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International Journal of Current Trends in Engineering & Research (IJCTER)
e-ISSN 2455–1392 Volume 3 Issue 5, May 2017 pp. 23 – 26
Scientific Journal Impact Factor : 3.468
http://www.ijcter.com

Review of Random Number Generation

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Abstract—Numbers that are evenly distributed over a defined interval and it is not possible to estimate subsequent values based on preceding ones are known as Random Numbers [12]. In early days, random numbers were generated using dice or like lucky draw method but now there are various methods to generate random number which has less predictability. The current methods to generate random number which discover are has many applications for example, data encryption, secure electronic voting, and simulate accurate complex systems [11]. This paper gives a review of the random number generation methods and analyses the techniques in terms of performance.

Index Terms—pseudorandom number, Captcha, Complementry multiply with carry

I. INTRODUCTION

RANDOM number generation methods are used to generate the number which is independent on previously generated number. Randomness has many uses in science, art, statistics, cryptography, gaming, gambling, and other fields [21]. From the starting of the random number there are various methods found, but each and every method has some advantages and disadvantages. True random numbers and pseudo random numbers are the types of random number [21]. True random numbers are unpredictable where as pseudo random number is predictable after some period, that period is too huge [21]. This paper gives the review of the pseudo random number generator (PRNG) methods.

II. LITERATURE REVIEW

From the review of many research papers it is observed that many researchers are developed different algorithms to generate irregular number. Algorithm of PRNG is used for generating a series of numbers that proximate the various properties of random numbers [13]. Pseudorandom numbers are important in simulations and are important in the cryptography.

There are many methods to generate random number. Form all this method here, Blum Blum Shub, Complementary-multiply-with-carry, Inversive congruential generator, Lagged Fibonacci generator, Linear congruential generator, Linear feedback shift register, Middle-square method, Multiply-with-carry, Xorshift, Counter-based random number generator (CBRNG), MIXMAX generator, Yarrow, BlumMicali algorithm all this methods are reviewed.

Blum Blum Shub proposed in 1986 by Lenore Blum, Manuel Blum and Michael Shub. A pseudo-random number sequence which is produced by generator is a polynomial time randomized for the every fixed initial segment. In this method there are two different generators are defined. They are 1/P generator which is predictable and x^2modN generator is not predictable. The applications of these methods are constructing de Bruijn sequences and public key cryptography [2].

Complementary-multiply-with-carry is the another method, uses the primes of the form $ab_r + 1$. This method is simple, fast, have a good quality and require astonishing period. CMWC is used in game development [14]. Inversive congruential generator is a nonlinear congruential PRNG [15]. This generator denoted by ICG.

Lagged Fibonacci generator method has the equation $x_n = x_nk + x_n \quad l \pmod{M}$; $l > k$ Where M= modules and also prime, l = register length, k = lag. This method used in computer hardware this can provide modulo arithmetic by storage-bit truncation.

Linear congruential generator is the basic of PRNG algorithm [7]. Following is equation for generating random number, $X_n + 1 = (ax_n + c) \bmod m$ where X_n is the sequence of pseudo-random values, m is the modulus, a is the multiplier, c is the increment,X_0 is the seed value [7]. This method is fast and requires less memory. But LCG is not useful for application where high-quality randomness is required.

Linear feedback shift register is used for creating a sequence of binary bit. This method is used in many hardware applications. Linear feedback shift register is generating random number in fast way. XOR operation is used for generating random number. This method is used in digital broadcasting and communications.

Middle-square method, middle digits of the previous number generate each successive number. First of all we take a seed value, and calculates it square. After squaring it, we select middle digits of that number and take it as the seed value for next pseudorandom number [20]. This way, middle digits of previous numbers acts as the seed value for the next number [20].

Multiply-with-carry method is used for generating sequence of random integer from an initial set of two into thousands of randomly choose seed values [19]. MWC invokes simple computer integer arithmetic and leads to very fast generation of sequences of random numbers with very large periods, ranging from 2^{60} to $2^{2000000}$, are the advantages of this method [19].

Xorshift random number generator is a class of PRNGs. By the combination of many XORshift operations, simple and fastest RNGs can be combined. If the number of combinations is odd then this primitive is Invertible. XORshift require less code and small state. This is the fastest non-cryptographically-secure random number generators.

Counter-based random number generator (CBRNG) are used for parallel computation. Counter based PRNGs are quick, need small or no state, and are easy to initialize. They have extensive periods and have approved set of statistical tests. Full AES and Threefish encryption algorithms are used by CBPRNGs. The fastest PRNGs are including in Philox and Threefry families [8].

MIXMAX is NXN matrix developed as a solution to the problem of determining the integer-valued unimodular maximal matrix generator of PRNs. MIXMAX generator is faster in 24 bit and 48 bit precision and 32 bit Mersenne Twister.Yarrow is an improvement of a PRNG. Yarrow reuses existing building blocks [18].

Yarrow is designed to be secure to handle cryptanalytic attacks, Yarrow is better at opposing the attacks [18]. For a restricted number of output bytes, yarrow gives limits to backtracking attack [9].

BlumMicali algorithm method is a cryptographically secure generator [17]. Let x be an odd prime, y be a primitive root modulo x, X_0 be a seed, and let [17]

$X_i + 1 = y^{xi}$ mod x. If xi ¡ p-1/2 then i^{th} output is 1, otherwise it is 0. Computing discrete logarithms modulo p is impossible if p is so large and because of this algorithm become secure [17].

From the above all discussion it is concludes that we have a many methods to generate Random number. Each method has its pros and cons. From the above review we can say, Complementary-multiply-with-carry is the method which is better to generate random number for some application which are totally depend on randomness and yarrow is also the method which is useful for security purpose.

III. APPLICATION

By reviewing all this method we can say that Complementary multiply with carry" is the method which can be used to generate captcha. The application is to replace captcha for web portals. To do so, first we generate the random number, and then calculate the length of this random number. Then, divide the random number into the array of two digits. If any two digit forms ASCII code, in build functions will convert this two digit number to alphabet, else keep it as it is. Therefore, length of the modified random number will be 5-10. This random number will be used instead of captcha while using web portals. This application will reduce overhead of using database in web portals for generating captcha. It will be done by validating random number generated by server with random number entered by user at client side.

Following image shows the sample of captcha.

Fig. 1. Captcha

IV. CONCLUSION

This paper briefly reviewed Random number generation algorithms. Proper selection of Random number generation techniques is an important to generate random number for security purpose. This paper gives overview of random number generation algorithms.

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International Journal of Current Trends in Engineering & Research (IJCTER)
e-ISSN 2455–1392 Volume 3 Issue 4, April 2017 pp. 128 – 133
Scientific Journal Impact Factor : 3.468
http://www.ijcter.com

Eye Monitoring System for Road Transportation Safety

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Abstract—The Research paper focuses on impact and importance of eye monitoring system to avoid road accident cases. Recently driver sleepiness and fatigues are major factors responsible for fatal road accidents. The current research work monitors blinking of the driver's eyes. Many a times, the drowsiness/fatigue of driver may results in sleep indication, unconsciously eyes get closed and the focus on driving gets distracted. In the designed eye monitoring system sensors are used to check that the eye lids are closed more than 5 seconds then these sensors will generates the voice signal. The voice signal is generated from the sensors are in the form of the audio voice signal. Audio signal will be amplified and resulting in loud voice alarm. Thereby resulting in strong voice alarm and making driver alert. Hence, within a few seconds driver will regain his focus and control the vehicle in an effective manner. Thus it will helps in avoiding any future road accidents due to the sleepiness and Fatigue.

Keywords— Eye monitoring System, Neural Network, IR Spectrum, Morphological Operation, Camera Lens, Audio Signal.

I. INTRODUCTION

Now day's vehicle accidents because of driver sleepiness and fatigues are causing the many harms to human being. Hence, lately diverse methods presented by many researchers for early recognition of driver drowsiness in order to stop accidents on road. The methods are generally known as driver face observing methods introduced for driver tiredness detection as well as accident prevention. Most of methods are established on image processing ideas in which images of river face are caught, and then extracted the eyes position of driver from input image. The symptoms for sensing the drowsiness are eyelid distance, eyelid closure over time yawning etc. In this paper our objective is to present innovative outline for detecting the driver sleepiness or fatigue efficiently using eyelid closure sensor approach. Innovative eyelid closure sensor points on input image. Local eye features are extracted and used for template matching process to detect whether eyes are open or closed. Most of existing methods uses either yawing technique or eye blinking technique for driver sleepiness detection; in this paper, I proposed method which is the sensing of opened and closed eyes.

II. LITERATURE REVIEW

In current section briefly we have few important research work in such related area for driver's drowsiness detection. These approaches are characterized into different categories based planned method such as face detection based methods, eye detection based methods etc

[1] Face Detection Methods As per Wang et al. anticipated method wherein position of face was estimated by the perpendicular projection of the gray level image. In this paper, background of the driver was hypothesized non-cluttered whereas the face has lighter contrast than background. Whereas Viola et al. offered an algorithm for object detection, which uses very simple features named Haar-like features. In such algorithm, many numbers of Haar-like features are extracted from the image, and a number of actual features are selected using AdaBoost algorithm, and then these features are administered in a hierarchical structure comparable to the decision tree. Owing to the simple extracted features and assortment of the best features, this algorithm is relatively fast and

robust. According to Hamada et al. method he used neural systems for face detection. In this method, an edge detection method was applied on the image, and then the result image was scanned by a window and is assessed by neural network to sense face.

[2] Eye Detection Methods In these methods, physiological and optical properties of eye in IR spectrum are used. Zhu et al. proposed imaging in IR spectrum based technique for eye detection, excluding that after initial eye recognition, used Support Vector Machine (SVM) for increasing precision of eye detection. In such paper, numerous SVM kernels are investigated and it is shown that Gaussian kernel has the best accuracy. Author Zhao et al. used only one IR light source for eye detection which was located along the optical axis of the camera. According to position of the light basis with respect to driver, pupil is constantly seen brightly in the image. Hence, eye locations were detected using opening morphological operation and subtracting the resulted image from the original image. Then, some candidate points were extracted by applying a threshold on variance image and then using connected component investigation. T. Brandt present approach with supposition that eye is the darkest points in face, eye location was estimated. Author Smith et al. determined binary image of face region after face detection based on the skin color. Binearization of face area was accomplished based on the skin color and causes eyes appear black, while other parts of the face appear white. Then, the connected component investigation was used to enhance the accuracy of eye detection. Author Roshani Tabrizi et al. proposed an eye detection algorithm that detects eye in the HSV color space. In this method, a linear transform was applied on image in YCbCr color space, and then the transformed image was converted to binary image. Additional methods are introduced by few authors for eye detection, yet such methods are very time consuming. Batista detected eye region based on a face model. For this purpose, the predictable eyebrow area was alienated from face image and was managed with Sobel edge detection operator. Then, the eyebrows area was detected by calculating projection of edges of image. Because eyes region is always underneath eyebrows area, eyes region was detected. It was anticipated that pupil is the darkest area in eye. With this hypothesis, after intensity improvement, image binarization was performed and after edge detection, pupil was detected. Author M. J. Flores proposed two different methods for eye detection in day and night.

[3] Drowsiness Detection Methods In R. Graceet al research window was utilized for eye tracking. This system was developed on a PC104+ and could attain a processing speed of 10 fps. The main shortcoming of this system is that in the cases of rapid movement of head, chasing is disturbed and uncovering should be done again manually. As per Rang-ben et al. they used a template matching method based on Hausdroff distance for eye tracking. Consequently, the similarity between templates besides search window was calculated, and the point with the lowest distance was estimated as eye location. Tracking speed of 10 fps was reported using this method.

III. RESEARCH METHODOLOGY

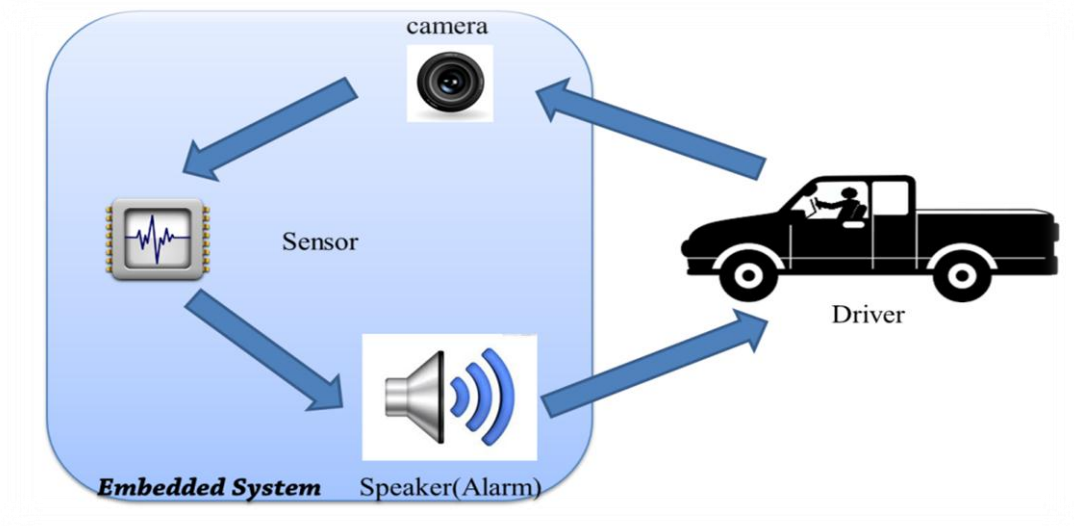
The Driver Eyes Monitoring System to avoid road accidental cases in road transportation is for vehicle safety technology feature that helps in preventing the road accidents caused by the drivers feeling drowsiness and fatigue.

In the current research work, the main focus is on the monitoring blinking of the driver's eyes. Many a times, the drowsiness/fatigue of driver may results in sleep indication, unconsciously eyes get closed and the focus of the safety driving gets distracted.

In case, if driver experience fatigue/sleepiness it results in closure of the eye lids and ultimately shows sleeping indication. Thus, in given research/project, if driver doesn't shows blinking for more than 5 seconds. Then it will be captured by the camera lens which is installed in the front of the

drivers face i.e. on the windshield. The image captured by the camera lens is send to the sensors. Sensors checks that the eye lids are closed more than 5 seconds then this sensors will generates the voice signal. The voice signal is generated from the sensors are in the form of the audio voice signal. Audio signal will be amplified and resulting in loud voice alarm. Thereby resulting in strong voice alarm and making driver alert.

Figure 1. Working of the System



Hence, within a few seconds driver will regain his focus and control the vehicle in an effective manner. Thus it will helps in avoiding any future road accidents due to the sleepiness and Fatigue.

Figure 2. Device Structure

The actual device structure is compact and easy to use. The installation of this device is very simple. Power supply is given to the device through the mobile charger plug which is available in the all the vehicle already. The device is mounted in the front of the drivers face (i.e. on the dashboard).

3.1. Benefits of the Device:

- Portable
- Ease of installation
- Less Cost

3.2. Benefits of the System:

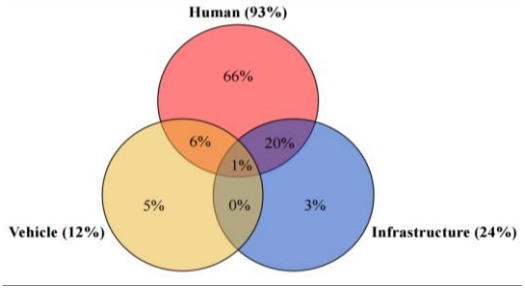
- Security and Safety
- Avoids accidents
- Easy to use

IV. RESULTS AND FINDINGS

4.1. ACCIDENT AND INJURY CONTRIBUTING FACTORS ANALYSIS:

Factors Influencing Occurrence of Accidents (155 accidents) A distribution by contributing factors (human/vehicle/infrastructure) for the 155 road traffic crashes analyzed for this study is shown in the Venn diagram (Figure A). This diagram shows that human factors alone (66%) had the highest influence on the occurrence of accidents, followed by the combination of human and infrastructure factors (20%).

Figure 3. Distribution of 155 accidents by contributing factors influencing the occurrence of accidents



4.2. HUMAN FACTORS INFLUENCING ACCIDENT OCCURRENCE:

For the 155 crashes examined, the following are the contributing human factors determined to have influenced the occurrence of an accident. The table shows both the number and the percentage of accidents influenced by each factor. Please note that more than one factor can influence an accident; hence, the sum of percentage influence will not be equal to sum of human factors influencing accidents (93%). Also factors with negligible counts have not been included in the table for analysis.

Table 1. Contributing human factors influencing the occurrence of 155 accidents

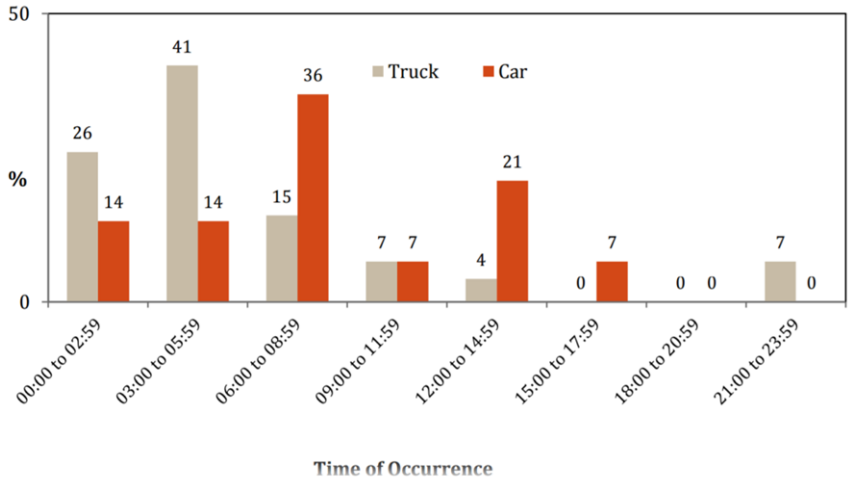
Contributing Human Factors (Accident Occurrence)	Number of Accidents	% Influenced
Improper lane change / lane usage (26 Cars, 11 Trucks. 2 Buses, 2 Mini-truck, 5 Unknown Vehicle)	47	30%
Speeding - exceeding speed limit (41 Cars, 4 Trucks)	45	29%
Driver – Sleep/Fatigue/Drowsiness (27 Trucks, 14 Cars, 1 Bus)	42	27%
Speeding - excessive speed for conditions (8 Cars, 7 Trucks, 2 Buses)	17	11%
Driver Inattention (11 Cars, 1 Mini-truck, 1 Bus)	13	8%
Overtaking on left side of vehicle (8 Cars, 1 Truck)	9	6%
Parked vehicle on road (Full or Partial) (6 Trucks, 1 Car, 1 Bus)	8	5%
Driving too slow for conditions (2 Trucks, 1 Mini-truck, 1 Bus)	4	3%
Following too closely (2 Buses, 1 Car, 1 Truck)	4	3%

As can be seen from Table 1, improper lane change, speeding, driver sleep/fatigue and overtaking from the wrong (left) side account for the largest percentage of the driver errors leading to an accident.

Driver sleep / fatigue — 27% (27 Trucks, 14 Cars, 1 Bus) Continuous driving for many hours, particularly on long stretches at constant speed, can make drivers feel bored and sleepy. Add nocturnal hours or post-lunch hours, and the problem is aggravated. These combinations can cause drivers to fall asleep and drive off the roadway into the median or the shoulder area. At what time is this problem most prevalent? Truck drivers typically spend a lot of time driving at night. Hence, 67%

of sleep/fatigue influenced truck accidents were observed between 00:00 and 06:00 hrs, as shown in Figure B. In the case of car accidents, however, 71% of the sleep/fatigue accidents occurred during daylight hours.

Figure 2. Percentage Distribution of sleep/fatigue accidents involving trucks and cars, by time of occurrence (Trucks = 27; Cars = 14)



V. CONCLUSION

Lately as per IRB survey it had indicated that 27 % road accidents are due the driver fatigue, sleepiness & drowsiness. So as to avoid road accidents designing driver drowsiness detection system will be certainly fruitful. Thus it is concluded that eye monitoring system is one of the rapid method for making driver alert if drowsiness or fatigue is experienced while driving. It is one of the most efficient method that can help us to reduce incidences of fatal road accidents caused due to the driver fatigue, sleepiness & drowsiness.

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Implementation of smart data in Market Research Strategies.

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Abstract*—Market research is one of the major sectors in today's world. One of the famous strategies used in market research is Surveys. Surveys consist of questions which are answered by consumers or customers. Data collected through these surveys is used to develop strategies for improving products and services. Consumers/Respondents may found surveys lengthy and irritating if they are asked to answer same questions repetitively. To avoid this we introduce Smart data in the paper. Smart data is usually a big data turned into actionable data that is available for a variety of business outcomes, whether it's in industrial applications, data-driven marketing or process optimization. With smart data were really looking at ways to remove the noise of the sheer aspect of Volume.

Keywords - Market research, Surveys, Consumers, Data, Smart data.

I. INTRODUCTION

There are many organizations working in market research domain. They develop surveys to collect data. This data is then shared with clients. Organizations do have a group of qualified respondents, which are paid respondents. Data provided by this respondent is 100% accurate. These respondents are general consumers of all market products and services. Based on such qualified respondents they hold a good data accuracy and high
reputation in market research. Every project market researcher takes survey and these respondents are asked to answer these surveys. These surveys consists many similar questions which are needed across all projects. Respondents may feel it as irritate and repetitive to answer same questions again every time. These may affects data accuracy and would not give proper results. To control this smart data is introduced. Smart data is data of respondents. Standards are developed and for every project/survey this data is pulled from database. This reduces the questions for respondents to answer and allows respondents to focus only on core questions. It helps in giving more accurate and quality data. Also saves respondent time and encourage them to give more surveys.

Fig. Market Research Process

Market Research - Market research is any organized effort to gather information of target markets or customers. It is a key component of business strategy. The term is commonly exchanged with marketing research; however, expert practitioners may wish to draw a divergence, in that marketing research is anxious specifically about marketing processes, while market research is anxious specifically with markets. Market research is a important factor in maintaining competitiveness over competitors. Market research provides vital information to recognize and inspect the market need, market size and competition. Market-research techniques encircle both qualitative techniques such as focus groups, in-depth interviews, and ethnography, as well as quantitative techniques such as customer surveys, and analysis of subordinate data. Market research, which includes social and opinion research, is the well ordered gathering and explanation of information about individuals or organizations using statistical and analytical methods and techniques of the applied social sciences to gain intuition or support decision making.

Surveys - A field of applied statistics of human research surveys, survey methodology studies the sampling of individual units from a population and the associated survey data collection techniques, such as questionnaire construction and methods for improving the number and accuracy of responses to surveys.
Statistical surveys are undertaken with a view towards making statistical presumptions about the population being studied, and this depends strongly on the survey questions used. Polls

about public opinion, public health surveys, market research surveys, government surveys and censuses are all examples of quantitative research that use concurrent survey methodology to answer questions about a population. Although censuses do not include a "sample", they do include other aspects of survey methodology, like questionnaires, interviewers, and non-response follow-up techniques. Surveys provide crucial information for all kinds of public information and research fields, e.g., marketing research, psychology, health professionals and sociology.

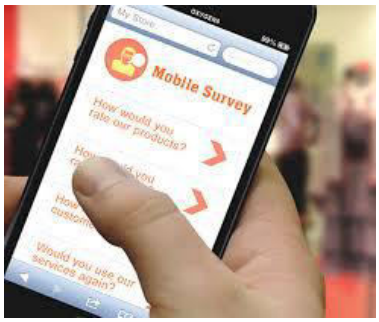

Fig.Mobile Survey

Questionnaires - This is a series of written questions a participant have to answer. This method collects responses to questions that are essay or agree/neutral/disagree style.

Interviews - Questions posed to an individual to obtain information about him or her. This type of survey is like a job interview, with one person asking another person a load of questions.

Consumers - A consumer is a person or organization that uses economic services or commodities. The consumer is the one who pays to consume goods or for taking any service for the purchased product. In this case the consumer is the one who buys the products. Every time a new consumer walks into any company or to any franchisee of that company the details of the consumer is stored in the data base. Then these consumers become the respondents for any survey that the company has to conduct.

II. IMPLEMENTATION

Respondent's basic data is stored in data base. In our case the respondent is the one who buys the product from any company. When the product is being sold the details of the consumer is stored in the data base. The next time whenever the consumer returns back to the company or to any franchisee of that company a review or feedback is taken from them. The feedback form can either be google sheets or particular site in which the feedback form is present. Every time the consumer visits to take any service from the company or to any franchisee of the company a reminder is sent to the consumer to fill the feedback form. The link of the google sheet or the website containing the feedback form is sent to the respondent. For every project these data is pulled from this database. Surveys developed are basically desktop applications. Smart data is pulled and stored into these surveys during development only. So when surveys are developed and shared with all respondents there is basic information already stored in the database.

A. Experimental setup: Step 1

We created a survey of 25 questions, and took the trial of 10 consumers. Time required to complete this survey was around 12-14 minutes. Out of 25 questions 10 were based on personal information like name, address, occupation, family information, contact etc. and other questions were related to the product.

Consumers were given link of this survey and were asked to fill them. When all 10 replies were received, they were stored and analyzed using many attributes. Below are the graphs of same:

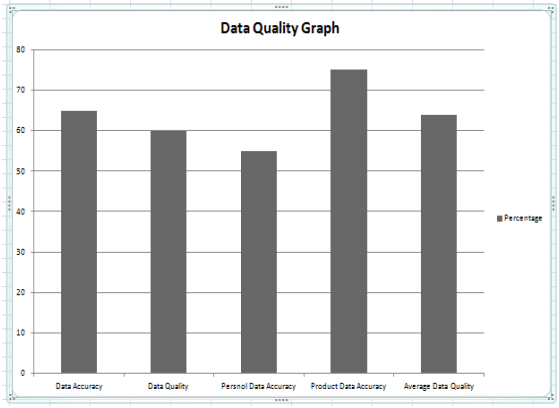

Fig. Data quality of 64-68%

We also found out that the average time required for 10 consumers to fill this survey and below is the graph to demonstrate it:

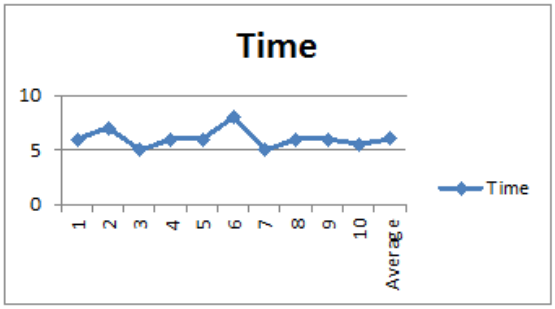

Fig. Average time 13.3 to fill the survey.

Fig. An average rating of 3.2/5 from the respondents.

B. Experimental setup: Step 2

In the next step, we again developed the same survey and asked the same 10 consumers to answer them. This time we fill their personal information data explicitly into the survey as we had it in my database when we first asked them. All 10 questions based on personal information were preloaded with data and consumers were only asked to validate it and fill the rest questions related to product. When we received the responses, they were analyzed again on same parameters. Below are the graphs that demonstrate the survey in three different dimensions:

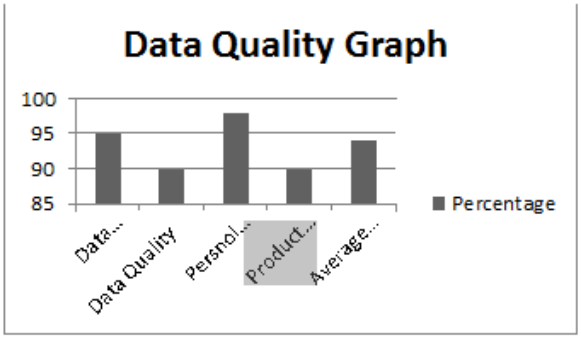

Fig. Data quality of 93-96%

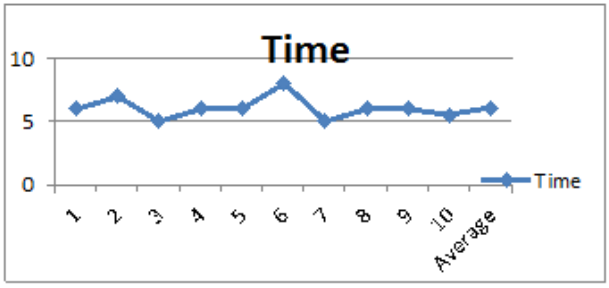

Fig. Average time 6.4 minutes to fill the survey.

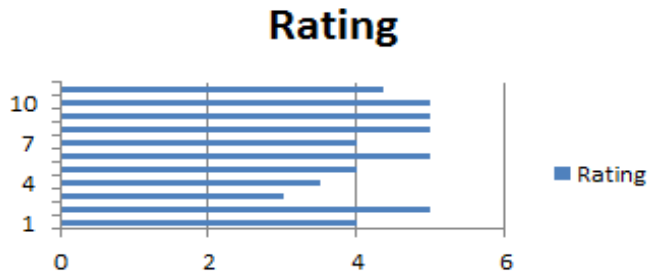

Fig. An average rating of 4.5/5 from the respondents

So from above three graphs It is found that consumer's Average data quality is 93-96%, Average time is 6.4 minutes and Rating given is 4.5/5. So there is drastically change observed in all 3 parameters.

III. RESULT

Above experiment gives us a clear indication of high rise in data accuracy, time saving and respondent feedback. Below is the table of same:

- From this table it can be noticed that data quality is improved by a great extent with smart data implementation.
- Respondent time is reduced from 13.3 minutes to 6.4, which is equivalent to half reduction in time.
- The last parameter about respondent feedback on survey is raised from 3.2 to 4.5. Which shows their interest is increased and are been encouraged more to give surveys.

Parameters	Without Smart data	With Smart data
Data Quality (%)	64-68	93-96
Time (minutes)	13.3	6.4
Rating (out of 5)	3.2	4.5

IV. OBSERVATION

- Observation shows - Less time is needed to complete projects as respondents have to answer only core questions.
- Data accuracy is increased; respondents feel easy and are encouraged to give more surveys.
- Smart data contains all basic information so it is helpful to sort respondents and project requirements.

V. CONCLUSION

Smart data helps organization to increase business. Respondents are more loyal and data is much more accurate than before. It has helped organization to complete more projects in less time. They can implement this technique in their process and can experience good growth in business.

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International Journal of Current Trends in Engineering & Research (IJCTER)
e-ISSN 2455–1392 Volume 3 Issue 4, April 2017 pp. 22 – 28
Scientific Journal Impact Factor : 3.468
http://www.ijcter.com

Impact and Importance of Cashless Transaction in India

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Abstract—The Research paper focuses on impact and importance of cashless policy in India. According to Government of India the cashless policy will increase employment, reduce cash related robbery thereby reducing risk of carrying cash. Cashless policy will also reduce cash related corruption and attract more foreign investors to the country. In many countries introduction of cashless economy can be seen as steps in the right direction. It is expected that its impact will be felt in modernization of payment system, Reduction in the cost of banking service, Reduction in high security and safety risk and also curb banking related corruption. Electronic banking will be made banking transaction to be easier by bringing services closer to its customers hence improving banking industry performance.

The financial safety over the digital payment channel is important for pushing the cashless economy idea. A major obstacle for the quick adoption of alternate mode of payment is mobile internet penetration, which is crucial because point of sale terminal works over mobile internet connection, while banks have been charging money on card-based transaction which is seen in hurdle. India has been using electronic payment system for many year now, However the retail sector still has predominance of cash transaction and payment through cash is yet to pick up card is the one of the most secure, convenient mode of cashless payment in retail market.

Keywords—Cashless Transactions, Unified Payments Interface, Information Technology, Cashless Economy, Economic Growth, Electronic-payment

I. INTRODUCTION

The Indian payment system is rapidly transiting to more and more IT based systems. In the retail sector we have very high volumes of money transactions. Other than cash, one of the growing payment methods adopted by merchants in the sector is payment cards. However, the whole isometrics of moving from cash-driven economy to cashless economy has somehow been assorted with demonetization that was aimed to extract liquidity from the system to unearth black money. With increasing adoption of electronic payments, particularly those driving e-commerce and m-commerce, there is a growing demand for faster payment services which, in turn, facilitate ease in doing financial transactions. Reducing Indian economy's dependence on cash is desirable for a variety of reasons. India has one of the highest cash to gross domestic product ratios in the word, and lubricating economic activity with paper has costs. According to a 2014 study by Tufts University, *The Cost Of Cash In India*, cash operations cost the Reserve Bank of India (RBI) and commercial banks about Rs21,000 crore annually. Also, a shift away from cash will make it more difficult for tax evaders to hide their income, a substantial benefit in a country that is fiscally constrained.

II. LITERATURE REVIEW

Cashless economy is not the complete absence of cash, it is an economic setting in which goods and services are bought and paid for through electronic media.

[1] According to Alvares, Cliford (2009) in their reports "The problem regarding fake currency in India." It is said that the country's battle against fake currency is not getting easier and many fakes go undetected. It is also stated that counterfeiters hitherto had restricted printing facilities which made it easier to discover fakes.

[2] Jain, P.M (2006) in the article "E-payments and e-banking" opined that e- payments will be able to check black "An Analysis of Growth Pattern of Cashless Transaction System. Taking fullest advantage of technology, quick payments and remittances will ensure optimal use of available funds for banks, financial institutions, business houses and common citizen of India. He also pointed out the need for e-payments and modes of epayments and communication networks.

[3]Srinivas, N. (2006) in his study "An analysis of the defaults in credit card payments", has tried to analyse the socio-economic profile of the defaulters of credit cards, to identify the set of factors which contributed to such defaults and suggest relevant measures to minimize the default cases. Analysis of reasons indicated that economic hardship is the major reason identified by majority of the sample units follows by rigid payment structure and loss of job/business. The main suggestion is that the banks concerned should redesign the payment structure of credit card defaulters in a flexible and affordable installment.

III. OBJECTIVES OF THE STUDY

The aim behind this Research is

- To know what a Cashless Transaction means.
- Impact and importance of Cashless Transaction System.
- Analyze the future trend of Cashless Transaction.

IV. RESEARCH METHODOLOGY

The study is based on secondary sources of data/ information. Different books, journals, newspapers and relevant websites have been consulted in order to make the study an effective one. The study attempts to examine the Impact and Importance of Cashless Transaction in India.

4.1 What is Cashless Transaction-:

"A cashless economy is one in which all the transactions are done using cards or digital means. The circulation of physical currency is minimal."

A Cashless Society describes an economic state whereby financial transactions are not conducted with money in the form of physical banknotes or coins, but rather through the transfer of digital information (usually an electronic representation of money) between the transacting parties.

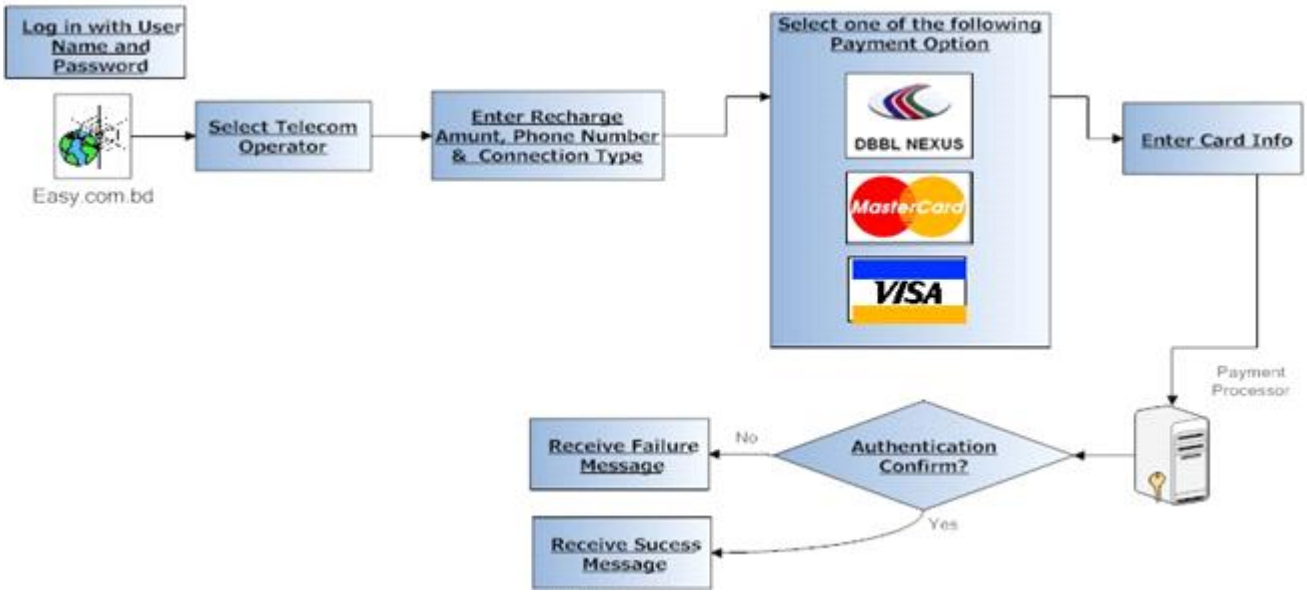
4.2 Process of Cashless Transaction-:

In this increasingly digital world, it's not surprising that money will follow suit as well. Recent trends show that digital money kept in mobile wallets will soon replace physical cash and even credit cards.

Below the example of cashless transaction Process.

Example-:

Figure-1 Online Mobile Recharge System.



- Log in with user name and password-: User enters the username and password.
- Select the Telecom Operator:-Select the user which telecom operator he want.
- Enter Recharge amount, phone number and connection type:-Enter the recharge amount, mobile number and connection type of the user.
- Select one of the payment options:-Select one of the payment option like ATM card, Debit card etc.
- Enter card Information:-Enter the card information like pin number.
- Payment Processor:-The payment is proceeding.
- Authenticate it is confirm or not:-the authenticate when it is confirm or not when it is yes then receive Success message. Or No then receive Failure message.

4.3 Importance of Cashless Transaction:-

- **Taxation**: with lesser availability of hard cash at homes and more in banks, there is lesser scope of hiding income and evading taxation and when there are more tax payers it ultimately leads to a lesser rate of taxation for the whole country.

- **Transparency and accountability**: it becomes a lot easier to track the flow of money with every transaction being recorded with the buyer, seller as well as regulatory bodies, making the system much more transparent and compliant. In the long term it leads to better business and investment prospects for the economy as a whole.
- More currency in bank will mean more circulation of money in the economy, leading to greater liquidity and would eventually mean lesser interest rates (according to the monetary policy of the country).

- **Reduced red tapism and bureaucracy**: with cashless transactions through electronic means the wire transfers are tracked and people are accountable which in turn reduces corruption and improves service time.

- **Less availability of cash for illegal activities**: when people are encouraged to go cashless, there is lesser cash available with the people and there won't be a means to invest in other activities to use the idle cash. Channels like hawala (illegal remittance) will ultimately suffer the brunt of a cashless economy.

- **Pack of cards**: No need to carry bulky notes in a case. Just carrying the required cards or mobile banking will suffice.
  More sense of safety with a PIN protected card etc. which will work only with your own credentials.

- **No fear of being robbed** unlike carrying cash and letting everyone know that there could be something worth snatching.

- **Tracking of expenses**: it becomes easier to determine how much was spent where.

- **The exact amount in small denominations can be paid**. Unlike cash transactions, there is no need to pay fringe amount in case the exact amount is not available with either of the parties.An important, though seemingly insignificant issue is that of hygiene of the notes.

- **Easier accounting**
  Direct payment to bank account. You don't need to go every day to deposit cash to your current account.

- **Easier transactions:-**We can easily do any transaction with security.

4.4 Impact of Cashless Transaction:-

4.4.1. Business Process-:

The impacts of Cashless Transaction on the Business sector are as following:

- Businesses are legally strong.
- Proper audit. Not hidden excess liability.
- Increase use of e-payment.
- Wallet hold business gets an advantage.

4.4.2. Education Process-:

The impact of Cashless Transaction on the education sector is likely to be minimal. Some of the foreseeable fallouts of demonetization on the Indian education sector are as following:

- The decision of the central government to withdraw high-value bank notes to curb unaccounted cash will hurt education institutions that accept donations or capitation fees for admissions.

- Accepting and accounting donations will become difficult because of the demonetisation drive. Education sector was not immune to the Indian theory of 'you can buy everything with money'. This move of demonetisation will definitely curb this mentality of many in the country.

- Nursery admissions, private education institutions and professional higher education including medical and engineering are the segments which accept donations widely. For the first time, these segments are going to feel the impact in a big way.

- Private educational institutions take huge of amount of donations in Cash which is 40% to 50% more than the fees of the course. We expect that demonetisation will impact the recipient.

- Admissions in private educational institutions and medical college admissions comes tagged along with donations without a glitch. The donations in medical colleges is usually more than 100% of the fees. Demonetisation will impact both admissions and also the receipt.

- MBBS seats is some colleges goes for Rs40 lakh to Rs60 lakh, while MD seats has a range of Rs 2 crore price tag on it. Similarly, engineering and management stream seats have a price tag between Rs 2 lakh to Rs 10 lakh each. This move can change the course of expensive education which can be made more affordable devoid of the capitation fee.

4.4.3. Economic Growth-:

The impact of Cashless Transaction on Economic Growth in India is as following:

- According to the Bank, India's growth in the first half of FY 2017 was underpinned by robust private and public consumption, which offset slowing fixed investment, subdued industrial activity and lethargic exports.

- The medium-term may be liquidity expansion in the banking system, helping to lower lending rates and lift economic activity," the World Bank noted.

4.4.4. Impact of Information Technology in cashless economy-:

- The impact of Information Technology on in cashless economy in India is as following:

- Because of information technology the cost of bank will reduce that will result in lower service charges for customers.

- Making Transaction is very easy by using information technology.

- New IT Technology like biometric are help to do secure and transparent transaction.

V. RESULTS AND FINDINGS

- **Future Trend of Cashless Transaction-:**

The payment industry in itself keeps on evolving with the ever changing consumer sentiments and the needs of the businesses. An innovation in this space is thus a continuous process, while the adoption of each of new development takes its own pace to penetrate.

Figure-2 Growth in Cashless Transaction.

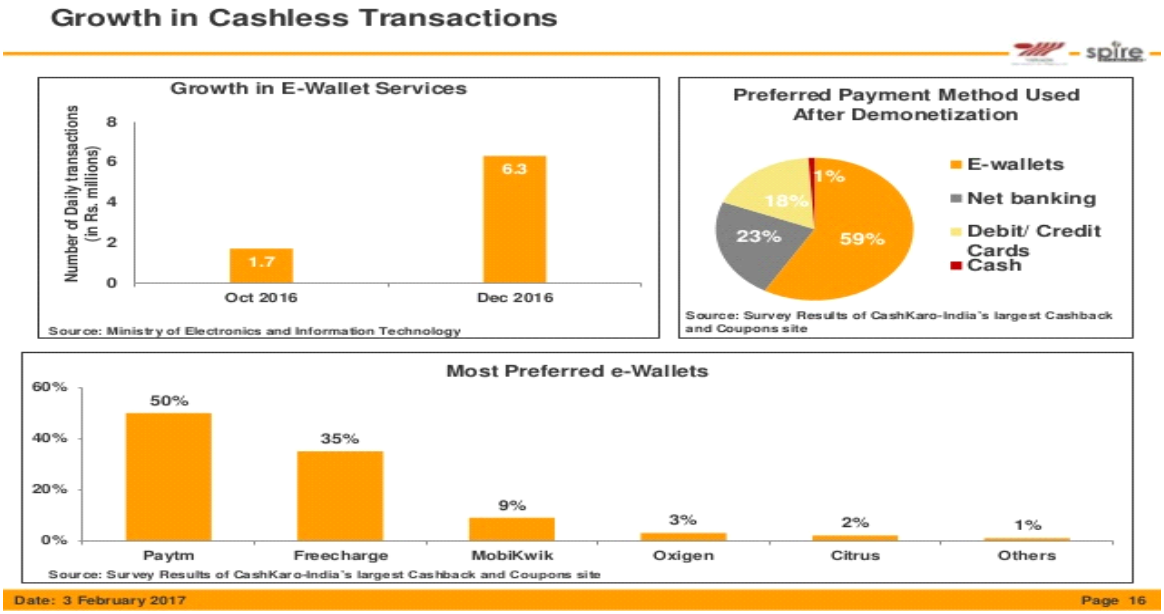


Table 1: Future Trend of Cashless Transaction in India (Source: RBI Bulletin)

System	Volume (Million)				Value (₹ Billion)			
	2015-16	2016		2017	2015-16	2016		2017
		Nov.	Dec.	Jan.		Nov.	Dec.	Jan.
	1	2	3	4	5	6	7	8
1 RTGS	**98.34**	**7.88**	**8.84**	**9.33**	**1,035,551.64**	**101,894.49**	**110,980.33**	**100,602.54**
1.1 Customer Transactions	93.95	7.56	8.47	8.98	700,899.82	66,880.17	72,702.57	68,863.65
1.2 Interbank Transactions	4.37	0.32	0.37	0.35	123,678.19	11,599.02	11,393.90	8,622.42
1.3 Interbank Clearing	0.016	0.002	0.002	0.002	210,973.63	23,415.30	26,883.86	23,116.47
2 CCIL Operated Systems	**3.12**	**0.35**	**0.31**	**0.32**	**807,370.42**	**97,225.02**	**95,947.71**	**88,068.84**
2.1 CBLO	0.22	0.02	0.02	0.02	178,335.28	17,637.88	24,112.95	21,189.97
2.2 Govt. Securities Clearing	1.02	0.17	0.13	0.12	269,778.20	40,141.88	38,256.72	34,408.21
2.2.1 Outright	0.88	0.15	0.12	0.11	97,285.41	20,487.42	14,966.26	13,427.04
2.2.2 Repo	0.134	0.015	0.015	0.014	172,492.78	19,654.46	23,290.46	20,981.17
2.3 Forex Clearing	1.89	0.17	0.16	0.19	359,256.94	39,445.26	33,578.04	32,470.67
3 Paper Clearing	**1,096.37**	**93.50**	**138.82**	**131.17**	**81,860.79**	**5,845.13**	**7,289.40**	**7,281.23**
3.1 Cheque Truncation System (CTS)	958.39	87.08	130.01	118.45	69,889.15	5,419.22	6,811.91	6,618.44
3.2 MICR Clearing	–	-	-	-	–	–	–	–
3.2.1 RBI Centres	–	-	-	-	–	–	–	–
3.2.2 Other Centres	–	-	-	-	–	–	–	–
3.3 Non-MICR Clearing	137.98	6.42	8.81	12.71	11,971.64	425.92	477.49	662.79
4 Retail Electronic Clearing	**3,141.53**	**312.76**	**418.98**	**386.31**	**91,408.14**	**9,748.58**	**12,610.71**	**12,399.63**
4.1 ECS DR	224.75	0.28	0.25	0.20	1,651.50	1.38	1.55	1.43
4.2 ECS CR (includes NECS)	39.00	0.76	0.91	0.76	1,059.44	7.89	12.84	10.51

4.3 EFT/NEFT	1,252.88	123.05	166.31	164.19	83,273.11	8,807.88	11,537.63	11,355.08
4.4 Immediate Payment Service (IMPS)	220.81	36.17	52.78	62.42	1,622.26	324.81	431.92	491.25
4.5 National Automated Clearing House (NACH)	1,404.08	152.51	198.72	158.74	3,801.83	606.62	626.76	541.36
5 Cards	**10,038.67**	**896.14**	**1,162.39**	**1,154.21**	**29,397.65**	**1,823.25**	**1,742.03**	**2,335.10**
5.1 Credit Cards	791.67	98.31	116.46	113.24	2,437.02	266.99	312.37	328.62
5.1.1 Usage at ATMs	6.00	0.40	0.38	0.44	30.41	1.39	0.88	1.54
5.1.2 Usage at POS	785.67	97.91	116.08	112.80	2,406.62	265.59	311.49	327.08
5.2 Debit Cards	9,247.00	797.82	1,045.93	1,040.97	26,960.63	1,556.26	1,429.65	2,006.48
5.2.1 Usage at ATMs	8,073.39	561.36	630.47	712.35	25,371.36	1,234.52	849.34	1,516.44
5.2.2 Usage at POS	1,173.61	236.47	415.46	328.62	1,589.27	321.74	580.31	490.04
6 Prepaid Payment Instruments (PPIs)	**748.02**	**169.32**	**261.09**	**295.45**	**487.58**	**50.74**	**97.70**	**108.69**
6.1 m-Wallet	603.98	138.09	213.11	261.67	205.84	33.06	74.48	83.53
6.2 PPI Cards	143.47	31.19	47.93	33.73	253.77	15.34	20.89	22.90
6.3 Paper Vouchers	0.56	0.04	0.05	0.05	27.97	2.34	2.32	2.26
7 Mobile Banking	**389.49**	**87.47**	**110.64**	**106.12**	**4,040.91**	**1,365.70**	**1,498.18**	**1,382.98**
8 Cards Outstanding	**686.04**	**772.36**	**789.44**	**846.83**	–	–	–	–
8.1 Credit Card	24.51	27.78	28.32	28.85	–	–	–	–
8.2 Debit Card	661.54	744.58	761.12	817.98	–	–	–	–
9 Number of ATMs (in actuals)	**212061**	**219973**	**219793**	**220402**	–	–	–	–
10 Number of POS (in actuals)	**1385668**	**1590714**	**1767733**	**2015847**	–	–	–	–
11 Grand Total (1.1+1.2+2+3+4+5+6)	**15,126.04**	**1,479.95**	**1,990.42**	**1,976.79**	**1,835,102.59**	**193,171.92**	**201,784.01**	**187,679.56**

Note : Data for latest 12 month period is provisional.

RBI Bulletin March 2017 61

According to RBI Bulletin Cashless Transaction in India increased day by day. From different transaction system E-wallet (PPI) system is going to be more popular , the statistics in report shows that , in NOV-2016 and DEC-2016 total value transaction done using E-wallet was 50.74 and 97.70 (Rs. In Billion) respectively and in JAN-2017 it is increased upto 108.69.

According to the survey conduct by Cash-karo India (cash-back and coupons site), After Demonetization i.e. from NOV-2016 , E-wallet payment method is more preferred by customers than any other payment methods. According to this survey, 1% users preferred cash as payment method, 18% for debit/credit cards,23 % for Net banking and 59% users preferred E-wallet as payment method. And in future also E-wallet system will be more preferable.

VI. CONCLUSION

However, the benefits of this move have now started trickling in with more and more people switching to digital modes of receiving and making payment. India is gradually transitioning from a cash-centric to cashless economy. Digital transactions are traceable, therefore easily taxable, leaving no room for the circulation of black money. The whole country is undergoing the process of modernization in money transactions, with e-payment services gaining unprecedented momentum. A large number of businesses, even street vendors, are now accepting electronic payments, prompting the people to learn to transact the cashless way at a faster pace than ever before.

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INTERNATIONAL JOURNAL OF CURRENT MULTIDISCIPLINARY STUDIES
Available Online at http://www.journalijcms.com
VOL. 3, ISSUE,03, PP.694-696, MARCH, 2017
IJCMS

RESEARCH ARTICLE

RFID APPLICATIONSIN INDIAN CONTEXT

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ARTICLE INFO

Received 9th December, 2016
Received in revised form 17th January, 2017
Accepted 6th February, 2017
Published online 28th March, 2017

Keywords:

RFID, RFID tags, Radio frequency, Identity Cards, Unique Identity.

ABSTRACT

This article surveys recent applications of Radio Frequency Identification (RFID) in India and helps entering with better understanding the world of RFID systems. RFID tags are small, wireless devices which helps to identify objects and people. These tags can either be passive, active or battery -assisted. RFID reader types are fixed, mobile or handheld units. Which type to use is governed by the application or environment in which they will be utilized, RFID technology uses digital data in an RFID tags, which is made up of integrated circuits containing a tiny antenna for transferring information to an RFID transceiver. Paper examines current applications and future scope of RFID and its applications in India.

INTRODUCTION

Radio Frequency Identification (RFID) in short is essentially an enabling technology. The unique advantage of RFID is that it eliminates the requirement of human intervention thus providing immense business value. RFID makes use of radio waves to transmit identity of a person or an object or even an animal wirelessly. On RFID intervention being used extensively, neighbourhood post offices are using RFID to track lost parcels, Indian farmers keeping a tab on their cattle using RFID, these are two small examples of massive RFID deployment.

RFIDs are sensed by sensors which are called as RFID tag readers. Applications of RFID includes RFIDs for tracking or automating files, airlines uses the technology to track the location of luggage trolleys, construction companies uses RFID tags inserted to concrete blocks for quick dissemination of results over the internet. RFID saves lots of wasteful expenditure along with the chances of human error. [1]

Current Applications

The most common applications of RFID in Indian context are as follows:

- Web Based Asset Management [11]
- Inventory Management [12]
- Access Control [9]
- Student Attendance System [10]
- Vehicle Tracking [5]
- Parking Management [6]
- Inventory Control Functions – Receiving, Picking and Ship confirmations are all being deployed with RFID as the main technology. [16]
- Laundry Automation- RFID based laundry management system, which provides them with an excellent solution to trace the clothes throughout its complete cycle of its arrival in the laundry to its dispatch. The RFID tags which are attached to the clothes are read when clothes enters the facility. Once the unique tag IDs for each of the cloth is obtained, the application software updates the database with related information about each clothes and generates reports at various stages. [13]
- Event Management- Multiple RFID readers installed at multiple locations at the event venue and RFID tags are carried by each visitor. Identification of unlimited no of visitors can be done from a distance of multiple meters by sophisticated HF/ UHF long- range RFID readers with a completely non-line of sight communications and with no manual intervention. Real time updates are displayed instantly at the venue and also they reached a wide audience outside through social media. [14]
- Hospital management- High frequency RFID solution system enable healthcare providers to track hospital supplies, medical equipment and patient records. Even RFID wristband are used for patients monitoring, medication records and new-born's tracing in hospital settings. Desktop HF reader and PDA Handheld reader are used for wristband information collection and transfer.[15]

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Future Applications

- RFID enable for warehousing agro based product-The grade material, age and quantity stored specific crate, can be identified. This can be done by tagging passive RFID to the crates. This process has a RFID scanner which will scan the cart at receiving dock and identify its grade, weight, location, crate number and store data according to it for dispatching it from warehouse. [8]
- Centre For railway information system- The center of railway information of India plans to use RFID to improve the wagon management system of railway. They have proposed to have a RFID tags or chip embedded in all the wagons and provide sheds with handheld devices that would read the chip and register data. [4]
- RFID Technology in car- A lane level navigation system is proposed in which car having the RFID reader is passing along a road on which RFID tags are installed. Thus, transport department will able to better signs if they are reviewing the RFID reading of car when it is changing a lane suddenly.[5]
- RFID based enterprise intelligence- Enterprise intelligence include misplaced object alert service which tracks the movement of user and object and notify the user when he thinks he or she had misplaced the object. When such situations occur, the system suspect the object and alert user via email or phone. RFID tags are attached to the objects and the owner to fetch their location.[9]

Rfid To Define Individuals Identity

RFID's to replace all the Identity Cards that are issued to Citizen of India:

In this paper, there are two scenarios have been analyzed:

A. Current scenario of usage of legal documents to define individual identity and
B. Proposed scenario of usage of RFID to define unique identity of Indian citizens.

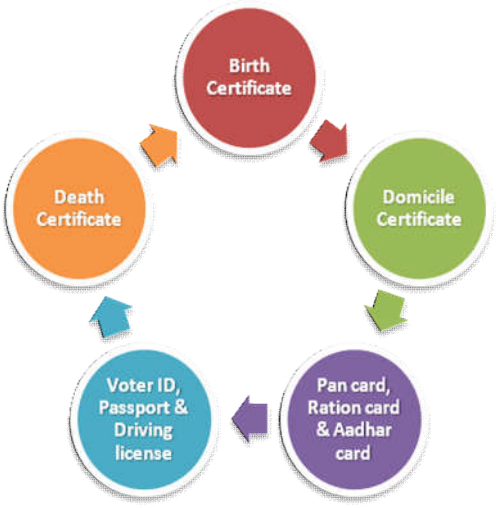

Fig 1 Illustration of Current scenario of usage of legal documents to define individual identity

Current scenario of usage of legal documents to define individual identity:

The typical cycle of using legal identity documents starts right from the birth of an individual and continues till their death!

It typically covers birth certificate, domicile certificate, pan card, Aadhar card, voter ID, passport, ration card, death certificate.

Proposed scenario of usage of RFID to define unique identity of Indian citizens:

Above mentioned all legal identity documents are proposed to be replaced by "A single unique RFID card!"

RFID is proposed to be link up with all the current identity proofs and enable various applications to be operated under single identity domain.

It is proposed with the following mentioned objectives:

- To achieve transparency.
- To compress multiple documents in to single handy card.
- To achieve error free election procedures.
- To reduce the process time for various legal documentations by enabling e-data.
- To ensure Indian nationality by enabling on-the-spot verification of RFID tag through scanning.
- To enable complete cash-less transactions as it is linked up with bank accounts.

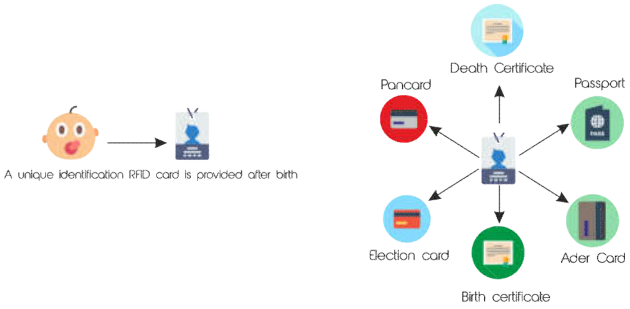

Fig 2 Illustration of Proposed scenario explaining the usage of RFID to define unique identity of Indian citizens

As per proposed scenario, a unique RFID card will be issued to an individual after birth, which will act as a unique identity card. The e-data of all documents will be linked up with this RFID which are issued to Indian citizen and are considered as an identity proof.

This will enable the citizen a facility to use a single RFID card to serve multiple purposes, as all the data will be accessible when needed.

It also enables our government to achieve all the above objectives along with transparency and security as it will be easy to check identity of an individual any-time any-where.

CONCLUSION

In this paper, possible usage of RFID technology is discussed in Indian Context.

It explains the mechanism to reduce the governmental cost per individual through usage of RFID.

It also explains that, if implemented properly, RFID will enable paper-free unique individual identity to every Indian citizen.

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