International Journal of Multidisciplinary Research And Studies

Available online at
https://ijmras.com/index.php/ijmras/article/view/643

INTERNATIONAL JOURNAL OF
MULTIDISCIPLINARY RESEARCH AND STUDIES
**ISSN: 2640 7272**
**Volume:02; Issue:12 (2019)**
Doi: https://doi.org/10.33826/ijmras/v02i12-01



# Smart Label: A New Paradigm for The Apparel Industry

NOORUL MUQADDIM[1], [2]TARIQUE MAHMOOD[2], REASHAD BIN KABIR[3]

*[1,2,3]Assistant Professor, Department of Apparel Manufacturing Management & Technology, Shanto-Mariam University of Creative Technology, Bangladesh*

*Kabir* https://doi.org/10.33826/ijmras/v02i12-01*

**Abstract**

Modern era is encircled by technological development. Conventional label which is a common item in apparel industry need to be replaced by smart one. In this paper several types of smart label are introduced, that are adapted in recent time. Some of the labels that are conferred here still are in emerging phase and their use are still limited to apparel or clothing items.

**Keywords:** Label, Smart Label, RFID, NFC, Augmented Reality, QR Code, Apparel Industry

## INTRODUCTION

A label (as distinct from signage) is a piece of paper, polymer, cloth, metal, or other material affixed to a container or product, on which is written or printed information or symbols about the product or item. Information printed directly on a container or article can also be considered labeling. Labels have many uses, including providing information on a product's origin, manufacturer (e.g., brand name), use, shelf-life and disposal, some or all of which may be governed by legislation such as that for food in the UK [1] or USA [2]

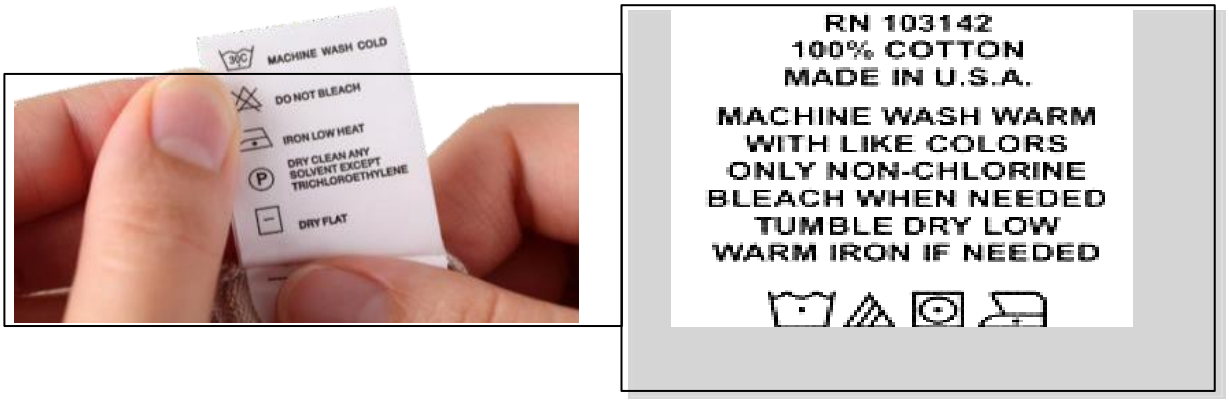
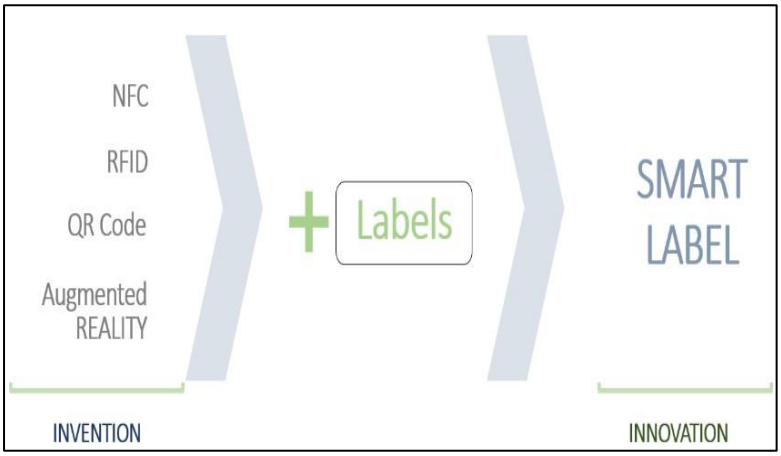


Figure 1. Traditional Label

Smart Labels are the new generation of labels which embeds technologies and features. Four types of smart label are available in recent days. They are: RFID, NFC, QR Code, and Augmented Reality.


Figure 2. NFC, RFID, QR Code, Augmented Reality (Clockwise)






**Reashad Bin Kabir*:** Assistant Professor, Department of Apparel Manufacturing Management & Technology, Shanto-Mariam University of Creative Technology, Bangladesh

Figure 3. Invention & Innovation in Label

## LITERATURE APPRAISAL & DESCRIPTION

### RFID

Radio frequency identification (RFID) is a wireless technology capable of automatic and unambiguous identification without line of sight by extracting a unique identifier from microelectronic tags attached to objects [3]. The RFID is a technology that uses radio waves to transfer data from an electronic tag, called RFID tag attached to an object, through a reader for the purpose of identifying and tracking the object. The RFID is already used to track and trace the victims in a disaster situation. Data can be collected in real time and be immediately available to emergency personnel and saves time by the RFID. Crisis management teams, hospitals and emergency personnel, have access to data through a computer database [4]. The RFID was the first explored in the 1940s as a method to identify allied airplanes [5].

### WORK PROCESS OF RFID

The most RFID systems consist of tags that are attached to the objects to be identified. Each tag has its own “read only” or “rewrite” internal memory depending on the type and application. A typical configuration of this memory is to store product information, such as an object's unique ID manufactured date, etc. The RFID reader generates magnetic fields that enable the RFID system to locate objects (via the tags) that are within its range. The high-frequency electromagnetic energy and query signal generated by the reader triggers the tags to reply to the query; the query frequency could be up to 50 times per second. As a result communication between the main components of the system i.e. tags and reader are established. As a result large quantities of data are generated. Supply chain industries control this problem by using filters that are routed to the backend information systems. In other words, in order to control this problem, software such as Savant is used. This software acts as a buffer between the IT and the RFID reader [6].

### CONSTRUCTION OF RFID

The RFID system consists of various components which are integrated in a manner defined in the above section. This allows the RFID system to deduct the objects (tag) and perform various


**Reashad Bin Kabir*:** Assistant Professor, Department of Apparel Manufacturing Management & Technology, Shanto-Mariam University of Creative Technology, Bangladesh

operations on it. The integration of the RFID components enables the implementation of an RFID solution [13]. The RFID system consists of following five components:

Tag (attached to an object, unique identification).

Antenna (tag detector, creates magnetic field).

**READER (RECEIVER OF TAG INFORMATION, MANIPULATOR).**

Communication infrastructure (enable reader/RFID to work through IT infrastructure).

Application software (user database/application/interface).

In this study the role of the RFID technology in improving patient safety and increase the impact of this technology in the health care industry has been discussed.

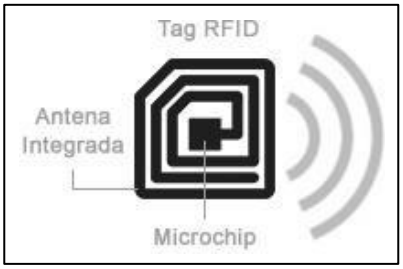



Figure 4. Construction of RFID

**NFC**

Among the different hi-tech content domains, Near Field Communication (NFC) represents an example of innovative production and a technological introduction in the clothing or apparel context. It has a threefold function: card emulator, peer-to-peer communication and digital content access, and it could be pervasively integrated in many different domains. The increasing attention on NFC technology from the academic community has improved an analysis on the changes and the development perspective. This study starts from an analysis of the scientific contributions to Near Field Communication and how the main researches on this topic were conceived [7].


**Reashad Bin Kabir*:** Assistant Professor, Department of Apparel Manufacturing Management & Technology, Shanto-Mariam University of Creative Technology, Bangladesh

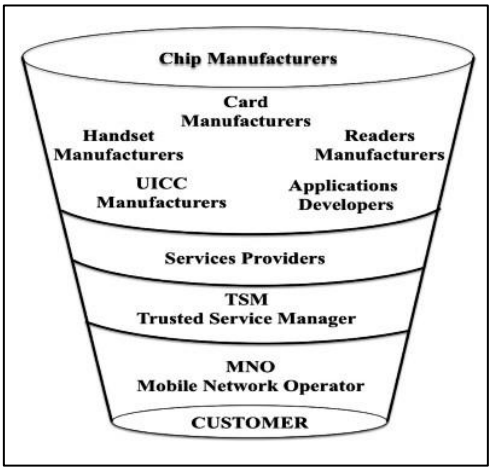



Figure 5. Near Field Communication stakeholder ecosystem (source: authors' elaboration based on [11].

The NFC standard was issued in 2003 [8]. It is a data transmission technology that uses short-range radio waves at the specific frequency of 13.56 MHz, by which it is possible to read tags that are a kind of passive circuit [9]. This technology, among the different sectors in which it is applied, is also integrated in smartphones. It originates from the evolution of studies and researches in the RFID field, or Radio Frequency Identification [10].

## IMPLEMENTATION IN WASHING MACHINES

Washing Machines and other peripheral devices can set proper operation program on the basis of the information from the tag.

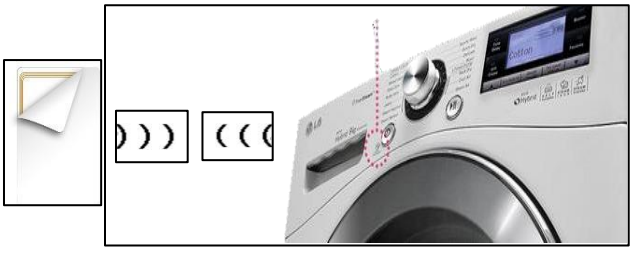


Figure 6. Smart Label readable Washing Machine (for RFID/NFC)

## QR CODES


**Reashad Bin Kabir*:** Assistant Professor, Department of Apparel Manufacturing Management & Technology, Shanto-Mariam University of Creative Technology, Bangladesh

A machine-readable code consisting of an array of black and white squares, typically used for storing URLs or other information for reading by the camera on a smartphone.

QR (quick response) Codes, a type of barcode, are beginning to make inroads in almost every sectors. They are still largely unknown, but early adopters in higher education and recent urban promotional campaigns are changing that. As with any new technology, it is important to understand what they can do and when they can help our users.

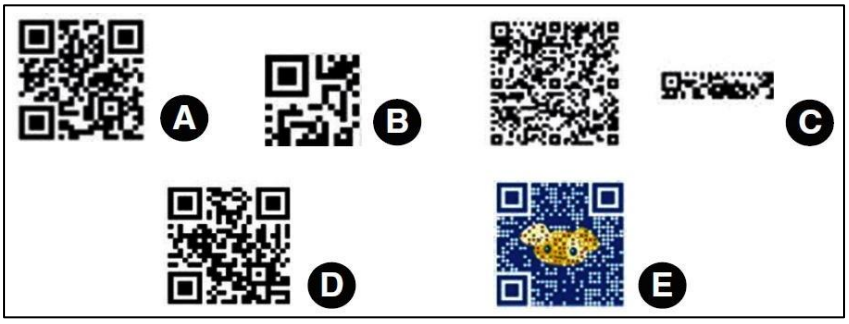
## A QR CODE IS A MATRIX BARCODE READABLE BY MOBILE PHONES WITH CAMERAS.

They are sometimes referred to as 2d codes, 2d barcodes, or mobile codes. On most phones purchased now a days, one must download a free app (application) in order to read the QR code, although some phones have one preinstalled [12].

## TYPES OF QR CODES

It is worth examining each type of QR code briefly. QR code model 1 is the original QR code, and it can store up to 1,167 numerals (Fig. 7A). Model 2 was created by improving model 1 so that the code can be read more smoothly, and it can store up to 7,089 numerals. An ordinary QR code usually refers to model 2. Next is the micro QR code (Fig. 7B). There is only one

orientation detecting pattern for this code. The advantage of the micro QR code is that it can be printed in a smaller space than the earlier models. An iQR code can be constituted of either square modules or rectangular ones (Fig. 7C). It can be printed as a turned-over code, black- and-white inversion code, or dot pattern code. SQRC has a reading restriction function (Fig. 7D). It can be used to store private information or manage a company's internal information. Logo can incorporate high-level design features such as illustrations, letters, and logos (Fig. 7 E) [13].





**Reashad Bin Kabir*:** Assistant Professor, Department of Apparel Manufacturing Management & Technology, Shanto-Mariam University of Creative Technology, Bangladesh

Figure 7. (A) QR code model 1, (B) micro QR code, (C) iQR code, (D) SQRC, and (E) logoQ [14].

## INFORMATION ENCLOSE BY QR CODE

All the Care Information can be stored in a QR code Label easily. A machine can read this information through QR code and calibrate itself for the optimal caring condition of the textile product

Home Automation

A smart phone can read this instruction and send to home automation software for handling

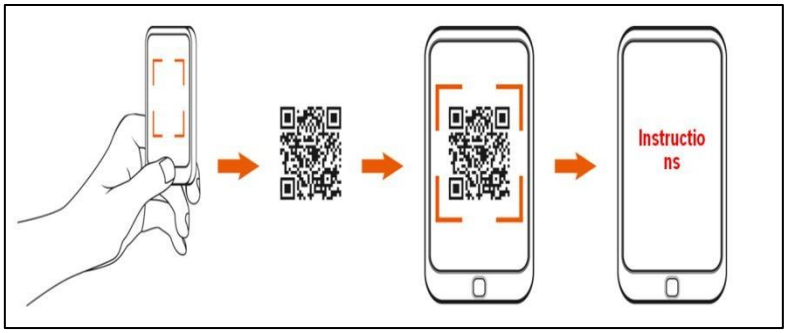



Figure 8. Home Automation of QR Code

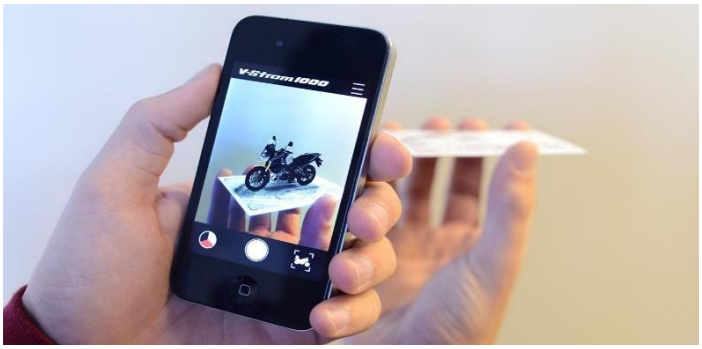


Figure 9. Augmented Reality

Augmented Reality & Aruco Virtual reality immerses your senses completely in a world that only exists in the digital realm, augmented reality takes the real world of the present and projects digital imagery and sound into it. Augmented and Virtual Reality both fall on the continuum of mediated reality. Which is where a computer system modifies our perception of reality versus the "real" world. As you can probably deduce this means many things qualify as augmented reality.

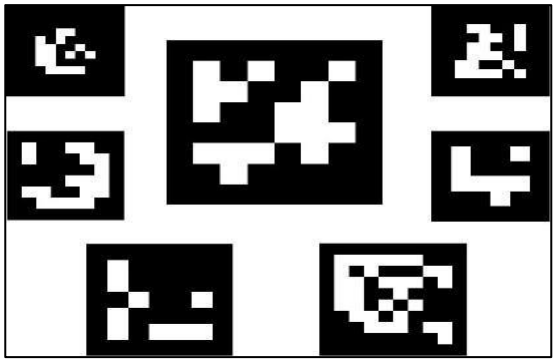

**Reashad Bin Kabir*:** Assistant Professor, Department of Apparel Manufacturing Management & Technology, Shanto-Mariam University of Creative Technology, Bangladesh

The heads up displays we see in some aircraft and cars that may show you things like "distance to a target", GPS position or your current speed are a form of augmented reality. Events with digital avatars of deceased musicians such as Michael Jackson and Tupac Shakur projected onto a screen using the Pepper's Ghost illusion would also qualify under a broad definition of augmented reality. However, when we hear about augmented reality these days it usually refers to a much more sophisticated, interactive and spatially aware implementation of the concept. Where digital objects such as 3D models or video are projected onto our view of reality as if they were really there [15]

## ARUCO CODE (MARKER)

An ARUCO marker is a synthetic square marker composed by a wide black border and a inner binary matrix which determines its identifier (id) .The ARUCO Library has been developed by the Ava group of the Universidad de Córdoba (Spain). It provides real-time marker based 3D pose estimation using Augmented Reality markers.

Figure 10. Aruco Code (Marker)



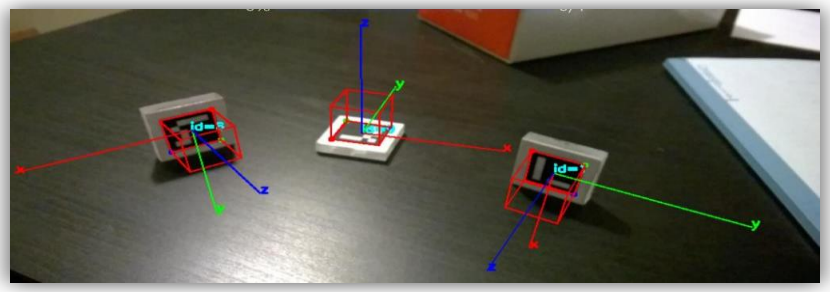


Figure 11. Positioning by Aruco Code

## MANAGERIAL IMPLICATION AND DISCUSSION

These Smart Labels can revolutionize the Fashion Marketing. Since advertisement is essential for product marketing and making advertisement is very pricey and time consuming. However,


**Reashad Bin Kabir*:** Assistant Professor, Department of Apparel Manufacturing Management & Technology, Shanto-Mariam University of Creative Technology, Bangladesh

casting of performers is also complicated. By using smart label specially Augmented Reality label no brands need to go for massive commercial rather they can produce advertisement in each label which will lower the "Cost of Making". On the other hand, by implementing this circulation of product can be improved as individual product can have separate advertisement in its label which will attract more customer to buy that product. In addition to this, use of Augmented Reality containing Label is economical in all aspects. As it requires no Television Commercial which are costly and, in some cases, not environmentally friendly. Hence, integrated use of these smart label is just the demand of time.

## CONCLUSION

A label is an essential part of a garment. As this is age of technology smart or high tech label and their use should be increased. Although the smart labels are used widely in various sectors but their integrated use in apparel and clothing item is still few. Since this is new concept and all the "pros and cons" should be measure before going for bulk use.

## REFERENCE


1. "UK Food Labelling & Packaging". Retrieved 5 Mar 2014.
2. Jump up^ "FDA Food Label Requirements in a Nutshell". Retrieved 12 June 2015
3. Wu Y, Ranasinghe DC, Sheng QZ, Zeadally S, Yu J. RFID enabled traceability networks: A survey. Distrib Parallel Databases. 2011; 29:397–443.

a. Ajami S, Akbari B, editors. Isfahan, Iran: Health Management and Economics Research Center, Isfahan University of Medical Sciences; 2012. RFID in Earthquake Information Management System: Work in progress. In Health system, risk management And Disaster.

4. Landt J. Potentials. Vol. 24. New York: IEEE Institute of Electrical and Electronics Engineers; 2005. The history of RFID; pp. 8–11.
5. Ahsan K, Shah H, Kingston P. RFID applications: An introductory and exploratory study. IJCSI Int J ComputSci Issues. 2010; 7:1–7.
6. Gabriella Arcese , Giuseppe Campagna , Serena Flammini and OlimpiaMartucci, Near Field Communication: Technology and Market Trends, Technologies, 2014, 2, pp. 143- 163
7. NFC Forum, www.nfc-forum.org. Available online: http://www.nfc- forum.org/resources/ faqs # howwork (accessed on 29 April 2014).



**Reashad Bin Kabir*:** Assistant Professor, Department of Apparel Manufacturing Management & Technology, Shanto-Mariam University of Creative Technology, Bangladesh

8. Ortiz, S., Jr. Is near-field communication close to success? Computer 2006, 39, 18–20.
9. Yaqub-Undergraduate, M.U.; Shaikh-Undergraduate, U.A. Near Field Communication— Its Applications and Implementation in K.S.A. 2012. Available online: http://www4.kfupm.edu.sa/ssc/4845_MohammedUmair_Yaqub.pdf (accessed on 29 April 2014).
10. Madlmayr, G.; Langer, J.; Scharinger, J. Managing an NFC ecosystem. In Proceedings of the 7th International Conference on Mobile Business, 2008 (ICMB '08), Barcelona, Spain, 7–8 July 2008;pp. 95–101.
11. Robin Ashford, "QR codes and academic libraries", ACRL TechConnect, November 2010, pp. 526-530
12. Jae Hwa Chang, "An introduction to using QR codes in scholarly journals" Science Editing, 2014;1(2): pp. 113-117
13. Denso Wave Incorporated. QRcode.com [Internet]. Aichi (JP): Denso Wave Incorporated; 2014 [cited 2014 July 28]. Available from: http://www.qrcode.com/en/
14. https://www.vrs.org.uk/augmented-reality/


**Reashad Bin Kabir*:** Assistant Professor, Department of Apparel Manufacturing Management & Technology, Shanto-Mariam University of Creative Technology, Bangladesh