

# Design and Implementation of IOT Based Smart Library

<sup>1</sup>Jash Desai, <sup>2</sup>Preet Moga, <sup>3</sup>Radhika Patwardhan

<sup>1,2</sup>Student, Dept. of Information Technology, Shri Bhagubhai Mafatlal Polytechnic, Mumbai, India

<sup>3</sup>Lecturer, Dept. of Information Technology, Shri Bhagubhai Mafatlal Polytechnic, Mumbai, India

Email IDs: <sup>1</sup>[jash17desai@gmail.com](mailto:jash17desai@gmail.com), <sup>2</sup>[preetmoga777@gmail.com](mailto:preetmoga777@gmail.com), <sup>3</sup>[radhikapatwardhan03@gmail.com](mailto:radhikapatwardhan03@gmail.com)

**Abstract** - This proposed system is to automatise the library. The details of user who lends the book from library will be updated into the database by reading the RFID (Radio Frequency Id) tags of every user. The RFID tags will be present in the Identity card of every student in the college. The details of book that is lent to the users will be updated to the database by scanning the barcode of every book using barcode scanner.

**Keywords:** IOT, Smart Library, embedded.

## I. INTRODUCTION

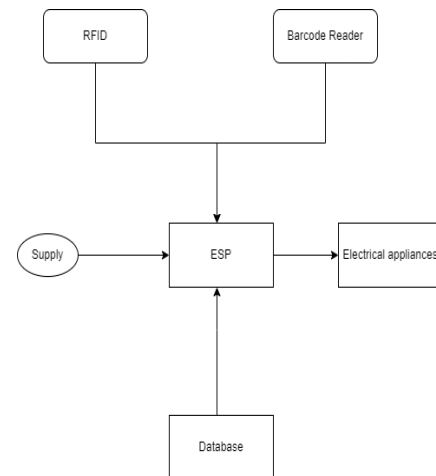
In our proposed project, we are going to automatize the library. It will be mainly useful for college libraries and libraries in industry or any organization. We use Node MCU (ESP 8266) also known as the WiFi module as a controller. The IOT concept will also be used in our proposal for data transmission and reception purposes. RFID tags placed in identity card of that particular student who is borrowing the book will be read by RFID reader. The book that which is going to be lent will be read by scanning the barcode which will be present on the cover of any book. These two information will be sent to the database via IOT.

## II. LITERATURE REVIEW

Building the smart library and its related issues; such as: monitoring, registering, establishing security, managing, tagging, tracking, self-servicing and detecting users is subject of interest. A RFID technology based system developing the self-service operations to improve the efficiency in the libraries.

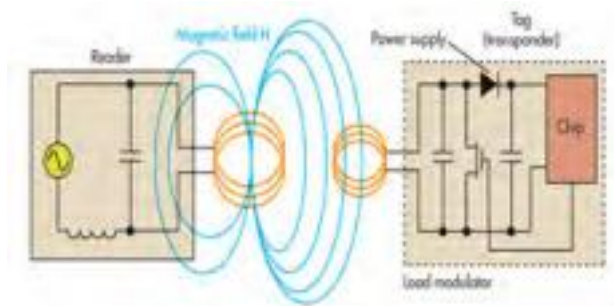
## III. MATERIALS AND METHODS

**Principle of Operation:** The information of students from the RFID tags and details of the books from the Barcode scanner will be sent to ESP 8266(Wi-Fi Module). This WiFi module will send these signals to the database via IOT. These data from the database will be notified or shown to the librarian. **Main Functions of our Proposed System** (a) To read the RFID tags from the student's Id (b) To read the ISBN code (Bar Code) from the books in library (c) To automate the library (d) To store the data's of students and books in cloud account.



### (a) To read the RFID tags from the students

RFID is a change which deals with radio recurrence and it is utilized for the auto-recognizable proof for the different item. The RFID system mainly consists of two parts. 1) RFID Reader 2) RFID Tags.



### RFID labels: There are three types of RFID labels

- 1) Passive labels
- 2) Active labels
- 3) Semi-active labels

These labels don't have any force supply. They used to get their capacity from the approaching radio waves from the Readers. While dynamic labels have a force hotspot for their inside hardware. What's more, for sending the reaction to the user likewise, it utilizes its own capacity supply. These semi-detached labels, they have a force supply for inner hardware, however for sending the reaction it depends on the radio waves got from the Reader.

Operating Frequency: This RFID system is mainly operated in three frequency bands.

- 1) LF: Low-Frequency band
- 2) HF: High-Frequency band
- 3) UHF: Ultra High-Frequency band

The exact frequency of operation varies from country to country.

Operating Principles: Most of the RFID systems operate on any of these two principles.

- 1) Burden Modulation
- 2) Backscattered Modulations

### (b) Working principle

Let us see the working standard for this RFID framework. This working standard depends on the repeat of action. Right now, the low and high repeat action the working principle relies upon the inductive coupling. While because of ultra high repeat RFID labels, working rule relies upon electromagnetic coupling.

In this RFID peruser persistently sending radio waves with a specific recurrence. So now these radio waves which are being sent by this RFID peruser file three needs.

- (i) It incites enough force into the tag.
- (ii) It gives synchronization to the tag.
- (iii) It goes about as a transporter for the information which is returning from the tag.

### (c) Near Field Coupling

In the event of low and high recurrence activity RFID labels and peruser are near one another. So the working guideline depends on inductive coupling). The field which is produced by this RFID peruser used to get couple with the receiving wire of RFID tag. What's more, due to this common coupling the voltage will get incited over the curl of the RFID tag. Presently some bit of the voltage is getting redressed and utilized as a power supply for the controller just as to memory components. Presently as the RFID peruser is sending radio rushes of a specific recurrence so the voltage that is instigated over the loop is additionally of a specific recurrence. So this prompted voltage is likewise used to determine the synchronization clock for the clock. So now, assume in the event that we associate a heap of loop, at that point the present will begin coursing through this heap and on the off chance that we change the impedance of the heap, at that point the present that is moving through this heap will also get changed.

### (d) Far Field Coupling

Let us see the working standard of ultra high recurrence. So for this situation of ultra high recurrence as the separation between the per user and the label will be up to hardly any meters, so the coupling between the per user the loop will be far field coupling. Thus, this RFID per user ceaselessly sending the radio influxes of a specific recurrence towards the tag and accordingly this label will send a feeble sign to the RFID per user. Presently this powerless sign which is being sent back to the RFID per user as known as back dissipated sign and the force of this back dispersed sign relies on the heap coordinating over the curl. Soon the off chance that the heap is coordinated precisely, at that point the power of the back Dissipated sign will be all the more however on the off chance that the heap isn't coordinated precisely, at that point the force of the back dispersed sign will be less.

### (e) To read the ISBN code from the books in library

The guideline behind the CCD innovation isn't in any capacity mind blowing – a CCD scanner utilizes a variety of little light sensors that are pointed at the standardized tag area on an item. The manner in which these scanners work is that they structure a kind of framework of small laser like lights on the outside of the standardized identification part of the item. Since standardized identifications are normally imprinted on white foundations a piece of that light radiated from the scanner is reflected to a recipient inside the leader of the scanner. That light is converted into a voltage utilizing a photovoltaic cell, and that measure of voltage relates to a solitary kind of item in the store.

### (f) To automate the library

Node MCU Dev Board is based on widely explored esp8266 System on Chip from Expressive. It combined features of WIFI access point and station and microcontroller and uses simple LUA based programming language. ESP8266 Node MCU offers Arduino like hardware IO, Event-driven API for network applications & then 10 GPIOs D0-D10, PWM functionality, IIC and SPI communication, 1-Wire and ADC A0 etc. all in one board, Wi-Fi networking (can be uses as access point and/or station, host a web server), connect to internet to fetch or upload data.



Excellent system on board for Internet of Things (IoT) projects. Recently, there has been interest in programming ESP8266 systems using Arduino IDE. Programming, of ESP8266 using Arduino IDE is not very straight forward, until it is properly configured. Especially because, the Input and output pins have different mapping on Node MCU than those on actual ESP8266 chip.

#### IV. CONCLUSION

After working on the hardware of the proposed system, the details of students are effectively read with the RFID tag. The RFID tags present in the identity cards of the students will be read and stored in the database. This RFID tag will be read along while reading the barcode scanner of the particular book lent by that particular student. The details of RFID and the ISBN code of book lent both will be stored in the database. By knowing the above details of the student details and ISBN code of the book, we will be able to know who lent which book. Hence there won't be any misjudgment or misunderstanding.

#### REFERENCES

- [1] Ali Nazar A R Jayabharath MD Udayakumar (2014), "An ANFIS Based Advanced MPPT Control of a Wind-

- Solar Hybrid Power Generation System", International review of modelling and simulations, Vol 7, no.4, pp 638-643.
- [2] Kalavalli C S.R.Paveethra S.Murugesan Dr.A.Nazar Ali (2020), "Design and Implementation of High Efficiency H6 PV Inverter with Dual Axis Tracking", International Journal of Scientific & Technology Research, Vol 9, issue 02, and pages 4728-31.
- [3] Markakis I (2013), "RFID enabled library management system using low SAR smart bookshelves", Electromagnetic in Advanced Applications (ICEAA) International Conference on IEEE.
- [4] Venkatesh V A NazarAli R Jaiganesh. V Indiragandhi (2019), "Extraction and conversion of exhaust heat from automobile engine in to electrical energy", IOP Conference Series: Materials Science and Engineering, vol. 23.
- [5] Shahid Syed Md (2005), "Use of RFID technology in libraries A new approach to circulation, tracking inventorying and security of library materials".
- [6] Sheikh Ghazala Shafi and Noman Islam (2012) "Towards a context aware smart library management system".

#### Citation of this Article:

Jash Desai, Preet Moga, Radhika Patwardhan, "Design and Implementation of IOT Based Smart Library" Published in *International Research Journal of Innovations in Engineering and Technology - IRJIET*, Volume 6, Issue 1, pp 19-21, January 2022. Article DOI <https://doi.org/10.47001/IRJIET/2022.601005>

\*\*\*\*\*