APPLICATION OF INTERNET OF THINGS IN SECURED LIBRARY MANAGEMENT SYSTEM

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Abstract - *Currently, the Internet of Things (IoT) has an essential influence on all elements of human life. This technology is embodied in a wide spectrum of networked products, systems, and sensors, which take advantage of advancements in computing power, electronics miniaturization, and network interconnections to offer new capabilities not previously possible. Along with other applications such as in service industries, monitoring system, device management, it has extended in size and dimension, improving many contexts of the society; such as, the traditional library management system. The objective of this project is to implement the Internet of Things in management of library system. By using the Internet of things approach, the patron can check the information about the required book any time. In addition to this, face recognition is used in order to get more secured access to the resources of library. The RFID tags are used which help to automate the issuing processes and allows identification of large number of tagged objects like books.*

*Key Words***: Management System, RFID, Internet Of Things, Face Recognition**

1. INTRODUCTION

1.1 Introduction to RFID:

RFID is an acronym for "radio-frequency identification" and refers to a technology whereby digital data encoded in RFID tags or smart labels (defined below) are captured by a reader via radio waves. RFID is similar to bar-coding in that data from a tag or label are captured by a device that stores the data in a database. RFID, however, has several advantages over systems that use barcode asset tracking software. The most notable is that RFID tag data can be read outside the line-of-sight, whereas barcodes must be aligned with an optical scanner.

1.2 How Does RFID Work?

RFID belongs to a group of technologies referred to as Automatic Identification and Data Capture (AIDC). AIDC methods automatically identify objects, collect data about them, and enter those data directly into computer systems with little or no human intervention. RFID methods utilize radio waves to accomplish this. At a simple level, RFID systems consist of three components: an RFID tag or smart label, an RFID reader, and an antenna.

RFID tags contain an integrated circuit and an antenna, which is used to transmit data to the RFID reader (also called an interrogator). The reader then converts the radio waves to a more usable form of data. Information collected from the tags is then transferred through a communications interface to a host computer system, where the data can be stored in a database and analyzed at a later time

1.3 Internet of Things:

The Internet of Things (IoT) is a scenario in which objects, animals or people are assigned unique identifiers and given the ability to automatically transfer data over a network without requiring human-to-human or human-to-computer interaction.

1.4.   IoT Basic Architecture:

Figure illustrates a simple architecture of an IoT scenario which can be divided in three layers: Perception layer, Network layer and Application layer. Based on three-layer IoT architecture, the events are sensed by the nodes and after a local processing of the data; information will be sent to a cloud system server through the gateway (base station) .
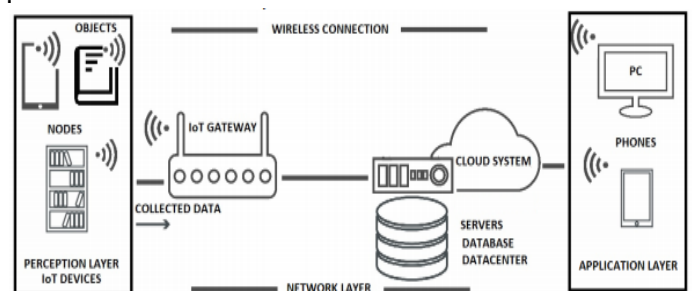

Fig.1 Basic Architecture of Internet Of Things

This project proposes RFID based library management system that would allow fast transactions. RFID tag, which will be used as a student id and book id, will be scanned by the handheld reader, consist of Raspberry Pi and RFID card. Most of the drawbacks associated with the bar-code technology will be overcome using the proposed system.

Here, Raspberry Pi module is used for face detection and face recognition for security reasons. With the help of this system, it becomes convenient to keep a check on the misuse of RFID cards. The camera will be connected to the Raspberry pi module. The student database is collected. The

database includes name of the students, there images & roll number.

2. LITERATURE REVIEW

Even though IoT is at the stage of its inception in libraries, researches have been done on how we can implement IoT in libraries. According to researchers, looking at the number of physical assets books, music, movies, equipment, and staff in a library, IoT is extremely beneficial to libraries in terms of saving staff time and improving user service.

The Author in [1] proposed a system in which the library management system in which the books can be located using the beacon signals from the installed at fixed intervals, and the information of required book can be retrieved using RFID tags.
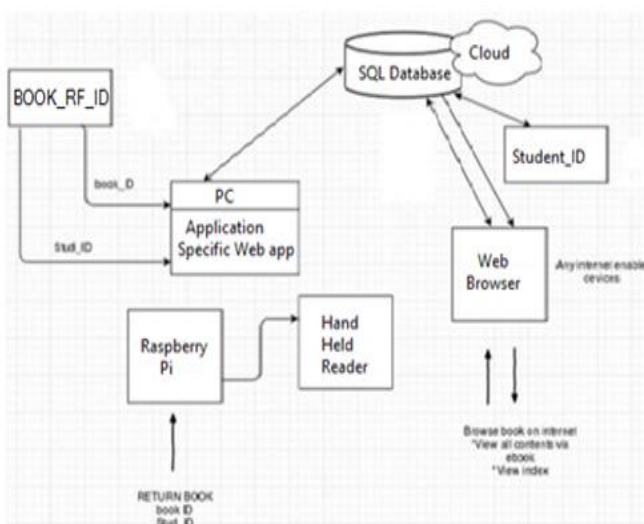
The authors in [2] have proposed a system in which Smart phones are used to capture the code markers set on the spine of the books arranged in the library. The major drawback of this system is that it is image dependent and without proper lighting. This would put a load on the users. Further the spines of the book should be broad enough to set code markers, this makes it difficult to install in case of books and magazines.

The author in [3] proposed an Attendance System in a classroom based on face recognition. It makes recording attendance easier by capturing the image of entire class and recognises the faces. This system proves to be time saving and convenient.
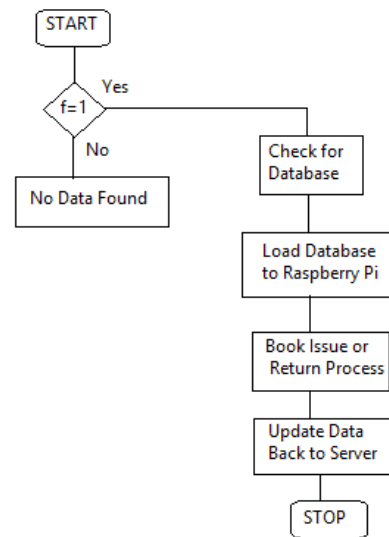
Author in [4] proposed an RFID system where the books are issued and returned his book by swiping students ID tag and RFID tag attached to book.

3. SYSTEM ARCHITECTURE

3.1. Block schematic:

3.2. Flow Chart:

3.3. Description:

In the proposed system, the RFID tags are attached to each book for unique identification. Also Students ID cards are RFID card. In proposed system, user need to scan book ID in front of the handheld reader after which all the information about the book such as book index, book abstract or book PDF copy will appear on computer screen. A patron can scan multiple books at a time and compare which book is more preferable. After finding which book is best, user need to scan his/her ID and there will be option available for issue the book and on clicking that button book will be issued by user. Therefore, there is no need to stand in long queue for issuing book and librarian's work gets saved. There will be computers allocated in the library for patrons use.

Librarian will return the book using handheld reader and keep an eye on calculating fines. Librarian will update book information and its location also. The librarian will have a unique username and password to access and control the whole process of library management system.

User can access his/her account using any internet enable device and able to search for the book using book's unique Id, its name, author and can have access to its information. The library data can be used while sitting from home via IoT. In addition to this, the books can be made available in the form of e-books stored on the system for the students to study even when sitting at home.

3.4. Implementation:

Initial setup will be done by storing the information of the students as well as books on the cloud database. This information is retrieved when the RFID card attached to the both the patron's ID card and book is scanned with the help of handheld reader.

With the help of user interface, Student or members simply place their ID card on the Handheld Reader and then login to a Self-account to borrow materials, browse the library, review their history, and return materials. Admin can update the database information such as book location, student's portfolio, and entries of new books. Admin can also do the fine calculation.

The camera connected to the Raspberry Pi module will capture the image and compare it with the face database, further the message will be displayed whether or not the face of the student is recognised. This makes it easier to ensure the librarian about secured access to the library resources.

4. APPLICATIONS

The future of IoT in libraries seems to be robust looking in to the developments in this sector. It may turn library buildings in to smart buildings, wherein patron can interact with various things in the library and get virtually all kinds of information using devices having communication capabilities. Over the years, apart from the possible areas of implementation, IoT may enter deeper into various areas of libraries and may be able to give statistics on usage of library resources, map indicating areas of library most used.

4.1 Applications of RFID:

The most common RFID application is for tracking and management. This includes pet and livestock tracking, inventory management and asset tracking, cargo and supply chain logistics, and vehicle tracking. RFID can also be used in retail for advertising customer service and loss control; in the supply chain for improved visibility and distribution; and in security situations for access control.

Multiple industries use RFID applications, including healthcare, manufacturing, retail, business and home use.

5. REFERENCES

[1]. Shamprasad M Pujar and K V Satyanarayanan, Internet of things and libraries, Annals of library and Information studies, Vol.62 September 2015, pp. 186-190

[2]. "RFID Based Library Management System", Discovery, Volume 19, Number 55, pp. 6-5, 2014.

[3]. Implementation of Classroom Attendance System based on Face Recognition in class. Ajinkya Patil, Mrudang Shukla, IJAET, July 2014

[4]. Library Management System Using RFID Technology, Sree Lakshmi Addepalli, Sree Gowri Addepalli, International Journal of Computer Science and Information Technologies, Vol. 5 (6), 2014

[5]. Raspberry Pi Architecture by Jon Holton and Tim Fratangelo – The Raspberry Pi Foundation

[6]. Internet of Things (2IMN15) 2015-2016, University of Technology Eindhoven by Leila F. Rahman

[7]. Smart Library: An IoT approach: Ankitha Mathew and Nitha K. P. International Journal of Engineering Research In Computer Science and Engineering (IJERCSE) Vol 3, Issue 10, October 2016.

[8]. Internet of Things: Architecture, Security Goals, and Challenges- A Survey. Aditya Jain, Bhuwnesh Sharma, Pawan Gupta.