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Automation in Public Library: A Modern Approach during Covid-19

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Abstract: Automation is the creation and utilization of advances to deliver a lot labor and products with insignificant human intercession Radio recurrence distinguishing proof (RFID) is a method for recognizing objects by questioning a one-of-a-kind trait of the article, (for example, an interesting distinguishing number put away on a silicon chip joined to the item) utilizing radio waves. This innovation guarantees significant degrees more noteworthy proficiency and exactness than were conceivable past advances, which assists with computerizing business measures and permits distinguishing proof of gigantic number of labeled articles like books, utilizing radio waves. This paper proposes Automation in Public Library which permits quick exchange stream and can make it simple to deal with the trouble and return of books from the library absent a lot of mediation of manual accounting which benefits by adding properties of detectability and security. The proposed framework is completely contactless technique and have been planned thinking about Coronavirus.
Keywords: radio frequency identification (RFID), RFID tags, MATLAB GUI, MySQL.

I. INTRODUCTION

The execution of Automation Technologies, strategies and cycles improve the proficiency, unwavering quality, and speed of numerous assignments that were recently performed by people. Indeed, even in the present current time, the greater part of the libraries is as yet working with the customary strategy. Along these lines, we need to apply new innovation for library robotization to diminish human responsibility. The essential innovation that we will utilize is Radio Frequency Identification (RFID). Innovative work in this field has made this innovation to be utilized in production network the executives, participation the board, library the board, computerized cost assortment and so forth in contrast with standardized tag innovation, RFID frameworks don't need view admittance to the tag to recuperate the label's information. The standardized identification framework utilized in libraries is very time debilitating and staff concentrated.

The execution of RFID in Library Management System smooths the quick giving, reissuing and returning of books with the assistance of RFID enabled modules. RFID engaged framework quickly conveys the book insights and library part information to the library the board framework and needn't bother with the manual composing. The RFID tag can envelop perceiving data which is novel, like a book's title or code, select of being highlighted a different data set. The data is perused by a RFID pursuer, which substitutes the predominant scanner tag pursuer as often as possible found at a library's dissemination counter.

One of the significant strides is to settle on a choice on which sort of RFID pursuer and tag is utilized for library mechanization. The meaning of pursuer is the thing that sort of label it peruses, its operational recurrence, capability of close to perusing, composing inside the tag, association type with PC. The pursuer has two primary purposes: the first is to communicated a transporter signal, and the second is to get a response from any labels in closeness of the pursuer. A label needs to get the transporter signal, alter it somehow or another similar to the information on the card, and retransmit the changed reaction back to the pursuer.

After that, tags which are positioned in book are combining with the individual Id. In cutting-edge passive RFID devices; the tag comprises of a small integrated circuit and an antenna. The improvement of passive RFID is that it demands no in house power source, the circuit on the tag is essentially operated by the carrier signal. Thus, the carrier signal broadcasted from the reader must be substantially large so that the response can be read even from the card.

In ordinary uses of utilizing RFID innovation, a tag is dedicated to an article used to perceive the objective, when the objective item goes through the space that the pursuer can peruse, the tag and the pursuer develops the radio sign associations, the tag sends its information to the pursuer, for example, interesting code and other information put away on, the pursuer gets that information and deciphers them, and afterward ships off a host PC to put the last contacts to the entire data preparing.

II. SYSTEM LAYOUT

A. Concept

Individually all book would be exclusively identified via theRFID tags ascribed to it and communication would be done wirelessly and an RFID sensor would be located near the librarydesk wherein one should only place the book near the sensor and it would get reissued/issued/returned depending on the actions required. Moreover, information regarding the asset i.e., book can be gained by both the authority and user remotely instead of the old-fashioned way of manually searching the book. This would save a lot of time and enableefficient queue management. As actions on these tagged assets are being recorded, data can be usefully exploited as per librarian's need. Hence, it is tracking books within a restrained broadcasting range.

B. Components

The system consists of following mechanisms:

1) *RFID Reader:* A RFID pursuer is the mind of the RFID framework and is fundamental for any framework to work. Pursuers, likewise called cross examiners, are gadgets that send and get radio waves to speak with RFID labels.
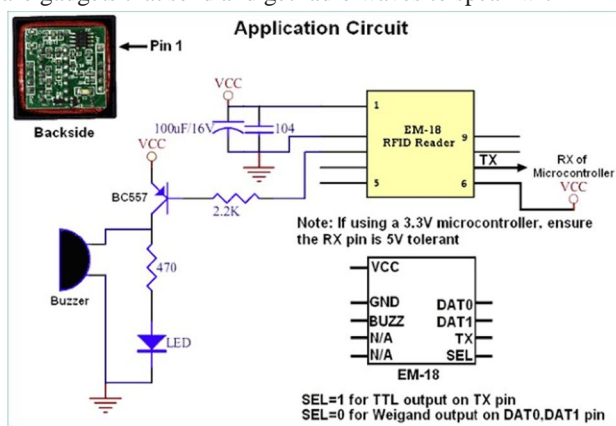

Figure 1: Application Circuit of RFID Reader

2) *RFID Tags:* Radio-recurrence distinguishing proof (RFID) utilizes electromagnetic field to consequentlyrecognize and follow labels appended to objects. A RFIDframework comprises of a small radio transponder, a radio recipient and transmitter. When set off by an electromagnetic cross examination beat from a close by RFID pursuer gadget, the tag communicates computerized information, normally a recognizing stock number, back to the pursuer. Other arrangement of labels is utilized as Library personality cards to get the subtleties of the client. There are two types of RFID tags:

a) *Passive tags* are fuelled by energy from theRFID pursuer's examining radio waves.

b) *Active tags* are controlled by a battery and in this manner can be perused at a more noteworthy reach from the RFID pursuer, up tomany meters.

Figure 2: RFID Tags

3) *Antenna:* RFID antennas perform two very important functions. First, they transmit power to the RFID tags by activating them, and second, they receive data back from the activated tags. A single antenna can activate and receive data from multiple tags simultaneously. The antennas are connected to the RFID reader using a coaxial cable.

4) *Microcontroller:* 8051 microcontroller is planned by Intel in 1981. It's anything but a 8-bit microcontroller. It is worked with 40 pins DIP (doubleinline bundle), 4kb of ROM stockpiling and 128 bytes of RAM stockpiling, 2 16-digit clocks. It comprises of are four equal 8-digit ports, which are programmable just as addressable according to the prerequisite. An on-chip precious stone oscillator is incorporated in the microcontroller having gem recurrence of 12 MHz

Figure 3: Microcontroller 8051

C. Implementation

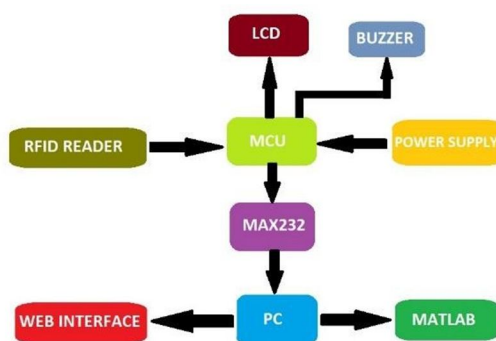The implementation can be seen in the following ProjectWork Flow Diagram.

Figure 4: Project work flow diagram

1) *Structure Of The System:* Each time a new book is attained by the library, an RFID tag is assigned into the book with the pertinent info like, Book name, Book author, Book number, etc. The meticulous data regarding the book is apprehended in the computer database. The computer database also stores all data for different users of the library. Each user is equipped with enumerated RFID cards. These cards carry recognition data and other accompanying details like: name, address, and mobile no. etc. for each user.

2) *The Login Method:* The librarian has the exclusive license of owning a unique master password for governing the GUI of the RFID LMS system. The LOGIN dialogue box come into sight the instant he powers on the system. The librarian then passes in the approving password and permits the system for additional usage.

3) *Librarian Interface:* This is the segment of software that has all the procedures like issue, reissue, and add information about latest user or a book. Most significantly the databank management is given to the librarian so that they can approach it. Henceforthlabor-intensive errors are eliminated and trades have been more automated than beforehand.

4) *The User Interface:* After the user Library-ID tag and the book tag are examined, it displays the information of the user and book issued by them. It can then implement functions of issue/re-issue and also state the penalty or fine if any.

5) *The Issue Procedure:* Once a user desires to get a book issued, he can get it done exclusive of any manual intervention. He simply zaps his RFID card in front of the RFID reader and it automatically opens his/her financial credit activity page. He then places the preferred books to be issued, one by one in front of the RFID reader. The computer registers all these data against his name. In conclusion a message is displayed notifying the user that the ISSUE has been efficacious.

6) *The Return Course Of Action:* At the point when the client needs to return books, he only glimmers the books over again before the RFID pursuer and the books without human mediation are adapted to return against the client's name.

7) *Penalty Computation:* The client over the span of the hour of returning the book clicks or initiates the punishment calculation button on theshowcase region or GUI board. The board returns the fine.

8) *WEB Interface:* The library website is technologically advanced, where each participant of the library can access his/her account and view individual transaction details and know about the book availability. This decreases time taken for transactions and standing in long queue as information is robotically uploaded. As internet is widely available, thiscan be extended to a large number of users. Some of the advanced features are mentioned below:
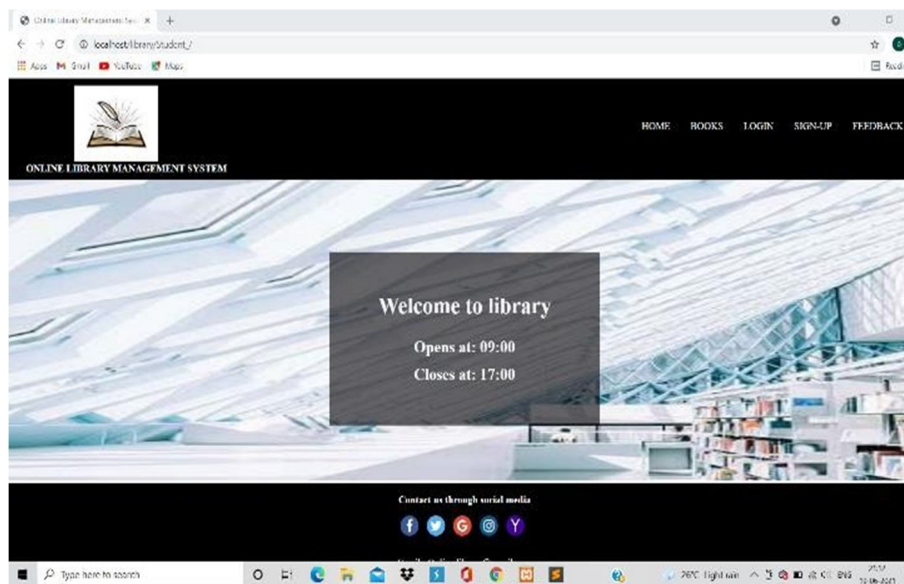

Figure 5: Web Interface

a) Countdown timer using java script
b) Chat box
c) Email notification from website
d) Feedback
e) Search
f) Request
g) Approve
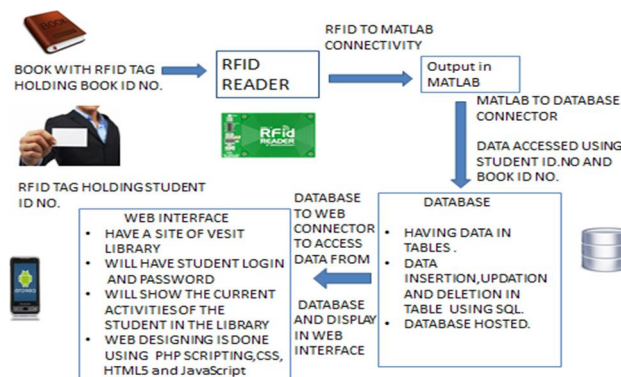h) Trending book section

9) *Model Inter-Relation*

Figure 6: Interrelation between various interfaces

This flow diagram portraying the inter relation between theinterfaces. A book with RFID tag is flick through by the reader and the input is fed into the librarian interface and the requested enquiry is sort out and the subsequent data isextracted from the database. Individual transactions can beseen on website as per user convenience.

D. Precaution and Safety MeasureFor COVID

1) UV Sterilization Box: UV Sterilization box isused to disinfect the returned books in the library. Each time a user returns the book to library, it will be kept in thebox for 4-5 hours so that all the germs or virus can be killedbefore any future use.

Figure 7: UV sterilization box

2) COVID Detection Using AI & Thermographic Cameras: Thermal imaging helps to detect covid-19 by measuring body temperature at the entrance of the library. It gives real time measurement of body temperature of the libraryusers.
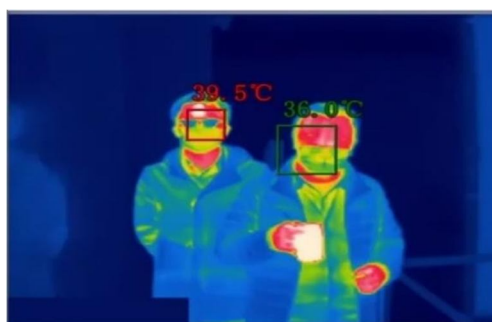

Figure 8: Thermal scanning

III. RESULT

Automation in Public Library based on RFID technologyis an exceptional system to be carry out in libraries to manage the books automatically and efficiently.Considering Covid-19, the system is highly secured and take protective measures into consideration. It will use theRFID reader to recognize and handle the books efficiently. Time saving, fast accessing of books and eliminating labor-intensive blunders is the principal reimbursements of the RFID in Library. The individual transactions can be observed using the website. The information can be disciplined using the interfacedesigned for the librarian. Therefore, both supervision andautomation have been put into operation.

IV.PROBLEMS & CHALLANGES

While constructing a system for library supervision and automation, the following issues can arise:

A. Getting the appropriate hardware, the compatibility amongst tags and readers is significant along with the mandatory frequency and other limitations.
B. Assembling the RFID reader circuit.
C. Sensing/reading the tags via the reader (tedious) and to getoutput on terminal window.
D. Once we get hold of the information, its manipulation is of great consequence like interfacing it and portraying it to the user as per their requirement (Time consuming).
E. Compressing both hardware and software to get a userfriendly and precise device.
F. Associating the databases to the other interfaces i.e.,website.
G. Certifying there is less of information redundancy in thedatabase, hence the need to appropriately blueprint it.

V. CONCLUSION

RFID in the library tempos up book lending, supervising, books seek out processes and thus frees staff to do more user-service tasks. To vintage superlative performance, RFID readers and RFID tags to be used must be of good quality. The resourceful employment of the technology also depends upon the information to be written in tag. These applications can lead to noteworthy savings in workforce expenditures, heighten customer service, decrease book theft and be responsible for a continuous information update of up-to-the-minute collections of books.

REFERENCES

[1] 2019 IEEE 15th International Colloquium on Signal Processing & its Applications (CSPA 2019), 8 -9 March 2019, Penang, Malaysia 978-1-5386-7563-2/19/$31.00 ©2019 IEEE

[2] Nyoman Karna, Donny Pratama, Muhammad Ramzani 2019 International Conference on Information and Communications Technology (ICOIACT) 978-1- 7281-1655-6/19/$31.00 ©2019 IEEE

[3] Sree Lakshmi Addepalli et al, / (IJCSIT) International Journal of Computer Science and Information Technologies, Vol. 5 (6) , 2014, 6932-6935

[4] J. F. Zhang and C. J. Wen, "The university library management system based on radio frequency identification," 2017 10th International Congress on Image and Signal Processing, BioMedical Engineering and Informatics (CISP-BMEI), Shanghai, 2017, pp. 1-6.

[5] Nyoman Karna, Donny Pratama and Muhammad Ramzani,"Self Service for library automation", School of Electrical Engineering Telkom University Indonesia 2019 ,International Conference on Information and Communications Technology (ICOIACT) ,978-1- 7281-1655-6/19.

[6] H. He T. Liu and E. Wang, "Intelligent book positioning system for library based on RFID", 2017 12th IEEE Conference on Industrial Electronics and Applications (ICIEA), Siem Reap, 2017,pp.723-726.

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