

# The Case of Use of the UX user Experience Design Methodology Applied to a Face-Recognition Attendance Control System

Ing. Erika González Botello<sup>1</sup>, M.C. Juan Ramos Ramos<sup>2</sup>, M.C. José Juan Hernández Mora<sup>3</sup>,  
LIC. Daniela Muñoz Coyotzi<sup>4</sup>

<sup>1, 2, 3, 4</sup>Tecnológico Nacional de México, Instituto Tecnológico de Apizaco, Fco. I Madero s/n, Barrio de San José, 90300, Tlaxcala México

**Abstract:** *The design of user experience (UX) is a term that has taken great popularity in the development of systems as it involves many factors, such as feelings, emotions, social, cultural factors, product, and user, product reliability, in addition to always seek the satisfaction of the user regarding to the product or service, taking into account the needs and requirements of the end users. This article retakes the methodology of user experience design to ensure that such design complies with the UX aspects within the development of a face-recognition assistance control system.*

**Keywords:** UX, usability, interaction, visual design, content design, prototyping, Wireframe

## 1. Introduction

The communication man-machine has been necessary since years ago and it is precisely the reason that one seeks a design of presentation of the information that allows managing the access, the recovery and the visualization of the information in a structured form and organized, improving the results obtained by the user and his own satisfaction. As this need has increased, various interface development methodologies have emerged, the one that has gained a lot of popularity among designers is the so-called UX user experience design, which is based on making the technology friendly, easy to use, satisfying and therefore useful for the user. [4]

It also includes factors such as usability that is the simplicity with which the final consumer performs a task in the system, the design of the interaction that determines the behavior of each element of the system such as links, buttons, menus, among others, the information architecture which determines the distribution of the contents of the system according to the hierarchy of each one of them, visual design that is the graphical representation of the interface (screens) of the product that include the use of images, colors, typography, etc. and the content strategy that justifies the use of certain multimedia elements in the product and defines the characteristics that must be fulfilled (size, format and weight of the files). [1] Therefore, the UX user experience methodology was chosen to perform the interface design of the attendance control system through facial recognition.

## 2. Methodology

To define the development of a suitable user interface of the Support Control System with face-recognition, the UX user experience design methodology was used, which main function is to focus on creating functional products, easy to use and aesthetically pleasing to meet the specific needs of the final consumer, plus it has a wide application in the design and development of websites, mobile applications,

tablets, and general purpose software. Like most methodologies, the UX user experience design methodology also has a 5-stage life cycle: **Research:** You get all the possible information from the project, users and product to be designed. **Organization:** All information is processed to be converted into a product. **Prototyping:** The design of the product is reflected from the organized information. **Tests:** The quality of the proposed design is checked. **Design:** The definition of the iconography, typography, and style of the final design of each one of the screens of the digital product is carried out [2]-[3]. Figure 1 shows the life cycle of the UX user experience design methodology.

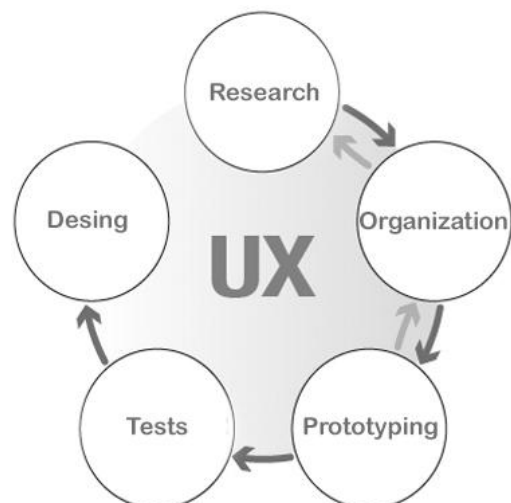


Figure 1: Methodology UX [8]

Once identified the stages of the methodology, the activities described in each one of them for the development of the user interface of the support system with facial recognition, which is described below were carried out.

### 2.1 Research

In this stage, the compilation of the functional and non-functional requirements of the system was carried out in

relation to the user interface. These requirements were expressed under the guidelines of the IEEE 830 standard, recommended practice for ANSI/IEEE 830 Software Requirements specifications, defining the general requirements of the same, were identified to the users who would use the system, its characteristics and needs, defined the processes that each of them performs with respect to their user stories, resulting in the case of use inherent to such users, defining their objectives with the use of the system. Since the department of services for which the development of the system was carried out has different areas of work such as maintenance of public lighting, maintenance of green areas, garbage collection, etc., each of these areas count with employees who perform the corresponding tasks, as well as having only the manager of the department in general. Two actors were identified: the user and the administrator. Figure 2 shows the tasks that the employee performs, summarizing the entry and exit register of the working day, having the intervention of an image processing module for the realization of facial recognition.

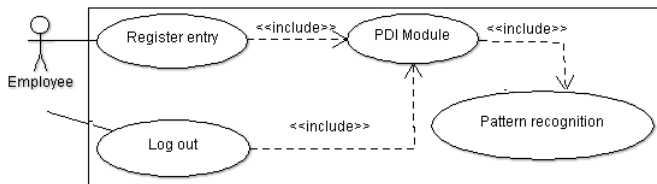


Figure 2: Employee use case

Figure 3 shows the tasks of the system administrator: login (validating the username and password), employee management (including adding new employee, editing, deleting, and adding photography), incident management (includes employee search, incident editing, and change save; The incidences considered are failures, delays, disability, vacations, permits, birthdays, economic permit and trade union event), download reports (includes downloading a general report of employees within a period of time, as well as the downloading an individual report per employee), calendar management (includes vacation management, consisting of allocating vacations to employee, editing and deleting these, managing economic permissions, consisting of assigning some economic permit to the employee, edition and elimination of this, and administration of trade union events, by means of which the assignment of the trade union events to all the employees, the editing and elimination of these are made and configuration of account with administrator permissions (user name and password editing).

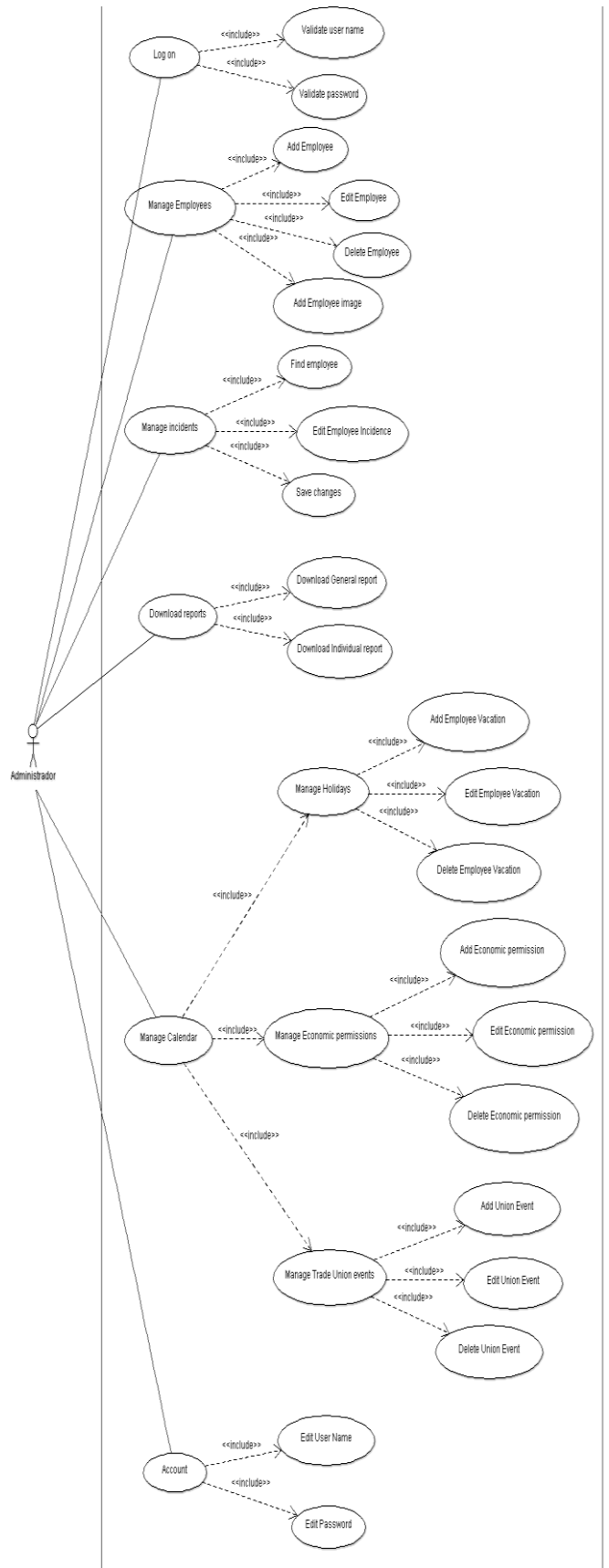


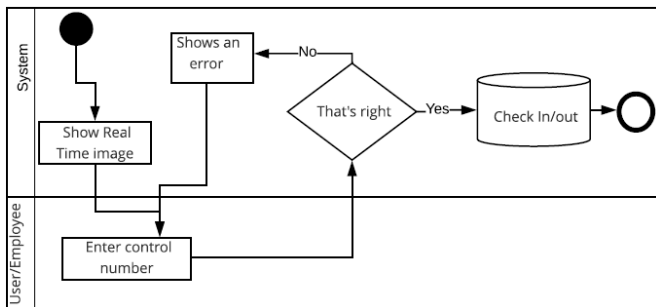
Figure 3: Administrator use case

2.2 Organization

At this stage, the information collected was classified defining each and every of the functional flows that the system would have, identifying the steps and situations of

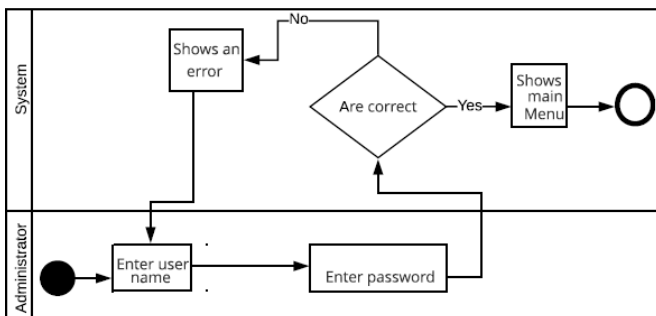
importance to maintain an order in the process, corresponding with the actual flows that the users perform. The representation of the structures of contents with respect to the necessities of the users was made [3]. The following figures are representations of such content with respect to the functional flows that users perform.

Figure 4 shows the flow of activities that the employee performs to record their input and/or output, in conjunction with the tasks the system performs.



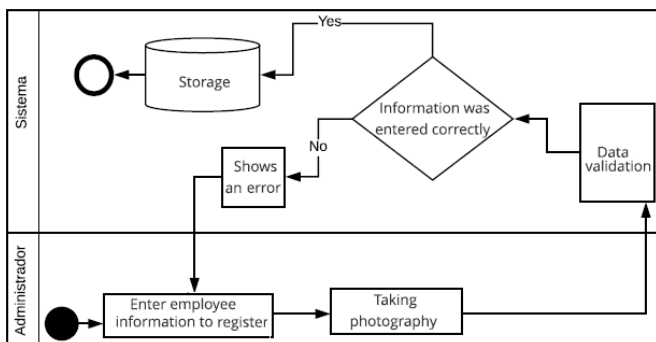
**Figure 4:** Flow of registered employee input/output.

Figure 5 shows the flow of activities the administrator performs to perform their login, in conjunction with the tasks the system performs.



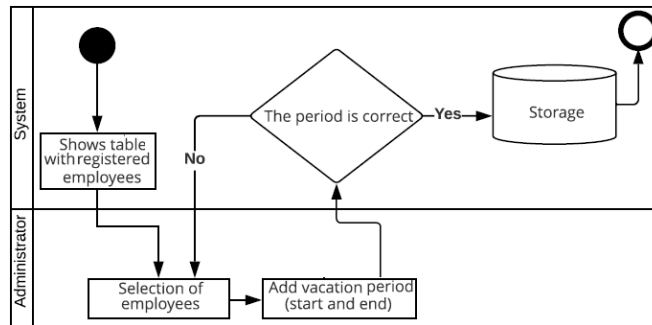
**Figure 5:** Administrator Logon Flow

Figure 6 shows the flow of activities the administrator performs to register a new employee, in conjunction with the tasks the system performs.



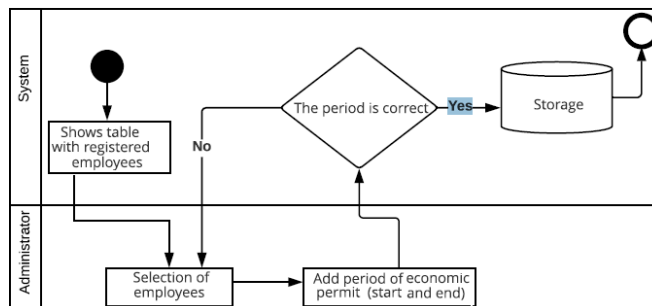
**Figure 6:** Flow of new employee registration

Figure 7 shows the flow of activities the administrator performs to assign a vacation period to employees, in conjunction with the tasks the system performs.



**Figure 7:** Flow assignment of vacation period

Figure 8 shows the flow of activities the administrator performs to assign an economic permit period to employees, in conjunction with the tasks the system performs.



**Figure 8:** Flow Assignment of economic permission

There are also streams of activities that the administrator performs to update the information of registered employees, modifying employee incidents, setting up their account, generating general and individual reports, the elimination of the registration of the employees, the edition and the elimination of the vacation period to them.

### 2.3 Prototyping

There are several recommended tools for prototyping within a UX project. Some of them are: UXpin, this tool allows to create prototypes from low fidelity to high definition. Marvel, is an online tool that allows to convert sketches made in pencil and paper into interactive prototypes. Pencil Project, is a free tool easy to use and install for the creation of mockups for applications and web. Balsamiq Mockups, tool that allows to create wireframes for applications easily, it means, the general visual skeleton of the solution. [3] Of the above and already with the organized requirements and in order that the users and the work team understood them, they defined the functionalities that will have the system, the visual design (the screens) with respect to the architecture of the information, creating a pen and paper prototype that gave way to another low-fidelity prototype created in Balsamiq Mockups, implementing general aspects without going into details, which allowed to encompass a wider spectrum of the interaction of the tasks to be performed. Balsamiq Mockups was chosen because it provides representations of all the elements used for the construction of a web or application, such as browser screens, titles, menus, images, videos, etc., besides that customers can make use of it without having any special technical knowledge, thanks to this, they can communicate their ideas and necessities in a more efficient

way, being of great help when defining the scope of a solution [7].

## 2.4 Test

In this phase the quality of the proposed design is verified, so the final users were tested with the purpose of knowing if the objectives and demands posed according to their identified needs have been achieved, looking for the comprehension of the tasks designed by users, interaction and ease of use. Some of the tests that UX proposes to know the degree of satisfaction of the users at the time of the use of the prototype are: *Test with users*, this is a test of usability based on the observation of how the real users use the system. *Heuristic evaluation*, which consists of conducting a questionnaire by a UX expert in order to check the usability of the system. *A/B Test* consists in the development of two versions of the same system measuring which of the two works best [2]-[3].

The tests carried out in the prototype were based on test with users, adapting it to the type of project, based on the observation and analysis of how the end users used the system, noting the problems of use which they found to be able to fix them later, as well as the time-taking that took the user to perform tasks within the system. During the test, the users felt comfortable performing the tasks corresponding to each one of them, since the prototype was endowed with components with which the user was immediately familiarized, deriving in the proper execution of the tasks with the flow between them. The time of execution of tasks was within the established times since the user easily manipulated the modules of the system thanks to the clear organization of the information realized.

The user determined that the interface is clear in the accomplishment of the tasks, understood the functionality of its components and do not consider it complicated. He perceived ease of use and he considers it intuitive and easy to learn. The general opinion of the user regarding the prototype of the system obtained a rating of 9.3 out of 10 points of satisfaction.

## 2.5 Design

At this stage, the interface of the support control system with facial recognition based on the approved prototype was generated, using the Swing library of the Java language. The Swing library is a graphical user interface (GUI) library, it is included with the Java development environment (JDK) and extends to another older graphical library called AWT; Provides a set of tools for building graphical interfaces that have similar appearance and behavior on all platforms where they are run, also offers the user components such as: windows, dialog boxes, toolbars, buttons, drop-down lists and many other elements with which users are familiar and accustomed to work [5]. The interface was programmed using NetBeans IDE 8.2, is an open source integrated development environment and free for the development of applications on Windows, Mac, Linux and Solaris operating systems, simplifies the development of web, enterprise, desktop, and mobile applications using the Java and HTML5 platforms. Fixed frames were used with change of panels

inside, a fixed toggle menu on the left side, as well as the required components in each of the modules. Figure 5 shows the main menu of the system.



Figure 9: System Main Screen

## 3. Conclusions

The UX user experience design methodology provided tools and guidelines for the development of the user interface for the face-recognition attendance control system, which allowed for the construction of a system suitable for requirements of the users, satisfying the needs of each one of them. Through the research, each of the functional and non-functional requirements needed for the accomplishment of the tasks of the users were identified. It carried out the organization of the information compiled in such a way that it allowed to see the real functional flows that the users continue in the realization of their activities. The prototyping of the system was generated, capturing the organized information and allowing to have a more general vision of the tool to be developed, the tests were carried out corresponding to the prototype to measure the quality of the proposed design, as well as the usability with users. The design of the system was carried out according to the specified in the prototype, defining iconography, typography and final style of each one of the screens of the system. With the completion of the stages of the UX methodology, the interface of the face recognition attendance control system was achieved as an intuitive, user-friendly interface that allows users to manage access, recovery and visualization of information in a structured and organized way. Among the benefits acquired by the users following the completed system are: establishment of a greater information processing in the automatic generation of reports, both general and of each employee, allowing the organization, clarification and delivery of these in time and form for making payments to employees. Employee attendance logging was streamlined, which reduced the rows at the time of each entry/exit log. The foregoing gave rise to a better service on the part of the managers with the employees of the department in question of administration of the incidents of these.

## 4. Future work

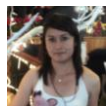
A future work is proposed to continue with the implementation of the system so that it can work in the cloud and through mobile devices, so the users have access from

any place where they are to the different modules of the system, depending on the roles of each one.

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## Author Profile



**Erika González Botello** has a degree in Engineering in Information and Communication Technologies from the Universidad Tecnológica de Tlaxcala, from 2014. She is currently studying the masters in Computer Systems in Software Engineering from the Instituto Tecnológico de Apizaco.



**Juan Ramos Ramos** has a degree in Computer Science from the Instituto Tecnológico de Apizaco, from 1993. He is also a Master in Computer Science and Telecommunications from the Instituto de Estudios Universitarios, A.C.; he works as a full-time professor at the Instituto Tecnológico de Apizaco in the area of Systems and Computing, teaching at the undergraduate and postgraduate level, in the areas of Programming and Software Engineering.



**José Juan Hernández Mora** has a degree in Computer engineer from the Universidad Autónoma de Tlaxcala, from 1994. Master in Computer science at the National

Center for Research and Technological Development of the TecNM, 2003. Research professor at the Tecnológico de Apizaco del TecNM. Teacher of the Master of computer systems of the Instituto Tecnológico de Apizaco.



**Daniela Muñoz Coyotzi** has a degree in Computer Science from the Instituto Tecnológico de Apizaco, from 2013. She is currently studying the masters in Computer Systems in Software Engineering from the Instituto Tecnológico de Apizaco.