AN E-PAYMENT ACCESS CONTROL SYSTEM BASED ON NFC

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Abstract—This paper presents a new approach for ticketing systems using NFC smartphones. Current systems use NFC enabled mobile phones either in card emulation or peer-to-peer mode for exchanging data and for validating tickets for instance. In practice these systems face different barriers regarding realization and interoperability from developers and operators perspective, which prevents them to be widely rolled out. In this paper we propose a solution, where the mobile phone is in reader/writer mode and the ticketing system is in card emulation mode. The major advantage for this inverse scenario is that it can be implemented very easily by using light-weight protocols, which are compatible to existing mobile phones. This paper provides an overview about the major problems, discusses advantages and disadvantages of the new approach, and finally describes an implementation from a proof of concept realization [2].

Keywords—Electronics ticketing, NFC card, Open Source

I. INTRODUCTION

Near Field Communication (NFC) is a short wave radio communication technology that is capable of both securely reading from and writing to other radio communications media, such as contactless smartcards, RFID tags or other NFC enabled devices. NFC devices can operate in two modes:

- Passive: An NFC device can operate passively, acting much like a contactless card.
- Active: An NFC device can operate actively, searching out other devices with which to talk to, acting much like a contactless terminal.

Near Field Communication (NFC) is a set of short-range wireless technologies, typically requiring a distance of 4cm or less. NFC operates at 13.56 MHz and at rates ranging from 106 Kbit/s to 848 Kbit/s. NFC communication always involves an initiator and a target: the initiator actively generates an RF field that can power a passive target. This enables NFC targets to take very simple form factors such as tags, stickers, key fobs, or cards that do not require batteries. NFC peer-to-peer communication is also possible, where both devices are powered. Near Field Communication (NFC) is a wireless connectivity technology that enables convenient short-range communication between electronic devices. NFC offers the ultimate in convenience for connecting all types of consumer devices and enables rapid and easy communications.

The use of NFC tag brings power consumption down to new levels: from low power to zero power, for example when waking up a device through NFC with no stand-by current. Or when communicating with a device which is completely switched off (or does not even have a battery inserted), where you can read diagnostic information or write configuration settings to the unpowered device. As our project is electronic ticketing system based on NFC for theatres, museums or concerts etc. in which the ticket charges will be deducted from the NFC tag, automatically by tapping the tag to the NFC tag reader due to which the door gets open itself for entrance[1].

II. LITERATURE SURVEY

Research also suggests, standards implemented “around mobile payments have seen better adoption rates”, specifically in European markets. With the support of the NFC devices and NFC industry providers, NFC standards would allow the technology to “become a global standard on mobile phones” and increase NFC card can be tapped against the NFC payment terminals instead of swiped which eliminates the less of credit card. This flexibility and application of the technology means NFC has the potential to be integrated to create virtually any kind of connected device. NFC provider Contactless is one company at the heart of driving the use of NFC in secure, fast and reliable transactions in payment, access control, transport and electronic identification. Inside's solutions can be found in smart cards, key fobs, mobile phones, handled devices, PC peripherals.
NFC is a short range wireless technology that allows contactless communications to take place between two devices. Based on Radio Frequency Identification (RFID technology), NFC can be applied in a number of areas, whether it’s paying for goods and services, ticketing, electronic keys or information sharing between devices. The potential services enabled by NFC making it an attractive technology for both business and consumers. NFC enabled devices to communicate and exchange data over a small simple touch to 4cm distance, simplifying tasks such as paying to use public transport by using data stores securely on the device to authenticate and authorize payment without the user needing to take any additional step such as pairing devices. NFC enabled devise only allows us to conduct small scale transactions. It has major advantage in both security and usability. As the technology is “based on pre-existing contactless payment and ticketing standards that are used on a daily basis by millions of people using their devices worldwide”, NFC’s future adoption success is heightened despite the non-linear nature of development often found in technology today and, specifically, in regards to wireless technology (“NFC Forum”) [1]. This paper gives an overview of NFC technology for generating tickets using intelligent NFC based android phone. We will see how through machine learning and NFC technology tickets can be generated in a more faster way as compared to the existing systems [3].

III. PROBLEM STATEMENT

In existing system there is a pass type ticketing which was fixed for same source or destination and of two type monthly and year wise. The person has to visit the museums or concert to renew account and NFC card was and data was entered to that card and it was scanned in each person from opening door to her point and it expires at the end of month or year as per account type, but proposed system is quite flexible that is it has to renew as per user’s need and opening door to her point is also flexible, as per the journey cost the amount is deducted from person account so it is easy, fast and less cash handling process. In that either person can board the museum and then take the ticket or he can use pass for monthly and otherwise for fixed opening door to her point. Some time change issue also get create person and ticket collector both don’t have change for ticket amount which creates issue. This is standard method works in the museum or concert.

IV. BLOCK DIAGRAM

![Block Diagram](image)

1. Microcontroller unit: Microcontroller is the heart of this system. To which all the sensor outputs are given as input. Also power supply is given for the processing of the function in the microcontroller. Microcontroller convert the analog signal to digital form and makes it in the proper form so as to sends it to the receiver.

2. Crystal oscillator: A crystal oscillator is an electronic oscillator circuit that uses the mechanical resonance of a vibrating crystal of piezoelectric material to create an electrical signal with a very precise frequency. This frequency is commonly used to keep track of time (as in quartz wristwatches), to provide a stable clock signal for digital integrated circuits, and to stabilize frequencies for radio transmitters and receivers.

3. Mifare NFC reader: In this project we used the mifare NFC reader to read or write the data. This NFC reader which can access and information will send with contactless.

4. Keypad: The 12 key matrix keyboards comprise 12 tactile push button switches arranged in four rows & three columns as shown in figure. Data is entered via this keypad. Keypad Port-B of the microcontroller is bi-directional I/O port. Three lines of port-b are used as scan lines and four lines for Port B are used as the input-sense lines. This configuration needs 10K pull-ups resistors as output drives from shorting together when two keys of the same row are inadvertently pressed simultaneously. In the circuit we are not adding these resistors because we are using internal pull-up resistors of microcontroller.

5. 16x2 Alphanumeric LCD: A 16 * 2 line LCD module is used to display the status and error message, which is send by microcontroller. LCD is connected on Port-C. Pin-3 of LCD is

V. WORKING

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5. 16x2 Alphanumeric LCD: A 16 * 2 line LCD module is used to display the status and error message, which is send by microcontroller. LCD is connected on Port-C. Pin-3 of LCD is
used to control the contrast by using preset or fixed value resistor. In this LCD, we can show 16 characters in 1st line & 16 characters in 2nd line. Total 32 characters can be displayed including space.

6. Servo Motor: The servo motor is the High dynamic response due to low rotor inertia torque. Then this will pass on the microcontroller.

7. Power supply: Here power supply of 5v is been given to the controller. It keeps the flow of power in the equal form.

VI. SYSTEM PERFORMANCE

In our project microcontroller which provide the High surge current capability and also Wide current range. In this case the NFC reader is used Which store the information of the own person and swapped it .this information first will go on the maw232 IC. The MAX232 has two receivers that convert from RS-232 to TTL voltage levels, and two drivers that convert from TTL logic to RS-232 voltage levels. As a result, only two out of all RS-232 signals can be converted in each direction. If have the low balance of the card then it will display on the LCD and it will store in location one. The servo motor is the High dynamic response due to low rotor inertia torque. Then this will pass on the microcontroller. The microcontroller will passes the information of the buzzer if have the low balance of the NFC card then it will on condition and the pass the information of the microcontroller and it will pass on the keypad it will recharge the NFC card then amount will be charged and one sliding door will open. the reader detect read and send a unique code of the tag serially this serial code. Serial code is receive by microcontroller. The user is grated access though the electronics ticketing system. And lastly to work this entire circuit power supply is the require and hence we have used 5v power supply

VII. ADVANTAGE

1. It saves time for processing paper tickets.
2. It provides high security transactions.
3. It is more secure as no one can steal or scalp.
4. Simple to install.
5. NFC does not require line of sight.

VIII. DISADVANTAGE

1. Poor read rate can occur if the reader and receiver are not properly aligned.
2. In cases when multiple tags and readers are at work simultaneously, double charges may occur.

IX. APPLICATION

1. The applications of our project could include: Electronic money Concert/ event ticketing Travel cards Identity documents Mobile commerce Electronic keys: replacements for physical car keys, house/office keys, hotel room keys, etc.
2. NFC can be used to configure and initiate other wireless network connections such as Bluetooth, Wi-Fi or Ultra-wideband.
3. NFC technology has the power to bring new simplicity and convenience to many aspects of a typical person’s daily life.

X. FUTURE SCOPE

1. NFC technology provides simplicity and ease of use.
2. It is easy to used.

Fig. 2: Hardware input

Fig. 3: Output
XI. CONCLUSION

NFC is a very short range technology which is backward compatible with the RFID infrastructure because of its very short range it is inherently secured from most types of remote attacks. The procedure of establishing communication is very familiar to human’s natural way of doing things, you want something to communicate, touch it together. This makes it much more user friendly than the older data transfer methods of searching then establishing a connection.

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