Workshop on Mobile Healthcare for the Self-Management of Chronic Diseases and the Empowerment of Patients

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Abstract

The wave of digital health is continuously growing and promises to transform the experience of patients, redefining their role as empowered actors of the healthcare processes rather than passive receivers of medical help. Mobile technologies are a fundamental component of this transformation since they have provided a platform for the development of novel solutions, allowing a gradual shift of healthcare closer to the patients' daily living and away from the traditional clinical environment. Chronic diseases are in the center of these developments as they require the continuous and active involvement of not only healthcare professionals but also patients both of who can be empowered through the use of specialized mobile applications and the analysis of data from modern miniaturized and wearable sensing devices. Furthermore, the communication channels introduced by mobile technologies can significantly increase the efficiency of the healthcare system and facilitate the communication between patients and healthcare professionals. The current workshop invites researchers from the fields of Information Technologies and Medical Sciences as well as healthcare professionals and technology developers to demonstrate and discuss innovative approaches related to the utilization of mobile Human Computer Interaction approaches in the modern healthcare environment.

Author Keywords

Chronic Diseases, Mobile Technologies, Mobile Health, Visual Analytics, Patient Decision Support, Personalized User Interfaces, Medical Privacy Protection, Disease Self-Management, Patient Empowerment, Electronic Health Records, Patient education and training.

ACM Classification Keywords

H.5.2. User Interfaces: Benchmarking, Prototyping, User-centered design; **H.5.1. Multimedia Information Systems**: Evaluation methodology, Artificial, augmented and virtual realities; **D.2.2. Design Tools and Techniques:** Evolutionary Prototyping; **J.3. Life and Medical Sciences:** Health

Introduction and Motivation

Chronic diseases are the major cause of death in the vast majority of countries around the world [1] with their prevalence being connected with important social parameters and economic indicators [2], forming in this way a key barrier for poverty alleviation and sustainable development [3]. Unfortunately, and despite their prevalence and aggregated negative consequences, the management of chronic diseases still remains suboptimal, mainly in terms of reduced patient adherence and efficient use of healthcare resources [4].

More specifically, patients suffering from chronic diseases are expected to monitor the changes in the severity of their symptoms and in many cases adapt their medication dosage based on their experience and under the guidelines of their responsible doctor. Unfortunately, this approach has been proven to lead to reduced levels of engagement and medication adherence, incorrect use of medication devices (e.g. inhalers), and consequently negative effects on the paients' quality of life, both in terms of health status and Disability Adjusted Life Years (DALYs).

Furthermore, chronic diseases introduce a spectrum of difficulties in the healthcare system mainly based on the lifelong need of patients to regularly visit their responsible healthcare professional for the accurate assessment of their health status and the adaptation of their medication regiment. As expected, these traditional approaches contribute to healthcare ineffectiveness, due to the long periods between doctor visits, and reduce the efficiency of the healthcare system in regards of both the increased cost of a doctor visit and the time required from the patient's side.

Mobile healthcare (mHealth) technologies hold the promise of integrated solutions to the above issues through the introduction of dedicated mobile phone applications (apps) that empower patients using self-management and motivation approaches. Furthermore, the possibility of direct and efficient interaction between patients and doctors through digital and interactive communication channels can elevate the most important inefficiencies of the traditional healthcare approaches. Finally, the combination of such mobile applications with the sensing capabilities of modern phones and other external miniaturized or wearable health monitoring devices creates the multimodal information basis of the innovative Mobile Health (mHealth) environment within the modern era of Internet of Things (IoT).

In recent years and based on the open architecture of mobile operating systems an almost exploding number of mobile applications have been introduces focusing on the majority of chronic diseases including asthma,

diabetes, cancer, cardiovascular conditions, and a variety of mental difficulties. Unfortunately, a significant percentage of these applications are not based on clinically validated knowledge, and are not subjected to any regulation framework for the protection of the safety, privacy and health of their users. Furthermore, and as the technological developments have made available a plethora of miniaturized and wearable sensing capabilities, mobile healthcare approaches are introduced to new challenges in terms of the creation of secure and effective Wireless Body Area Networks (WBAN) and the manipulation of an exploding number and size of data resources (BigData) within a highly interconnected and dynamic environment of Health IoT.

Workshop Goals

The current workshop is aiming to attract the interest of researchers in the fields of Information and Communication Technologies and Medical Sciences towards the formation of a framework for the development of Mobile Applications that comply to ethical and clinical requirements and are provide also novel and useful solutions to problems of the traditional healthcare system with special focus on the self-management of chronic diseases by patients.

More specifically the workshop aims at contributing towards the following objectives and challenges:

- Consolidation of research and practices related software healthcare solutions in the context of the mobile environment as formed by smartphone apps, IoT approaches and modern wearables, with special focus on the characteristics of chronic diseases.
- Establishment of a meeting point for the cooperation of researchers from different areas covering

technological and clinical aspects of mHealth solutions and based on a common basis of ethical, safety and privacy requirements.
- Review and discussion of current examples of mobile healthcare solutions for chronic diseases with the view to identifying common practices, new directions and unresolved challenges.
- Collation of shared experiences and results from designing and working with the healthcare community, as well as perceptual and psychophysical results with implications for designing with mHealth for patients.
- Discussion of the main characteristics of an mHealth barriers and regulation framework [5, 6] for the validation of health oriented applications on the basis of clinical and technological knowledge.
- Extension of the body of knowledge in the area of mobile healthcare and separation of important characteristics that differentiate the management of chronic diseases.
- Strengthening of the links between academic and commercial sectors for the support of innovative solutions both in terms of clinical validation, technological support as well as fast and effective commercialization of outcomes when appropriate.

Workshop Structure

The main goal of the workshop is to create a dynamic and highly interactive atmosphere for the discussion of novel mHealth approaches for the empowerment of patients suffering from chronic diseases. The workshop will last on day and will be separated into two main parts, namely the papers session and the final round table.

In the first part of the workshop, participants will present their work and discuss with the audience their encountered difficulties, current views and future directions. Taking advantage from the small size of the audience these discussions are expected to be concise and contribute to the agenda of the final round table. Following the paper sessions, a round table will be organized at the end of the workshop that will be structured around four main pillars, namely:

- A plenary discussion about the challenges of proper regulation and standardization of mHealth solutions (Safety, Privacy, Ethics and Legislation).
- Discussion of User Centered Design approaches in the framework of mHealth, focusing on patient engagement (Gamification, Social Networks, etc.)
- Conclusion of the workshop with proposals by organizers and participants for future collaborations.

Discussion

Human Computer Interaction is a fundamental component of Mobile Healthcare Solutions since it can significantly increase their usability, safety and effectiveness. In this direction, the current workshop is aiming to form a framework for the design and development of healthcare applications towards patient empowerment and self-management of chronic diseases. More specifically the workshop will cover:

1) Methods, techniques and technologies for the support of healthcare in the modern environment
2) Software and hardware development for privacy preservation and protection of medical data.
3) Utilization of visual analytics approaches for the presentation and analysis of multimodal and multisensorial large amounts of data.
4) Personalization of user interfaces for increased user engagement and application usability.

5) Innovative clinical decision support mechanisms for the support of patient self-management approaches.
6) Patient education approaches on the basis of modern mobile Human Computer Interfaces such as Virtual Reality and Gamification.
7) Socioeconomic aspects of the use of mobile technologies in the healthcare environment

Acknowledgement

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