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**NFC Investigation and its use to Restaurant
Management**

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ملخص

اتصال الحقل القريب NFC هي تكنولوجيا اتصالات، التي أصبحت تستخدم اكثر و اكثر كل يوم، حيث يتم تبادل المعلومات بين الاجهزة التي تدعم NFC وتكون عبارة عن تطبيقات للهاتف النقال لتسهيل الاجراءات المتبعة في الوقت الحاضر. المزايا الرئيسية مقارنة بالأنظمة الآلية الأخرى هي تحسين جودة الخدمات من جهة وتخفيض تكلفة المعدات من جهة أخرى، هاته الدوافع تستخدم هذه التكنولوجيا الجديدة في كثير من مجالات الحياة. و إدارة المطاعم هي مجال مثير للاهتمام لتطبيقه ويتعلق NFC بالعديد من التقنيات مثل C# و Java على Android OS. لتوفير وظائف كثيرة مثيرة للاهتمام.

الكلمات الدلالية: NFC، بطاقة، Android OS، Java، C#، إدارة المطاعم.

Abstract

Near Field Communication is a communication technology that is being used more and more each day. It enables the exchange of data between two NFC-enabled devices. Its application in the field of mobile phone services opens up new applications and transactions of everyday life, which aim to facilitate and expedite the procedures followed at present. The principal advantages compared to the others automated systems are its new propositions to improve the quality of services and also reduced the cost of equipment.

This, motives us to use this new technology in many life fields, the restaurant management is an interesting area to applied it. NFC is related to many technologies as Java on android OS; C# to provide many interesting functionalities.

Key words NFC, Tag, Android, Java, C#, Restaurant Management.

Résumé

La communication à champs proche (Near Field Communication) est une technologie de communications qui est employée de plus en plus chaque jour. Elle permet l'échange des données entre deux dispositifs supportant le NFC. Son application dans le domaine des services de téléphone portable ouvrent de nouvelles applications et transactions dans la vie quotidienne, qui visent à faciliter et accélérer les procédures suivies actuellement. Les principaux avantages comparés aux autres systèmes automatisés sont ses nouvelles propositions pour améliorer la qualité du service et également à réduire le coût d'équipement. Ceci nous motive d'utiliser cette nouvelle technologie dans plusieurs domaine e la vie, la gestion des restaurants est un domaine intéressant où elle pourrait-être appliquée. NFC est reliée à beaucoup d'autres technologies telles que Java sous Android OS et C#.

Mots clés NFC, étiquette, Android, Java, C#, Gestion du Restaurant.

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General Introduction

One of the emerging developments in the mobile communication industry is the use of cell phones for multiple applications and functions. In the last few years, different wireless technologies have been integrated into mobile phones for various functionalities and services.

All these innovations have been put into mobile phones to make them friendlier and almost indispensable.

Near Field Communication (NFC) is an evolving technology with touch-based interaction as a new feature in the mobile industry. It has several new possibilities, such as travelling on the subway, unlocking the door and performing other activities by simply bringing an NFC compatible handset close to a compatible NFC reader.

NFC is a short-range radio technology based on RFID (Radio Frequency Identification) technology and allows communication between devices in close proximity. It operates in an unregulated radio frequency band of 13.56 MHz and can interoperate with existing contactless smartcards as well as RFID standards. It has a data transfer speed of 106-424 kbps [25]. Its operating modes are based on contactless smart card standards (ISO/IEC 18092 NFC IP-1 and ISO/IEC 14443). With the use of this technology, devices such as mobile phones are designed to carry out similar functionalities such as existing contactless cards [26].

Some of the distinctive features of NFC from other existing short-range wireless communication technologies such as Bluetooth and WIFI are that, it uses a technique known as magnetic coupling, which allows a passive device to absorb energy from an active device in close proximity during inductive magnetic coupling. It also has a short transmission range of less than 10 cm, which makes it very secure and protects it against attackers [10].

With the adoption of NFC technology in the mobile industry, it will be possible for anyone to depend on the mobile phone for several activities such as the payment of goods and services, event ticketing, merchandise, access to security doors, download advertisement on a smart poster to a mobile phone, etc. All these are possible with the inception of an NFC-enabled mobile phone. NFC supports the use of mobile equipment by touch-based interactions and can be carried out basically by the user in different modes, such as Touch & Go, Touch & Confirm, Touch & Connect, Touch & Explore, thereby leading to numerous use cases in end user electronics [27].

NFC technology can also be used for embedding information into consumer products such as product information, mobile coupons (mobile coupons) etc.

This technology is beginning to gain ground in Japan and South Korea, and USA, and successes have been recorded in some of the NFC pilot projects taking place in different parts of the world [28] [5].

In late 2002, NFC was jointly developed by NXP/Philips semiconductors, Sony and Nokia. In December that same year, the technology was adopted by the European Computer Manufacturers Association (ECMA) international [26] and was approved a year later by the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC).

Our work investigates the power of usability of such technology, and to do that, we implement a restaurant management system using NFC technology to connect the client with the restaurant application, this one could be developed using a different technologies, like Java and C# on different operating systems as well as android for mobile and Windows 7. A new issue had to be handled which is the integration of all these technologies in a one whole project.

Motivation

Who let the NFC has improved the quality of management of some fields of life that wants to be better!

One of the fields where the NFC can be proved important is restaurant where “the client is a king”, and especially expects some level of comfort in order to reach better, and manage the whole complexity of the service within the restaurant, and makes the service transparent. The NFC seems the abstraction of many services, and gives free-hand to client for edit his menu, also on the side of management services will all be managed by a server in satisfied connection with the customer.

Goals

This survey is conducted on near field communication in mobile phones and PDAs. It presents an overview on how an NFC mobile device embeds various functionalities, including that of existing contactless devices, its compatibility and benefits over existing technologies used in consumer electronic devices. The goal of this thesis is to show how the use of NFC technology on mobile devices will make life easy and better, based on qualitative comparison

existing technologies used in related consumer electronic devices and the benefits that are derived from other new possibilities that are present in NFC enabled devices. Especially use it in a restaurant system where we make a collective work between the NFC and android system.

Methodology

We will carry out a survey on NFC technology and other existing technologies that have been used over the years. A study will be carried out on the benefits of the techniques used in these technologies. A qualitative comparison with other existing technology will be made and a conclusion on why the use of NFC technology on mobile device is preferred to some other technologies. We will also look at the future of NFC in our global village and the possible areas where it is used now and where it could be used in future.

To accomplish these tasks, we will use relevant research scientific papers, articles, books and search engines to acquire relevant information for our survey. We will formulate case scenarios on the use of NFC on mobile phones based on its functionalities and draw our conclusions on its benefits over conventional methods.

Structure of the thesis

The thesis is structured as follow:

Chapter one discusses some celebrated automated systems which are in race to gain the market. After a succinct presentation of these technologies, and compared them to the NFC is established to show the specificities of this one.

Chapter two is devoted to a detail description of NFC technology in deep way. We begin with some common required definitions. We explore the way the NFC works, as well as presenting the related equipment, the operation and communication modes are invoked, the structure of the mobile is discussed and the main functionalities of the NFC are cited, and the standards are established.

Chapter three an investigation of the APIs provided by Android OS to handle the NFC technology more specifically the communication. The structure of NDEF message proposed by NFC is deeply discuss. The socket is discussed cause of their performance to manage the network communications needed in the project.

In Chapter four we proceed to the design of the project, UML 2.0 is used to model the two applications the mobile one and the server, and some of their interfaces are provided.

We conclude our thesis with a conclusion.

General Conclusion

In this thesis, we have tried to introduce the NFC technology which is a new advancement towards a near future where communication and information are the ecosystem of modern life. NFC offers some services which improve interactivity between human being and interactive systems. Jumping among the complexity of protocols to simplicity of physics law to establish data exchange between devices.

The field of the automated systems was discussed through the presentation of the main technologies used in industry and services. The importance of the new features proposed by NFC was shown through a comparison involving NFC and the actual technologies.

A technical description of NFC was essential to expose the functionalities, the operation and communication modes it offers. More especially to understand the way it handles the data exchange with applications running on Android OS taken as a mobile OS.

It's must be highlighted that the present work concerns an exploration of the facilities offered by the NFC to interact with interactive applications, which could be developed in the other languages desired to run on different platforms. How NFC communicates with the application was the main issue of this thesis. The restaurant application was developed with Java and installed on Android OS. The Android OS offers APIs enabling the communication with the NFC tag, some applications using these APIs offer a high level of services to program NFC tags, and they were these ones which we have used in our project. Finally, the Java application interacts through socket with C# application running on PC.

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