

Automobile Information Retrieval And Updating Using NFC Based Secure Mobile System

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ABSTRACT

The present day metropolitan areas have seen a burgeoning growth in human population as well as vehicles. More vehicles mean more traffic and hard control over it. People in such case tend to break the traffic laws more easily. In highly populated cities it becomes very difficult for the traffic department of police to control the vehicle traffic. Also to enforce law on vehicle owner becomes difficult as most of the traffic offenders tend to misconduct with the traffic police and so a lot of time is wasted. To overcome this difficult we introduce our project on vehicle information tag using NFC. NFC is a short-range high frequency wireless communication technology that enables the exchange of data between devices over about a 10 cm distance. NFC is an upgrade of the existing proximity card standard (RFID) that combines the interface of a smartcard and a reader into a single device. It allows users to seamlessly share content between digital devices, pay bills wirelessly or even use their cell phone as an electronic traveling ticket on existing contactless infrastructure already in use for public transportation. So our project consists of a NFC card tag attached on the exterior of the vehicle, which consist all the necessary information about that car (i.e. its owner, registration paper, PUC, insurance paper and other important documents). The traffic police to browse to the history of the car and its owner will use NFC reader to the NFC vehicles tag. Traffic police can check the information of the car without communicating with the owner and can fine them in a digital way (by crediting fine charge in the tag).

Keyword: - Near Field Communication (NFC), Radio-frequency identification (RFID)

1. INTRODUCTION

This paper aim is to develop a mobile application for android phone for getting and updating automobile information using NFC (Near Field Communications) tag/card. This application is a secure mobile system which can only be updated by an authorized person. Traditionally automobile papers are to be carried while driving the vehicle for the purpose of being validated by the traffic police or otherwise required at any time. The following are the necessary documents to be kept in the vehicle:-

- Proof of valid certificate of registration.

- Proof of valid certificate of insurance.
- Proof of tax payment.
- Pollution Under Control (P.U.C) certificate.
- Insurance cover note, tax payment receipt and renewal of registration certificate are valid evidence.

We convert all these important document information into a digital form and store it into the NFC (Near Field Communications) tag/card which will be present in the automobile. This enables the owner of the vehicle to leave the important documents at home. This will also make it easier for the traffic police to check the information about the automobile in a digital manner and also easy for authorized person to renew the PUC and insurance in the digital way .

1.1 What is NFC?

NFC is based on technology specified by numerous international standards that allows for easy transfers of information over small distances. It can turn a handset into a device for reading data attached to physical objects, be used for exchanging data between two mobile devices .As noted earlier, NFC is compatible with and builds upon existing RFID technologies found in millions of access, payment and identification cards data which is accessible through an emerging RFID reader infrastructure. NFC is particularly well-suited for use in mobile devices, where its operation and behavior are controlled by the device owners We will also be using the term “Tap ‘n Go” because it clearly conveys a visual image in which this technology is intended to be used. In the context of use with mobile devices, NFC has three principal modes of operation.

1.2 Various modes in NFC

Reader/Writer:- This NFC mode enables mobile devices to read data stored in passive RFID tags embedded in public posters, displays, and products and to act upon that contains a Uniform Resource Locator (URL), which is an Internet encoding of access instruction for a file or Web address, or the SMS instruction for sending a text message .This NFC mode also enables Mobile devices to write data to some tags notably virtual tags in other devices.

Card Emulation:- This NFC mode enables mobile device owners to make a contactless business transaction, in the same way smart cards are used today. This mode operation enables mobile devices to be used for identification, payment and access control application.

Peer to peer:- This NFC mode enables mobile devices to more easily interact with each other (i.e., each phone has to be equipped with NFC and the enabling applications) to quickly launch a mobile communications bearer for sharing data with each other, whether to exchange business cards, photo, documents or other type of personal information in "peer-to-peer" data transfers.



Fig 1: - Various modes of NFC data transfer.[3]

1.3 How NFC works?

Card Emulation: - In card emulation mode, the “NFC Device” behaves like a contactless smart card. It is functioning as a target in a passive mode. While a contactless card is powered by the magnetic field generated by the interrogator, an “NFC Device” may require more energy to operate. Indeed, an NFC application on a mobile phone,

a tablet or a consumer device may benefit from other features than just NFC (screen, applications, security, internal communications, etc.). Access to these features requires an internal power source, a battery or power supply.

Reader Mode: - The “NFC Device” in reader mode behaves like a simple contactless card reader. It initiates communication by generating a magnetic field and then sending a command to the target. The target responds to the interrogator by retro-reflecting the incident wave as described in above. The specificity of NFC operating modes is that the target can be not only a tag or a contactless card, but also an “NFC Device” that behaves like a contactless card (in card emulation mode). Usages of reader mode are principally information reading, when “NFC Devices” is used to read data by waving it in front of electronic labels available on streets, bus stops, sightseeing monuments, ad banners, parcels, products or on business cards (vCard).

Peer-to-peer mode: - This mode allows two “NFC Devices” with the same NFC performance to exchange the data with each other alternately. Each of these devices supports both interrogator and target communication modes, sending and receiving by turns the data. Communication in peer-to-peer mode is slower than in conventional reader / card emulation mode, because of the management of a heavier protocol, which is necessary for the repartition of roles between the two “NFC Devices. “This mode can be used to initiate gateways (pairing) with other technologies for data transfer at higher than NFC (Bluetooth, Wi-Fi or Wi-Fi Direct) data rates.

2. LITERATURE REVIEW

Since NFC technology is started to be promoted, various real-life applications have been evolved. An NFC literature review study in revealed that, about 40% of the NFC literature concentrated on developing new NFC applications. Indeed, design artifacts, which propose composed applications or services operating in two or more modes can be seen in NFC literature. The following literature review consists of idea and conclusion from various other authors who paper’s had a great influence on our paper. Automobile information retrieval with NFC TAGs (written by Sarabjeet Singh): Makes Use NFC tag and Android Application to retrieve information of any automobile. M-commerce using NFC tags (written by Shashank Saxena, Sanskar Rane, Asmita Mane, Shubada Ladbde)[2]: The research paper deals the requirements to create an Android based M-commerce application using NFC. It would require Mobile Devices that support NFC technology. Near Field Communication (Written by Hussien Ahmad Al-Ofeishat): This paper gives a brief introduction on NFC technology, advantages and disadvantages, future scope of NFC technology. Security in Near Field Technology (Written by Ernst Haselsteiner and Klemens Breitfu)[4]: The following paper deals with the security issue in NFC technology, threats in using NFC technology, areas where the technology can be used and how to overcome security threats in NFC.

Table 1:- Literature Survey.

Author's	Title of the Paper	Techniques/ Software used	Conclusion	Year
Sarabjeet Singh	Automobile information retrieval with NFC TAGs	NFC, MySQL, Android Studio.	Although there are many existing solution for retrieving the information of an automobile but none of them are available for the use of a common person or individual under any circumstances. This proposed solution being an extension of the existing solution is not only less costly but also within the reach of common person to use. [1]	2015

Shashank Saxena, Sanskar Rane, Asmita Mane, Shubhada Labhe	M-commerce using NFC tags	NFC, Android Studio.	NFC based shopping is created as a model with the use of NFC technology that allows users to perform the shopping process and verification of expenditure. Applications created with ease of understanding and the design can be created and tailored to the shopping process to make it more effective and user friendly. Thus making it easier & convenient for the users to do the entire shopping process with the use of this application, as compared to the existing systems. [2]	2014
Hussien Ahmad Al-Ofeishat	Near Field Communication	NFC	The following paper deals with the overall working of NFC technology. Also state the security threats, advantages and disadvantages of NFC. Its also discusses about the present use of NFC technology and the future of NFC technology. [3]	2012
Ernst Haselsteiner and Klemens Breitfu	Security in Near Field Communication (NFC).	NFC	In this paper they used Maximum Entropy for learning the opinion holders automatically with the help of two ways i.e. Classification and Ranking.[4]	2008

3. EXISTING SYSTEM

Near Field Communication Technology, NFC has many of its roots in the RFID business. Some of the basic ideas came directly from RFID work that had been previously undertaken. Now Sony and Phillips have taken the lead and jointly developed the technology. It follows on from their proprietary smart card protocols and can be seen as an initiative to move forward the contact-less ticketing and payment applications that are seen as the next stage in this market. The standard for the technology was approved as an ISO/IEC standard on December 8 2003, having been approved earlier as an ECMA standard. The next stage in the standardisation process came when Nokia, Sony, and Phillips formed the NFC forum on 18th March 2004. The NFC forum grew quickly and in 2008 there were over 150 members comprising manufacturers, applications developers, financial services institutions, etc. In June, 2006, the NFC Forum formally outlined the architecture for NFC technology. In August, 2006, the NFC Forum released the first four Forum-approved specifications. These NFC specifications set in place a "road map" to enable interested parties to create their own products. The present day metropolitan areas have seen a burgeoning growth in human population as well as vehicles. More vehicle means more traffic and hard control over it. People in such case tend to break the traffic laws more easily. In highly populated cities it becomes very difficult for the traffic department of police to control the vehicle traffic. Also to enforce law on vehicle owner becomes difficult as most of the traffic offenders tend to misconduct with the traffic police and so a lot of time is wasted. To overcome this difficult we introduce our project on vehicle information tag using NFC. Automobile information retrieval with NFC TAGs system are created for the common people. Common man can identify the information from the public transport route of the automobile, so the on-hire automobiles such as rickshaws and taxis cannot deny service to the passengers. Components used for sample Implementation includes: NFC TAG, MySQL Database, NFC Application ,Web Client, Web Service/Script.

4. PROPOSED SYSTEM

NFC technology has evolved from a combination of contactless identification and interconnection technologies including RFID and it allows connectivity to be achieved very easily over distances of a few centi-metres. Simply by bringing two electronic devices close together they are able to communicate and this greatly simplifies the issues of identification and security, making it far easier to exchange information. In this way it is anticipated that Near Field Communications, NFC technology will allow the complex set-up procedures required for some longer range technologies to be avoided. A further application that was proposed was that NFC connections could be used to configure the connection between two wireless devices. All that was required to configure them to operate together wirelessly would be to bring them together to effect the NFC "connection". This would initiate the a set-up procedure, communication could take place over the NFC interface to configure the longer range wireless device such as Bluetooth, 802.11 or other relevant standard. Once set up the two devices could operate over the longer range allowed by the second communication system. In the proposed System we are create the NFC base android application. The owner of the automobile reminds the renew date of the important document. This project is mostly deployed by the traffic police and RTO. The traffic police check the information regarding the automobile when the owner breaks any traffic law. Owner does not need to carry all the important vehicle papers, all the information is stored in the NFC tag which is implemented in the automobile. If any document needs to get renewed, the RTO updates the information of the automobile. Traffic police and RTO retrieve and update the information using android application which is implemented by us.

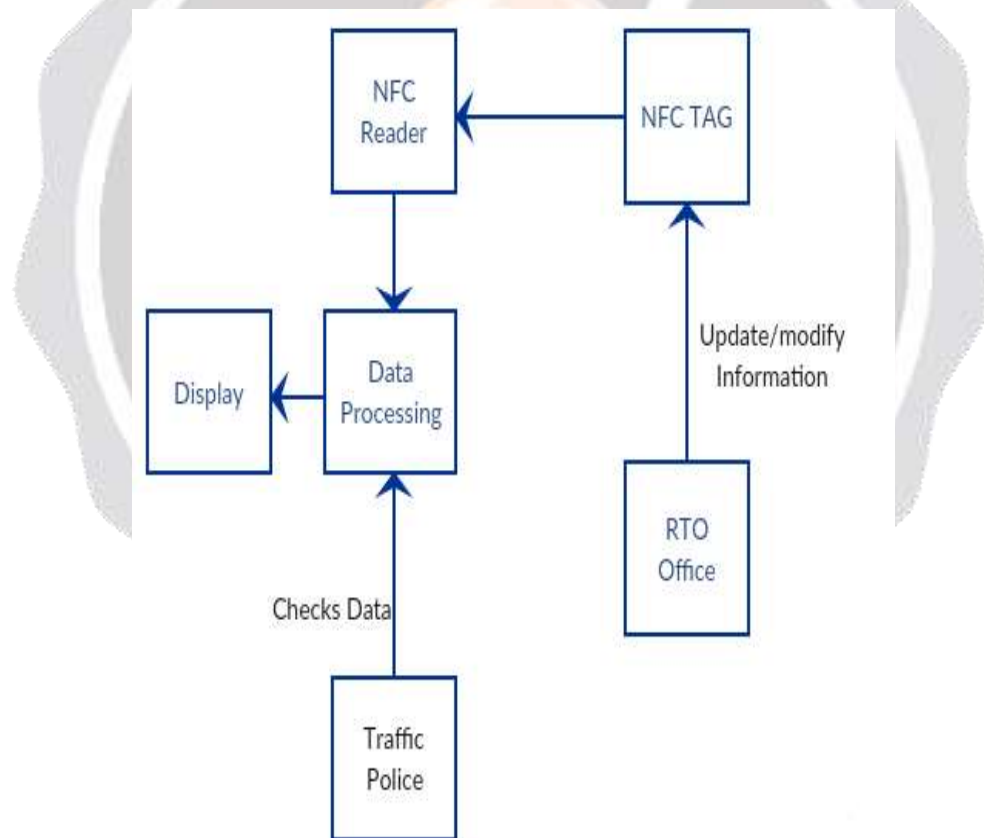


Fig -2: Block diagram of proposed system.

5. MARKET REVIEW

The global near field communication (NFC) market size was valued at USD 4.80 billion in 2015. The growing mobile penetration with improved payment infrastructure and data connectivity presents a significant opportunity for the growth of NFC-enabled mobile payment. Growing popularity of mobile devices and the increasing number of online consumers is expected to drive the demand for m-commerce. The near field communication technology is

extensively used in pay terminals using mobile devices. Retailers, such as Target, Macys, and Walgreens, have started using the Google wallet technology. Businesses in the emerging markets, such as India, China, Japan, Taiwan, and Malaysia, are localizing the content for the mobile platforms for maximizing the potential sales. Furthermore, well-established infrastructure and device penetration in developed markets are supporting mobile transactions among individuals and between financial institutions and consumers. The increasing demand for enhanced government policies and security issues is expected to drive the near field communication market growth. Enterprises across the industries are developing and deploying new products for improving the productivity with increased security. The increasing need for lowering the cost of ownership and the increased convenience need is further expected to continue dictating the industry development. The growing development in NFC technology has encouraged consumers to make small and large payments using the mobile devices. The proliferation and adoption of mobile payments including digital wallets and usage of apps have encouraged the non-payment technology firms to enter into payment landscapes which is expected to further drive the market growth. Furthermore, the increasing penetration of smart phones in the developing economy has led to the development of the technology.

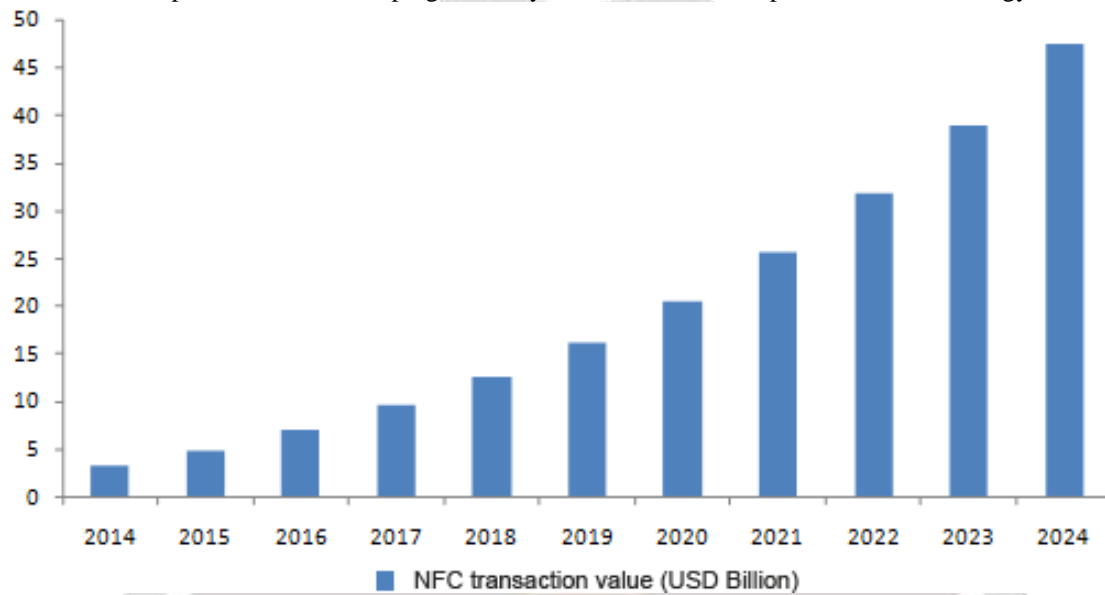


Fig 3 :- Global NFC market, 2014-2024(USD BILLION).[2]

Based on product, the NFC market is segmented into SD cards, SIM cards, near field communication cover, near field communication ICs, near field communication readers and near field communication tags. NFC tags and NFC readers are expected to gain prominence over the next 8 years, which can be attributed to the high demand originating from payments and access control segments. The technology of combining the SD card with the near field communication technology has resulted in less cost infrastructure for the manufacturers, leading to enhanced demand in the industry. The ability of SIM cards for cashless payments with improved user experience is expected to improve the product market. Furthermore, increasing demand for connectivity between devices for sharing information and data through online and in-store payments in a retail store has also led to the growth of the NFC technology in the segment. The near field communication cover is considered as an accessory for converting smart phones into NFC-enabled smart phones. The technology is yet to be deployed in the emerging regions and has penetrated in developed countries such as the U.S., Canada, and the UK. The flexibility of the product for converting the devices to NFC-enabled is expected to lead the growth. The near field communication-based application segment can be categorized into access control, ticketing, data sharing, medical devices, transaction, product identification and others. The transaction application is estimated to dominate the business in terms of revenue in 2015. Proliferation of smart phone with increasing need for better consumer experience is expected to propel the demand. The ticketing segment enables the commuters to use the near field communication mobile for contactless transport ticket. The NFC-based ticketing application stores the transit details digitally on the mobile phone and allows the passenger to tap the mobile phone for boarding. The technology has led to the implementation of a cost-effective transport ticketing solution, which is expected to enhance the customer experience. The increasing need for the digitizing of medical records and for tracking the fitness of consumers has led to the enhanced demand for near field communication-based medical devices. For instance, medical devices, such as Jawbone UP4, track the heart rate and also assist in making payments to the retailers. The device's capability of multi-tasking is also expected to influence the industry in a positive manner. The Asia Pacific NFC-based market is expected to remain the key

revenue-generating region, accounting for over 20% share in 2015. The increasing penetration of smart phones and tablets is estimated to be the reason behind the adoption of the NFC technology. The rapid diversification of mobile payment services has accelerated collaboration amongst the industry participants resulting in the development of the technology. The international banks have been enthusiastically investing in building the mobile payment network, which is further expected to increase the application segment collaborating the financial service provider and retailers. The European market is expected to witness major developments in various applications, which include near field communication-based transactions, ticketing and access control over the forecast period. Growing adoption of NFC technology has led to increased implementation of POS terminals at retail outlets for contactless mobile payments and Visa Cards. The industry players are constantly introducing improved and advanced near field communication enabled devices to increase the customer base and to expand the product offerings. The key industry competitors include Huawei Technologies Co., Ltd (China), NXP Semiconductors (Netherlands), Infineon Technologies AG (Germany), Mediatek Inc. (Taiwan).

6. IMPLEMENTATION

The following project was coded in Android studio version 2.2.3. Language used was java and UI was created using xml. The image below shows the screenshot of the UI. The application has fields like registration number, insurance number, PUC expiry date, insurance Expiry date. All this field are used to perform write operation on NFC tag which will be embedded on the exterior body of vehicle.

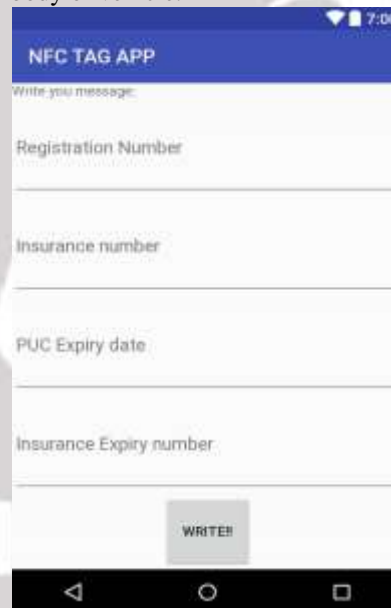


fig 4 :- Screenshot of user interface.

6. CONCLUSION AND FUTURE SCOPE

This paper aim at making the vehicular database more systematical. The use of NFC in automobile information retrieval system will boost up the traffic management system as well as help the government to keep a better track on vehicle that are running in the country. Since this system does remove the vehicle related paper work completely, the owner of the car also does not need to worry about the vehicular paper. Moreover the notification alert system notifies the owner incase his paper work is going to expire. This paper was written to help the government in good way possible. Also this system can be used to provide cashless system by crediting fine and payment via online transaction system. This can be achieved by connecting the system to an online database.

7. REFERENCES

- [1]. Sarabjeet Singh: Automobile information retrieval with NFC TAGS, 2015.
- [2]. Shashank Saxena, Sanskar Rane, Asmita Mane, Shubhada Labhe: M-commerce using NFC tags, 2014.
- [3]. Hussien Ahmad Al-Ofeishat: Near Field Communication, 2012.
- [4]. Ernst Haselsteiner, Klemens Breitfu; Security in Near Field Communication, 2008.