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# *NFC: The Ultimate Technology Fashion Statement*

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## INTRODUCTION

### **NFC Interactive Clothing**

Clothing is one of the fundamental requisite for human survival. With the advancement in civilisation, though changes made on the aesthetic aspect of clothes improved exponentially, not much improvements are visible in terms of technology in the textile industry. Nowadays, the major challenge faced by most of the popular brands is replication of their goods in the black market. Up until now no methods have been technologically developed to recognize the counterfeits that are sometimes unknowingly purchased by the people. Any customer who purchases clothes has concerns about its brand value, colour, quality, texture and material. When a customer buys a cheap knock-off unknowingly, they may misinterpret the brand's potential. Our job is to make sure that the customer requirements are fulfilled; for the purpose of which we make use of IOT, NFC and Mobile Application technologies.

IOT is a new revolution of the internet that is used to link objects to a big network using the Internet. Innovations in IOT are the need of the hour. IOT finds its use in various fields like health, travel, education, industries, business, etc. It helps in digitising analogue objects. These objects can be made to communicate between each other using various methods. The proposed system makes use of NFC embedded within the clothes. By connecting the clothes to the terminal of the internet using NFC tags, identification, tracking and monitoring of the clothes to which the tag is attached becomes easy. They are a cheap replacement to traditional barcodes, highly reusable and can store more data. They support various encryption schemes. The main selling point of latest NFC tags is that it is waterproof, dustproof and light proof making it more robust.

Now a days, everything is based on Cloud and experts too believe that cloud computing is the new trend in the development of Computing Technologies. For devices where memory is an issue, cloud technology has provided

a solution. It is an Internet based computing technology where services are provided to the end users on a pay per use basis. It helps in the storage, retrieval and maintenance of large data with added advantages like ubiquity, consistency, reliability, etc. It therefore serves as the podium for the development of various new technological innovations.

The entire data involved in the proposed system "Interactive Clothes" is stored and retrieved from a relational database maintained in a cloud environment; this includes all the data starting from the manufacturers to the dealers and the end users. The database is setup in such a way that, only the necessary data will be available to any particular entity at any given time. For example, the end user need not know about the batch number of the product. This is done using the concept of data abstraction.

After the advent of mobile operating systems like iOS and android, the world has witnessed an unprecedented revolution in communication devices. After mobile gadgets became smart, the entire focus has catapulted towards developing applications for the convenience of the users and to meet their day-to-day requirements. The proposed model has an android application with features that benefit the end user.

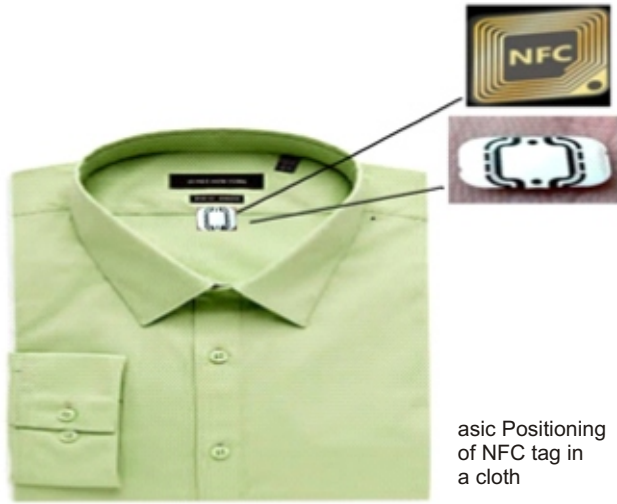
### **PROPOSED MODEL**

#### **- Embedded NFC tag in cloth**

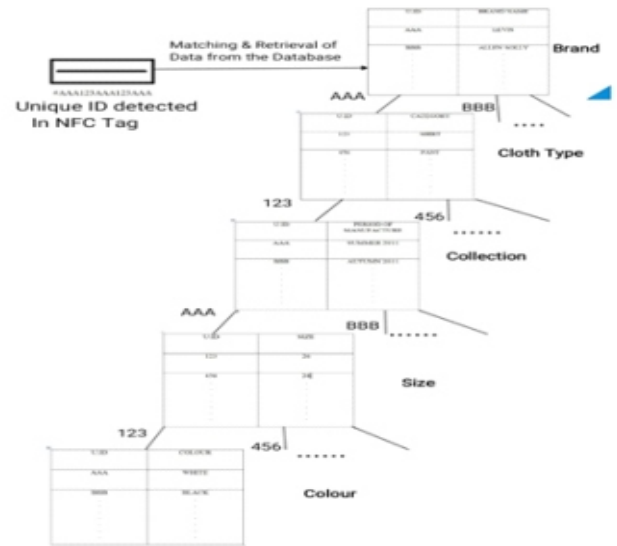
A micro-NFC chip resistant to water, heat, dust and pressure is embedded within the clothes. The chip has a unique Id written in it during manufacturing itself. The Id is encrypted for security reasons. The manufacturer will create a new entry for the Id and fill his side of the table data. The retailer, after selling the product will fill a few additional details. In the user side, the tag will be scanned by the Mobile Application; the Id will be decrypted and read. It is cross referenced with the database and corresponding details are retrieved. The user will fill the remaining fields and will begin using the cloth.

#### **- Cloud Database**

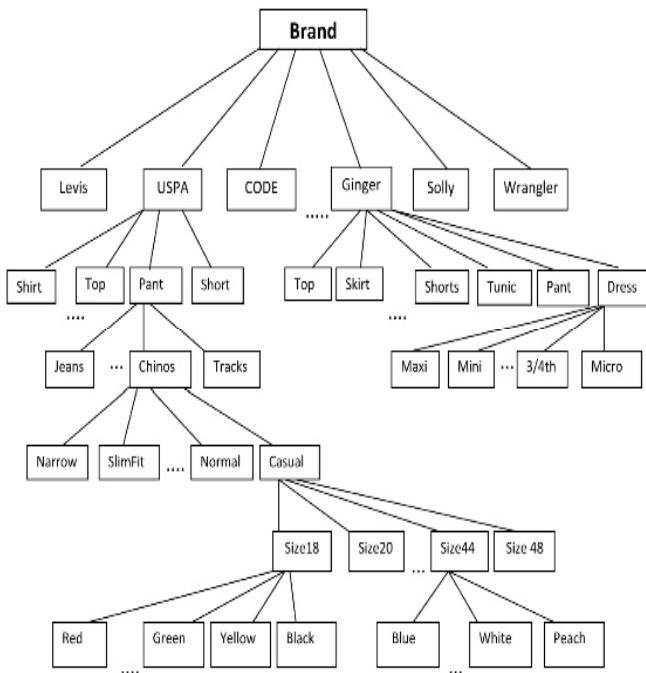
A single relational database with a number of tables is stored in the cloud environment. This database contains all the necessary tables and fields to serve the queries of the



Basic Positioning of NFC tag in a cloth



manufacturers, retailers and end users. Once the Id is decrypted and read, it is checked whether it is a valid id or not. This helps us to eliminate counterfeits. This is done by cross-referencing the Id with a table containing Ids and the name of the customer it was sold to. After validation, The id is broken down into a n fragments. Each fragment serves as the primary key for a table. Fragment n-1 serves as the foreign key for the table containing nth fragment as the primary key. Thus, the tables are traversed hierarchically and the details are gathered. But all details are not visible to everyone. Abstraction is done based on each entity's access rights and the type of query, and only the necessary data is delivered to them. This data is then utilized by these entities for the intended purpose.



Tree based classification for hierarchical storage in Cloud Database

### - Mobile application

A mobile application based on android platform is developed. This application acts as the interface between the end user and the interactive clothes. The user enters a few details every time they add a new item to their wardrobe. An abstract of the services provided by the application are as follows:

- Acts as a personal stylist, helping the user in mixing and matching various items in the wardrobe.
- Indicates the frequency of use of the cloth selected by the user i.e., the number of times the selected cloth has been used and the date and day the cloth has been last used by the user.
- The user selects his skin tone on a scale of 1 to 10, 1 being the lightest, while starting to use this application. This will thus help in the application to decide which outfit with regard to colour, type, etc; goes well with the complexion of the user. An algorithm is designed in order to make the application decide on this factor.
- From the list of clothes the user has been using frequently, the application will be able to decide to which brand the user prefers the most and which brand cloth lasts longer without fades, wear and tear, etc.
- The application will also help the user have a wash count every time the cloth is washed. After selecting a day's outfit, the user will be prompted to select whether the items in the outfit were washed after their previous usage. After selecting, the wash count of the items are displayed.
- The user interface interacts with the user through voice and displays messages; whether the selected outfit is suitable for the day. It makes use of data like the day's climatic condition i.e., temperature, pressure, humidity and precipitation and an algorithm is run; according to which details on if it will be suitable for the day or not is decided.

- It will also interact as to if the outfit is suitable for the particular occasion. The user can interact by initially setting the type of occasion using the interface; e.g.: party, wedding, conference, casual, beach, etc. Depending upon which suggestions will be given by the application along with the accessories which match with the outfit; from the list of accessories available to the user.
- The application has an option to help the user in washing the clothes. The launderer has access to the NFC of the clothes; which can be scanned to maintain his database; for the clothes he washes. The launderer after finishing the cleaning can send a message to the user through the application if the work is done. The bill will be generated and sent to the user. The payment can be made through online money transfer and the clothes can be delivered to the user's place thereby making the laundry process hassle-free.
- The user's measurements will be stored in the database which is used by the application to help the user in the online shopping scenario. Suppose there is an outfit the user really likes but the shopping site does not have it in-stock, the application will help the user to find the outfit on the internet and also to make sure that the outfit is available in the user's measurements. This helps in preventing stress for the user and also saves time by avoiding returning of the outfits after its delivered to the user.
- The application is useful not only to the customer and the laundry man but also to the manufacturer and dealers. It helps the manufacturer to store details about the cloth such as date of manufacture, wear and occasion of the cloth, colour, texture, material, collection-summer or winter, helps in segregating the defective and perfect goods, date of sale to the customer or dealer, etc.
- It helps the dealer to have details about the date of sale, date of purchase from the manufacturer. billing details



### - CONCLUSION

The paper proposes the use of internet of things and NFC technology to modernise the process of manufacturing, buying, selling and managing products in the clothing and fashion industry. The mobile application which is proposed not only helps the end users but also provides a wide range of services to the manufacturing companies. Not only does it help to identify counterfeits but also helps the users in many ways like digitising laundry jobs, keep wash counts, etc. Finally, the system aims to associate internet with the clothing sector and thereby focuses on bringing new innovations to the already booming internet of things. A new dimension of services will be unleashed due to this confluence thereby improving the Quality of livelihood.

### - ACKNOWLEDGMENT

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