EFFICIENT M-COMMERCE MARKETING APPLICATION BASED INTERNET OF THINGS USING NEAR FIELD COMMUNICATION

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ABSTRACT

Accessing product information for the targeted client is one of the prime requirements of marketing. The advent of internet has made the communication must faster and effective. This revolution has lead the introduction of mobile commerce as fast and portable means of communication. This area is highly researched on in view of Internet of things. The proposed system has introduced a new implementation of Internet of Things that is targeted for highly cost effective marketing tool. The systems also utilizes Near Field Communication (NFC).

Keywords-component: Mobile commerce, Internet of Things, Near Field Communication

1. INTRODUCTION

M-Commerce is also known as mobile electronic commerce or wireless electronic commerce. It is believed to be the next gold rush after e-commerce. Business organizations of different industries are rushing to stake a claim [1]. However, m-commerce is many things to many people. Some people conceive m-commerce as an extension of e-commerce to mobile phones. Some people think it is another new channel after the Internet. In general, m-commerce refers to any transaction with a monetary value that is conducted via a mobile telecommunications network. According to this definition, m-commerce represents a subset of all e-commerce, including both business-to-business and business to consumer. M-Commerce uses the internet for purchasing goods and services as well as sending and receiving messages using hand-held wireless devices. Wireless web applications will enable users with Internet enabled cell-phones. M-Commerce is believed
to be driving fundamental changes in the way business is conducted in many industries, particularly in telecommunications, information technology, media and financial services. M-commerce is so important because it represents the extension of the Internet beyond the static terminal of the PC, or even the television, into a more nimble, anytime, anyplace and anywhere context. It will enable millions of people to access web information services wherever they go [2]. It extends the reach of the e-services beyond the PC and the fixed network. M-Commerce is so important for the following reasons:

- The number of mobile terminals available is larger than the PC user base and is growing much faster.
- User’s intimacy with the terminals is higher. The terminal and service represents a more convenient and personal combination.
- It is truly accessible anytime and anywhere.
- It will enable employees to access information wherever they are and make decisions instantly without being confined to a desk or computer.
- M-commerce eliminates many time-consuming tasks.

According to the GartnerGroup, consumer to business e-commerce will soon come from smart phones using mobile commerce technology. Many researchers suggested that next phase of electronic business growth will be in wireless and M-commerce [3][4][5][6][7]. While electronic commerce continues to see phenomenal growth, mobile commerce is still in its infancy. However, as wireless network grows, it is expected that emerging wireless and mobile networks will provide new avenues for growth in mobile commerce, create new business models for mobile operators and offer new applications to business and consumers [8][9].

The interaction between mobile devices and physical objects in the real world is gaining more and more attention as it provides a natural and intuitive way to request services associated with real world objects. We currently see several approaches for the provision of such services. Most of them are proprietary, designed for a special application area or interaction technique and provide no generic concept for the description of real world services. On the other hand the Internet of Things provides a set of standards and methods to tag objects in the real world. We think that the combination of these two technologies can support the development and dissemination of mobile interactions with the real world. Therefore, in this paper we present a concept, architecture and an early prototype currently under development for mobile interactions with the Internet of Things. Hereby we use Semantic Web services for the description of services provided by the physical objects. This service description is then used for the automatic generation of user interfaces rendered by the mobile device. In section 2 we give an overview of m-commerce and Internet of Things followed by challenges in Section 3. Section 4 discusses about proposed system followed and conclusion in Section 5.

II. M-COMMERCE & INTERNET OF THINGS

In simple terms Mobile Commerce is any transaction, involving the transfer of ownership or rights to use goods and services, which is initiated and/or completed by using mobile access to computer-mediated networks with the help of an electronic device or data transfer. This is the old new buzz in the town. The concept of using mobile phone in place of credit cards and hard cash was pushed long ago, when neither of such services nor the consumers were matured. But with the new technological developments both in hard ware and software specifications, the concept
of Mobile commerce has come into tune once again. The different payment methods used to enable M-commerce are:

- Premium-rate calling numbers,
- Charging to the mobile telephone user's bill or
- Deducting from their calling credit
- Registration of a credit card that is linked to a SIM card.
- Using encrypted microchips capable of data transfer

Services like Mobile banking, Mobile ticketing, money transfer, Mobile payments, content purchasing, Mobile purchasing will have a huge influence on the means by which we do our day to day trivial commerce, and when summed up will become a big source of revenues for mobile platforms. All said monetization of mobile platform is not as easy as it seems, because of its unique characteristics. There is huge population which is not yet in the reach of these services. Excess of players is a critical challenge that everyone faces because it is very easy to duplicate any new service and only requires limited resources in the initial stage, thereby denying the rightful owners their due share. Privacy is main deterrent for the free flow of any of these services and concerns over it mount as the developers move in. Ergonomics of mobile phone devices is also reasonable for the slow growth of such services, and this can be overcome by new input techniques [10], additional features and design changes is the software applications which makes the life of the user more comfortable. As the marketers move in the customers move out, and this phenomenon has repeated itself in our past experiences. So the arrival of such people should be finely integrated into the services. In case of mobile community platforms the social network fatigue may soon creep in, thereby gradually decreasing the footprint of the consumers which will impact the advertising revenues, this can be overcome by constantly innovating your services and inducing your customers towards this platform for a more productive purpose. The rate and intensity at which the Mobile phones are integrating into our daily life provides entrepreneurs with enormous potential for providing products and services which were not even dreamt in the past by common man. Mobile communications has already changed our social behavior and be ready for many more surprises in the future. Findings of some studies states that the features added so far to mobile platforms are not considered to be adding value and useful by the consumers rather they are perceived as “gadgets”. This brings us to the basic and essential marketing concept that enterprises initially should try satisfy the needs of the customer and then the revenues will automatically flow. It is a futile attempt trying to create a unique business model for a service which is either not wanted by customers or way ahead of its time. The most important issue that the corresponding parties involved must consider are the human and social dimensions and these amazing opportunities would turn sour if the mobile platforms are only seen through the economics and technical lenses. Finally I would say that there is no single way to secure your revenues, it should always be a combination of different broad ways as stated above and the business model should be appropriate to the service you provide. Traditional approached will not solve your problems and you should tweak many of those methods to suit your service but at the same time you need not reinvent the wheel.
The Internet of Things has emerged both as a vision of research and business practice. As the ownership of the term is not clearly defined, also a clear definition is missing. Clearly, ITU’s report “Internet of Things” has provided great popularity to the Internet of Things. It explains it as the capability of items to share information about themselves. The main driver is RFID, but as technologies progresses various others, such as sensors, might become feasible soon. Making mobile act like a PC means more internet connected computer in the future. Mobile can replace any other electronic device if the required hardware is present. For example, mobile has a camera, it is small, and it has an internet connection. Moreover, a mobile phone is cheaper than a good quality CCD barcode scanner. This will tremendously increase the number of internet connected “readers”. Coupled with new tagging methods such as Microsoft Tag, internet and location based systems, mobile’s evolution as a PC will contribute to the expansion of the internet of things.

III. CHALLENGES

M-Commerce could be developed to become strategic weapons for businesses to improve their competitiveness. Several previous researches have explored such opportunities [11][4][12][13]. Some important challenges are:

- M-Commerce services have not been as rapid in the US as in Japan and Europe.
- Keyboards and screens on cell phone are tiny and awkward to use.
- Data transmission speeds on existing wireless networks are very slow, ranging from 9.6 Kbps to 14.4 Kbps compared to a modem of 56Kbps.
- Most Internet enabled phones have minimal memory and limited power supply.
- Web content on wireless phones are mostly in the form of text with very few graphics.
- All web sites have still to configure their services to display text in such a way that it can be accommodated on cell phone screens.
- Unlike Europe and Japan, Wireless networks in the US are based on several incompatible technologies (CDMA & TDMA standards).
- For M-Commerce to take off, more Web-sites need to be designed specifically for wireless devices.

Many mobile applications are downsized desktop applications. However, the design and implementation is so complicated that the process involves numerous parties in the industry to work together [14]. With the evolving and charming wireless technologies and solution paradigm (such a WAP, Bluetooth Java, XML, compression technologies (MPEG4, RMF), users can enjoy more user-friendly and personal supportive applications before long. The future of wireless applications and their development environment include

- Open Platforms and Solutions: Contrasting to the traditional legacy system and solution design, the entire IT industry is moving towards an open system and architecture of application design, catering for high productivity and flexibility of solution implementation, integration and maintenance requirement. Wireless application design is also targeting for “one application, run on any mobile handheld.” Same principles apply to the data synchronization. Like “one stop shopping,” users also want to update information through a single point of access. If the user has his/her personalized profile in a handheld, changing a new device should not require him/her to do the same configuration again in future.
• All-in-one device, with rich application package (multimedia): Mobile usage is popular because it brings much convenience and flexibility to users. It eliminates the geographical limitation and time constraints. It is foreseeable that the mobile devices will cooperate closely with other electronic devices and media, gradually forming a convergence of device capability. In future, users can perform multiple tasks by using just one device. We expect that mobile device may integrate with not only phone and simple data presentation device, but also with higher quality of multimedia interfaces, such as digital camera, MP3 player, video streaming and conferencing, fax, printing, home controller, etc. Consequently, the applications will become more comprehensive and feature to support the various functionality and interactions among different applications and systems.

• Personalization: Obviously, personalization is a powerful feature because applications and service providers can identify users’ specific needs while users on the other hand can have a better and greater control on their personal mobile devices.

• Right form factor: All applications require a good form device and channel to empower their functionality. Mobile devices are often used in a dynamic environment where the user is engaged in multiple activities. Therefore these devices must present the best possible user interface for quick and simple usage. Input methodology (by keys, hand-writing or voice) is one of the crucial subjects. It is not possible for users to input data and requests using long and complicated procedures and key sequences. Mobile devices must be simple so that users are not required to focus on their devices in the way they are using a desktop computer. These devices should have no installation scripts and complicated menu structure. Screen design, weight and size of the device are also important.

IV. PROPOSED SYSTEM

As mentioned, there are two separate domains which the proposed system will combine in the proposed approach: the Internet of Things and physical mobile interactions where mobile devices are used to communicate with physical objects. The prime aim of the proposed system is to connect these two domains whereas the mobile device acts as a middleware between them. Fig. 1 represents a schematic diagram of the proposed system.

![Fig. 1. Schematic diagram of the proposed system](image_url)
The mobile device acts as a Global Client that is not dependent from the physical objects it interacts with and also from services it invokes. In order to interact with both domains it utilizes diverse components represented as Interaction Client and Service Client. The Interaction Client identifies an exclusive identifiers and supplementary data stored on the Physical Object while the Service Client communicates with the service domain. The Global Client stores user context information and device capabilities which could enrich the automatic user interface generation. As device context, the proposed system considers several mobile platforms which vary in their physical interaction capabilities (e.g. camera or RFID/NFC reader) and user interface capabilities (e.g. XHTML browser or J2ME runtime environment). Therefore, the Global Client has to be able to support a random combination of device capabilities included in the communication process.

Services in the web service domain are majorly depicted as Semantic Web services in order to facilitate automatic service invocation/composition, interoperability, and automatic user interface generation. Services are grouped into Base Services and Context Services. Base Services execute the main functional tasks related to the interaction with physical objects. There may be a fixed relationship between a Physical Object and an initial Base Service. Context Services provide context information such as location and time. All services can intermingle with each other. For
example a Base Service can request other Base Services or Context Services. However the Global Client should also be capable of accessing Context Services unswervingly. For connecting the service domain and the physical interaction domain, the proposed system highlights a concept called Interaction Proxy that provides three main functions: service composition, analysis and user interface generation. Service composition illustrates the interaction with several web services that can be involved in the physical interaction procedure. Analysis is required to determine the deficient of semantic interoperability between different services. Another spotlight of the proposed work lies in the involuntary generation of a user interface for diverse services which should be provided to the user in an unswerving and translucent way. By providing a definition of required inputs and outputs for the service invocation, the semantic service explanation already defines a raw organization of the device user interface. In proposed technique, the semantic service description is enhanced by a supplementary user interface extension that illustrates a parameter type-based mapping to a concrete user interface. From the architectural point of view we identified diverse approaches to which domain the Interaction Proxy can belong. The user’s privacy could be guaranteed by assigning the Interaction Proxy to the Global Client. On the other hand the process of analysis is most probably too computationally demanding for mobile phones. Therefore, a hybrid approach is provisioned in which the Interaction Proxy concept is split into a device and a server constituent. To illustrate proposed concept, this paper attempts to illustrate the initial experimental model. The proposed system is designed as a sample application for product information. For this purpose, a product marketing poster will be pasted on the supermarket alleys for awareness purpose to the walking by customers. But the poster will not be simply a piece of image of product, it will be equipped with encrypted information using Near Field Communication tags. It is expected that an interested customer should have android enabled NFC enabled handset. The mobile device will scan the NFC tag and subsequently all the product related information will be displayed instantly on the user mobile phone. The service can use embedded context information such as position to verify the nearest vendor or identify the availability of the product. In this simple scenario there is a main product marketing service that is composed of several different vendor services and context aware services. The design of the product is done on java platform especially using J2Me on Android OS 2.2.

V. CONCLUSION

So far the visualization of an Internet of Things is constrained to the standardized portrayal of physical objects. Improving physical objects with service communication support is still only accomplished by proprietary solutions. In this work, the proposed design illustrates the idea of combining physical mobile interactions and the Internet of Things in a generic way. The paper presents a system enabling the mediation between physical objects and multiple services through a Global Client. The study is focused on the composition of independent services which should be furnished to the user in a consistent and seamless way. By using Semantic Web service technologies it can be seed a great likelihood to surmount the semantic inappropriateness between diverse services. Moreover the user can be benefited from illustrating services semantically to automatically produce a homogeneous user interface utilizing the proposed semantic user interface annotations. A prototype based on an product marketing scenario is developed.
REFERENCES


