

Start the Presentation. The end-user puts his personal identification card next to the RFID reader. This action will send the ID to the CM. If the identification is correct, the CM loads all the presentation documents assigned to the end-user, and she/he sees only the one she/he chose previously.

Switch Document. One of the added values of the RFID Presenter is the switching capability between different documents. The end-user needs to see all documents in the screen in order to select them according to the talk. To that end, CM has to show a new layer in the projection with extra information that allows seeing the document being selected.

Manage the Documents. This work supports these documents for the validation of the RFID Presenter.

(i) Power Point document: typical presentation document by Microsoft Office. Main actions over this kind of document are move forward and backward.

(ii) PDF document: this document format is a standard between different operative systems so it could be very useful. Actions defined for this document are as follows: go to the next or previous page, move to first or last page, and maybe adjust the document to the width of the display.

(iii) Video file: a video is very useful to show to the audience a demo or a prototype in operating. Play and pause video are basics and controlling the volume would be very interesting if you cannot check the acoustics of the conference room.

Table 1: Defaults functions.

Document	Joystick 5-position				
	Left	Right	Up	Down	Enter
PowerPoint	Go backward	Go forward	[No function]	[No function]	[No function]
PDF document	Go to previous page	Go to next page	Go to first page	Go to last page	Adjust width display
Video file	Move backward	Move forward	Up volume	Down volume	Play/pause
Audio file	Move backward	Move forward	Up volume	Down volume	Play/pause
Flash animation	Key "left"	Key "right"	Key "up"	Key "down"	Key "enter"
Prezi presentation	Go backward	Go forward	Zoom in	Zoom out	[No function]

(iv) Audio file: in this case, we also want to start and pause it; and control the volume of the audio.

(v) Flash animation: in certain areas, a flash animation can be a good way to show experimental results so we include this one with a basic interaction.

(vi) Prezi presentation: one example of novel presentation system so we have integrated this one into conference application. The main actions are move forward, move backward, zoom in, and zoom out.

Close the Presentation. When a speaker finishes his presentation the CM has to include an extra visual layer where speakers can close all the used documents.

Laser Pointer. At any time, the speaker can use a laser pointer to mark any important part of the document shown. This option is really useful to give to the audience a visual reference about the important information.

4.2. Interaction Model. Two viewpoints have been used in the design of the interaction model, a functional and ergonomic viewpoint.

(i) Functional design: the presenter has to execute all the defined functions with the simplest input interaction system.

(ii) Ergonomic design: the presenter has to be comfortable and the interaction has to be as user-friendly as possible.

These two perspectives have to develop together because the user has to sense an immediate value gain with the prototype [6].

The *reading* of the RFID card is done approaching it to the RFID reader of the presenter, and it will be marked with a specific image in order to guarantee a good lecture.

The *switching* and *control* of presentation documents will be done with a digital joystick and five different and clear interactions: turn left, turn right, turn up, turn down, and push joystick when it is in the central position. Joystick will be located at the top of the presenter and can be controller with the thumb finger. In Table 1 all the actions are related with these five joystick interactions.

The switch button indicates the *switch* action, and while it is pushed the joystick sweeps between other documents. If the switch button is released the selected document is reproduced. This button is located on the front of the presenter and can be triggered using the index finder.

Table 2: Interface with the computer.

Function	I/O device	Notify to PC
Initialization	Joystick	Yes
Start the presentation	RFID Reader	Yes
Switch documents	Switch button + Joystick	Yes
Manager the document	Joystick	Yes
Close the presentation	Switch button + Joystick	Yes
Activate laser pointer	Laser button + Laser LED	No

The *closing function* is done with the switch button, including an extra *close session* option as a presentation document. If the end-user selects it all the session is closed.

The *initialization* is done pushing the joystick in the central position when the CM asks for the paring validation.

And finally the *laser pointer*, which is located in the front of the presenter, is controlled with a dedicated button below the switch button.

In summary, the RFID Presenter has one RFID reader, one five-position joystick, two dedicated buttons, and one laser emitter. Table 2 shows the implemented functions with their input/outputs interactions. Note that all functions, but the laser pointer, are transmitted to the CM, as they require to be projected somehow.

The design is completed with an On/Off switch and two LED diodes: one blue that is active when the Bluetooth connection is opened and one green/red that switches when the battery is low.

4.3. 3D Design. The mechanic design of the RFID Presenter must fulfill the two main requirements defined in Section 4.2; it has to be as close as possible to a commercial product and it has to be as user-friendly as possible (Figure 4). Moreover, it must support all the interaction interfaces mentioned before and the intrinsic fabrication limits within the rapid prototyping technology.

The design process has been led by continuous end-user feedbacks over subsequent versions of a rapid prototype that has been developed with a 3D open source printer (300 μm). The aim of these feedbacks has been to prioritize the ergonomic issue while fulfilling the functional and interaction requirements. Three iterations have been done until

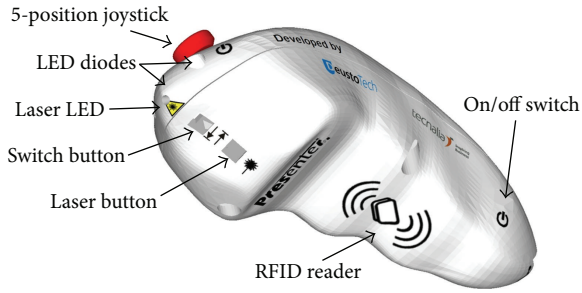

Figure 4: Button configuration and 3D design.

the last prototype has been considered acceptable by end-users, which has been printed with an industrial color 3D precision printer (100 μm). Figure 5 shows the evolution from the first design to the final prototype.

4.4. Hardware Architecture. The hardware architecture of the RFID Presenter is shown in Figure 6. It is based on a microcontroller, a power management electronic, I/O peripherals, and a Bluetooth transceiver.

The controller is a PIC 18F2520 chip of Microchip, with 8 bits processor, 32 KB flash memory, 25 IO, I2C and UART hardware communication ports, 3 timers, and so forth.

The battery is a 3.7 V-550 mA/h rechargeable LIPO battery. It can be charged with +5 V, such as a USB port, through MAX1555 integrated circuit; and a simple battery reader, based on a voltage divider, monitors the energy level (the USB port is only used for charge, not for communications). Then, the power is regulated to 3.3 V with a low dropout regulator TPS73133 integrated circuit.

The RFID reader is a SM 125 chip of Sonmicro, which can be read 125 KHz. tags. SM 125 can be controlled over UART port or I2C bus by a controller. In Version 4 of the RFID Presenter we use UART interface.

The joystick is a generic model and data is sent by digital signals to the controller. The *switch button* is an independent peripheral, a pulse switch model that generates one digital signal.

The Bluetooth RF communication is done with an EB301 module of A7 Engineering, and it uses serial communication (UART) between the controller and remote PC.

Finally, the laser pointer is a LM-102-B119 of Wenta Electronic that works independently to the controller and it is activated and deactivated with a pulse switch like switch button.

5. "Conference" Manager (CM)

The conference manager is an easy to use desktop application whose main view is shown in Figure 7. It has three main functions: the interface for the *initialization* process, the communication gateway with the RFID Presenter, and the control use of the documents used in the presentation.

The *initialization* starts with the uploading of all the presentation documents by the end-user. Then the administrator links, on one hand, the identification (ID) of the end-user to the RFID card that will be used in the conference, and on the other hand, the RFID Presenter with the computer connected to the projector. The latter requires the selection of the serial port name, pushing the connect button and confirming over the presenter device. The initialization is finished pushing the *presentation mode* button and setting it in background mode.

The control of the presentation starts as soon as the end-user puts the conference card next to the RFID Presenter. The CM checks the ID in the data base and a successful identification opens the first document, and its associated viewer that the end-user has previously selected.

The activation of the *switch button* launches in the CM the change document menu shown in Figure 8, and the joystick data activates the functions defined in Table 1.

To finalize the presentation, the end-user has to close his session and, for this, he has to reply the change document process but in this case, he has to select the last option *close session* in the menu. In Figure 8 we can see the list of documents and this last option.

In this example the desktop application of Figure 7 shows one option for the *Speaker Management* because this version uses a local repository. When the presentation mode is active, the conference manager runs the process responsible for controlling the user presentation and this process does not know if the documents are in a local or remote repository.

5.1. CM Architecture. The conference manager architecture (shown in Figure 9) is designed for working independently to the local or remote repositories. It has been implemented with Microsoft.NET framework 3.5 with some external libraries. Some SW components will be briefly summarized in the next lines.

Presenter Driver. This component uses a serial port under the Bluetooth protocol to establish the link with the RFID Presenter. When a message arrives to the computer, *Presenter Driver* validates and formats it before notifying the conference manager component.

Repository Manager. The main function of this manager is to isolate the conference manager component for the real repository (local or remote) to guarantee the correct operation of the system with both repository types. In the local repository version, end-user data and document references are saved in a XML file and the documents in a specific folder of the computer.

Viewers. They are launched by the conference manager and they receive the joystick's command. Each kind of document has its own viewer to implement the appropriate interaction. For developing these viewers, we use external libraries and COM components. For example, we use the *Microsoft.Office.Interop.PowerPoint* extension for PPT viewer, *PDFnet* library for PDF viewer, or *Shockwave Flash* COM component for Flash player.

Conference Manager. This component is always waiting for receiving a notification from the *Presenter Driver* with a RFID Presenter message. It executes one or more actions

Figure 5: Version 1 and Version 4 of the prototype.

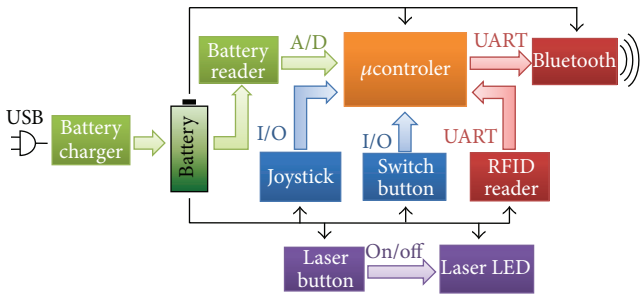

Figure 6: Block diagram.

Figure 7: Conference main form.

over the *viewers* based on the message and the state of the presentation. These actions can be as follows.

(i) Start a new presentation with a new RFID value: get end-user data and documents from the *Repository Manager* and launch the default document viewer.

(ii) Play a joystick command over the present viewer: when the conference manager component receives these kinds of messages, the command will be codified and sent directly to the current viewer. This will identify the joystick's command and execute the desired function.

(iii) Switch document: this action has three phases; the first one is an extra layer with the document list (shown in Figure 8); the second one is the joystick commands for the navigation between them (no acting over the viewers); and the last step is the selection of the new document. In this moment, the conference manager component closes the extra layer and the current viewer and launches a new viewer with the selected document.

Figure 8: Switch document menu.

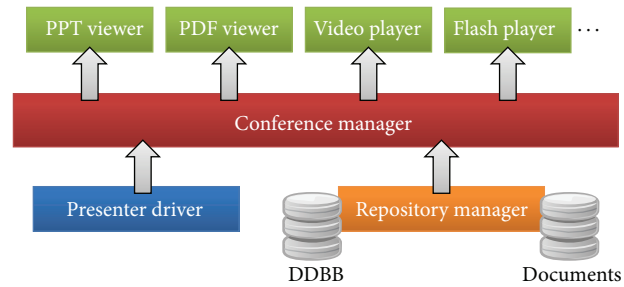

Figure 9: SW components within the conference manager architecture.

(iv) Close the presentation: Finally, the conference manager component closes all viewers and erases the end-user data and the documents from the temporary memory to wait for the next end-user.

In Figure 9, the application data only moves in one direction, bottom-up. This condition can be explained because the inputs of the system are the RFID Presenter and the repository; and the outputs are the viewers.

5.2. Document Viewers. The document viewers and their software design are one of the key parts of this design, and this design is prepared to easily include more document types in the future.

In Figure 10 we can see the simple software architecture for the document viewers. We have defined an interface with only three methods (*Show*, *Hide*, and *ButtonPressed*) that all document viewers have to implement. The conference manager component always works onto this interface and it

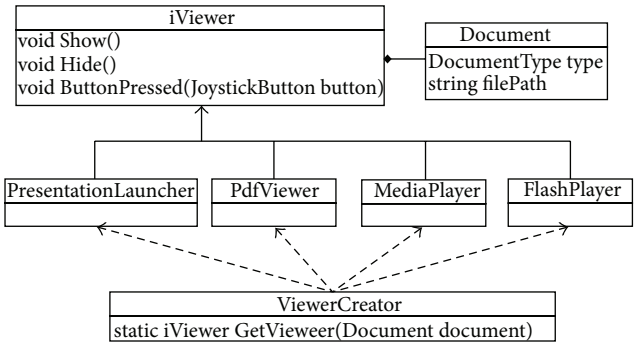

Figure 10: Document viewer's software design (this design is based on factory method pattern but simpler).

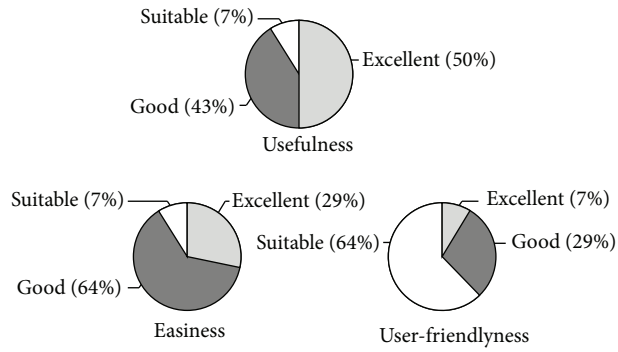

Figure 11: Validation results.

does not have to know what kind of document it is or how it works.

When the conference manager loads a new document, it uses the *ViewerCreator* to get the appropriate viewer and it calls the *Show* method to launch the project screen. If the conference manager component needs to close the viewer, it uses the *Hide* method and if joystick commands are received the conference manager component calls the *ButtonPressed* method.

5.3. Conference Administration. The system can use a local repository and in such case the administrator can work in the computer used in the conference.

But the system can also use a remote repository and the administration can be done in a Web page by the end-users. They can register in the Web page and administrate their own documents and personal information. The conference administrator only has to associate the conference card to the web users.

6. Validation

The validation has been carried out during the entire design process, in order to previously detect those key facts that many times make the product fail. The validation shown here is done to the physical device, the presenter, and we differentiate between technical validation and interaction validation.

6.1. Technical Evaluation. In this kind of testing, we use the typical procedures to validate the device such us in-circuit functional test or a debug port (disabled it for the final version).

Each component in the RFID Presenter was tested independently before being included in the prototype and then, whenever we develop a new PCB design, they were tested again. With this methodology, we solved technical problems very soon and we could develop the latest versions faster.

In the final version, we want to remark an important functional requirement for the validation of the prototype: the consumption of the device is low enough to work for more than 12 hours straight.

RFID reader is the component with higher consumption, 45 mA when reads and 20 mA when it is not active, but the device only does one read for each speaker so we can considered an average consumption of 20 mA.

Bluetooth is the other component with an important consumption. In this case, Bluetooth module consumes 27 mA when it is transferring information but less than 5 mA when the module is idle (more than 95% of the time, the Bluetooth module is in idle mode).

Considering all components, the average consumption of the prototype is 32,8 mA with consumption peaks of 95.6 mA when RFID reader reads a card and sends its code through Bluetooth module.

The functionality and, above all, the new services implemented have been tested based on a test protocol defined at the beginning of develop. It includes six parts with several questions in each part (power management, buttons, RFID reader, Bluetooth connection, switch document option, and laser pointer).

Version 4 of the prototype beats all the test protocol without any faults.

6.2. Interaction Evaluation. In the final interaction evaluation, we prepared a questionnaire with 12 questions and one last free question for comments. Also, two members of the project development wrote down any additional comment that user could make during the proof.

First questions were about objective information as if the user had used a presenter before (only half had used one), the size of the hand measured from the wrist to the end of the middle finder (the sizes were from 16 to 21 centimeters), or the hand they usually use (only one user was left-handed).

The rest of the questions can be grouped in three categories: the usefulness of the system, the easiness to learn and use the system, and the user-friendliness of the system and their interfaces. In Figure 11 we present a summary of the user evaluations for these three main questions.

Test users could evaluate different questions from bad, suitable, good, to excellent.

Based on these results, users considered the RFID Presenter very useful and they are capable of using it very quickly but it could be more comfortable and user-friendly.

7. Future Work

Following with the new services offered to the end-user, in the remote administrative version, he can personalize actions of the RFID Presenter. For example, he can set the actions for go next or previous page in the PDF viewer or even he can have more actions than buttons and select which actions are executed with each button.

In present version, web administration system has implemented the minimum code necessary to use it but it does not include any external repository like Dropbox or Google Drive. These kinds of repositories are very popular and many people use them as backup system or to work in different computers. Also, the system is designed for several conferences but present implementation only can work with one conference.

The shown system only consumes documents from the Cloud but maybe it is possible that generates information for social networks or for the conference itself (how many time each speaker consumes, or who is talking in every moment...).

Other possibility in future developments is its integration into a traditional mouse peripheral. It will be possible with a trackball in place of the joystick and an extra button to select this new mode.

8. Conclusions

Every day, systems and users connected to the Internet upload new information that can be accessible by any day-to-day object through a wireless connection.

Current technologies allow us to develop a great variety of new devices or enlarge the capabilities of existent ones. Rapid prototyping technologies are one of the key factors in developing, analyzing, and validating the products based on the Internet of Things concept. With adding manufacturing processes we can design, print, and test our product ideas, without any electronics inside, in really short time.

The development of a presenter, which has end-user recognition feature and Internet accessibility, lets us implement new and useful services never seen before. Without a proper validation during the development of the prototype, we would not be able to sustain the end-user approval.

The final results demonstrate that end-users appreciate the new capabilities of the product and also can be a competitive advantage for the manufactures.

Conflict of Interests

The authors declare that they have no conflict of interests regarding the publication of this paper.

References

[1] K. Finkenzeller, *RFID Handbook: Fundamentals and Applications in Contactless Smart Cards and Identification*, Jon Willey and Sons, 2003.

[2] E. Welbourne, L. Battle, G. Cole et al., "Building the internet of things using RFID: the RFID ecosystem experience," *IEEE Internet Computing*, vol. 13, no. 3, pp. 48–55, 2009.

[3] A. Gluhak, S. Krco, M. Nati, D. Pfisterer, N. Mitton, and T. Razafindralambo, "A survey on facilities for experimental internet of things research," *IEEE Communications Magazine*, vol. 49, no. 11, pp. 58–67, 2011.

[4] L. Atzori, A. Iera, and G. Morabito, "The Internet of Things: a survey," *Computer Networks*, vol. 54, no. 15, pp. 2787–2805, 2010.

[5] E. S. Martinussen and T. Arnall, "Designing with RFID," in *Proceedings of the 3rd International Conference on Tangible and Embedded Interaction (TEI '09)*, pp. 343–350, February 2009.

[6] M. Kranz, P. Holleis, and A. Schmidt, "Embedded interaction: interacting with the internet of things," *IEEE Internet Computing*, vol. 14, no. 2, pp. 46–53, 2010.

[7] "Withings Scales," http://www.withings.com/en/scales.

[8] H. Jabbar, T. Jeong, J. Hwang, and G. Park, "Viewer identification and authentication in IPTV using RFID technique," *IEEE Transactions on Consumer Electronics*, vol. 54, no. 1, pp. 105–109, 2008.

[9] "Presenter Remote Red Laser Pointer," http://www.kensington.com/kensington/us/us/p/1443/K33374USA/presenter-remote-red-laser-presenter.aspx.

[10] "Presenter Expert Red Laser with Cursor Control," http://www.kensington.com/kensington/us/us/p/1443/K72425AM/presenter-expert-red-laser-with-cursor-control.aspx.

[11] "Logitech Wireless Presenter R400," http://www.logitech.com/en-us/product/wireless-presenter-r400.

[12] "Logitech Professional Presenter R800," http://www.logitech.com/en-us/product/professional-presenter-r800.

[13] "Ring Pointer," http://www.geniusnet.com/wSite/ct?xItem=58132&ctNode=3619&mp=1.