

# Interactive Clothing based on IoT using QR code and Mobile Application

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**Abstract**— The proposed system is named as Interactive clothes that influence utilization of QR to code and IoT. A QR code is inserted inside the clothes that comprises of a one of a kind ID. A mobile application is generated, that scans the QR code situated inside the cloth and gets connected to a database put away in a cloud database. It gives an advanced domain to both the producers and the end clients. From assembling viewpoint, the system can distinguish counterfeit brands, keep track of the devoted clients, and limit the assets waste and monitoring track of the merchandise utilizing a single RDBMS system. For end clients, the advantages are gigantic. Personal Stylist (Mobile Application) gives a straight forward UI where clients could get recommendations in regards to their clothes with different outfits, dressing as per the season and choosing whether the shading suits their skin tone or not.

**Keywords**— Cloud database, IoT, Mobile application, QR-code, Relational database system.

## I. INTRODUCTION

As we all know that, food, shelter, clothes, health and education are the fundamental need for human being. With the progression and increment in development, however changes made in clothes enhanced exponentially. These days, the real test looked by the vast majority of the mainstream brands like Adidas, Nike etc. is replication of their merchandise operating at a profit showcase. There are no any strategies have been innovatively created to perceive the fakes that are in some cases unwittingly purchased by customer. Anyone who buys clothes clearly looks the brand esteem, shading, quality, surface and material. When a customer purchases cheap clothes unconsciously, they may be pretended for the quality of original one.

In this paper, keeping in mind the end goal to satisfy the customer requirements with the end goal, I make use of Internet of things technology, QR code and Mobile Application advancements. IoT is another upset of the web which is utilized to interface items to a major system utilizing the Internet. Advancements in IoT are the need of great importance. IoT discovers its utilization in different fields like wellbeing, training, ventures, and so on. The proposed system influences utilization of QR to code implanted inside the clothes. By associating the clothes to the terminal of the internet utilizing QR codes,

recognizable proof, following and observing of the clothes to which tag is connected turns out to be simple. They are cheap substitution to conventional scanner tags and can hold much more information. They also provide support to different encryption mechanisms.

The principle of most recent QR codes is that it can be influenced waterproof and tidy making it more vigorous. These days, everything depends on cloud and specialists too believe that distributed computing is the new pattern in the improvement of IT. For devices where memory is an issue, cloud innovation has given an answer. It is an Internet based figuring innovation where administrations are given to the end clients on a compensation for each utilization premise. It helps in the capacity, recovery and upkeep of large information with included points of interest like omnipresence, consistency, unwavering quality, etc. It in this manner fills in as the platform for the advancement of different new technological developments.

The whole information inside the proposed system "Interactive Clothes" is put away and recovered from cloud system.

## II. LITERATURE REVIEW

With the improvement of web based business and the blasting of m-trade, recommendation(suggestion) systems turn into a basic capacity of web based shopping platforms (e.g. Flipkart.com, Snapdeal.com) to help customers to rapidly and easily discover the things that address their

issues and inclinations. Such proposal in this manner likewise accommodating to act programs as purchasers and thus expanding strategically pitching and building users' reliability. [1]

Current parking system experience may go from postponed meetings; fine charge from the person in no parking zones, vehicles making tracks in an opposite direction from that dead zone the space that fringes on the stopping and furthermore no parking zone. With 900,000 autos and 16 million bikes are getting added to Indian nation streets consistently, finding a place to stop is a fight in the present world. For such issues, a critical arrangement has been proposed in the present parking administration systems with RFID innovation. For that reason, RFID readers, RFID labels, PC, barriers and softwares are utilized as principle components. The software has been utilized for different works. For example, the administration of vehicles, controlling, and exchange detailing of vehicles for parking areas situated on different zones of the city. Registration and registration activity, administrations of the parking garages will be done with RFID readers, labels and barriers. [2]

Numerous conventional membership or rental administrations have gone online nowadays. The majority of these specialist organizations expect users to enroll their, real identity. Tragically, if the suppliers gather and dissect their customer's rental records, this may cause security ruptures to the customers, for example, individual side interests, ways of life, or rental propensities. On the off chance that they their examination comes about or even uncover them to an outsider, it can promote the ruptures. [3]

Due to the effect of capturing environment and resolution, these 2D barcode images are captured by scanner or digital camera, these 2D standardized tag are caught by scanner or advanced camera such as spherical distortion, geometric distortion, image blurring. Furthermore this 2D barcode is then even partly defiled so that it can't be recognized. In order to increase the efficiency of recognition for 2D barcode, the captured images must be gone through preprocessing. [4]

Quick Response code (QR code) is the latest invention in the mobile marketing world. QR codes ability of linking brick world to digital domain is changing the approach of marketing. It gives marketers an opportunity to interact with consumers and engage them with their brand. [5]

In this paper, it intends to assess the need and necessity of the QR code in business, QR execution [QRI], the relationship between QR code and the production network, pros and cons of QR code. This article will endeavor to discover the right way in production sector. We should assemble more knowledge after the further investigation of various articles and this is the essential procedure. The paper demonstrates the different focal points from which producer could accomplish: for instance to enhance

planning, decrease stock possessions, enhanced production and enhanced communication. [6]

The need for data has increased with the increase in the number of users and data. So many cryptographic algorithms are implemented to provide better security at lower cost. Thus in this paper, MD5 and Blowfish (cryptographic algorithms) are studied. They are then compared based on different parameters and are then considered for FPGA implementation. [7]

### III. SYSTEM ARCHITECTURE

#### A. Embedded QR code in cloth [8]

A laminated QR-code is impervious to water and dust, pressure is implanted inside the clothes. The QR-code has a special ID written in it by manufacturer. The manufacturer will create a new entry for the Id, fill his side of the table information. The retailer, after selling the product will fill a couple of extra points of interest. In the user side, the QR-code will be scanned by the Mobile Application, then the Id will be read by it. It is cross referenced with the database after that, corresponding details are retrieved.



Figure 1. Basic positioning of QR code in cloth [8]

#### B. Cloud Database [8]

This database contains all the important fields to serve the inquiries of the manufacturers, retailers and end customers. Once the Id is read it is checked further for its a legitimate id or not, this helps to take out counterfeits All the insights about the item are not visible to everybody. Abstraction is done based on each entity's access rights and the type of query, and just the essential information is conveyed to them. This information is then used by these entities for the proposed purposes.

#### C. Mobile Application [8]

A mobile application based on android platform is developed. This application acts as the interface between the end user and the interactive clothes. The users enter 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.
- From the list of clothes the user has been using frequently, the application will be able to decide onto which brand the user prefers the most and which brand cloth lasts longer without fades, wear and tear, etc.
- 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.



Figure 2. Basic working of the system [8]

#### IV. ALGORITHMS

##### A. MD5 Encryption Algorithm

MD5 is a cryptographic hash algorithm widely used in the field of authentication security. MD5 algorithm takes an input of any length and produces 128 bits output. The Core of MD5 algorithm is hash function, which compresses an input of random length for an input of constant length. It should have the following properties such as:

- A. Computation should be easy.
- B. Should be hard enough for the message to be computed from its digest.
- C. Should be difficult to find another input with same digest.

MD5 contains an operation number of 64 that is grouped in 4 rounds of 16 operations. F is a non-linear function. One of its functions is used in each round. The 32 bits constant is denoted by  $K_i$ , the input message of 32 bits block is denoted by  $M_i$  which is different for each operation. The left bit rotation by  $s$  places is denoted by  $s$ . Four functions are possible, a different one used for each round. The following steps illustrate how to calculate the message digest of the message:

1. Appending the padding bits.
2. Appending the length.
3. Initialization of MD buffer.
4. The message is processed in 16 word blocks.
5. Output.

The implementation details of the MD5 algorithm are as follows:

- 1) Check the no. of bits (length) of the original message (NOM).
- 2) Add No. of bits to the input message (IM), so a total length of the result data equal to the multiple of 512 (the add bit are 1 0 0 .....0).
- 3) Add 64 bits which represent the length of the IM to the result of point 2 the final will represent by  $M$ , where  $M$  (multiple of 512 bits).
- 4) Divided  $M$  to blocks ( $B$ ), each one has 512 bits.
- 5) Divided ( $B$ ) to 16 blocks ( $X$ ) each one have 32 bits.
- 6) The algorithm steps have 4 rounds and each round has 16 steps. The total no. of steps is 64.
- 7) There are four 32 bits shift registers, each one has initial (Hex.) values as:
  - a. Reg. A = [6 7 4 5 2 3 0 1]<sub>32</sub> – bits [A]=[D]’
  - b. Reg. B = [e f c d a 8 9]<sub>32</sub> – bits [B] = [C]’
  - c. Reg. C = [9 8 b a d c f e]<sub>32</sub> – bits [C] = [B]’
  - d. Reg. D = [1 0 3 2 5 4 7 6]<sub>32</sub> – bits [D] = [A]’

- 8) The values of A, B, C and D are stored temporarily in AA, BB, CC, and DD registers respectively.
- 9) This algorithm includes 4 “rounds” of processing. These rounds have same structure but each has different functions F, G, H and I. The operation in single step involve the functions:

$$A=B+((A+F(B, C, D)+XJ[K]+T[i])\lll\ll s) \quad (1)$$

$$D=C; C=B; B=A; A=D \quad (2)$$

Where:

XJ [K] - denote the Kth 32 bits word of  $XJ\lll\ll s$  - circular shift left by s bits.

In the end of four rounds, the output is added to the input of first round

$$A=A+AA; B=B+BB; C=C+CC; D=D+DD \quad (3)$$

- 10) Then, the outputs are 128 bits will arrange as follows:

DCBA  
(Most) (Least)

### B. Decoding Algorithm of QR code

- 1) Binarization.
- 2) Obtain the approximate region of QR-code. Implement coarse positioning for QR image according to the finder patterns.
- 3) Implement accurate positioning according to the alignment patterns.
- 4) Calculate the inclination angel to rotate QR-code image, implement rectification process.
- 5) Obtain version number , implement self-adaptive sampling;
- 6) Decode based on corrected image, input a standard 2D matrix

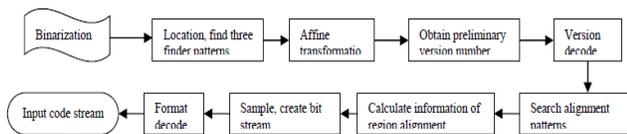


Figure 3. The decoder flowchart of QR code

### V. CONCLUSION

In this paper, the versatile application system which is proposed helps the end clients as well as gives an extensive variety of administrations to the assembling organizations. It helps the users in numerous routes and there by modernize the process of manufacturing, buying, selling and managing products in the clothes, fashion and textile industry.

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### Authors Profile

Mr. Mutkule Prasad Raghunath have completed ME (Computer Engineering) from Savitribai Phule Pune University. He is currently working as a Lecturer in Department of Computer Engineering since 2017. His main research work focuses on IoT, Network Security and Artificial Intelligence based education. He has 1 years of teaching experience.

