SafeWalk App, mobile application in health for people living in motor disabilities

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Abstract. The research had the objective of develop a mobile application in health for people with motor disabilities oriented to be multiplatform and will allow integrate different accessibility functionalities. The exploratory method was used to aproach reality and as instrument, information search was carried out in government sources, main mass media of the country, observation in public places and semi-structured interviews to health area professionals. With that information was possible identify the need of this population in term of mobility issues, either because of its near or far enviroment. The application will gather information of the places available to serve this population and will be used to accessibility to their interest places. Users will be able to part of a community of people with similar conditions, interact with them and share information. Also they will have the possibility of communicate with tutors that can provide various kinds of help and contact them through a button available across the interfaces of the applications. It will generate information that will can be rated by users to estimate if the registered places are really accessibles and have good rating from those who have already been there.

1. Introduction

In Colombia there is a social inclusion policy, which consist in guarantee the rights and duties of persons with disabilities (PCD) [1], this population daily find barriers that limit the full enjoyment of life. Government has developed projects that allow work with different organizations in the country to strengthen the quality of life of these people, but still find problems in their development and is not evidenced a contribution to their welfare.

To analyze the problematic it is necessary to mention that, according to figures from DANE, people included in the Location Registration and Characterization of People with Disabilities (RLCPD by its
The majority of alterations present are: the movement of the body, hands, arms and legs with a figure of (34.05%) [2] being the highest number of different disabilities currently reported and continues rising. It is understood that these people have physical problems that limit their movement and many of them by their own way, adapt themselves so that their life is in equal conditions.

The investigation of this social problematic is performed in the interest of providing a solution to this population. The development of a mobile application that generates information for people with a motor disability [3], and because of their condition, require information from their environment about accessible places, attention in these places, points of interest that will be reported according to preferences that the user has previously set, ability to assign tutors (People without disabilities) which together with users generate information from the environment and the ability to interact with a community within the application, that is exclusively for people with disabilities and tutors.

In order to determine the functionality of the applications, continuously are proposed new utilities that can be integrated and form a final product because it seeks to obtain reliability, ease of use for the user and the community, contribute a positive and differentiating impact, pertinent to the solution and informative support for the mobility of the population with motor disability.

2. Methodology
The qualitative research finds establish a serie of generalizers of analytic and theoretic types about topic; that allows the interpretation of the different human expressions and the understanding of the subjective reality (Yin, 2009) [4], originated by the sense that things acquire according to the social actors in their natural environment from their own values (Taylor & Bogdan, 2000) [5]. The exploratory method was used that approximate to the understanding of a reality, their characteristics and dynamics, also because combine techniques that allow describe situations without exhibit problems of results validity. As sources of information it was consulted in governmental bodies, information media, observation of some access spaces of this kind of population and semi-structurated interviews carried out to health and engineering specialists of Medellín city.

Through the literature review it evidenced that a big part of studies about the topic are a quantitative cut that suggest that throws indicators, but not subjective interpretations of this reality, what gives relevancy to perform studies of qualitative order. Observation in public and work places was carried out. Semi-structured interview was used, every time that possibilities the change according interview dynamic and ease that other questions flow to deepen or clarify interpretations (Vargar J., 2012) [6].

Once acquired the information, it proceeds to identify and structurate the main needs, that have the people in motor disabilities and taking into account the barriers that must be faced on a daily basis. Such as access to different means of transport, access to commercial establishments, education centers, health centers, among others [7]. The development of an application oriented to the mobility of people with motor disability was proposed. This is proposed in discussion with trained professionals that contribute to the development of each utility. Their contributions provide a panorama that generalizes the lack of social inclusion of these people and of adequate facilities in public places of the city, this solution is proposed from ICT knowledge (Information and Communication Technologies), guite users and be a support for government social inclusion policies.

2.1. Design considerations for application
SafeWalk App is a cross-platform application with graphic individualities by operating system provided by the development environment (Ionic Framework) [8], which has its previously designed components for free use, which are used for the development of the graphic environment of the application.
Some modifications are added to the components to adapt it to its own criteria that facilitate navigation and highlight the functionalities of the application to provide accessibility and maintain a more fluid user-application interactivity.

2.2. Application Development
The application is developed in a web-based structure that provides the Ionic Framework (Framework A framework, work environment or framework is a standardized set of concepts, practices and criteria to focus on a particular type of problem that serves as a reference, to face and solve new problems of a similar nature) development framework with customized components in its graphic line and functionalities development. The programming is done in the Typescript language; a web language that controls the communication between the graphic interface and the logic of the application.

The programming language used implements other development frameworks such as Angular JS, which makes the system more robust and allows to perform more complex tasks such as view loading, navigation and communication with servers. Additionally it has the Apache Cordova framework that allows to communicate with the hardware of the device granting access to components such as the camera, the geolocation, among others. This framework acts as an interpreter between the web language (Javascript / Typescript) and the native language of the device (Objective-C / Swift for iOS and Android / Java for Android) enabling the use of these components.

For the storage of data, authentication and management of users of the application, it makes use of a development platform owned by Google called Firebase. This platform allows the creation and authentication of users using different authentication providers such as Github, Google, Facebook and Twitter, as well as authentication using email and password or with the cell phone number via SMS. In the case of the application, we will use the authentication by email and password, as can be seen in ‘ figure 1 ‘. Firebase also provides a database to store user information such as your profile and registered entities.

![Figure 1. Starting screen](image-url)
3. Result, application SafeWalk App

According to information compiled in the main communication media and governmental entities, the need to create a tool to support the population in disability status in mobility issues was identified [9,10]. SafeWalk App is an application that brings users closer to establishments with accessibility for them.

The picture of disability that is not addressed in a relevant way, only in Colombia corresponds to a quite significant number. The policies that currently exist, although they cover the priority needs of people with disabilities, do not represent systems that at all times address problems that they are in many occasions very diverse, more when talking about issues of mobility and accessibility, because the systems that have been implemented as they are the respective signaling, buses with preferential seats and services of first necessity in shopping centers, hospitals and educational centers they are known by all the population for which they are destined, most of the times, for the ignorance or little access to this type of information.

With the type of research carried out, information was obtained that gave rise to the guidelines that defined each functionality and each utility, thus, the main parameters were established in favor of the development, evaluation and automation of the application in order to generate information in mobility. for people with disabilities is a fact that does not depend only on the policies implemented by the government, but is a system that owes its operation to the joint work of different entities that provide information.

The application is developed in a way that is transversal for smart mobile devices with iOS and Android operating systems, which allows a percentage of 96% of the global market [11,12]. It has two interconnected developments, the first, the development of the mobile application for people with motor disabilities; the second, for future development, a registration website for commercial, governmental, health and educational entities in order to collect the information that will be available to the target public.

For the development of the mobile application you will have a side menu to access the functionalities ‘figure 2’ and you will make use of the geolocation provided by components of the mobile device, this in order to obtain in real time the establishments of preference of the user ‘figure 3’. In order to support the mobility system of the application, it is also proposed to have a user tutor and if you need additional help, the application will provide information such as your location, suggest places of interest and have the possibility to contact you through the community ‘figure 4’ or by call.

The interaction with the tutor can also be evidenced when the user is in trouble and use the panic button [13] ‘figure 5’ that will serve to contact him or a local emergency entity and be able to transmit audio or video to know the real situation of the user [14].
Figure 2. Initial Utilities

Figure 3. Navigation map

Figure 4. App community

Figure 5. Configuration panic button
4. Conclusions

Mobile health technologies in recent years have shown an improvement in the quality of life of users. Improvement in the accompaniment and generation of information that solve doubts and inconveniences, but due to the wide range of applications available in stores. They are considered developments that are far from being considered a complete system of sanitary support of first necessity, that is why it is necessary to create support plans with broad functionality that are inclusive and at all times promote the safety and quality of life of the users.

The needs faced by the population with some motor disability due to social or cultural factors that are often discriminatory and relegate disability as an impossibility, implants in a negative way, a vision of an environment to which one does not belong if one has disability. Factors such as the low possibility of accessing employment, traveling and freely accessing any health establishment and service, among others, make the person move away from the environment and not dare to meet and interact with him.

The way in which a mobile application is really useful, for the accessibility of people with disabilities is determined by the quality of its development, its functionality and ease of interaction, if the facility is spoken, mobile devices such as cell phones and tablets have advantages over other equipment, size, integration of functionality and the possibility of being connected to the internet; the use of mobile devices constantly increases, which is why it is to be expected that they are suitable devices that allow the generation of information regarding mobility issues.

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References

[1] Ministerio de Salud y Protección Social 2014 Política pública nacional de discapacidad e inclusión social 2013 – 2022 https://www.minsalud.gov.co/sites/rid/Lists/BibliotecaDigital/RISE/DE/PS/politica-publica-discapacidad-2013-2022.pdf
[2] Ministerio de Salud y Protección Social 2017 Sala situacional de la discapacidad (PCD) https://www.minsalud.gov.co/sites/rid/Lists/BibliotecaDigital/RISE/DE/PES/presentacion-sala-situacional-discapacidad-2017.pdf
[3] Arévalo J A 2016 Aplicaciones móviles en medicina y salud XIII Jornadas APDIS España, Universidad de Salamanca)
[4] Yin R K 2009 Investigación de estudios de caso: diseño y métodos . Thousand Oaks, CA: Sage
[5] Taylor S and Bogdan, R 2000 Introducción a los métodos cualitativos de investigación. La búsqueda de significados. Barcelona: Paidos. doi:10.1017/CBO9781107415324.004
[6] Vargas J 2012 La entrevista en la investigación cualitativa: nuevas tendencias y retos. Revista CAES 3 119-139
[7] Col prensa 2015 Ni el Gobierno sabe cuántos discapacitados hay en Colombia http://www.vanguardia.com/actualidad/columbia/293839-ni-el-gobierno-sabe-cuantos-discapacitados-hay-en-colombia
[8] Ionic framework 2018 Obtenido de Ionic: https://ionicframework.com/
[9] Nación con información de corresponsales 2017 La deuda del país con su población en condición de discapacidad El tiempo
[10] Saigí F, Novillo D an Piette J D 2017 Red CYTED-RITMOS: hacia la búsqueda de soluciones para fomentar la salud móvil en América Latina. Rev Panamá Salud Publica.
[11] Valero N 2018 Consumo móvil en Colombia Siempre conectados: ¿Bendición o maldición? Deloitte.
[12] Arévalo J A and Canelo J A 2017 Aplicaciones móviles en salud: potencial, normativa de seguridad y regulación Rev Cubana información en ciencias de la salud.
[13] Atlas España 2018 Aplicaciones del botón de pánico ABC España
[14] Pont-Sorribes C, Codina L and Pedraza-Jiménez R 2009 Comunicación de riesgo y sistemas de información en la web: cinco modelos. El profesional de la información 18 389-397