

# Asset Management Security System Using RFID Technology

Soumyasanta Rakshit<sup>1</sup>, Dr. S. S. Sridhar<sup>2</sup>

<sup>1,2</sup>, Department of Computer Science & Engineering – SRM Institute of Science & technology, Kattankulathur, Tamil Nadu, India  
\*Corresponding author E-mail: [soumyasanta.r@rediffmail.com](mailto:soumyasanta.r@rediffmail.com)

## Abstract

Using radio wave or radio frequency scanners to identify wirelessly any object is not so much complex in reality. The latest version of this technology is known as radio frequency identification or RFID. RFID has three building blocks: small tags built around microchips, that carry a digital identification code; The RFID scanners also known as readers, the readers are also known as interrogators and networking hardware and the software to link scanners to the main computer databases that can be in hardware or cloud storage. In this project, we describe the implementation of RFID technology in the platform of asset management system in an organization. Using RFID technology track the all of the assets is the main aim of the project. The RFID interrogators open a serial port and then reads a RFID tag to use it as a unique parameter in the database to access and show the record associated to the RFID chip. Any change is wirelessly synchronized to the main database server. An admin will look after the whole server as an administration. If any new asset is introduced which is not in the main database, when the RFID scanner detects that the admin will get a notification message also in anyway if any asset will tamper by anything or anyone or if someone will try to steal any asset then again, the admin will get a notification message instantly.

## 1. Introduction

Radio frequency identification is a special kind of advanced technology which is implemented in the asset management system here. Here we discuss how we can manage the assets using RFID tags and the RFID scanners. The tags and the scanners are interlinked through backscatter technology. Not only to track the assets here we discuss if a tag will be tampered then how we will be informed. To trace how the asset was tampered or to check the tampering of a RFID asset we prefer fragile the watermark process. Micro displacement of the tags also can be tracked through this project. If the scanner can trace any new asset or any unusual incident happening with an asset then the admin of the whole administration will be notified through mail or message. Also, privacy and security are two important issues for any kind of technological implementation. Here the integrity and the identification of all the RFID tags are checked by encryption method. Through the high-quality scanners at the time of scanning the micro displacement is observed here for all of the assets associated with RFID tags.

## 2. Existing Systems and Their Drawbacks

We can track assets of an organization manually or using the bar code scanner. The manual process is too much time taking and also it is possible that any asset can be lost. Though bar code scanning is an advanced technology but if the tag is in the asset then it is impossible to track the asset using bar code scanner. Also, in the case of bar code scanning it is mandatory that the asset is near about you. But always it is very hard to take the scanner on the line on sight. As a result, there is always a chance to lose an asset accidentally.

## 3. Implementation Steps

- Step 1: Have to build and maintain a main database containing all of the assets.
- Step 2: Have to attach the RFID tags with all of the assets.
- Step 3: Have to make the connection in between the main database and the RFID scanners.
- Step 4: Have to track the assets with the help of the RFID scanners.
- Step 5: If any new asset will detect by the scanner which is not in the main database then the admin of the whole server and the administration will get a notification message.
- Step 6: If any asset will tamper by anything or anyone or if someone will try to steal any asset then again, the admin will get a notification message instantly.
- Step 7: The scanners will check the privacy and security of the tags along with the asset.
- Step 8: Micro displacement of the tags/chips will be detected.

## 4. Merits of the Proposed System

- No requirement for line of sight: Scanners use radio frequency waves to access the RFID chip, eliminating the need for line-of-sight access. Like a barcode scanning process, the RFID device does not need to be positioned perfectly in front of the scanner to be read.

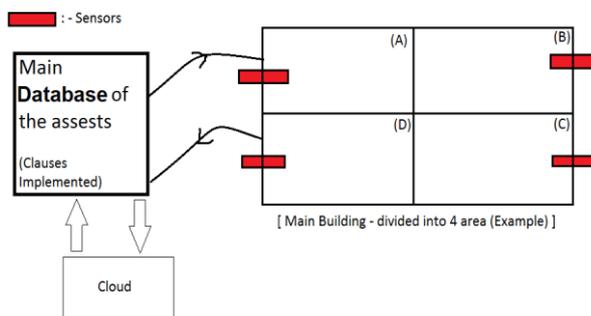
- Distance for scanning: The range of the scanner to scan a tag is 20 feet to 40 feet approx. Which is not possible in the case of barcode scanning technology.
- Scanning Speed: A RFID scanner can scan a chip 25 times faster than a barcode scanner.
- Complete automation: Radio frequency identification enables the interrogators to capture data on tags and transmit it to a computer system, without any involvement of human.
- Durability and reusability: The tags are very small in volume and can be embedded right into a product’s packaging or the product itself.
- Detection of new asset. When the RFID scanner detects any new asset where a RFID tag is associated then the admin who looks after the whole server in between the reader and the main database and the whole administration will get a notification message instantly.
- Maintaining of security and the privacy of the asset. Here, we will use symmetric encryption during data transfer from the tags to scanner.

Observing the micro displacement of the asset. In the advance technology UHF RFID is used not only that radars are also used as scanner in the field of sensors. By which it is very to observer the micro displacement of the asset. Sometimes radar is also used to check the displacement.

### 5. Overall System Architecture/Block Diagram

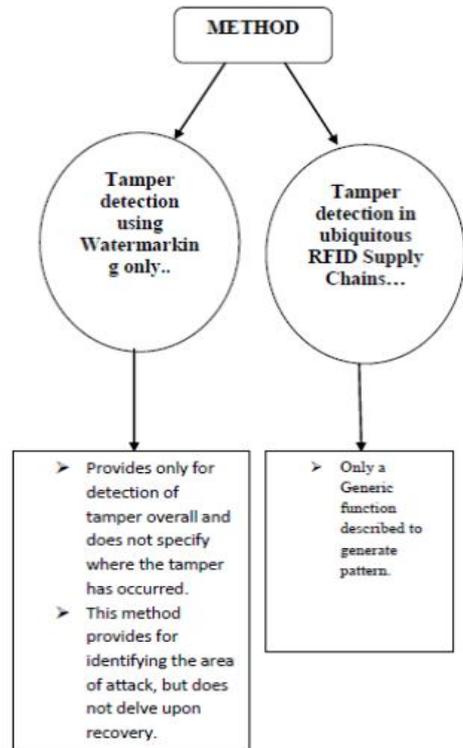
Basically, Radio frequency identification technology has two components: the scanner or the interrogator and the Radio frequency identification tag or the Radio frequency identification chip.

Here the RFID technology is implementing for tracking all types of assets in an organization. If anybody wants to, he/she can use the systems in a private building also. According to the block diagram a building is divided into four blocks. For each and every block a single RFID scanner is assigned. Already we know that a RFID scanner can scan up to 40 feet. All of the RFID scanner is linked with the main database which contains all of the assets of the organization. Each of the scanner when starts to scan to track the assets it also will match with the main database. The RFID tags are attached with all of the assets. When the tracking of the assets is going on the other implemented intelligence are also going on at the same time.

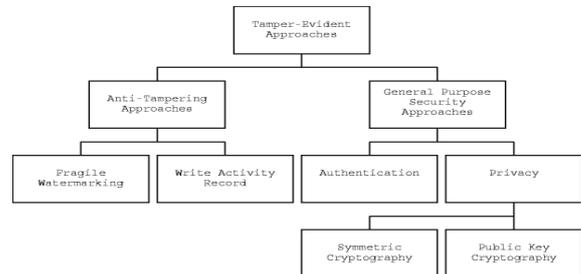


### 6. Tampering In Rfid Tags

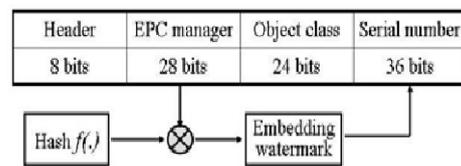
There are many cases in which the Radio frequency identification chip which is attached with the asset can be tampered in many ways. In that scenario it is not the when we will track the assets that particular will be skipped. The scanner will detect the tampered tag. Not only that if the tag is covered with some barrier (Example – aluminium foil) in that scenario also the scanner will detect the tags. Besides here the privacy and the security are also checked by encryption.



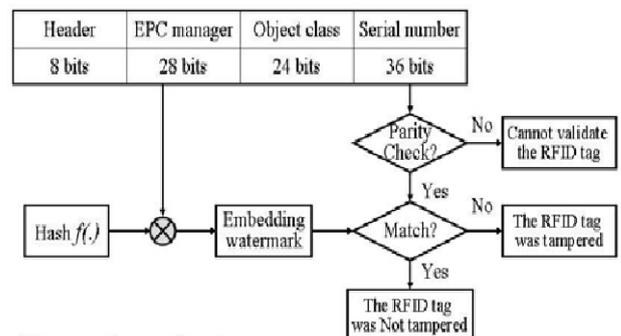
### 7. Tampering & Their Detection in Rfid Tags



### 8. Flow Chart of Rfid Tamper Detection in Watermarking Method



(a) Process of watermark embedding



(b) Process of tamper detection

## 9. Integrity and Confidentiality Implementation of Rfid Tags Using Encryption

The main security issue of RFID technology is duplicity or tampering of the tag and sniffing information about the user. This problem can be evaded using encryption. Now there are two types of encryption, such as asymmetric and symmetric. For asymmetric encryption algorithm it takes too much computational power but in case of symmetric encryption algorithm it is lighter in the aspect of computation power consumption.

Here, we will use symmetric encryption during data transfer from RFID tag to scanner. So that if any unauthorized person sniffs the traffic of that RFID network so that every data that person will capture will be meaningless to him/her. So that no one can sniff the information about the user and duplicate the tag.

One drawback of symmetric encryption is that if the attacker gets the key then he or she can decrypt the data. Because here we are using RFID technology to detect or monitor the assets of an organization, not for the public uses, that's why we will use symmetric encryption instead of asymmetric encryption. As the tag has no own power source, it gets power from the radio wave only sends by the scanner that's why symmetric encryption is much preferable due to less computational power consumption.

## 10. Detection of New Asset

If any new asset is introduced which is not in the main database, when the RFID scanner detects that the admin who looks after the whole server in between the RFID scanner and the main database and the whole administration will get a notification message instantly.

Algorithm:

Step 1: Firstly, we have to make the connection in between the main database containing all of the assets with the RFID scanner.

Step 2: With the backscatter technology the RFID scanner will detect the assets along with the RFID tags.

Step 3: The RFID scanner will start to check the tags with main database.

Step 4: If all of the RFID tags will match with the database then iteration will stop.

Step 5: If the RFID scanner will detect any new asset along with a RFID tag which is not in the main database then the scanner will send an instant notification to the admin.

## 11. Detection of Any Unusual Incident with the Rfid Tags

In anyway if any asset will tamper by anything or anyone or if someone will try to steal any asset then again, the admin will get a notification message instantly.

Algorithm:

Step 1: Firstly, we have to make the connection in between the main database containing all of the assets with the RFID scanner.

Step 2: With the backscatter technology the RFID scanner will detect the assets along with the RFID tags.

Step 3: The RFID scanner will start to check the tags with main database.

Step 4: At the time of checking if any tag is missing or find tampered then an instant notification message will send to the admin.

## 12. Expected Outcomes

1. It will be user friendly for any organization to track their assets.
2. Almost there will be no chance to lose any asset.
3. No manual database will be there, complexity will be reduced.
4. If any tag along with the asset was tampered by any issues that will be detected by the scanners.
5. Micro displacement of the tags can be detected.
6. New asset along with a RFID tag will be detected instantly.
7. If someone will try to steal or tamper any asset then a notification message will notify the admin instantly.

The whole implementation is highly flexible for scanning as it is using the radio waves only. No human power is required as there is no manual work. The whole project is fully automated. As the RFID technology is implemented for the asset management system, it is very easy to track them. All over time complexity is reduced. The only disadvantage of the project is cost. In some cases, maybe there is a chance to cross the all over budget.

## References

- [1] Dr. Ridha Kamoua, Xuan Wang, Weifeng Zheng. "Personal Asset Tracking." Electrical and Computer Engineering, Stony Brook University 2016.
- [2] Kishor T.Patil, Dr. Santosh k. Narayan. "An improved Fragile Watermarking Method for Tamper Detection between RFID Tag." Amravati University, 2014.
- [3] C.C Tan, Q LI. "A Robust and Secure RFID based pedigree system." ICICS, 2006.
- [4] Etienne Perret Grenoble Alpes. "Micrometric Displacement Sensor Based on Chip les RFID." LCIS, Valence, F-26900, France Institut Universitaire de France.
- [5] Sergio Bravo Solorio, Asoke K. Nandi. "Secure Fragile Watermarking Method for image authentication for improve tampering localisation and self-recovery capabilities." Signal Processing Book, 2016
- [6] F.Y.Shih,Yi-Ta Wu. "A Novel Fragile Watermarking Technique". IEEE 2004
- [7] John C Nelson, Timo Santala, Jonathan Lenchner, Robert Calio, Michael Frissora, John E. Miller. "Locating and Tracking data center assets using active RFID tags and a mobile robot." IEEE 2013
- [8] Daquiang Zhang, Min Chen, Laurence Tianruo Yang, Shengjie Zhao, Minyi Guo, Yin Zhang. "Real-Time Locating Systems Using active RFID for Internet of things." IEEE 2014
- [9] I.J Garcia Zuazola, A. Sharma, J.C. Batchelor, I. Angulo, A. Perallos, W.G. Whittow, J.M.H Elmighni, R. Langley. "Radio frequency identification miniature interrogator antenna sprayed over an in-vehicle chassis." IEEE 2012
- [10] Muthuselvi R. "Asset tracking and management system for library using active radio frequency identification." Computer Science Engineering, Kamaraj College of Engineering & Technology. 2016
- [11] K.T Patil, Sanket Sonawane, Saili Shinde, Dr. S.K. Narayankhedkar. "Tamper Detection technique in RFID System." IJERA 2015
- [12] Vidyasagar Potdar, Elizabeth Chang. "Tamper Detection in RFID tags." IEEE 2007
- [13] Woo Chaw Seng. "Digital image watermarking methods for copyright protection and authentication." Artificial Intelligence, University of Malaya. 2012