Realistic Implementation of NFC and its Awareness Among Budding Technocrats

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Abstract: Near Field Communication (NFC) is a short range (less than 10 cm) wireless communication technology that communicate or exchange of data between two electronic devices. Because of the digitalized world, every people having their own mobile so it is a technology that facilitate how we can use our mobile smartly for various applications like payment and loyalty applications to access keys for houses, offices, travel, shopping malls and hotels etc. NFC technology is a holistic approach with different perspectives including communication essentials, ecosystem and business issues, applications and security issues. This paper is a holistic approach on NFC, about the technology and awareness of its application to the budding technocrats. This paper aims at the budding technocrats to check awareness of upcoming technologies like NFC and update them for better future. For the awareness of NFC and its applications in budding technocrats we use the Quiz – Questionnaire tool. We use this tool to analyze the knowledge and awareness of the technology in budding technocrats.

Keywords: Communication, NFC technology, real world applications, Quiz –Questionnaire

I. INTRODUCTION

In the modern era with the help new technologies we can communicate and interact with each other. The new technologies change the way of Communication. Communication is the process of transferring the information from one place to another. It is a process in which two or more parties exchange information and share meaning.

One of the most popular communication technology is the Near Field Communication (NFC) technology. It is a short range wireless communication technology that enables the exchange of data between devices over about a distance less than 10 cm. There are two types of devices to transmit and receive the signals are transmitting device and receiving device. With the help of NFC, billions of people throughout the world those who are using smart phones will have many facility in upcoming future like they can easily transfer their money, offers diverse services from payment and loyalty applications to access keys for houses, hotel rooms, travel and offices etc. Using credit cards, subway tickets, and paper coupons all into one device, a customer can board a train, pay for groceries, redeem coupons or store loyalty points, and even exchange contact information. All are possible with the help of a smartphone. For example: Google has recently launched Google Wallet that supports MasterCard PayPass, PayPal that offers money transfers between smartphones. Near field communication technology uses a reader and tags. Using these tags smartphones and other enabled devices communicate with other device. NFC allows a reader device to create a radio frequency current that communicates with NFC tag holding the information the reader wants. Passive devices, such as the NFC tag in smart posters, store information and communicate with the reader but do not actively read other devices. Peer-to-peer communication through two active devices is also a possibility with NFC. This allows both devices to send and receive information.

II. NFC TECHNOLOGY

NFC (near field communication) is a short-range wireless connectivity technology that are used for the exchange of data between two electronic devices. It operates at 13.56 MHz frequency. NFC is designed to be a secure form of data exchange. One of the device in NFC network is known as 'NFC tag' and the other device is known as 'NFC reader'. This unique feature allows NFC devices to communicate peer-to-peer. NFC technology is the upgrade of RFID (radio frequency identification) standard technology. It uses principle of electromagnetic induction between two loop antennas for establishing communication. The connection of NFC is established in few seconds. The frequency range of NFC falls under unlicensed radio frequency band. It is considered as ISM band. NFC can also work when one of the devices is not powered by a battery.

Fig.1: NFC TechnologySource:https://www.slideshare.net/NehaSingh145/nfc-technology-27491511

NFC tags are programmed which contain a small microchip with little antenna. It can store a small amount of information for transfer to another NFC device, such as a mobile phone. NFC readers that enable to interact with NFC tags. Many types of data we can store on an NFC tag. The actual amount of data varies depending on the type of NFC tag that we used. Different NFC tags have different memory capacities. For example, a standard 'Ultralight' chip NFC tag can store a URL of around 41 characters, whereas the newer NTAG213 chip NFC tag can store a URL of around 132 characters. Usually, this information is stored in a specific data format (NDEF – NFC data exchange format) so that it can be reliably read by most devices and mobile phones [1]. NFC tags are used into three areas such as asset management, marketing and personal use.

Fig.2: NFC tags

Table 1: following table shows the useful parameters of NFC technology

S.No.	Specifications	NFC technology support
1.	Coverage distance	less than 10 cm
2.	Operating Frequency range	NFC 13.56MHz
3.	Data rate	106/212/424 kbps based on NFC tag type
4.	Data access mode	Read/Write or Read Only
5.	Standards	ISO14443 A/B, ISO 18092 etc

II.I. Different types of NFC TAGS

NFC tags, for example stickers or wristbands, contain small microchips with little aerials which can store a small amount of information for transfer to another NFC device, such as a mobile phone.

1. NFC Tag - Clear Flower (MIFARE Classic 13.56MHz/1K S50)

This is a MiFare Classic keychain fob - often used for electronic locks or customer identification. The tag contains a NXP S50 chip and an antenna, and is passively powered by the reader/writer when placed a couple inches away. It can be used with NFC Shield [2].

Fig.3: NFC Tag - Clear Flower

2. NFC Card Tag (MIFARE Classic 13.56MHz/1K S50)

This is a MiFare Classic card - often used for electronic locks or customer identification. The tag contains a NXP S50 chip and an antenna, and is passively powered by the reader/writer when placed a couple inches away. It can be used with NFC Shield [2]. It has 1 KB non-volatile EEPROM storage. It Built in encryption engine with 48-bit key. 4 Byte unique identifier burned into the chip.

Fig.4 (a): Different types of NFC tags
Sorce:https://www.elecrow.com/nfc-card-tag-mifare-classic-1356mhz1k-s50-p-545.html

Fig.4(b): Different types of NFC tags

III. WORKING OF NFC

Evolved from radio frequency identification (RFID) tech, an NFC chip operates as one part of a wireless link. Once it is activated by another chip, small amounts of data between the two devices can be transferred when held a few centimeters from each other. No pairing code is necessary to link up and because it uses chips that run on very low amounts of power. NFC is much more power-efficient technology than other wireless communication types technology.
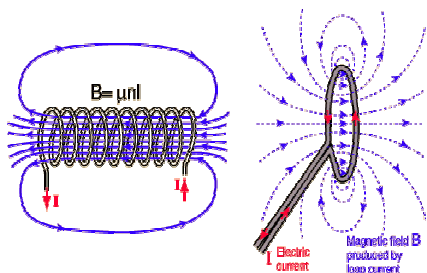

Fig.6: source: http://cdn01.androidauthority.net/wp-content/uploads/2013/04/magnetic-fields.png

The active NFC device induces an electromagnetic current in the passive components through an electromagnetic field and that is the reason passive NFC devices do not need power supply of their own as they are powered by the electromagnetic field produced by the active NFC device.

The transmission frequency for data across NFC is 13.56 megahertz, and data can be sent either at 106, 212 or 424 kilobits per second [3].

The tech involved is deceptively simple. Evolved from radio frequency identification (RFID) tech, an NFC chip operates as one part of a wireless link. Once it is activated by another chip, small amounts of data between the two devices can be transferred when held a few centimeters from each other.

IV. DIFFERENT MODES OF OPERATION

NFC devices work on three different modes for its operation. Card emulation, Peer-to-peer, read/write and. Card emulation has smart card capability for mobile devices. It allows a device to function like a passive device. This is the mode by which our mobile phones function as a wallet. Peer-to-peer communication allows two active devices to send and receive information or say write to each other i.e. NFC device is capable of being both a NFC reader and a NFC tag. Read/Write is directed towards one device which can either read or write to other device.

Fig.6: NFC Protocol Families
Source:https://software.intel.com/en-us/android/articles/nfc-application-development-on-android-with-case-studies.

V. COMPARISON OF NFC WITH OTHER SHORT-RANGE COMMUNICATION TECHNOLOGIES

Compared to other communication technology, the biggest advantage of NFC is it is quick and easy to use. The following graph compares NFC to other communication technologies.

Fig.7: Comparison of short-range communication technologies
Source:http://www.fut-electronics.com/wp-content/plugins/fe_downloads/Uploads/Comparison%20of%20Wireless%20Technologies.pdf

Table 2: This table shows the comparison of NFC with other short-range communication technologies

NFC	It is a short-range wireless connectivity technology that enables simple and safe two-way communication between electronic devices over about a distance of less than fewcentimeters , allowing consumers to perform contactless transactions, access digital content, and connect electronic devices with a single touch.
Bluetooth	It is wireless technology was designed to replace cables between cell phones, laptops, and other computing and communication devices within a 10-meter range.
Wi-Fi	It was designed and optimized for Local Area Networks (LAN); it provides an extension or replacement of wired networks for dozens of computing devices within a +100-meter range.
ZigBee	It is wireless technology. ZigBee has a standard enabling control and monitoring capabilities for industrial and residential applications within a +100-meter range.
IrDA	It is a short range, line-of-sight communication standard for exchange of data over infrared light over a distance about less than 1 meter. IrDA interfaces are frequently used in computers and mobile phones.
RFID	RFID means Radio Frequency Identification. It is an automatic identification method, relying on storing and remotely retrieving data using devices called RFID tags. RFID tag is a small object that can be attached to or incorporated into a product. RFID tags contain silicon chips to enable them to receive and respond to queries from an RFID reader/writer.

Table 3: This table shows the comparison of NFC with other short-range communication technologies

VI. LIST OF VARIOUS NFC ENABLED MOBILE PHONES

The following list shows the various number of NFC enabled mobile phones and tablets available to purchase today, or already announced and coming soon [4].

- Acer Cloud Mobile
- Acer E320 Liquid Express
- Acer Liquid Glow
- Acer Liquid S2
- Adlink IMX-2000
- Alcatel One Touch 922
- Alcatel One Touch 996
- Alcatel Onetouch Idol 2
- Alcatel Onetouch Idol 2 Mini S
- Alcatel Onetouch Idol 2S
- Alcatel Onetouch Pop Fit
- Amazon Fire Phone
- Apple iPhone 6 and iPhone 6 Plus
- Apple iPhone 6s and iPhone 6s Plus
- Apple iPhone 7 and iPhone 7 Plus
- Apple iPhone SE
- Apple Watch
- AsmaithaSruta 7   Tablet
- Asus MeMO Pad 8 (ME581CL)
- Asus Padfone 2
- Asus Padfone Infinity
- Asus Vivo Tab
- Asus Vivo Tab RT
- Asus VivoTab Smart
- Asus ZenFone 2
- BBK Vivo Xplay
- Benq T80
- BlackBerry Bold 9790
- BlackBerry Bold 9900/9930
- BlackBerry Classic
- BlackBerry Curve 9350/9360/9370
- BlackBerry Curve 9380
- BlackBerry Dtek60
- BlackBerry Passport
- BlackBerry PlayBook
- BlackBerry Priv
- BlackBerry Q10
- BlackBerry Q5
- BlackBerry Z10
- BlackBerry Z30
- Blu Life Pure XL
- BQ Aquaris M5.5
- BWC ToughSlate 7
- C-Mii 1
- C-Mii 3
- Casio DT-X8
- Casio G'zOne CA-201L
- Casio IT-800
- Cat S60
- Cetrix CB250
- Cetrix CD661
- Cetrix CT973G
- Cetrix CV300
- Dell Venue 11 Pro
- DLI 9000
- Faea F1
- Faea F2
- Faea F2S
- Famoco FX-100
- Firefox OS Flame
- Fujitsu Arrows A
- Fujitsu Arrows µ F-07D
- Fujitsu Arrows Kiss
- Fujitsu Arrows Tab
- Fujitsu Arrows V
- Gentag GT-601v2
- GioneeElife E7
- Google Nexus 10
- Google Nexus 5
- Google Nexus 5X
- Google Nexus 6
- Google Nexus 6P

- Google Nexus 7 (2013)
- Google Nexus 9
- Google Pixel
- Google Pixel XL
- Google Project Tango tablet
- Hike X1
- Hike X1D
- HisenseSero 7 Pro
- HP Elitebook Revolve
- HP Elitepad 900
- HTC Desire 500
- HTC Desire 510
- HTC Desire 610
- HTC Desire 620
- HTC Desire 816
- HTC Desire C
- HTC Desire Eye
- HTC Droid DNA/HTC J Butterfly
- HTC Droid Incredible 4G LTE
- HTC Evo 4G LTE
- HTC First
- HTC Incredible
- HTC Mini
- HTC One
- HTC One M8
- HTC One M9
- HTC One Max
- HTC One SV
- HTC One VX
- HTC One X/XL
- HTC Ruby/Amaze 4G
- HTC U Play
- HTC U Ultra
- HTC Windows Phone 8X
- Huawei Ascend G300
- Huawei Ascend G6 4G
- Huawei Ascend G600
- Huawei Ascend G7
- Huawei Ascend Mate 7
- Huawei Ascend P2
- Huawei Ascend P7
- Huawei Ascend Y201
- Huawei G620S
- Huawei Honor 6
- Huawei Honor 8
- Huawei Mate 8
- Huawei Mate 9
- Huawei P8
- Huawei Sonic/Turkcell T20
- Huawei TalkBand B1
- iBerryAuxusNuclea N2
- iOcean X8
- Jolla by Jolla
- Kuoziro FT701W NFC Tablet
- Kyocera Hydro Elite
- Kyocera Hydro Icon
- Kyocera Hydro Vibe
- Kyocera Torque
- Lenovo K800
- Lenovo ThinkPad Tablet 2
- Lenovo Vibe X3

- LG Fx0
- LG G Flex
- LG G Flex 2
- LG G Pro 2
- LG G2
- LG G3
- LG G3 Beat/LG G3 S
- LG G4
- LG G5
- LG Intuition
- LG KU380-NFC
- LG L50
- LG L70
- LG L90
- LG Mach
- LG Optimus 3D Max
- LG Optimus 4X HD
- LG Optimus Elite
- LG Optimus G
- LG Optimus L5
- LG Optimus L7
- LG Optimus LTE
- LG Optimus LTE Tag
- LG Optimus Net
- LG Optimus Vu
- LG Phoenix 2
- LG T530 Ego
- LG V10
- LG V20
- LG Viper
- LG Volt
- Lumigon T2
- Lumigon T2 HD
- Lumigon T3
- M3 Android NFC Communicator
- Megafon Mint
- Meizu MX3
- Meizu MX4 Pro
- Microsoft Lumia 640
- Microsoft Lumia 650
- Microsoft Lumia 950
- Microsoft Lumia 950 XL
- Motorola Droid Maxx
- Motorola Droid Mini
- Motorola Droid Razr
- Motorola Droid Razr HD
- Motorola Droid Razr M
- Motorola Droid Razr M 4G LTE
- Motorola Droid Razr Maxx HD
- Motorola Droid Turbo
- Motorola Droid Turbo 2/Moto X Force
- Motorola Droid Ultra
- Motorola MC75A HF
- Motorola Moto X
- Motorola Photon Q 4G LTE
- Motorola Razr D3
- Motorola Razri/MT788
- MTS 975
- Nextbit Robin
- Nokia 603
- Nokia 700

• Nokia 701	• Samsung Galaxy Grand 2 LTE
• Nokia 801T	• Samsung Galaxy Grand Prime
• Nokia 808 PureView	• Samsung Galaxy K Zoom
• Nokia C7/Astound	• Samsung Galaxy Light
• Nokia Lumia 1020	• Samsung Galaxy Mega
• Nokia Lumia 1520	• Samsung Galaxy Mini 2
• Nokia Lumia 2520	• Samsung Galaxy Note
• Nokia Lumia 610 NFC	• Samsung Galaxy Note 3
• Nokia Lumia 620	• Samsung Galaxy Note 4
• Nokia Lumia 720	• Samsung Galaxy Note II
• Nokia Lumia 730/735	• Samsung Galaxy Premier
• Nokia Lumia 820	• Samsung Galaxy Round
• Nokia Lumia 830	• Samsung Galaxy Rugby LTE/Pro
• Nokia Lumia 920	• Samsung Galaxy S Advance
• Nokia Lumia 925	• Samsung Galaxy S Blaze 4G
• Nokia Lumia 928	• Samsung Galaxy S II
• Nokia Lumia 930	• Samsung Galaxy S II Plus
• Nokia Lumia Icon	• Samsung Galaxy S III
• Nokia N9	• Samsung Galaxy S III Mini
• Nokia Oro	• Samsung Galaxy S4
• OnePlus 3	• Samsung Galaxy S4 Active
• OnePlus One	• Samsung Galaxy S4 Mini
• Oppo Find 5	• Samsung Galaxy S4 Zoom
• Oppo Find 7	• Samsung Galaxy S5
• Oppo N1	• Samsung Galaxy S5 Active/Sport
• Orange Infinity 996	• Samsung Galaxy S5 Mini
• Orange San Diego	• Samsung Galaxy S6
• OrientPhone P6 Plus	• Samsung Galaxy S6 Active
• Panasonic BizPad	• Samsung Galaxy S6 Edge
• Panasonic Eluga	• Samsung Galaxy S7
• Panasonic Eluga Power	• Samsung Galaxy S7 Edge
• Pantech Discover	• Samsung Galaxy Stratosphere II
• Pantech Sky Vega LTE	• Samsung Galaxy Victory 4G LTE
• Pantech Sky Vega Racer	• Samsung Galaxy Young
• Philips Xenium W336	• Samsung S5230 NFC
• Porsche Design P'9981	• Samsung S5260 NFC
• Porsche Design P'9982	• Samsung SHW-A170K
• Prada phone by LG 3.0	• Samsung Wave 578
• Runbo X6	• Samsung Wave M
• Samsung Ativ Odyssey	• Samsung Wave Y
• Samsung Ativ S Neo	• Samsung Windows RT Ativ Tablet
• Samsung Ativ SE	• Samsung WP8 Ativ S
• Samsung Galaxy A3	• Sharp Aquos Phone Serie
• Samsung Galaxy A3 (2016)	• Sharp Aquos Phone Zeta
• Samsung Galaxy A3 (2017)	• Sharp RW-T107 NFC Tablet
• Samsung Galaxy A5 (2016)	• Sharp RW-T110 NFC Tablet
• Samsung Galaxy A5 (2017)	• Smartisan T2
• Samsung Galaxy A7 (2016)	• Sonim XP1301 Core NFC
• Samsung Galaxy A7 (2017)	• SonimXPand NFC
• Samsung Galaxy Ace 2	• Sony SWR10 SmartBand
• Samsung Galaxy Ace 4 LTE	• Sony Vaio Fit
• Samsung Galaxy Ace Style	• Sony XperiaAcro S
• Samsung Galaxy Alpha	• Sony Xperia AX
• Samsung Galaxy Avant	• Sony Xperia C5 Ultra
• Samsung Galaxy Axiom/Samsung Galaxy Admire 2	• Sony Xperia E3 Dual
• Samsung Galaxy Core 2	• Sony Xperia Ion
• Samsung Galaxy Core Advance	• Sony Xperia L
• Samsung Galaxy Core LTE	• Sony Xperia M
• Samsung Galaxy Exhilarate	• Sony Xperia M2
• Samsung Galaxy Express	• Sony Xperia M5
• Samsung Galaxy Express 2	• Sony Xperia P

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- Sony Xperia S
- Sony Xperia Sola
- Sony Xperia SP
- Sony Xperia T
- Sony Xperia T2 Ultra
- Sony Xperia Tablet Z
- Sony Xperia V
- Sony Xperia VL
- Sony Xperia Z
- Sony Xperia Z Ultra
- Sony Xperia Z1
- Sony Xperia Z1 Compact
- Sony Xperia Z2
- Sony Xperia Z2 Tablet
- Sony Xperia Z3
- Sony Xperia Z3 Compact
- Sony Xperia Z5
- Sony Xperia ZL
- Sony Xperia ZR
- TazTagTazPad
- TazTag TPH-One
- The Toughphone Defender
- THL 5000
- Toughshield R-500
- Toughshield T700
- Turkcell MaxiPRO5
- Turkcell T11/ZTE Racer II
- Turkcell T40
- Umi Cross
- Umi X2S
- Vertu Constellation
- Vertu Ti
- Vodafone Smart 4 Power
- Vodafone Smart 4 Turbo
- Vodafone Smart III
- XiaomiMi 2A
- XiaomiMi 5 and Mi 5 Pro
- XiaomiMi Mix
- XiaomiMi Note 2
- Xiaomi Mi3
- Xolo X900
- Yota Devices YotaPhone (2014)
- YulongCoolpad 8870 NFC
- Zopo ZP998
- ZTE Axon
- ZTE Blade II
- ZTE Flash
- ZTE GoTa GH800
- ZTE Grand X IN
- ZTE Kis
- ZTE Nubia Z5
- ZTE Orbit
- ZTE PF200
- ZTE R233
- ZTE Turkcell MaxiPLUS5

VII. SOME REALISTIC IMPLEMENTATION OF NFC

1. Walmart Pay: In today's world the customers wants to save money as well as time also. Recently the Walmart launch Walmart Pay. Using Walmart Pay customers have the facility to pay with their smartphones in Walmart stores. Using QR codes which would be scanned at the terminal during check-out and take funds from whichever credit card the user has on file inside the app [5], Walmart becomes the only retailer to offer its own payment solution that works with any iOS or Android device, at any checkout lane, and with any major credit, debit, pre-paid or Walmart gift card – all through the Walmart mobile app [6].

Checkout using Walmart Pay happens in three easy steps:

1. **Open:** Visit any register, open the Walmart app and choose Walmart Pay. Activate the camera.

2. **Scan:** At any time during checkout, simply scan the code displayed at the register. Walmart Pay is now connected.

3. **Done:** Associate scans and bags the items… and it's done. An eReceipt will be sent to the app and can be viewed at any time.

2. Contactless Payment

Fig.8: Contactless Payment
Source: http://mashable.com/2010/05/06/near-field-
communication/#DvgoP7H3L5q7
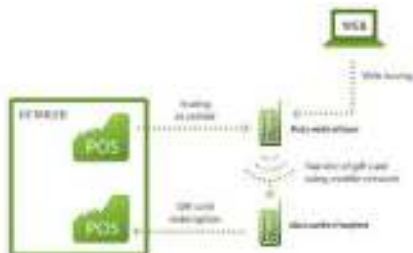
We can use of NFC in contactless credit card payments. Phones could "tap and go" using infrastructure already in place for credit card systems.

3. Smart Objects

Fig.9: NFC tag often contains information like a phone number or
URL
Source:http://mashable.com/2010/05/06/near-field-
communication/#DvgoP7H3L5q7

An NFC tag often contains information like a phone number or URL. Infotags used in buses, at bus stops, the theater, a restaurant, in schools and a pub that could be read with a mobile phone.

4. Social Media

Fig.10: Showing Friendticker

Before Foursquare took off, a German company called Servtag was working towards a similar concept for NFC-enabled phones called Friendticker. The company applied more than 250 NFC-tag stickers at various locations in Berlin that users would swipe their phones past in order to alert their friends that they were "checked in" at that location [7].

5. Door Technology

This involves installing keyless door lock on your door which allows you to lock and unlock your door safely using a remote control or smartphone when placed in the field of door reader. This means you no longer you have to worry about carrying keys with yourself. In case you don't have your remote or smartphone with you, you could even use a unique PIN which can be entered into the keypad of your door [8].

Fig.11: Door Technology using NFC
Source: http://www.techiestuffs.com/what-is-nfc-technology-how-
does-it-work-and-what-are-its-applications/

6. NFC wristband

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NFC stands for Near Field Communication. It is a wireless technology used to pay for items, manage information, open doors at hotels, and provide access to events.

Fig.12: NFC wristband
Source: http://www.zerintia.com/technology.html

7. Google Wallet: Google Wallet is the new payment method that involves waving your smartphone in front of an NFC scanner. Some Android and BlackBerry devices support NFC, mainly for sharing contact info and other snippets with other people with compatible devices.

Fig.13: Google Wallet using NFC
Source:https://www.linkedin.com/pulse/guide-mobile-wallets-battle-payments-shehzad-s-qureshi

8. Bus tickets: with the help of NFC smartphones, Ticket inspectors use this technology to read passengers' transport tickets and check that they have paid their fare. The previously used handheld devices were bulky, and they were energy gobbles, but NFC smartphones have provided a significant hardware upgrade.

Fig. 14: NFC chip used in bus
Source: www.thetartan.org

Student ID cards containing the NFC chip when tapped on bus passively transfer info through NFC to bus system's active card reader which receives our info and charges the university for the trip [9].

VIII. APPLICATIONS OF NFC

The NFC technology has a number of uses or applications including:

1. Touch and Go, Touch and confirm, Touch and connect, Touch and explore.

- Touch and Go – it can be applied on applications such as access control, transport and in ticketing of events. In such cases, the user only needs to bring the device with the tickets close to the reader. In addition to this, the technology can also be implemented on data capture applications to help with picking up of Internet URL from a smart label that is found on a poster.
- Touch and confirm –it can be used in applications involving mobile payment to help with the confirmation of a user interaction. In most cases it is used in scenarios where the user has to confirm his interaction by entering a password or by simply accepting the transaction.
- Touch and connect – NFC has the ability of allowing two phones to be connected and exchange information. Here, the two connected NFC-enabled devices can allow for the transfer of data, allow for downloading of music and even provide for the synchronization of the address books.
- Touch and explore – devices that are equipped with NFC technology offer a consumer more than one possible function [10].

Some other uses of NFC in different applications are:

2. PatientID+: Health care requires a lot of information these days, including patient identification, insurance coverage, and payment information. PatientID+ unites all that info and stores it in one place: either on the user's PatientID+ contactless tag or in their NFC phone. The patient then enters a PIN to access and transmit the information to the health care provider on arrival, bypassing the tedium of filling out forms and making sure data is accurate.

3. Smartwatches and fitness trackers: NFC chips being used in smartwatches and fitness trackers so that they can do payments with a touch, tapping phone to the watch to power it on.

4. Video games : The NFC chips inside these games are capable enough to store user data such as experience points, progresssions, customized settings. In Skylanders, the figurines over gaming console accessories can be linked up to the game to enrich the experience with these new characters to play with Disney Infinity and Amiibo toys yield similar rewards [11].

5. Billboards and Signs: Passive NFC components can be used in Billboards and Signs due to which we will be able to get more information about the topic discussed on the board by tapping our phone over it.

6. Bluetooth speakers and Headphones: The devices brandishing the NFC logo means that by holding a smartphone near the NFC-enabled device one can connect via Bluetooth much faster than pairing devices manually.

7. Hanging out with friends: Using NFC we can share games, pictures, money, links, and info with friends by bumping phones.

8. At the office: At office we can use of NFC for Paying for snacks out of the vending machine or clocking in and out for breaks takes only seconds.

Fig. 16: standard applications of NFC

Fig.17: NFC based applications using mobile phone
Source:https://www.researchgate.net/figure/283498836_fig25_Figure-52-Some-NFC-applications

Fig.18: NFC based applications
Source: http://uxpamagazine.org/near-field-communications/

Fig.19: NFC based applications
Source: http://poutouscollisionandmechanical.com/nfc-technology-coming-car/

VIII. NFC ENABLED APPs

1. Trigger (Free): This is a powerful Android automation app that allows to automate numerous tasks and scripts such as NFC tags. Creative users can program a wide variety of tasks to be triggered with an NFC tag.

2. Tasker ($2.99) + Locale NFC Plugin ($1.53): Tasker is another well-regarded Android automation tool, and with the addition of plugins, such as the Locale NFC Plugin, users can use NFC tags as triggers to initiate Tasker tasks.

3. Puzzle Alarm Clock (Free): Using this app, we can hitting the snooze button on an alarm clock app. In order for Puzzle Alarm Clock to stop beeping, users need to solve a puzzle, or physically get up to an NFC tag or QR code. The app comes with a variety of random puzzles and the option to automatically open an app right after the alarm.

4. Insta WiFi (Free): This is an app that allows users to share Wi-Fi network login details through an NFC tag or QR code. Afterwards, users can simply tap their phone against the NFC tag or scan the QR code to connect to the network.

5. NFC Tools (Free) + NFC Tasks (Free) : NFC Tools is a combination of NFC tag reader and writer, allowing you to read technical details and information stored in the tag, as well as write information into non-write-protected tags. Users can save text, links, details, GPS locations, addresses, configure Bluetooth connections and more. The addition of companion app NFC Tasks allows users to create automated task scripts that can range from enabling or disabling network settings, alarms, launch Tasker tasks, configure wireless networks and more.

6. NFC ReTag Pro ($1.99) : NFC ReTag Pro allows users to reuse write-protected NFC tags by storing the tag's device ID and using that to trigger for a variety of tasks. NFC ReTag Pro comes with a variety of actions that you can trigger with a tag, such as phone settings, network controls, launching apps or Tasker tasks and more. A neat feature with the app is that you can program in tag cycles, programming different tasks each scan [12].

Fig.20: shows different NFC Apps

7. Parking meters: Unfortunately, NFC doesn't provide a way to eliminate paying for parking altogether, but if you're stuck having to feed a meter, NFC can at least make it quick and easy. PayByPhone's meter setup lets those with NFC phones tap the sticker on the parking meter to automatically launch the parking app, enter the amount of parking time they wish to buy, and have the fee charged to a credit or debit card associated with the mobile phone number. As a bonus, PayByPhone will even send a text message reminder before the parking period expires so that additional time can be purchased by phone from any location if necessary.

8. The Museum of London: The Museum of London will be one of the first public locations in London to start using NFC technology [13]. Looking to create a more interactive experience, the Museum of London teamed up with Nokia to create NFC-enabled apps. Visitors with NFC-enabled devices can learn more about various objects on display, buy tickets for future exhibitions, get vouchers for the museum's shop and cafés, and Like or follow the museum on various social media platforms.

9. SleepTrak: This device-and-app combo is mighty handy for folks dealing with sleep disorders. The device attaches to your arm while you sleep, during which it tracks symptoms associated with inefficient sleep. Then it is read via NFC the next morning, and the app analyzes the data and provides suggestions for better sleep habits.

10. ATI Log-IC NFC Logger: shipping required lots of specialized equipment, shippers simply need these NFC data loggers and an Android app to keep tabs on thermometer readings.

IX. SURVEY ON NFC FOR SEEKING AWARENESS IN BUDDING TECHNOCRATS

The survey was designed and targeted for the young buddingtechnocrats mainly engineers who are studying latest technology in their course structure. NFC is the one of the latest technology which is being used in many areas like shopping malls, mobile payment, for receiving and paying amount for purchase goods etc. As the paper was targeted towards realistic implementation of NFC and knowing the awareness about NFC in young budding technocrats. A series of questions were designed to know the awareness about NFC technology and the same was plotted for better reach so that the respondents can easily fill them

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IX.I. SURVEY RESULT AND QUESTIONNAIRE

Results for: NFC and Budding Technocrats

REALISTIC IMPLEMENTATION OF NFC AND ITS AWARENESS AMONG BUDDING TECHNOCRATES

IX. DATA INTERPRETATION AND ANALYSIS

In this paper the online survey conducted for seeking theawareness of NFC technology in budding technocrats. The survey result shows the maximum respondents are youngsters with the age group of 18-22 years followed by age group consisting 23-25 years. In this survey all the respondents have their own mobile devices. In the response of mobile usage for the purpose, the result shows mixed responses that includes data transfer, communication, Text/SMS and social media. In response of the range of NFC, 57 percent of the respondents give the correct answer. In the response of frequency over which NFC use to send data, near about 68 percent respondents gave the correct answer.in response to devices having NFC, the response was segregated into smart phone, laptops, tablet etc. In the current scenario high end smart phones are NFC enabled, the response says it can be understandable that people wants NFC technology in all the devices that they use. In the response of question asking about the use of NFC making payment near about 78 percent supported the technology. In response towards NFC based applications, people are

aware of payment, retail, smartwatch, etc. In response to the question regarding the smart phone having NFC enabled, near about 49 percent respondents says Yes and near about 49 percent respondents says No. Means people who do not have NFC enabled phone are slightly more may be due to high end pricing of smartphone. The question regarding NFC technology should be included into syllabus, all respondent support. After the survey results, it can be interpreted that budding technocrats are very keen to learn, understand and make use of a latest emerging technologies. For better understanding and experience for budding technocrats, these technologies should be the part of course curriculum or a method should be devised to get a touch and feel of these kind of technologies.

IX. CONCLUSION AND SUGGESTIONS

In this digitalized world every people having their own mobile. Many retailers are focused to get better services to their customers. With the help of this technology people can save their time as well as money also. NFC is the technology which is easily used in mobile, laptops, tabs etc. and can communicate and exchange the data between two electronic devices over about a distance of less than 10 cm. Because of the great demand of NFC technology due to its low cost, low power, short distance, flexible communication modes, it is used for several applications like payment transactions, retailer, smartwatches, games, time and attendance, travel, automobile, loyalty Apps, media and Advertisement etc. In this paper the survey was online filled by the budding technocrats, After successfully survey filled by the budding technocrats it concluded that they are more interested to learn about new

technologies and they wants the NFC technology should become a part of syllabus.

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