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A Literature Survey Based on Effective Identification of Black Money, Fake Currency & Expiry Using NFC, IoT & Android

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*Abstract---**NFC tag is appended with the rupees note, in this tag incorporates the rupee esteem, label number and expiry date of cash. We are actualizing 4 approachs for recognizing the dark cash. In each office/shops we introduce cash numbering gadget which would read the money like tag no, esteem and expiry date. We would give peruser gadget which can be appended to the android versatile by means of OTG network to any of the dealers/merchants. QR code - if there should be an occurrence of little merchants like road business dealers (vegetable offering individuals). So open can filter the QR code which contains the record points of interest of the server. Naturally sum would be credited to the merchants account. We are executing cashless exchange utilizing card. Utilizing the majority of the over four philosophies RBI can without much of a stretch track of the considerable number of exchanges (Income and Expenditure) made by each individual client. One more execution is SMS warning for expiry money.***

1. INTRODUCTION: HF-based RFID and NFC systems are widely spread nowadays. They can be found in our everyday lives, in applications such as payment, transportation and logistics, healthcare, and access control systems. A particular boost has been recognized since RFID/NFC reader functionality has been integrated into a vast amount of smart phones. The basic principle of such a contactless RFID/NFC system is illustrated. The reader device emits an alternating magnetic field, which is used to power the transponder and to exchange data with it by means of modulation. The achievable reading distance of such a contactless and passive system depends on several factors. One of the most important factors is the size of the antenna: the larger the antenna, the better the coupling. However, the smaller the antenna and the tags are, the higher is typically the variety of products that can be tagged. If such transponders are manufactured small enough, then they can be integrated into various products, casings, or consumable materials in a discreet way. Given this motivation, it is of highest interest to provide small-sized and secured RFID technology, which can be integrated into products in a very discreet way and which can be verified in terms of authenticity withCommonly available RFID reader devices. However, to the best of our knowledge, there is a major gap in industry and in academia concerning this field of application. This work addresses the outlined gap and presents a miniaturized, system-in-package, contactless and passive authentication solution that features NFC and state-of-the-art security measures. This is achieved by integrating Infineon Technologies' CIPURSET Move chip which is a security chip featuring an open security standard, into embedded Wafer Level Ball Grid Array (eWLB) packages, together with HF-antennas, ferrites, as well as discrete elements that improve HF-coupling characteristics.

2. RELATED WORK:

2.1. Currency enrollment:

We can design and implementation of currency enrolment. In this every currency having tag number, currency value and serial number. Here first the User wants to create an account and then only they are allowed to access the Network. Once the User creates an account, they are to login into their account and request the Job from the Service Provider. Based on the User's request, the Service Provider will process the User requested Job and respond to them.

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All the User details will be stored in the Database of the Service Provider. In this Project, we will design the User Interface Frame to Communicate with the Server through Network Coding using the programming Languages like Java. By sending the request to Server Provider, the User can access the requested data if they authenticated by the Service Provider. Christo Ananth et al. [2] proposed a system in which FASTRA downloads and data transfers can be carried over a high speed internet network. On enhancement of the algorithm, the new algorithm holds the key for many new frontiers to be explored in case of congestion control. The congestion control algorithm is currently running on Linux platform. The Windows platform is the widely used one. By proper Simulation applications, in Windows we can implement the same congestion control algorithm for Windows platform also. The Torrents application which we are currently using can achieve speeds similar to or better than ―Rapid share (premium user) application.

2.2. RBI server:

Bank Service Provider will contain information about the user in their Data Storage. Also the Bank Service provider will maintain the all the User information to Authenticate when they want to login into their account. The User information will be stored in the Database of the Bank Service Provider. To communicate with the Client and with the other modules of the Company server, the Bank Server will establish connection between them. For this Purpose we are going to create a User Interface Frame.

2.3. QR code process:

QR code short for Quick Response code is a specific two-dimensional code readable by dedicated QR code readers and smart phones. The code consists of black module arranged in a sequence pattern on a white background. The information encoded can be text, URL or other data. In case of small vendors like street business merchants vegetable selling people and so, Public can scan the QR code which contains the account details of the server. Automatically amount would be credited to the specific user account.

2.4. Cashless transaction:

We will create and implementation of cash less transaction. As per the government policy, we are implementing cashless transaction using card. As we know card transaction is activated in the bank.

2.5. Black money detection:

We will create and implementation of black money detection. Using the entire above four methodologies RBI server can easily track all of the transactions (Income & Expenditure) made by every individual users, merchants or vendors. This is directly compared with the total audit report provided by these people. This system will strongly detect the black money process.

2.6. Expiry sms alert:

We will create and implementation of SMS alert for expiry date of currency. Every currency note having expiry date. In case currency is expiry means automatic SMS alert to corresponding user. This system will totally eradicate the black money.

3. CASE STUDIES

3.1. Amul case study-the good

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Amul, the dairy cooperative jointly owned by 36 lakh milk producers in Gujarat has adapted cashless mode in a massive way. Since November 8th, 5.4 lakh farmers have opened their saving accounts in various banks. With this, almost 18 lakh milk producers are now getting their money directly into their bank account. As per RS Sodhi, MD of Amul, farmers are now saving a lot more, optimally planning their yearly financial goals, and with bank accounts, are able to get loans at a lesser interest rate. Before, loan sharks used to have a major influence in their financial world, as the farmers used to get stuck within their high-interest trap, and ended up spending more money. He said, "The response from farmers to open bank accounts has been immense. Earlier, they were spending money recklessly and had not developed the habit of saving. With their bank accounts now being operational and a withdrawal limit in place, milk farmers have seen an improvement in their savings too. Also, they can look forward to applying for loans once they built a supporting credit history.Amul, which propelled India to become world's largest producer of milk and milk products, is now making India a cashless nation.

3.2. Raymond story-the bad

Raymond, the 91 year old behemoth of textiles and garments has said that post-demonetization; they have experienced 30% reduction in sales. As per CEO Sanjay Behl, 90% of the textile market is based on cash, and the sudden demonetization drive has left the industry crippled, and gasping for breath. Interestingly, Behl also said that they are confident about stabilization of the market, as new currency is being introduced gradually, and people are opting for cashless mode of payments. However, the reality is that 30% of their products are not selling right now. Raymond is sure that once GST kicks in, the situation_will improve. In the month of September, Raymond announced that 10,000 workers can be fired as automation is being introduced within their factories. This is certainly one of those short-term bad stories, which resulted due to demonetization.

3.3. Foxconn story-the ugly

Due to demonetization, sales of electronic gadgets and mobile phones have reduced to some extent, and the ugliest impact can be seen at Foxconn, where nearly 2000 workers have been asked to go on a paid leave for 2 weeks. As per insider sources, if the situation doesn't improve in the next week, these employees can be asked to resign as well. Nearly one-fourth of the overall workforce of Foxconn is getting hit by the demonetization move, and this is the ugliest story so far. As per another set of reports, sales of mobile phones have been reduced by 50% post-November 8th, and the current market of 'Make in India' handsets have shrunk to Rs 175-200 crore.Besides Foxconn, companies like Lava, Karbonn, Intex have also either fired or forced paid leaves 10-40% of their entire workforce in India. Starting December 12th, Lava has temporarily closed down one of their major plants, and it employed 5000 people. Foxconn's plant at Sri City in Andhra is now manufacturing only 1.2 million handsets a month, compared to 2.5 million capacity.

4. SYSTEM ARCHITECTURE

Fig.1 Architecture Diagram

5. DEFINITION AND GENERATION OF TAXPAYERINTEREST INTERACTED NETWORK

5.1 Analysis of how to model the proposed network

Generally speaking, there are two kinds of elements: nodes and edges in an original and un-contracted taxpayer interest interacted network. Nodes can be divided into two types, representing Person and Company respectively, while edges can be unidirectional or directed. So, the network is denoted as Net = {P0┌ C0, E0┌A0, VC0, AC0}, where P0is a set of nodes representing persons, C0is a set of nodes representing companies, E0 is a set of unidirectional edges, A0 is a set of arcs (directed edges), VC0 and AC0 are the set of colors attached to vertices and edges respectively. To simplify the original network, we describe how to build a TPIIN as well as nodes, edges, their colors and the contraction operations on some of them as follows. Since a person p┌ P0 can have a number of positions such as Chairman of the board(CB), Chief Executive Officer(CEO), Shareholder(S) and Director(D), the basic colors of Person nodes can be divided into four subtypes: CB, CEO, S and D. These subclasses are not mutually exclusive. In accordance with the various possible combinations of positions, there are fifteen possible disjoint subclasses of colors for Person nodes, defined by CEO and D and S and CB, CEO and D and S, CEO and D and CB, CEO and S and CB, D and S and CB, CEO and D, CEO and CB, CEO and S, D and S, D and CB, S and CB CB, S, D, CEO. Considering realistic scenarios, 1 in a small-scale company, there are a few investors and all of them are shareholders. A shareholder of such a company is himself a director; 2 in a large-scale company, shareholders select some of them to be directors or a shareholder can be himself a director if he holds a high enough percentage of the shares. If a shareholder is at least a director, then he can be involved in the process of monitoring and decision-making of a company, otherwise, he cannot. Based on this, the four subclasses (CB, CEO, S and D) of colors for Person nodes can be replaced by the three subclasses: CB, CEO and D. Therefore, fifteen possible subclasses of colors for Person nodes are reduced to seven possible subsets (CEO and D and CB, CEO and D, CEO and CB, D and CB, CB, D, CEO). According to Company Act of China, "a legal person (LP) is a unique representative of a legally and separately registered company/corporate/trust/institution". "The role of a LP be assigned to a CB or an executive/managing Director (this is a CEO and D) or a CEO". Usually, a role of a LP in a large-scale company is assigned to a CB or CEO, while the role in a small scale company is assigned to a general manager (equals to CEO) or an Executive Director or a CEO. So, a LP can belong to one of these subclasses (CEO and D and CB, CEO and D, CEO and CB, D and CB, CB, CEO). In a well-defined network it is not necessary to have different subclasses (colors) of nodes but, when gathering persons' roles from different data sources, these subclasses (colors) will be relevant to nodes in order to distinguish them. A Company node, c┌ C0 , represents a legally and separately registered company/corporate/trust/ institution and has a unique link with a LP and may link with Person nodes with other subclasses of colors, such as a D. The color for a unidirectional edge, ue┐ E0, is Interdependence that represents two kinds of relationships, kinship and interlocking, while, for arcs (directed edges), they have different colors, Influence, Trading, and Investment, for different relationships, influence, trading, and investment relationship, respectively. After gathering corresponding data from various information sources, different homogeneous relationship graphs are formed according to different relationships. Then, after carrying out a procedure of multi-network fusion (shown in Fig. 5) on these homogeneous relationship graphs, a taxpayer interest interacted network (TPIIN), TPIIN = {V, A, VC, AC} is created, where V is a set of nodes, A is a set of arcs, VC is a set of colors for nodes and has two elements, Person and Company, and AC is a set of colors for nodes and has two elements, Influence and Trading. This procedure of multi-network fusion is discussed step by step as follows.

5.2 Formal definitions

As mentioned in the Section 4.1, an institution/corporate/trust that pays taxes to the country legally and singly is a taxpayer. The basis of a TPIIN is a set of nodes of distinct types and a set of edges of distinct types. The two different colors of nodes are: Company and Person. The two relationships defined are: influence relationship between a Person node and a Company node or a trading relationship (from one Company node to another).

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DEFINITION 1: Based on above types of nodes and arcs, a taxpayer interest interacted network is represented as a quadruple:

TPIIN = {V, E, VColor, EColor},Where V = {vp | p = 1, ..., Np} denotes a set of vertices. E denotes

Vertex that represents a company or a syndicate of companies (described in section 4.1); Person denotes the color of a vertex that represents a person or a syndicate of Person nodes (such as the node B in Fig. 3(b)). According to the two colors in VColor, the vertices in a TPIIN can be represented as V = P ∪ C, where P = {vl l l = 1, . . ., NS, NS < Np} denotes all Person nodes, C = {vc l c = 1, . . ., NC , NC < Np} denotes all Company nodes, then NS + NC = Np. EColor IN TR { , }   denotes a set of colors marked on directed arcs in a TPIIN, where IN denotes an influence relationship between a Person/Company node and a Company node and means that vp has an influence on vq directly as described in Section 4.1; and TR denotes a trading relationship among Company nodes and means there exists a trading relationship from vp to vq. From the view of influence relationship and trading relationship, there are two parts in a TPIIN: the antecedent network and the trading network. The antecedent network covers all relationships (investment and interdependence, etc.), which have influence on transactions between Company nodes, except for the trading relationship. As known in graph theory, a directed path is represented as = {v1, e12, v2, ..., vl-1l, el-1l, vl}, V() = {v1, v2, ..., vl-1l, vl} and E() = {e12, ..., el-1l}. If vi≠ vj (i ≠ j, vi, vj V()) holds, then is a simple directed path.

DEFINITION 2: Suspicious tax evasion group (Suspicious Group) In a TPIIN, a suspicious group consists of two simple directed trails, 1 and 2, that have the same start and end nodes, and in E(1) E(2) there exists one and only one relationship incoming arc, TR e to the end node.

DEFINITION 3: Simple suspicious tax evasion group (simple suspicious group) In a TPIIN, a simple suspicious group is a suspicious group, whose two simple trails have no same nodes except the start and end nodes. Furthermore, in a simple suspicious group of a TPIIN, we call a simple trail from the start node to the end node as a component pattern.

5.3 generation of a tpiin

As mentioned in Section 4.1, a TPIIN is generated after a multi-network fusion method has been adopted to abstract different relationships between taxpayers from various information sources managed by CSRC, HRDPSC and PTAOS and then fuse these relationships and corresponding homogeneous networks together. Considering that the generated TPIIN is a large scale graph, our task of identifying the suspicious tax evasion groups is a three-step approach as follows: The first step is to segment a large scale TPIIN into small weakly connected sub graphs by applying divide and conquer strategy. This step is inspired by an intuitive idea that a trading relationship edge that connects two unconnected sub graphs (ante(i) and ante(j)) of an antecedent network is an unsuspicious trading relationship. Obviously, this means that there is definitely without one party (node) involved in two sub graphs at the same time behind the trading relationship edge. Therefore, the i-th maximal weakly connected sub graph of an antecedent network and the trading relationship links between its Company nodes forms the i-th weakly connected sub graph of a TPIIN, denoted as sub TPIIN(i) The second step is to list all potential relationship trails in a sub TPIIN (see Definition 4) in the form of InOT-OutOSP walk (see Definition 5) or InOT FTAOP walk (see Definition 6). Inspired by the frequent pattern tree from the business transaction database [9] and considering the characteristic of a DAG (see Appendix A), we propose an algorithm for constructing a patterns tree and generating a potential component pattern base from each sub TPIIN The third step executes the task of detecting the suspicious groups of potential tax evaders. The task finds any two matched component patterns both with a same antecedent element behind a trading arc in each potential component pattern base The second and third steps are executed iteratively until every sub TPIIN is processed. Based on the idea described above, a definition is introduced as follow

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DEFINITION 4: Sub TPIIN In a TPIIN, a sub TPIIN is a graph that consists of one maximal weakly connected sub graph (MWCS) of an antecedent network and all trading relationship arcs between the Company nodes in the MWCS. In this paper, a sub TPIIN is in a form of edge list (a row * 3 array) and is a part of a TPIIN. The pseudo code of the above three-step approach is shown in Algorithm 1.

Algorithm1: *Detecting suspicious tax evasion groups*

Input: *Array tpiin (in the form of edge list: r x 3, r is a number of arcs. The top (m – 1) rows of a tpiin store all arcs in an antecedent network while other rows of the tpiin belongto a trading network. m indicates the index of first trading relationship arc in tpiin.)*

Output: *File susGroup(i), i = 1, ..., L. (a separated file, susGroup(i), saves all suspicious groups that are mined from the i-th subTPIIN. L is the number of subTPIINs in the tpiin.) File susTrade(i), i = 1, ..., L. (a separated file, susTrade(i), saves all suspicious trading arcs mined from the i-th subTPIIN)*

1. *Abstract all Influence arcs from tpiin to form a (m - 1) * 3matrix, Antecendent (an antecedent network);*

2. *Abstract all trading arcs from tpiin to form a (r – m + 1) * 3matrix, Trade (a trading relationship network);*

3. *Find each MWCS in Antecedent and save it into PA_vertSet(i) and PA_edgeSet(i) accordingly, where i = 1, ..., L;*

4. *For i = 1, ..., L do*

5. *Acquire all trading arcs between the vertices in PA_vertSet(i) from Trade and add them to tradingEdge (ak*3 array, k is the number of the trading arcs related toPA_vertSet(i));*

6. *Merge PA_edgeSet(i) and trading Edge to generate a sub TPIIN, sub TPIIN(i), and empty tradingEdge;*

7.*Use Algorithm 2 to create the i-th patterns tree as well as generate all potential component patterns in sub TPIIN(i) and save them into a file, patterns(i);*

8. *Carry out the pattern matching algorithm (Appendix B) to find all suspicious groups and trading arcs in patterns(i), then save them in files, susGroup(i) and susTrade(i) respectively;*

9. *End for*

10. *Return all susGroup(i) and susTrade(i);*

Algorithm 1 takes a TPIIN, tpiin (a r x 3 matrix) as input, where the first and second column of tpiin represent the index of start and end node of each arc, respectively, and the third column of tpiin indicates the color of the corresponding arc (note that, in our codes, 0 represents black while 1 represents blue; we keep the words, black and blue as shown in Fig. 8). Firstly, TPIIN is divided into two parts: Antecedent (a (m - 1) * 3 matrix) and Trade (a (r – m + 1) * 3 matrix) (Steps 1-2). Secondly, step 3 is to find all MWCS in Antecedent by employing the function find sub graph() that is an improved deep-first search strategy and described in Appendix B. Thereafter, the vertices and arcs in the corresponding antecedent network are stored in PA_vertSet(i) and PA_edgeSet(i) (i = 1, ..., L), respectively, where L is the number of MWCSs in Antecedent. Thirdly, inspired by the strategy of divide and conquer, generate each subTPIIN, subTPIIN(i) (i = 1, ..., L), and then process individually to find suspicious tax evasion groups and suspicious trading arcs (Steps 4-10). Furthermore, Step 5 is to find all trading arcs

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ofPA_edgeSet(i) from Trade and then Step 6 adds them into PA_edgeSet(i) to generate subTPIIN(i). Step 7 uses Algorithm 2 to create a patterns tree as well as generate all potential component patterns for subTPIIN(i), where Algorithm 2 is described in the following paragraph. Step 8 finds matched component patterns and then gets all suspicious groups and suspicious trading arcs in each subTPIIN from these matched patterns, the detailed process is described in Appendix B.

Algorithm 2: *Generating a patterns tree and its base*

Input: *Array sub TPIIN (a sub TPIIN in the form of edge list)*

Output: *File patterns (a file that stores all potential component patterns in sub TPIIN)*

1. *Calculate the values of in degree and out degree of each node in sub TPIIN and save them in an array in and an array out, respectively, and form a 3-column matrix, Nodes ;*

2. *Sort the order of the elements in Nodes according to the increase in indegree of each node and inverted order of out degree of each node, the result is saved in listD;*

3. *Find all nodes of degree-zero in Node and save them in an array indegree0;*

4. For *i = 1, ..., length(indegree0) do*

5. Put *the i-th element of indegree0 into an array, str;*

6. *Find all children of str(1) in subTPIIN and save them into an array, next nodes;*

7. *If next nodes is empty then*

8. *Output str into the file patterns;*

9. *Else*

10. *for j = 1, ..., length(nextnodes) do*

11. *Add next nodes(j) to the tail of str;*

12. *Apply deepsearchNext(next nodes(j), subTPIIN, patterns, str) (shown in Appendix B) to search a whole trail from next nodes(j) and end searching this trail until meeting criterion Rule1 or Rule2, and save this trail to str; Rule 1: End the search of this trail if meet a node that has the zero value of their out degree; Rule 2: End the search of this trail until meeting a node that is the end node of a black arc as well as the black arc is the first trading relationship in this trail;*

13. *Output str into the file patterns;*

14. *End for*

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15. End if

16. End for

17. Return patterns;

Algorithm 2 shows the pseudo code of creating the patterns tree as well as generating all potential component patterns for each sub TPIIN, sub TPIIN. In which, Step 1 calculates the values of in degree and out degree of each node in sub TPIIN and save them in an array in and an array out, respectively, and forms a 3- column matrix, Nodes. The vertices in Nodes are sorted and the result is saved in an array, ListD, according to increase in in degree of each vertex and inverted order of out degree of each vertex (Step 2). Example of this kind of sorting. Next, Step 3 obtains the nodes of in degree-zero from ListD and put them into an array indegree0.

DEFINITION 5: In degree-zero-start-and-out degree-zero-stop walk (InOT-OutOSP walk) An In degree-zero-start-and-out degree-zero-stop walk is a trail belongs to a set of trails in an antecedent network and does not contain any trading arc.

DEFINITION 6: In degree-zero-start-and-first-trading-arc-stop walk (InOT-FTAOP walk) An In degree-zero-start-and-first-trading-arc-stop walk is a trail that adds a trading arc to the tail of a trail belongs to a set of trails in an antecedent.

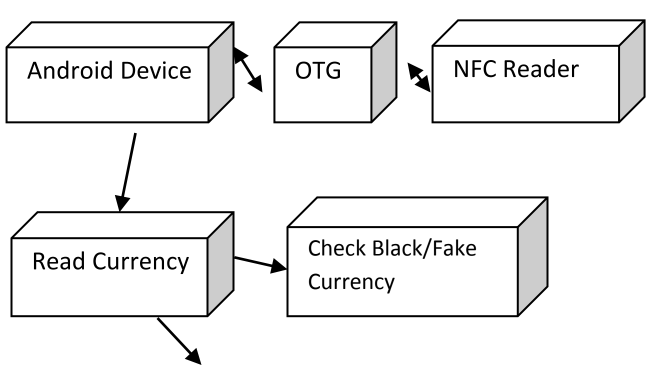
6. IMPLEMENTATION:

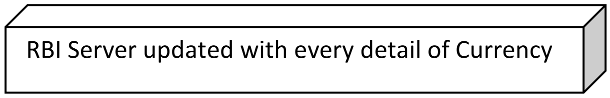
In the system, we first investigate the classic tax evasion cases, and employ a graph-based method to characterize their property that describes two suspicious relationship trails with a same antecedent node behind an Interest Affiliated Transaction (IAT). Between the transaction parties the most important Thing is that there exists a complex and covert interactive relationship. For example, if there exist. We are implementing 4 methodologies for identifying the black money. In every office/shops we install money counting device which would read the currency like tag no, value and expiry date.

6.1. Level wise flow of implementation

In this level we have the currency with the NFC reader which reads the serial number, expiry date of particular currency the currency note was taken and counted by this methodology, we can easily detect the fake currency.

Fig.3.Level 1 implementation





Here we have a NFC Reader connected to our Android Device through OTG Connectivity Cable. We here read the Currency through this setup. This setup facilitates Mobility and freedom of carrying the device on the go. This is another way we are validating the Currency. Everything as it is gets updated in the RBI Server. So, that the RBI is able to monitor each and every transaction that is happening throughout the country.

7. CONCLUSION AND FUTURE ENHANCEMENTS

In each office/shops we introduce cash tallying gadget which would read the money like tag no, esteem and expiry date. We would give peruser gadget which can be joined to the portable through OTG network to any of the dealers/sellers. QR code - if there should arise an occurrence of little merchants like road business shippers (vegetable offering individuals). So open can check the QR code which contains the record points of interest of the server. Naturally sum would be credited to the merchants account. We are executing cashless exchange utilizing card. Utilizing the majority of the over four procedures RBI can without much of a stretch track of the considerable number of exchanges (Income and Expenditure) made by each individual client. One more usage is SMS notice for expiry cash.

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