Smart Library Access And Management System

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Abstract: In the present day scenario in colleges and schools we use a costly interface just to access library and process the attendance system. But to satisfy these requirements we don't require such costly interfaces. Generally RFID tags are used as the interface between the stored database and the students. But we have brought a cost efficient system excluding the RFID usage and providing a photographic interface to the students. The main idea of this project is to apply the software knowledge of LabVIEW and image processing. LabVIEW plays the major role in acquiring real time data and processing it as an image. As an Instrumentation Engineer, we use LabVIEW as the tool for building, testing and deployment of Virtual Instruments that can be further developed into fully functional blocks. These Functional blocks comprise of NI-VISION and MOTION modules that aid in the precise processing of image data and image acquisition. A USB2.0 PC camera is used to capture the image of the identity card and the access code printed on the book. The captured image from the camera is subjected to a series of computation in Vision Assistant module and the machine training details are saved. The processed data is linked with the database using suitable connectivity techniques. To make it more innovative, database connectivity is ensured using MS SQL, an online server which holds the data of the books and the details of the students. This online server provides an additional advantage of accessing the database throughout the connected devices. Also a dual interface approach is carried out which provides the librarian end and thee student end of access to the system. This makes the processing and the usage very easy and simple to the student.

Key words: LabVIEW, Image acquisition, Vision assistant, Database, MS SQL

1. INTRODUCTION

The traditional libraries are the libraries that use the manual detailing of the books and the remitter details. In those libraries the manual work load for the librarian is too high[4]. Also the readers of that libraries will have to wait a long time for entering the details to the librarian. This causes inconvenience to both the librarian and also the reader. One major issue is that the librarian should maintain all the written records of the readers for the future usage. To provide a remedy to this problem a system RFID based smart library system was introduced. In this system the user is given a RFID integrated reference card which the user can use to save the record of the book that person has taken. Also the books are provided with the barcodes on each of them. The librarian will have a barcode scanner with them through which the barcode is scanned and the corresponding data of the book from the database is viewed to the librarian and the signal from the RFID tag will provide the data of the user from the user database[1]. This Now the librarian will mark the book to the corresponding user. This has reduced lot of annual works for both the users and the librarian. But in the above mentioned methodology the work is done easily and quickly, but this method is a costly setup. Because the RFID tags used in those reference cards of the users is around Rs.500. So, when there is a loss of this card the will have to spend much the reference card alone. Also, the barcode scanner costs around RS.2000. This device is also guaranteed for 2 to 3 years[5]. After the time period we have to change it. Therefore, this system is a costlier setup.

2. LITERARY SURVEY

1. P. Iyappan, R. Abinaya. (2014) 'Smart Online Library using Dynamic Access Policies', International Conference on Advanced Communication Control and Computing Technologies, Vol.3, No.2, pp. 74-77.

An emerging technique utilized in software development is supported the concept of service. In recent trends, service based architecture plays a vital role in business solutions. For library management system for educational institution provides better solutions. This scenario shows in the library will have minimal amount of books. Recent system in library is issuing the book with some required more information like return date, late submission of books and all. Some of the students may affected those activities like books are not returned properly with date of return, they may forgot the dates, etc. So that this proposed method focused on efficient online library management system that neutralizes the distribution of the books to the user supported various dynamic access policies.

2. **Ignace T. Toudjeu and Prosper Z. Sotenga. (2010) 'Design and Implementation of an RFID Based Smart Attendance Register', Tshwane University of Technology, Department of Electrical Engineering Pretoria, South Africa, Vol.40, pp. 125-247**

Attendance is a very significant factor for many South African education institutions.. The traditional approach of manually taking and managing attendance registries is daunting for the Registrar and the Registrar. Techniques exist to provide attendance identification and register. Most of these techniques do not take into account some very important factors such as the scalability, autonomy and flexible use of a participant. This work thus presents an approach to arriving at a cost-effective solution to revolutionize the conventional and red tape process. This is achieved by using the new rapidly growing radio frequency identification (RFID) technology to develop a modular device for the acquisition of attendee's identity. An IEEE 802.15.4 compatible radio interface is also integrated to provide stand-alone data acquisition in the admin database application.

3. M.Amir, Abas, Auji.M, Dahlui.(2017) 'Attendance Management System (AMS): Comparison of Two Different Approaches', International Conference on Engineering Technology and Technopreneurship, Vol.56, pp. 62-74.

Different approaches to the implementation of accelerated analysis for the Attendance Management System have been designed and analysed. The first design is to apply data access by means of a card reader and the data is stored in the memory card. All data that represents student ID are processed by the Attendance Management System to monitor student performance. While the second approach is applying same data access through RFID via a control unit for validating the Student ID. Both approaches have advantages and disadvantages with respect to cost and speed of treatment. However, after a thorough comparison study, the second approach presents more advantages than the first approach.

4. Mohammed Abdallah, Omar Elkeelany. (2014) 'A Survey on Data Acquisition systems DAQ', International Conference on Computing, Engineering and Information, Vol.4, No.2, pp. 99-115.
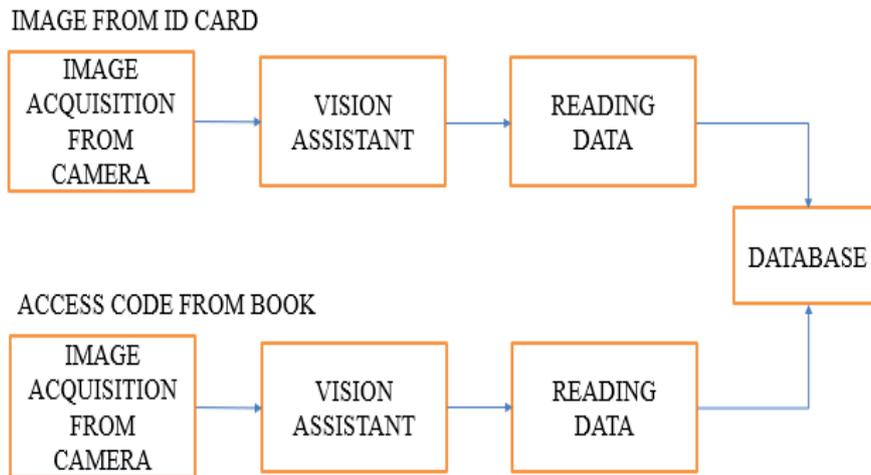
Data acquisition systems are employed in varied applications in our world. Varied techniques and algorithms are used to attain prime quality acquisition. For high quality. Each application has its own philosophy and knowledge acquisition structure. Hence, during this paper, a survey on knowledge acquisition systems has been conferred. Completely different DAQ classes are introduced. A comparison study between these classes has been conferred.

4. Mrs. C. Jayalakshmi and Dr. R. Sarangapani (2013) 'Green Libraries by Using Smart Technology', Minnesota State University, Vol.4, pp. 42-46.

A Library is intended to reduce negative impact on the natural surroundings and maximize in door environmental quality by suggests that of careful web site choice, use of natural construction materials and perishable product conservation of resources and accountable waste proposal (recycling etc).
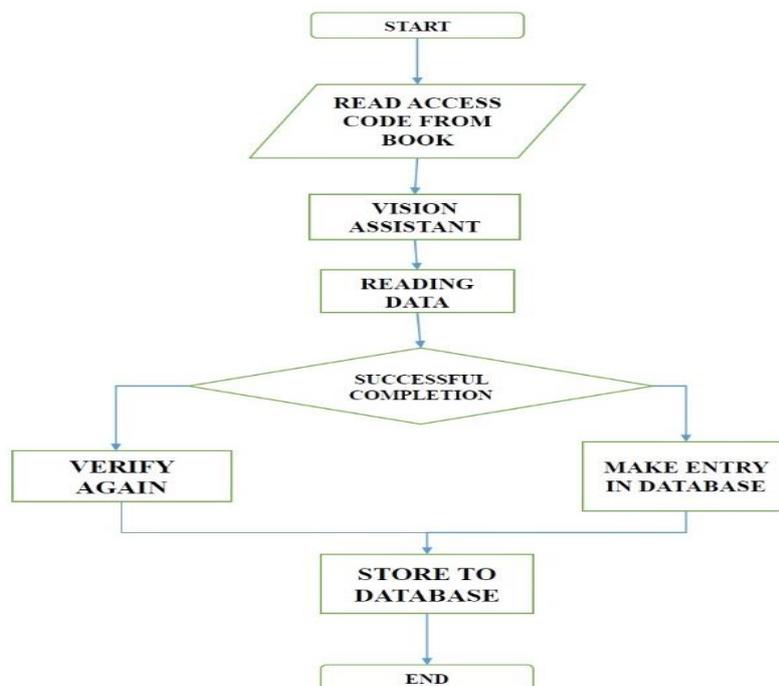
3. PROPOSED METHODOLOGY

The image acquisition from the identity card and the books are made by the USB type web camera that acquires the image of the same. LabVIEW is the base software used to carry out the image processing[2][3]. The main idea of using LabVIEW is that it is native to Instrumentation Engineers and offers the scope of Graphical Programming. The basic blocks to carry out image processing are available as modules that perform specific functions. Use NI-MAX to obtain the details of the connected peripherals. Under the Devices and Interfaces tab, check for NI-IMAQdx Devices. It can be seen that cam0: USB2.0 PC CAMERA is detected by the PC. Hence it can be used for the image acquisition. Apart from that we can assess the System Configuration and available resources in the next tabs. On the Block Diagram, place the Vision Acquisition VI from Right click>>Vision and Motion>>Vision Express>>Vision Acquisition[4]. Double click placed VI to enter the properties. Use the 'Test' option under the Vision Acquisition Express to obtain the image of the identity card[15][16]. Click next and finish the setup of the acquisition part. Now the VI is configured to acquire image data from the USB2.0 Camera[6]. On the Block Diagram, place the Vision Acquisition VI from Right click>>Vision and Motion>>Vision Express>>Vision Assistant. Double click placed VI to enter the properties as shown in Figure 1.

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IMAGE FROM ID CARD

```
IMAGE
ACQUISITION  →  VISION      →  READING
FROM            ASSISTANT      DATA
CAMERA
                                              DATABASE
ACCESS CODE FROM BOOK

IMAGE
ACQUISITION  →  VISION      →  READING
FROM            ASSISTANT      DATA
CAMERA
```

Figure.1 Block Diagram of Smart Library Access and Management System

Use the image processing tab with OCR in order to process the numbers on the identity card[14]. This will further prompt to a window displaying the test image acquired and tabs with the possible options that can be made upon the image. Under OCR/OCV Setup click the Train tab and select a path for the Character Set. Perform the training of the numbers in the identity card by selecting a region of interest and setting it to train mode. A file under the .abc extension is created with the data of the numbers that have been trained. Perform the same operation for various angles and lighting conditions of the setup to achieve maximum correct responses. After training is done, the supporting VI is created to enable the output string to be converted into a Numeric value for further operations to be performed on it[8]. The data is then used to display the Year of Study details of the particular student. Next the data of the books need to be acquired. For that the same procedure is followed until OCR/OCV Setup is selected. Select access code which is the standard code used in the department library. The previous procedure to enable the Vision Assistant VI are the same as mentioned above. Following that, accessing the database is the next step. This stage includes opening a .csv file containing the data of the student and retrieving that particular data from the list.CSV stands for comma separated values. So any data stored in that format is delimited by a comma. Using the proper programming, one can access the correct row and correct data from there. Combatively, all the above mentioned VI's are clubbed together and a single compatible system is formed to enable hassle free access to the data of the students who have enrolled themselves in this system. The flow diagram shown in Figure 2 shows the process of smart library access and management system.

```
          START
            ↓
     READ ACCESS
     CODE FROM
        BOOK
            ↓
       VISION
      ASSISTANT
            ↓
      READING
        DATA
            ↓
     SUCCESSFUL
     COMPLETION
      ↙        ↘
 VERIFY        MAKE ENTRY
 AGAIN         IN DATABASE
                  ↓
             STORE TO
             DATABASE
                  ↓
                END
```

Figure.2 Flow Chart of Smart Library Access and Management System

5. RESULT AND DISCUSSION

The training is made to read the register number of the students from the identity cards[9][10]. This number that is read from the image is readable in string format . The string to number conversion is made by the string functions from the functions pane. The function used for the conversion of the string to number is available in the functions pane of the front panel .
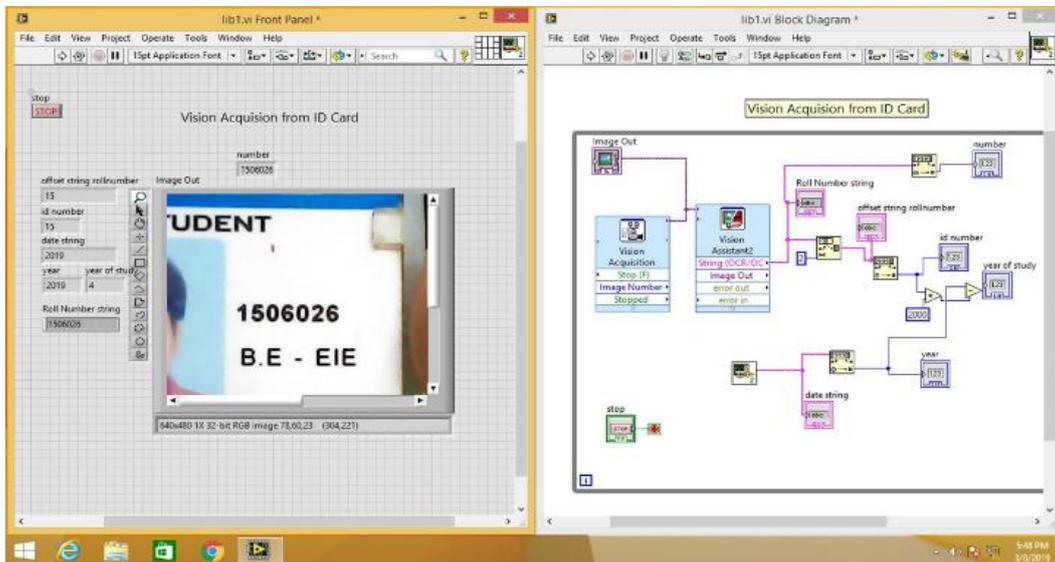

Figure.3 Library Access and Management System using LabVIEW

The data of the students like their register number, name and year of study, mobile number and mail id are collected is shown in Figure 3. These collected data are to be consolidated and stored in a MS SQL database[7][9].
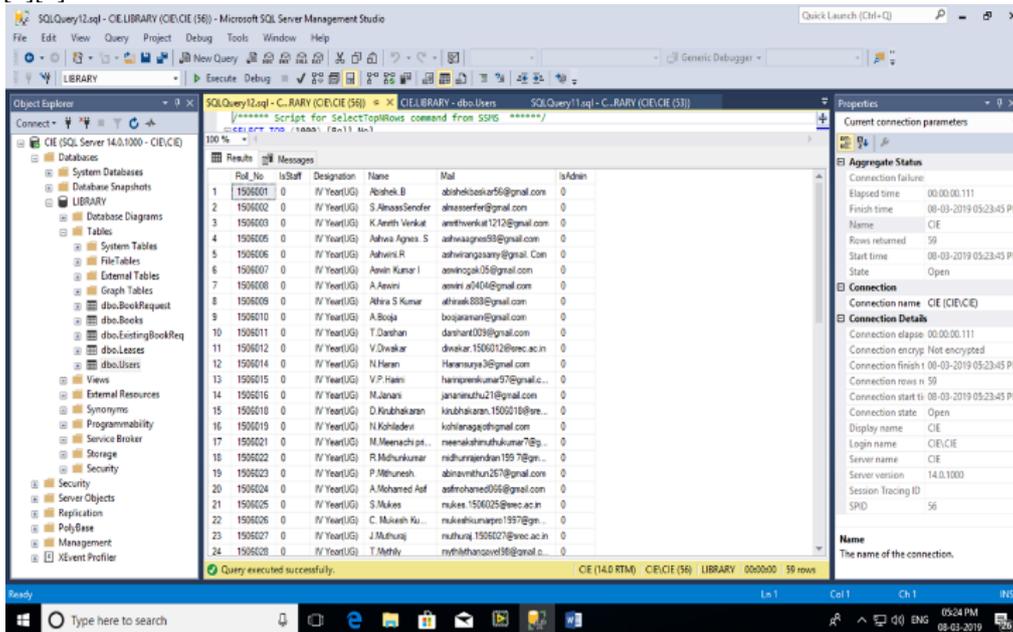

Figure.4 Database of Users

The data of the books like access code, author's name, title and isleased are collected. These collected data are consolidated and stored in a MS SQL database as shown in Figure 4.
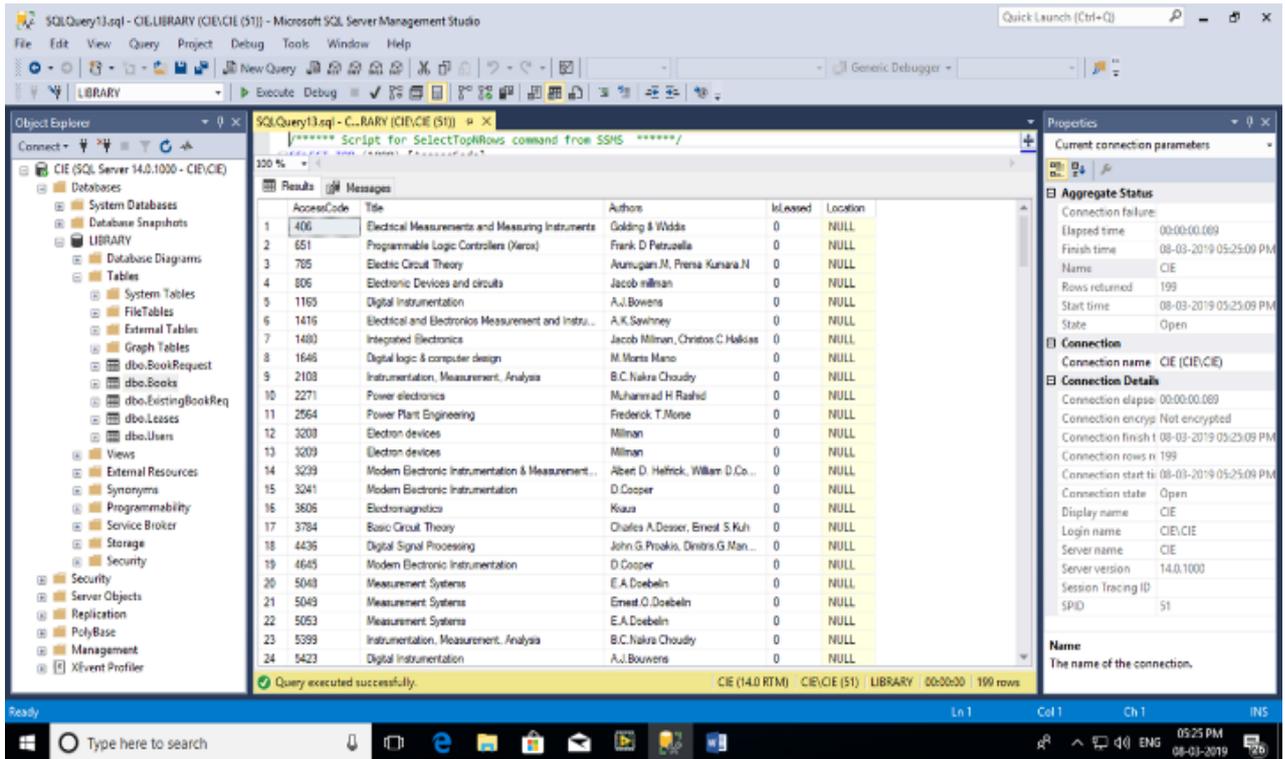
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Figure.5 Database of books in library

When acquiring the student data, there occurs a dispute in arranging them via year of study. This is because when a student is studying in his third year, that student is supposed to be the student of third year from the May month of this particular year to May month of the next year. Therefore, when we are using the default date and day generator it does not analyze the year of study effectively as shown in Figure 5. So, we have to create a separate way of the year of study analysis so that the further processing the data of the student will become easier as shown in Figure 6.
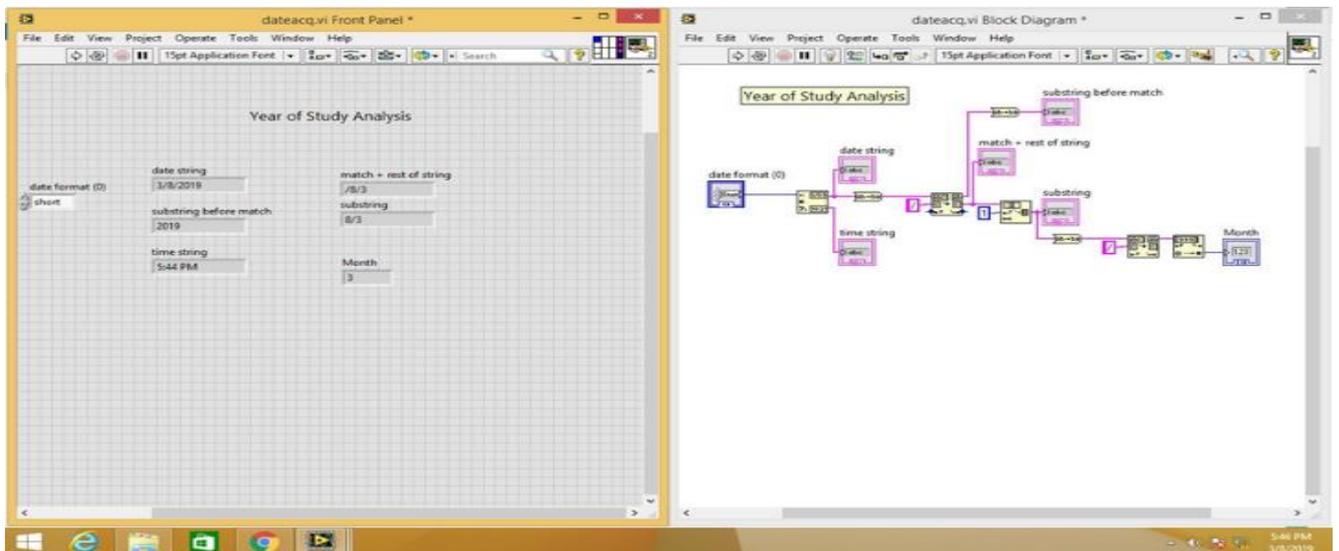

Figure.6 Year of Study Analysis

5. CONCLUSION AND FUTURE SCOPE

In these experimental studies, Smart Library Access and Management System made use of the most efficient user-friendly software LabVIEW[11][13]. Generally data access in places such as colleges use RFID based cards which are quite costly, whereas we have used image processing with LabVIEW which makes it cost efficient[12]. The idea of this work is to reduce the cost of the data accessing cards being in use as of now and provide a user-friendly web access interface for the convenience of the users. We can further extend this work using LabVIEW software to machine learning in python.

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