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Smart Library System Using IoT

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***Abstract:** This paper proposes the design and implementation of smart library for digitalizing the library by using Internet of things without any human interruption. The arduino mega 2560 is main component of this project it is interfaced with Radio frequency identification technology, Liquid crystal display(LCD),GSM Module and NodeMCU. Implementation of this framework is based on RFID technology i.e. RFID tags are placed on books and RFID reader is used to read these tags. This study is to automize the library such as allowing fast transaction flow and easily handling the activites like process of issuing and return of book from library can be done using by using RFID technology and student will get notified using GSM. RFID is used to check the availability, misplacement of book, provide anti-theft and location of book. Book availability and location of book can be checked on webpage. Information of each user card will be maintained on database and update automatically using IoT.*
***Keywords:** Arduino mega 2560, RFID reader, RFID tag/Card, GSM module, NodeMCU*

I. INTRODUCTION

The most widely used inventory systems are manual system and barcode scanner used by handheld system use by various types of organization, including companies, universities and public organization. In the developing country such as India, technology plays a crucial role in day to day life. Every educational institute has the library and an existing library management system uses manual systems and barcode identification technology.

This manual system causes human error and it consumes more time whereas barcode scanning requires proper line of sight which is read only.

It is important to digitalize the existing library and the problem of barcode technology can be overcome by using RFID technology. RFID is the wireless technology it consist of RFID reader and RFID tag/Card used for various features: Storage, security, entry/tracking of personnel and vehicles, production and inventory tracking, luggage, delivery and logistics. The main objective of our study is to automate the library system without help of human, reduce time and provide security. For that we are using IoT and RFID technology.

This system consists of RFID tags placed on books and each tag consists of unique ID and these tags are read by RFID reader. Each tags consists details such as author name and book title, this information is pre-updated into database and every student have RFID card and separate account is maintained for each students in the database and automatically updated on issuing or renewal or returning of the book by using web server.

By using RFID technology misplacement of books can be avoided and prevent from antitheft. User can check availability of books and location of books on web page. On webpage separate page is maintained for student and administration login.

II. PROPOSED DESIGN METHODOLOGY

The proposed method for based Smart library system using IoT is shown in figure 1and it is used to automate the library and consume time of librarian. In this proposed system RFID tags are embedded on every book of library and information related to that particular tag is preloaded in database such as book title, book Id and so forth.

Webpage is created for library information in which user will be able to check the availability of book and in which shelf that particular book is place.

Webpage also consist of student login and administration login page .This system also provide issuing ,returning of books by using RFID technology and update status is send to students by using SMS and if any student forget to entry the issued then it alert by buzzer this provide from antitheft of books.

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A. Block diagram

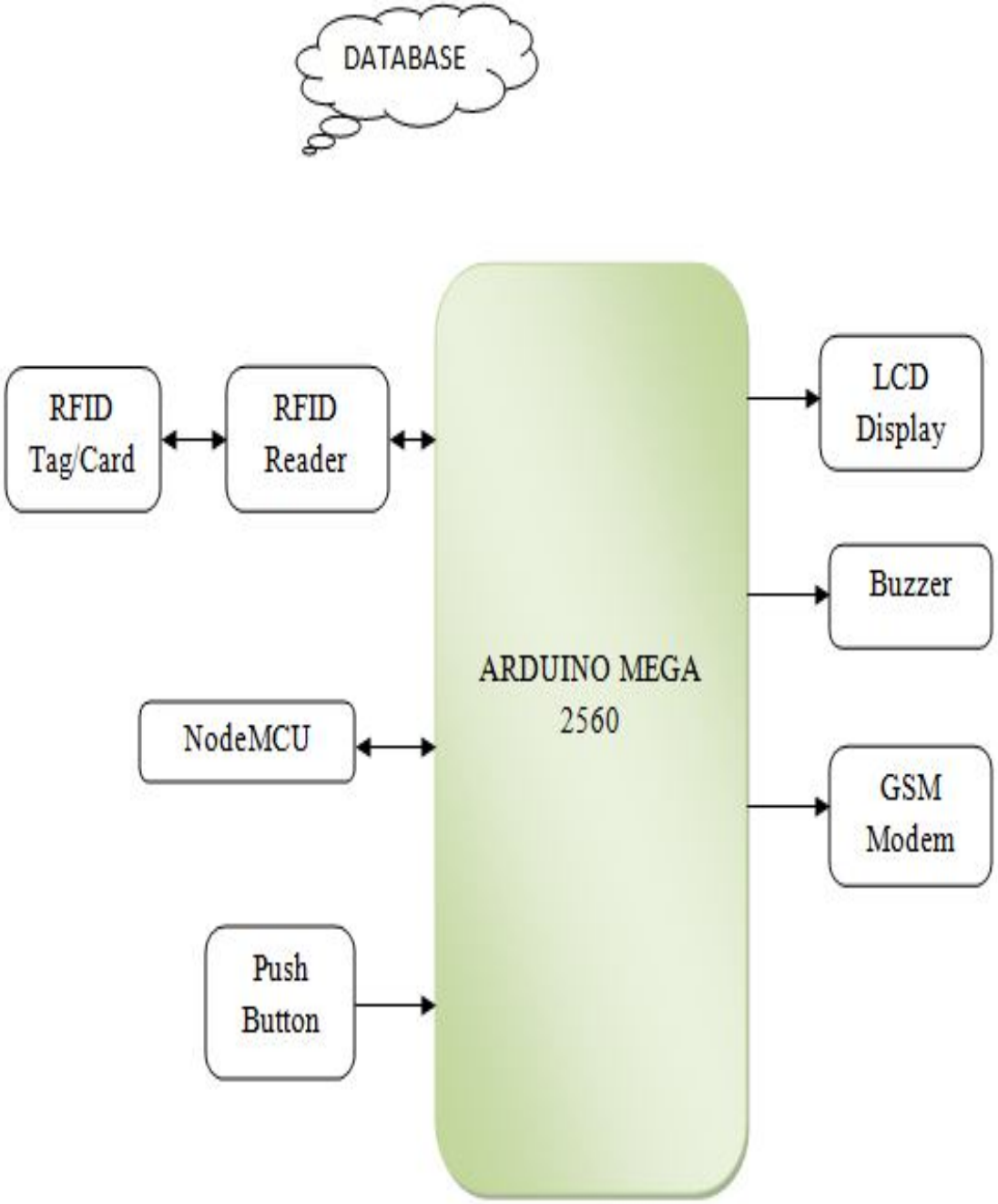


Figure 1: Block diagram of proposed system

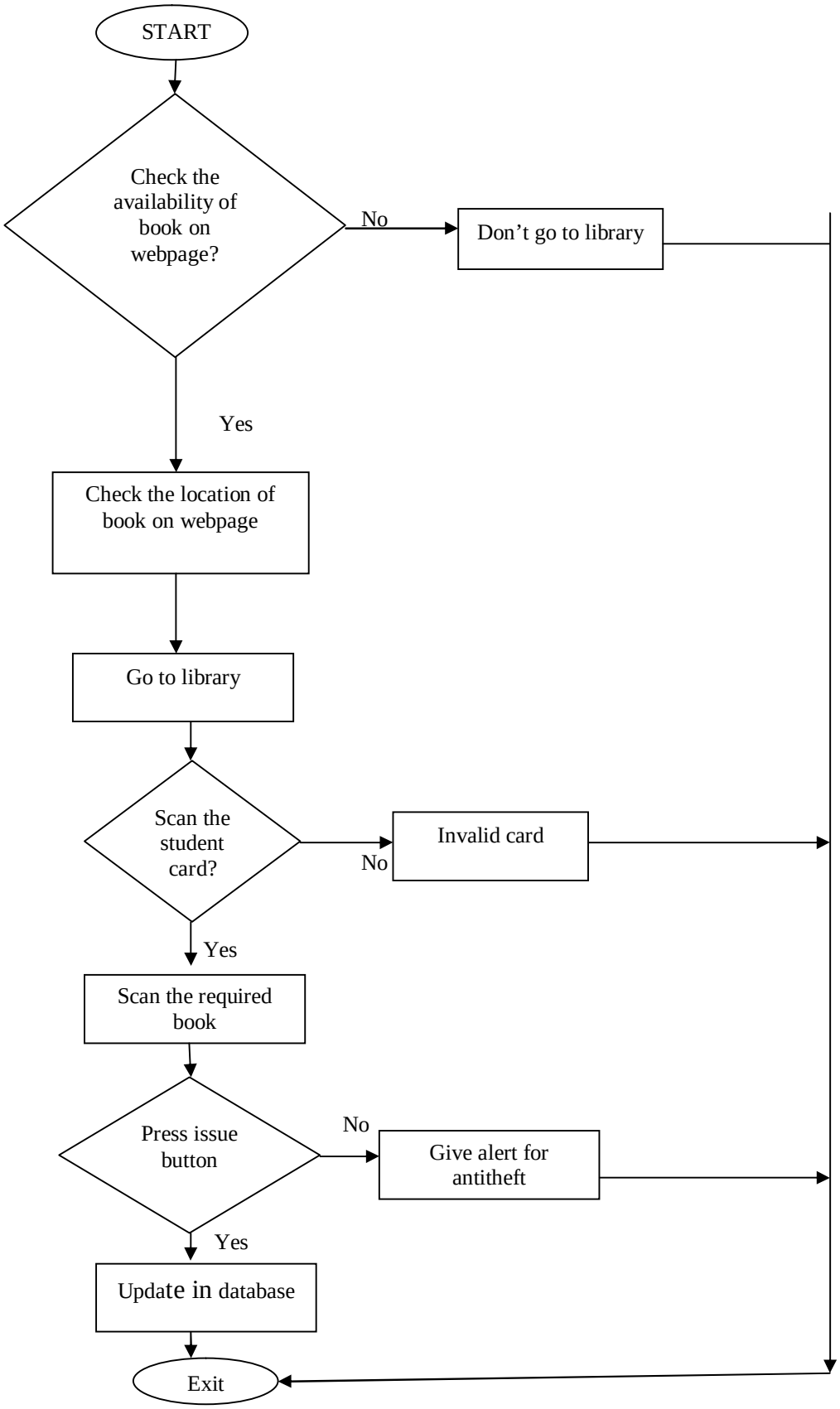
B. Hardware Component

The hardware components consist of Arduino Mega2560 used for controlling all activities which has operating voltage of 5V. Power supply circuit is used to convert AC voltage to constant DC voltage. RFID tags are placed on books and RFID reader is used to read the tags. Buzzer is used to alert the librarian about theft of book if not entered. LCD is used to display the status of books and user. GSM is used to send messages to user. Nodemcu is used for web server and push button is used to give input to Arduino as issue, renewal and return.

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C. Flow chart



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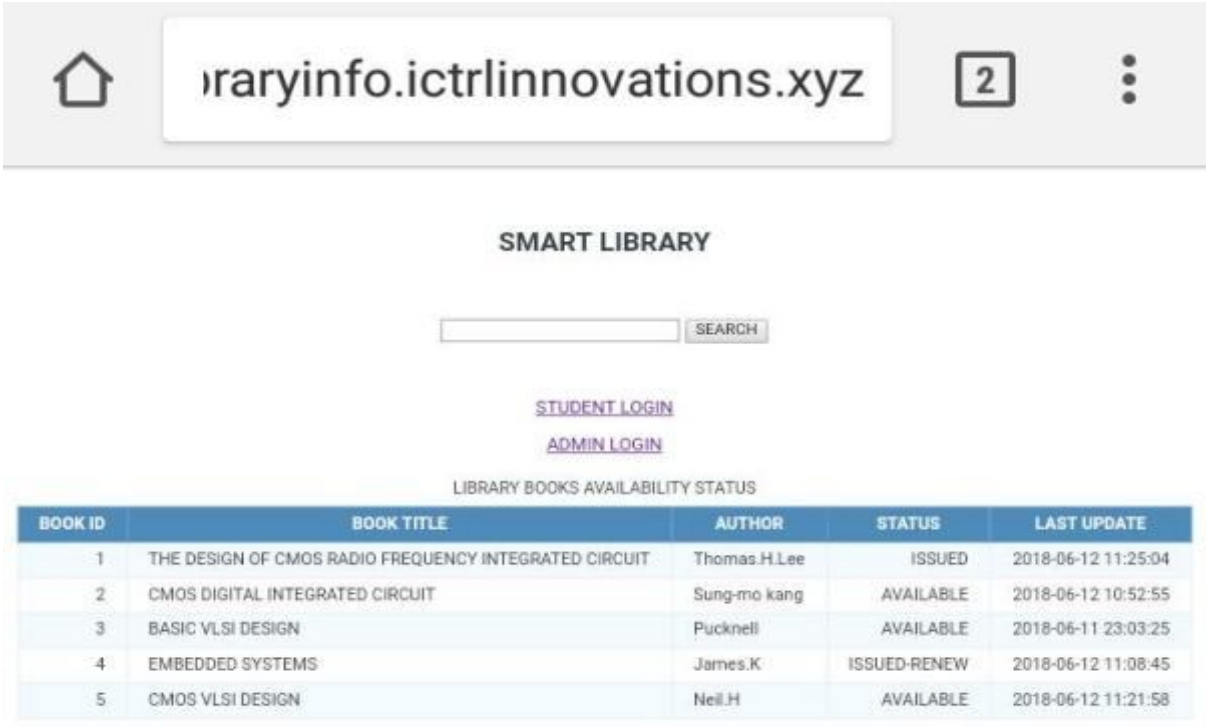
III. EXPERIMENTAL SETUP AND RESULT

The following figure shows the experimental setup for proposed system which implements the smart library system which is used to automate the library without human intervention and digitalize the library



Figure 2: Experimental setup

For this system we created a website by the name “libraryinfo.ictrlinnovations.xyz” the below figure shows the webpage for the proposed library and it shows the detail of books , book ID and author name and status of book.



BOOK ID	BOOK TITLE	AUTHOR	STATUS	LAST UPDATE
1	THE DESIGN OF CMOS RADIO FREQUENCY INTEGRATED CIRCUIT	Thomas.H.Lee	ISSUED	2018-06-12 11:25:04
2	CMOS DIGITAL INTEGRATED CIRCUIT	Sung-mo kang	AVAILABLE	2018-06-12 10:52:55
3	BASIC VLSI DESIGN	Pucknell	AVAILABLE	2018-06-11 23:03:25
4	EMBEDDED SYSTEMS	James.K	ISSUED-RENEW	2018-06-12 11:08:45
5	CMOS VLSI DESIGN	Neil.H	AVAILABLE	2018-06-12 11:21:58

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Figure 3: Webpage used for proposed system

The following figure shows the location of book by referring the book ID.

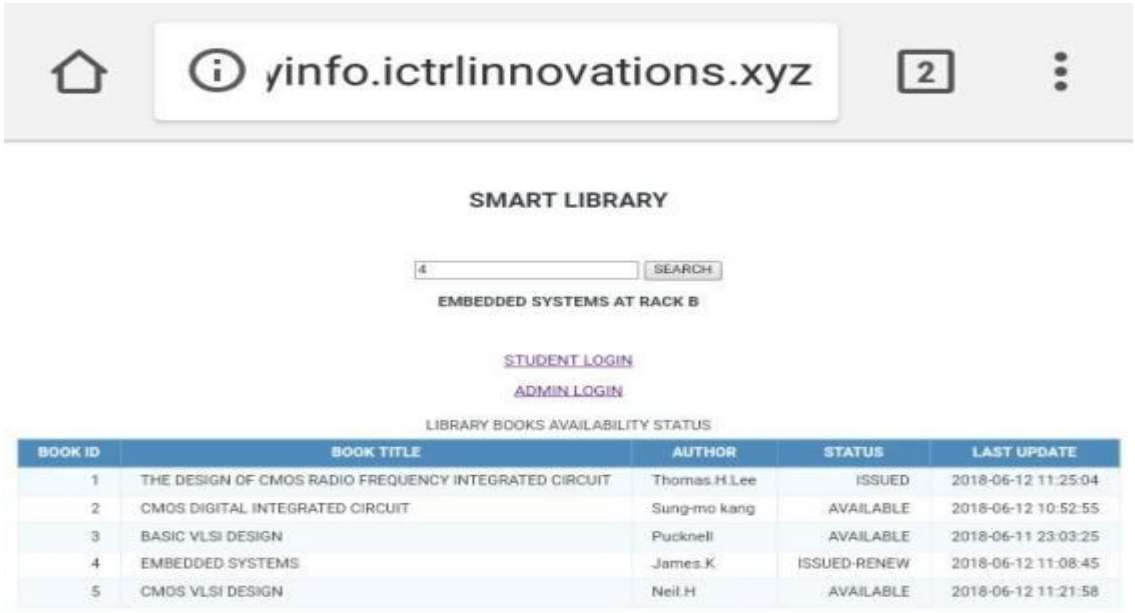


Figure 4: Webpage

The below figure shows misplacement of book and also show to which slot that particular book belong.

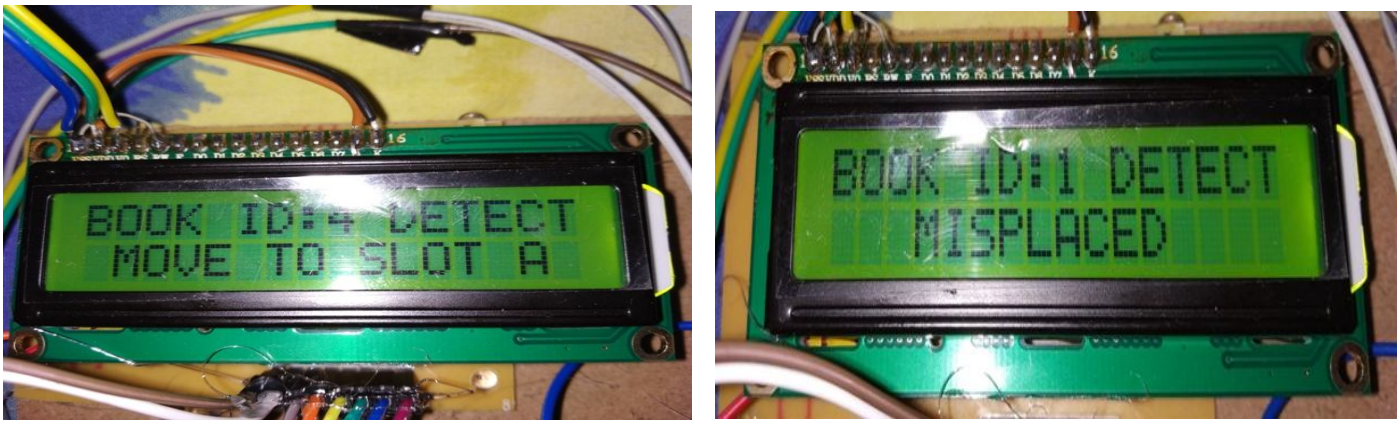


Figure 5: Misplace of book

The below figure shows the alert message on the LCD to indicate if any theft of book occurs and give the buzzer to indicate it.



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Figure 6: Anti-theft

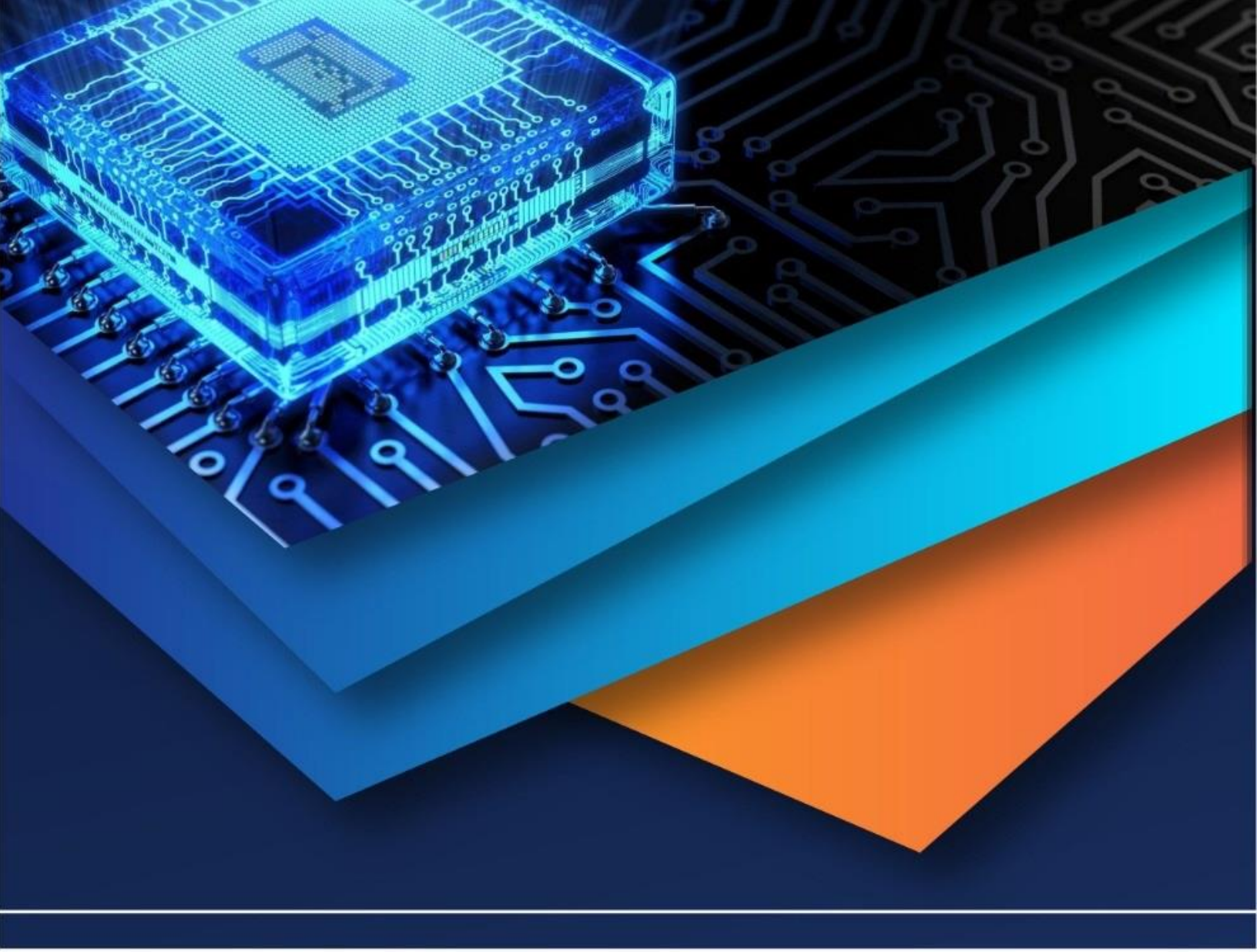
IV. CONCLUSIONS

The proposed system is very efficient in terms of technology and easy to use, consumes less time and automate the library and reduce the workload of the librarian. The availability of the books is checked on the web server hence the users need not to go to library to check the availability of the book. The main advantage of this project is that all the activities such as issue, renewal and return of the books are digitalized and all these actions are automatically updated in the database. This framework also provides the information about the misplacement and antitheft of the books.

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