Mobile Devices, Mobile Interfaces, Mobile Implants: … Mobile Ethics?

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Abstract: - The evolutional course of super fast mobile devices that gradually apply immersion techniques and in parallel communicate with the Internet of Things, has promoted a global community that shares our very personal characteristics. The motivation for participation lays on the advanced interactivity techniques and the "data exchange" with a vast on-line community. For the first time, all these achievements are easy to access and nearly free to operate. However, in this operational environment, how far away is the next step, i.e. the use of implants?

Key-Words: Social Networks, Internet of Things, Mobile Devices, Visualization, Implants

1 Introduction

The concept of mobility is well perceived by contemporary audiences since a massive participation has occurred and an unprecedented penetration has been recorded in the synchrony of our societies, not withstanding racial, ethnical or sovereignty limitations. The property of mobility is indeed synonymous of existence: in a world where we cannot exactly record how many people have a "home", we can adequately enumerate the number of mobile phones. For an estimated 7,012,000,000 inhabitants in this planet, there are 6,800,000 active mobile phones [1]. It is also estimated that in 2014 the number of mobile phones will exceed for the first time the global population.

Apart from ethical approaches, the study of mobile interfaces and interaction technologies gives a clear perspective for *identity* in human communication. Although the cropped information thus far predominantly comes from extensive hacking and mass surveillance [2], the majority of characteristics that render personal profiles comes from visualized streams via those devices, a process that demands the terminal factors equipped with features as photo streams, video messaging, voice activation and communication, and etc variants.

Indeed, the hi-tech substrate for ubiquitous instant messaging acts as a technology enabler that promotes the "one world" concept as a communication achievement. This is possible due to widespread incorporation of hi-tech gadgets and simultaneously, an ever-increasing Wi-Fi bandwidth that has started its amalgamation process with the mobile telephony network coverage system.

In contrast to desktop computing, mobile computing can occur using any device, in any location, and in any format (Fig. 1). The integration of mobile communication methods with broadband desktop computing has revived the communication frenzy to unprecedented levels.

Fig. 1 A classic interface of multifaceted, omni device broad band communication scheme using widespread software.

2 The Mobile Devices and their Interfaces

Although the leader in new technology penetration was desktop computing for more than a generation, neither its *metaphor* nor its *paradigm* seemed to pamper for more than 1 billion broadband installations up to now. To make things worse, its marketing seems to be shivering and the offered services are less appealing for the masses. On the contrary, mobile computing and mobile communications are awe-inspiring the new generation and provide technological substrates for global integration and deliverance.

Three concepts need initially to be deciphered in order to approach the issue of mobile device penetration: innovation, service emancipation, and co-creation.

- *Innovation* does not only tamper advanced gadgets in terms of user manipulation; it also has the notion of new tasks via new devices, especially the *wearable* ones (Fig. 2). Prolonged

battery life, endurance in hard treatment and affordability seem to be the driving forces for ubiquitous penetration.

- *Service emancipation* engulfs a variety of publicly widespread iterations not only between peers but also among key-role players, as is the case with the public sector or the banking sector. These services have helped users reduce the cost of various on-line transactions, primarily by re-allocating their availability "on the fly" and allowing them to exhort their core competencies. For instance, a businessman while on travel may alter his airplane schedule using his smartphone, while being in a congested air terminal and without having to access a desktop computer, or bothering his travelling assistant. A major achievement of service emancipation has been the alteration of the unified perspective for state of the art Web services (i.e. what we call the Web 2.0 paradigm) to the foundation of *Demand-Driven Web Services* (DDWS), i.e. the Web 3.0 paradigm, and its technology enabler, HTML 5.

Fig. 2 The evolution of species: state of the art devices, with new interfaces, the *wearable* ones.

- *Co-creation* focuses on the massive creation of context. By motivating the users of a wide spread system, like Facebook™ or YouTube™, one may achieve paramount streaming of data and information. Although in the context of classic economic terminology the interplay is rationed between "customers" and "consumers", in innovative environments the entities involved in such interaction are merely characterized as "users".

Strictly speaking, the Web is presently, the most well-known interface for end-user access to ICT-based services. In this sense, the neologism for *technodemocracy* cannot exist without the prior extension of its geographical canopy to virtually every active citizen. In practice this demands penetration of technology in everyday life activities, like data exchange, entertainment, work, communication and education. These technologies, now extending their features to wearable devices, are DLNA, Bluetooth, NFC, Wi-Fi, IPv6, 3G, 4G.

Consequently, the *Internet of Things* (IoT) [3] emerges as the next frontier; in this brave world, physical objects are integrated into the network by upgrading their role to active participants to social or financial processes.

Such is the case of RFID-like behaving credit cards, home gear, business equipment, security devices, probe outlets, transportation paraphernalia. This huge amount of interconnected objects provided by IoT can be considered to produce rather simple events that have to be processed and correlated in real time.

However, state of the art operating systems do not incorporate the full support for machine learning exploitation for such a magnitude of simultaneous events; obviously, the manual handling of these events generated daily by heterogeneous systems is not feasible nor safe [2].

In brief, within the framework of an extensively *wired* world, for our context the center of attention is the co-creation of innovations. Such innovation activities may embrace diverse cooperating producers as well as the users of a wide range of services. The interplay between "producers" and "customers" creates the content.

3 Wearable and Implanted Devices

Although the concept of a wearable device that incorporates advanced mobility characteristics is getting more and more approval within the Internet community, the notion of transplanted devices is rather new to the wide public (Fig. 3).

It would be commonplace to note that in today's contemporary society, there is hardly any form of transaction either in financial terms (i.e. buying, selling) or education (i.e. registration, administration,, purchase of certificates, examination inspection, electronic examination, teaching and learning) that is done without ICT. The new concept that emerges besides e-business, e-commerce, e-transaction, e-learning, e-banking, e-registration, is e-health.

However, given the limited available resources in academia or, even further, to the on-line community, it is rather difficult to massively deliver health services. This research emphasizes on some devices that protract the wearable interfaces to devices that are actually transplanted in the human body, and what's more, they communicate with subtle inner structures such as the cochlear tube and nerve.

Already, by using devices like Google Glasses® , users have started to approach sensitive instruments of their organism, as is their eyes. When the wearable devices extend to instruments like the cochlear implants (Fig. 3b) then there is an even further increase in sensitivity by a factor of 10.

Subtle operations and engineering methods take place as any malfunction or any unguided penetration may induct erroneously the electrode into the posterior semicircular canal (Fig. 3c) damaging the facial nerve, or creating an unsupervised electrode contact within the vestibule.

a.

b.

c.

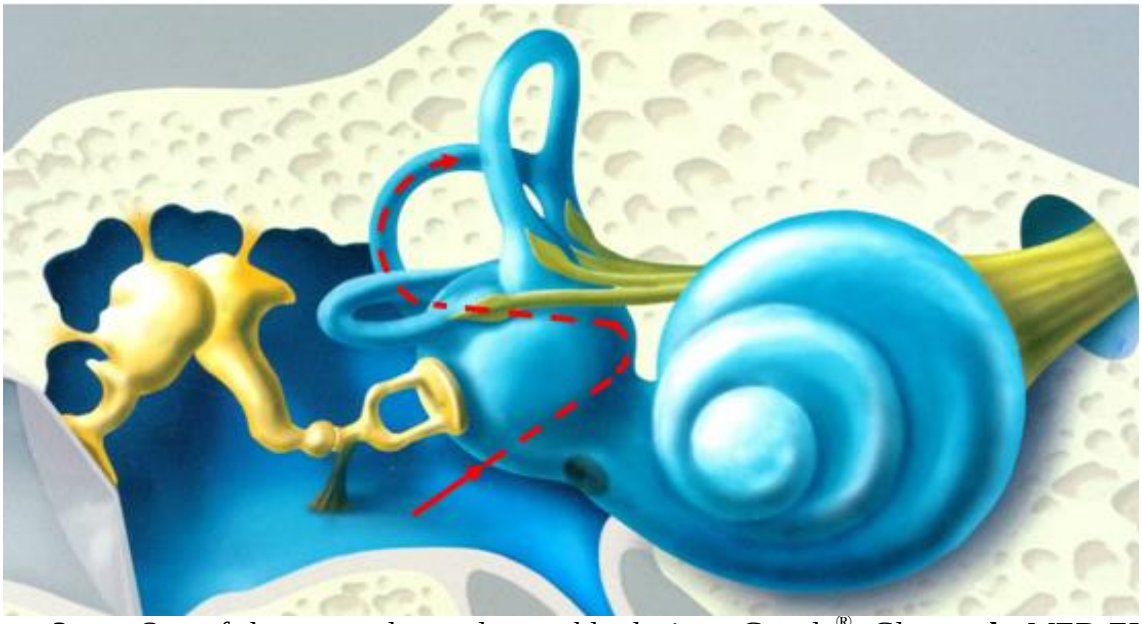

Fig. 3 **a.** One of the most advanced wearable devices: Google® Glasses. **b.** MED-EL® $SONATA_{TI}^{100}$ cochlear implant comprising of: Antenna, magnet, receiver stimulator in titanium casing, electrode array with electrode contacts No 12 (apical) through No 1 (basal) spaced at 2.4 mm intervals. The overall length of the implantable electrode array is 30.3 mm and its width 1.3 mm at the base and 0.8 mm at its apical end. **c.** Schematic diagram of the electrode's course. The electrode was inserted from the middle ear cavity into the vestibule, then it was sharply bend posteriorly and upward and finally found its way into the posterior canal through its ampullary opening

Other sensitive parts are the external auditory meatus, and the tympanic part of the temporal bone.

It is hard for the time being to bridge the gap between exterior wearable devices and medically implanted electronic devices that surrogate human instruments that are malfunctioning. It is, though, the road ahead.

4 Conclusions

Regarding the above, it is obvious that mobile devices deploy interfaces to the inner core of our human crossing points. It is not only the case of glasses that enable us to interface with the IoT using our voice and projecting on-screen information on our glasses. It is about an en route process, that has commenced some 4 years ago with the deployment of highly interactive smartphones that track our voice characteristics, our finger print biometric identity, our facial characteristics that we voluntarily promote as "selfies", our vertebrate **retina**'s unique distinctiveness.

It is obvious that we cannot refrain from taking part into a global social exchange that is enhanced by social networks and an ever increasing penetration of the IoT. Taking into account that the next border is that of implanted mobile devices, devices that can penetrate our own inner circle, how far can we go?

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