Development of a Usable and Accessible Conversational Interface for a Mexican University System

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Abstract
Currently, conversational interfaces are becoming more common due to the convenience of interacting with a device using natural language. This kind of interfaces brings accessibility for users with low technical skills and the integration of users with disabilities (visual or motor). However, it is necessary to identify user experiences challenges from users with visual and motor disabilities in conversational interfaces and which HCI testing methods apply to evaluate them. The aim of the research presented in this paper is to implement a conversational interface in a Mexican university system where the user experiences might be easier, intuitive and efficient. At this time, there is not a system of these characteristics. The proposed interface will bring accessibility and usability advantages to an existing university computer system, which is not currently accessible.

Author Keywords
Conversational interfaces; accessibility; usability; user interface design; user testing

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): User interfaces

Introduction

The most common way for humans to communicate is through conversation[1]. Due to the advances in the accuracy of Automatic Speech Recognition (ASR), Natural Language Processing (NLP), the ubiquity of microphones and power of machine learning algorithms, the use of conversational interfaces are becoming commonplace. These interfaces enable people to interact with devices using conversational spoken language[2]. Hence, in this type of interface, both computers and humans speak natural language, increasing user attention, facilitating the execution of tasks of users with non-technical training and taking advantages that hands and eye free interfaces provide in many situations.

The development of conversational interfaces has focused mainly on native applications like messaging[3][4], social assistance for elderly [5][6], customer services [7][8], e-commerce[9][10], home appliances [11][12], and entertainment[13][14]. However, it is just the tip of the iceberg. More and more developers and users explore the benefits of having a conversational interface, interacting through a fluid conversation and sometimes combining other kinds of interactions such as touch or visual.

In conversational interactions, we assume that technology will be more accessible and usable for everyone. It facilitates the use of devices and services when users are doing activities with their hands (driving, cooking, operating specialty machinery) or when the user has difficulties to manipulate objects or coordinate movements when interacting with a device, especially with blind users and users with motor disabilities. Conversational interfaces could provide better user experiences offering faster, easier and more pleasant interactions with a system[15].

Mexican University System

The University of Guadalajara is located in the Metropolitan Area of Guadalajara City and in eight regions of the state of Jalisco, Mexico. This university is composed of about 120,000 undergraduate and graduate students. Currently, there are approximately 667 students with some type of disability, which together makes 0.5% of the student population. Architectural projects have been developed to provide accessible facilities that contribute in favor of inclusion and educational equity for people with disabilities[16].

Figure 1: SIIAU system.

The University of Guadalajara's students and professors use a computer system called SIIAU (Integral System of Information and University Administration). In this system, the students can see their academic records, course schedules, and tuition fees, among other types of information[17]. Each student must use the system for registering for courses at the beginning of each semester (Figure 1). However, this is a difficult task for students

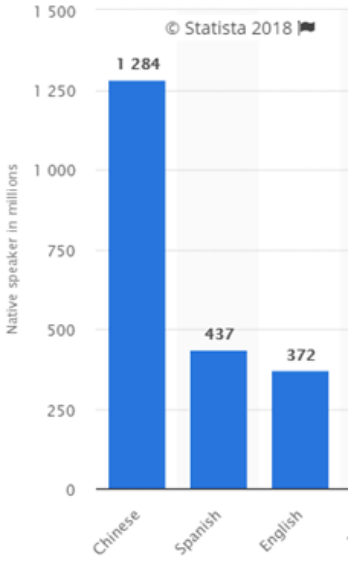

Figure 2: The most spoken languages.

with visual or motor disabilities. Even though several webpages of their institutional website comply with the international standards of web accessibility established in the Web 2.0 Content Accessibility Guidelines (WCAG 2.0) [17a]. Implementing an interaction with natural language, instead of using a web page reading tool, will help make this task much easier and more intuitive.

Development of Conversational Interfaces in Spanish

The development of conversational interfaces reported in the literature has mainly focused on conversational platforms developed for English speakers. In addition, few developed conversational interfaces are available in Spanish language (Table 1). There is not a case of use of a conversational system based on natural language that guides the process of registering subjects or services of a student. The development of conversational interfaces in Spanish is currently very relevant because Spanish is the second most spoken language in the world[18] (Figure 2). The use of natural language interactions in

Assistant	# Languages	English	Spanish
Alexa	3	1	0
Bixby	3	1	0
BlackBerry Assistant	ND	1	1
Braina	1	1	0
Cortana	13	1	1
Cubic	2	1	0
Emma	1	1	0
Facebook M.	46	1	1
Google Assistant	8	1	1
Hey Athena	1	1	0
Hound	1	1	0
Howdy	1	1	0
Jibo	1	1	0
Lucida (Sirius)	1	1	0
Maluuba	1	1	0
Mya	1	1	0
Mycroft	1	1	0
Nina	38	1	1
S Voice	8	1	1
SILVIA	4	1	1
Siri	20	1	1
Ubi	1	1	0
Viv	1	1	0
Vlingo	5	1	1
Voice Mate	ND	1	1

*ND = No data

Table 1: Comparison of languages that current conversational assistant can handle.

Companies such as Amazon have developed APIs (application programming interfaces) where people can develop custom conversational AI assistant, for example api.ai (Dialogflow), Alexa (Amazon), Microsoft (Cortana), Mycroft (Mycroft AI team), Facebook (M), Google (Assistant), Nina (Nuance), SILVIA (Cognitive Code), Siri (Apple) to mention some. However, not all provide Spanish language to support and some are with a cost for service.

Objectives

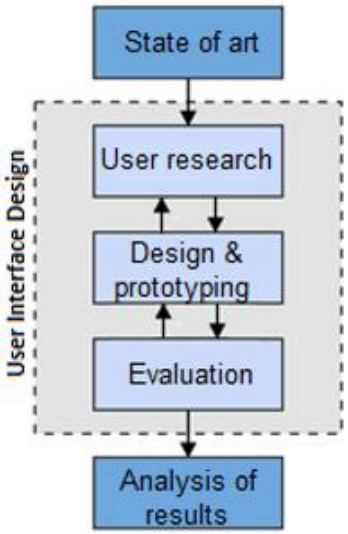

Figure 3. Main phases of the research.

Our main research and development objective is to implement a usable and accessible conversational interface in Spanish for a Mexican university system.

Specific objectives:

- To define the interface design, the objects, and actions that are part of a Spanish conversational interface for users with visual or motor disability.
- To identify user experiences challenges from users with visual and motor disabilities in conversational interfaces.
- To implement the HCI testing methods suitable for conversational interfaces.

The scope of the research problem covers users with visual or motor disability, although it could be used by any user who makes a query or record by voice.

Research Questions

Q1 - What are the User Experience challenges for users with visual and motor disabilities in conversational interfaces?

Q2 – What HCI user testing methods can be effectively used to evaluate conversational interfaces?

Methodology

The main phases of this research (figure 3) are:

1. State of art: Write a literature review of primary research studies in relation to development of conversational interfaces for disabled people and in Spanish language, including development platforms, analyzing their features, advantages, and disadvantages.
2. User research: Define context of use, requirements, and characteristics of users with visual or motor disability in conversational interfaces.
3. Design and prototyping: Create a conceptual design, information architecture and workflow modeling.
4. Evaluation: Conduct user usability and user experience testing, following user recommendations and feedback with for eliminating weak usability results and identify promising areas for improvement.
5. Analysis of results: analysis of qualitative and quantitative results obtained in this research.

Status of Research

Currently, the first author is a doctoral student of Information Technologies at the University of Guadalajara, México. A systematic review of platforms and services for developing conversational interfaces is underway, with the aim of identifying features, advantages, disadvantages, and available programming languages and APIs suitable for developing conversational interfaces. The information obtained in the literature review will define which is the best option for developing a conversational interface for a Mexican university system, which will support its accessibility, due to the actual system is impossible to use by students with visual or motor disabilities. In addition, implementing the conversational interface will also be useful for regular users for hands-free operation.

Context and motivation

Our main motivation is to further research on conversational interfaces for disabled users, in

particular, conversational systems in Spanish language. This project will help to increase the use of new way of interaction in a university context and at the same time to help to implement strategies for bringing accessibility to users with disabilities. Therefore, the participation in this symposium would be a great opportunity to obtain valuable feedback and improve our research. Furthermore, we would like to contribute to cross-cultural multidisciplinary projects and research on human-computer interaction.

If the first author is admitted to this symposium program, the first author will take this opportunity to grow as a person as a more experienced academic. Additionally, I shall commit myself to the best of my abilities to ensure that the program grows and contribute to achieving the proposed goals of the symposium by sharing my knowledge and actively participating in related events.

Expected results

Our scientific contribution in this research will be to elaborate a model for developing a usable system that allows interaction with conversational interfaces, specifically for Spanish-speaking users with visual or motor disabilities. In it, we will need to define which HCI testing methods will be applied to evaluate the proposed interface. Although there are HCI testing methods that have been used with people with some motor or visual disability, it is necessary to identify the convenience of their use with this relatively new form of interaction, which is the conversation, with the aim of making the interaction highly intuitive and natural for the user. This will be a fundamental requirement to contribute to the cohesion of the entire user experience architecture in a conversational interface. This model will be applied in a conversational intelligent system at University of Guadalajara, Mexico. However, it could be applied as a baseline to design inclusive, simple and intuitive conversational interfaces, where the communication processes being more natural for disabled users.

I would like to receive advices and suggestions about evaluation practices and methods that I can use in my research. Any feedback that participants and/or world-renowned experts can provide on how conduct and/or improve this research will be welcome.

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