

STUDENT DATABASE MANAGEMENT AND ENQUIRY SYSTEM USING BARCODE SCANNER

Raj Kiran T¹, T Abhinav², V Nafeez³, Adithya H B⁴, Amulya S⁵, R Meghana⁶, Sunil MP⁷

^{1, 2, 3, 4, 5, 6} UG Student, ⁷ Assistant Professor

^{1, 2, 3, 4, 5, 6, 7} Department of Electronics and Communication Engineering, School of Engineering and Technology, Jain University, Bangalore.

ABSTRACT

Student's attendance plays a very vital role in order to justify their overall academic performance. Unfortunately, there is no automated attendance record maintenance system available in schools and colleges for the students. Today with advanced technology, there a lot of technologies are being used in this century. Several of software apps are created in order to make the data's that are saved online and access the stored data through manually. The stored computerized data is more secure because it will be protected by encryption key. Thus, here is one attempt to develop such one system and to solve the existing problem. The main objective of the proposed work is to design a student database management system using Barcode scanner. In this work we convert the manual student database management into computerized system for data reliability and easy accessibility. This system provides any information regarding students such as his/her USN, Department, Attendance status, Internal Assessment score, Provisional results of any semester and also other personal information. It provides all the information of a student starting from the first day till the end of his/her course, so that it can be used later for all reporting purpose, attendance tracking, curriculum details, and hence can be used for future reference.

This system will have the required databases of student directory, this application has been developed using Microsoft Visual Studio 2012 using C programming language and using MS Access for creating the database. The standalone system is accessed using barcode scanner is interfaced to the Arduino microcontroller. The student should use their Identity card and swipe it on barcode scanner to check their details. The Student database System is located on a server which can be accessed anytime and all the information's are being updated through Admin panel. Besides, by using this system we can reduce the time and human effort. The system is user - friendly with GUI support and all the instructions of accessing the system will be displayed on LCD screen. The proposed prototype is to setup student's full pledged information, it is not only for students, and it can also accessed by their parents, just by sending one SMS to know about their ward completely with respect attendance and academic performance report card. It is secured and consumes less time to access.

Keywords— Barcode, SMS, Attendance, Enquiry, Student, LCD, GUI

1. INTRODUCTION

With Posting of internal assessment report through postal method, this may not reach on time, lot of paper work, manual interaction is more, may lose of data, time consuming, all these can be avoided with the proposed automated smart system. Objective of the proposed system to eliminate the possibility of human error, data is secured, and attendance awareness among the students, backup of total information is done. Auto detailed information of marks, attendance is sent to Parent/Guardian through email and through the SMS every month. Even if parents want to know performance of student they can SMS and get reports through SMS. The parents can request for the report by sending SMS at any time (round the clock) and get performance of their children. The proposed can be used in such an application. This project implements automated SMS Response system using global system for mobile application (GSM) modem. Existing System are like using RFID is harder to

understand, it can be less reliable, RFID tags takes more memory than barcode labels and more than one tag can respond at same time, and expense is one of the most significant disadvantages of RFID. Other important thing is if we implement with RFID tags, we need to provide separate RFID tag to each and every individual student, which will increase system cost.

2. LITERATURE SURVEY

Attendance is the act or fact of attending (being present at) school. Also, attendance is used to define the number of persons present on a particular day at school. An attendance policy provides the guidelines and expectations for students' attendance at school as defined, written, disseminated, and implemented by the school. Attendance can be recorded in many ways such as using web based, RFID, biometrics and bar code scanner. Since most of the application developed nowadays requires the world wide accessibility, web based *system* is the most common attendance *system* that available.

One of the higher institution in Malaysia have used RFID to record the attendance of their student and the record sent to online server for an online accessibility [2]. Apart from that, there is plenty of educational institutions used RFID technology to record their student attendance. Easy connection Attendance is the act or fact of attending (being present at) school. Attendance can be recorded in many ways such as using web based, RFID, biometrics and bar code scanner. Since most of the application developed nowadays requires the world wide accessibility, web based *system* is the most common attendance *system* that available.

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Hema Subramaniam, Marina Hassan, Setyawan Widyarto [4] proposed a Barcode Based Student Attendance System (SAS) in this the data captured using bar code scanner sent to the attendance system for the purpose of recording and preparing attendance record. Bar code scanner used to scan the student card which contains the student identification number. The twelve digits then send to the attendance system and it will remain displaying student record for 5 second before change to the state to accept another student card number. Each recorded data will be send to the database which developed using database processing application. Structured query language (SQL) used to query data to produce various kind of student attendance report.

N. M. Z. Hashim, N. A. Ibrahim², N. M. Saad, F. Sakaguchi, Z. Zakaria[5] proposed a Barcode Recognition System by using image processing. The system will be able to read barcode through an image and the system capable to capture the image by using a webcam. This project will be using MATLAB software program to develop the system and it will integrate with webcam or digital camera. System will analyze the image and then display on the Graphical User Interface (GUI) the barcode type, data and size of the image. System is designed to recognize different types of barcode and display the data once the barcode image is captured. System also is to provide convenience way of observing data from the barcode with lower costing compared by using the electronic barcode scanners.

3. PROPOSED SYSTEM

In this proposed work. The block diagram displays the process of the complete system. In proposed system, students can access their details when they feel to check, which is on the output window (LCD screen) or by a smart phone application. This system provides information about their respective student attendance and marks. It provides more security and reliable than RFID technology. Even if parents want to know performance of student they can SMS and get the reports through SMS. The parents can request for the report by sending SMS at any time (round the clock) and get performance of their children. The information of students like their ID, subject marks and subject wise attendance percentage needs to be entered in GUI from admin computer and then the entered data will be stored in database installed on a web server. Once all the information is entered, the user can view their data by just

swipe/sense their college ID card at the barcode scanner. The prototype developed contains two different modules. They are Students enquiry process and SMS enquiry process.

3.1 Student enquiry process

- Students scan their college ID card to barcode scanner to view their profile and information like subject wise marks, attendance percentage and provisional semester marks on a LCD screen.
- As the college ID is scanned by barcode reader the information is transferred to Arduino Uno through USB host.
- From Arduino UNO the College ID number is transferred to Arduino Mega by using TTL logic.
- Arduino Mega displays the respective student information on LCD display by accessing the database using GSM/GPRS module.

3.2 SMS enquiry process

- Parent/Guardian requests his/her College ID number to the request number mentioned. The GSM/GPRS receives the ID number and get the corresponding information from database via provided internet connection.
- The information collected is sent to Parent/Guardian's mobile as an acknowledgment through SMS.

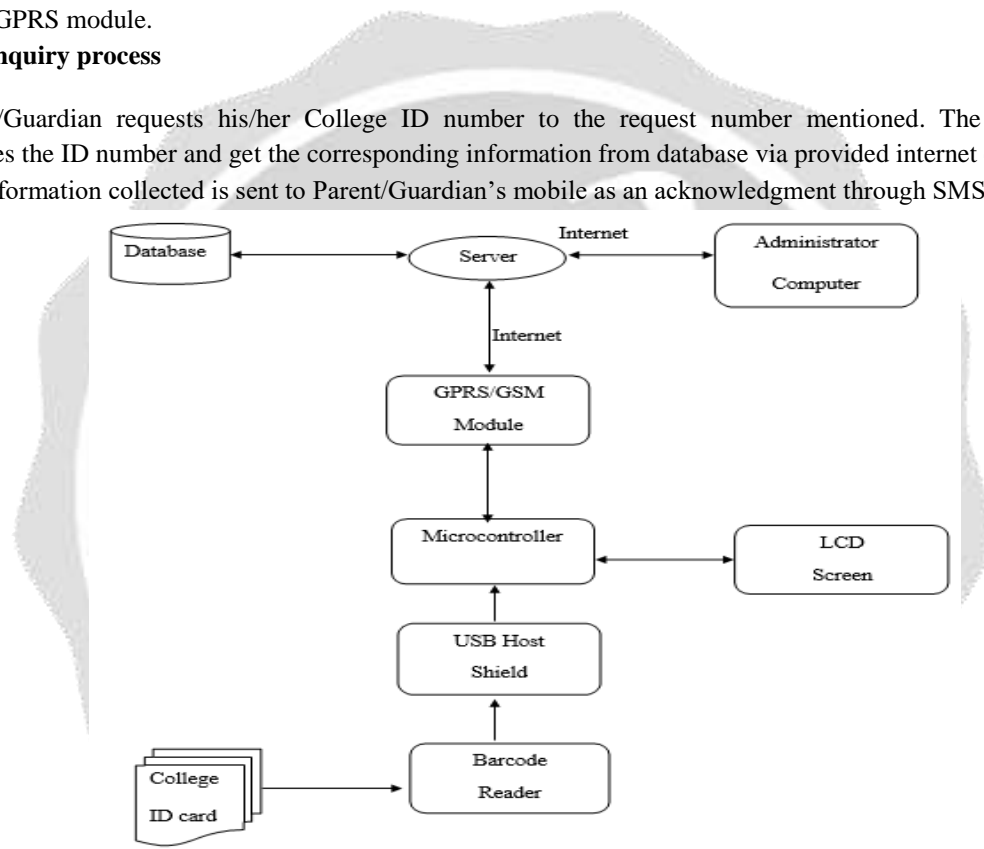


Fig.1.Proposed Block diagram

4. HARDWARE IMPLEMENTATION

4.1 Arduino Uno And Mega 2560

The Arduino Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

First we connect our Arduino Mega to the Computer or Laptop to see which COM port will be used to burn the program from the computer or laptop. This also provides power to the Arduino Mega. For interfacing these both we require only 1 pin, TX of UNO to RX of Mega (TTL Logic). Before interface burn the program on UNO which

supports to retrieve the scanned information from the barcode through USB host. UNO converts alpha numeric character from barcode and send to Mega as ASCII character.

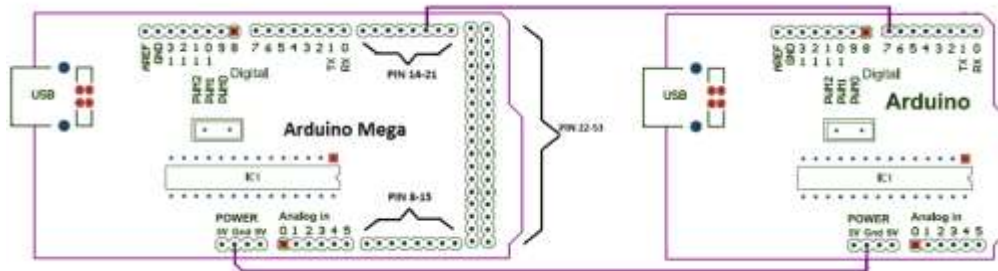


Fig.2.Interface between Uno and Mega

4.2 GPRS/GSM MODULE (SIM900)

The GSM shield by Arduino is used to send/ receive messages and make/receive calls just like a mobile phone by using a SIM card by a network provider. We can do this by plugging the GSM shield into the Arduino board and then plugging in a SIM card from an operator that offers GPRS coverage. The shield employs the use of a radio modem by SIM Comm. We can communicate easily with the shield using the AT commands. The GSM library contains many methods of communication with the shield. This GSM Modem can work with any GSM network operator SIM card just like a mobile phone with its own unique phone number. Advantage of using this modem will be that its RS232 port can be used to communicate and develop embedded applications. Applications like SMS Control, data transfer, remote control and logging can be developed easily using this. The modem can either be connected to PC serial port directly or to any microcontroller through MAX232. It can be used to send/receive SMS and make/receive voice calls. It can also be used in GPRS mode to connect to internet and run many applications for data logging and control. In GPRS mode you can also connect to any remote FTP server and upload files for data logging. This GSM modem is a highly flexible plug and play quad band SIM900A GSM modem for direct and easy integration to RS232 applications.

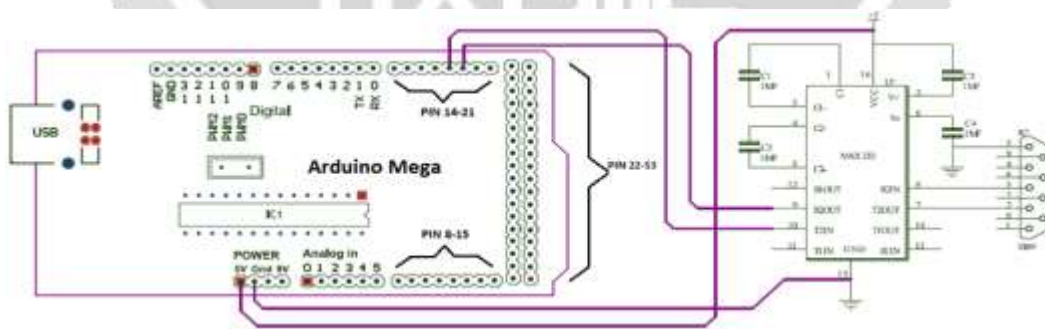


Fig.3.Interface between Arduino Mega and GPRS/GSM Module

4.3 Barcode Scanner

A Barcode scanner is an electronic device for reading printed barcodes, it consists of a light source, a lens and light sensor translating optical impulses into electrical ones.

It contains a decoder circuit analysing the data provide by the sensor and sending it to scanner's output.

A hardware device or software program that interfaces with a computer to translate data read by a device other than a key board, such as a magnetic strip or barcode reader or other such scanning device, into keyboard data. For example, data entered into a database via a bar code reader must first be translated into alphanumeric characters in order to be understood by the person interfacing with the database since humans do not read bar codes. The term wedge comes from the fact that the hardware device typically sits, or wedges, between the keyboard and the system unit. The keyboard is attached to the scanner, which is attached to processing component of the computer. Software wedges are programs that reroute the data once it has been input into a computer, typically through a COM port. The input data is routed to the keyboard buffer by the software, making it appear as if it entered the system through the keyboard. Keyboard wedges can be used simultaneously with keyboards.

The USB Host Shield contains all of the digital logic and analog circuitry necessary to implement a full-speed USB peripheral/host controller with your Arduino. A four-wire serial interface is used to communicate with the host controller chip, so the shield connects the Arduino's hardware SPI pins (D10-13) to the MAX3421E. The Host Shield takes its power from the 'Vin' pin on your Arduino. Power from that pin is regulated to both 5V and 3.3V on the shield.

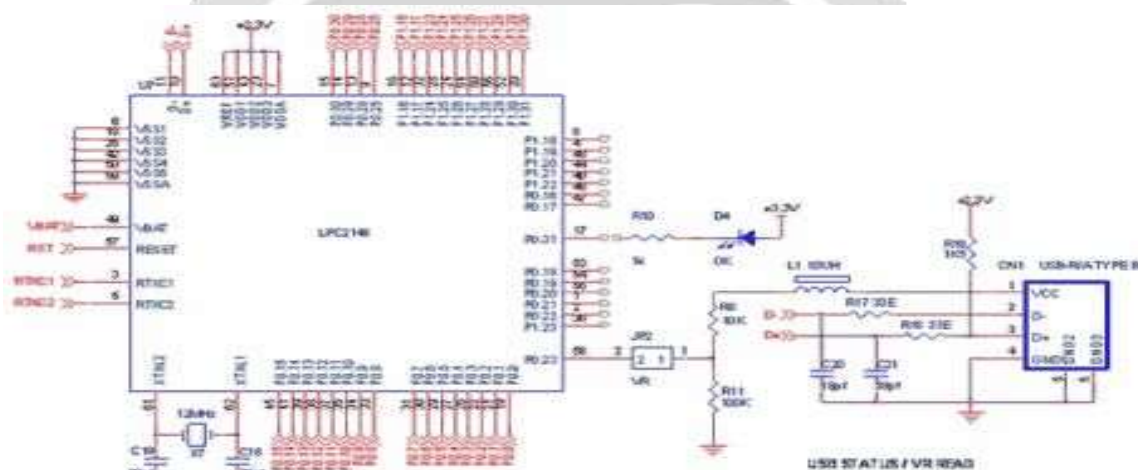


Fig.4. Block diagram for USB Shield Host 2.0

- For interfacing these both we require a set of pins which transfer information from Arduino Uno to USB Host Shield.
- The pins are connected as follows:
 - 7,10,11,12,13,Vin,Gnd pins of Uno are connected to 7,10,11,12,13,Vin,Gnd pins of USB Host Shield respectively.

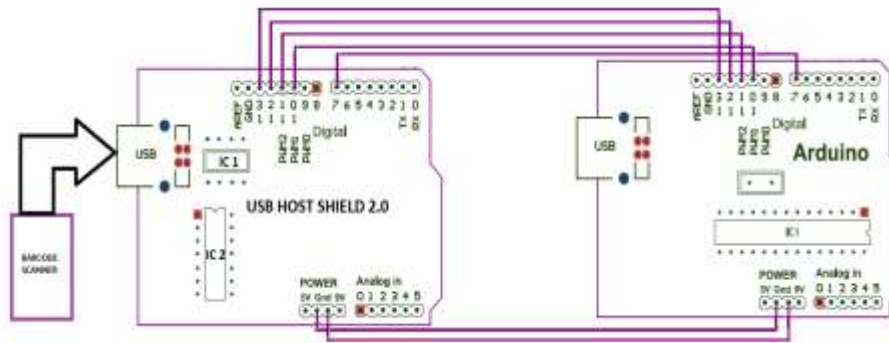


Fig.5. Interface diagram between Arduino Uno-USB Host Shield 2.0

4.4 LCD Display (20X4)

This is a basic 20 Character by 4 line display. We need 11 general pins to interface to this LCD screen including LED.

- i. 8 data pins D7:D0
Bi-directional data/command pins.

Alphanumeric characters are sent in ASCII format.

- ii. RS: Register Select
RS = 0 > Command Register is Selected

RS = 1 > Data Register is Selected

- iii. R/W: Read or Write
0 > Write, 1 > Read

- iv. E: Enable (Latch data)
 - Used to Latch the data present on the data pins.
 - A high-to-low edge is needed to latch the data

- v. VEE: Contrast control

It can be easily interfaced with micro-controllers, by sending ASCII characters through data.

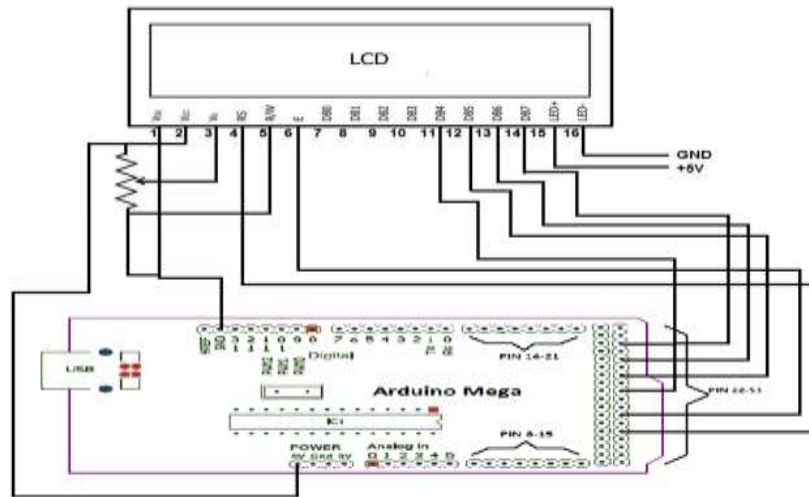


Fig.6. Interface between LCD and Arduino Mega

5. SOFTWARE IMPLEMENTATION

5.1 Embedded C

Embedded C is a set of language extensions for the C Programming language by the C Standards committee to address commonality issues that exist between C extensions for different embedded systems. Historically, embedded C programming requires nonstandard extensions to the C language in order to support exotic features such as fixed-point arithmetic, multiple distinct memory banks, and basic I/O operations.

5.2 PHP (Pre-processor Hypertext) & MySQL (My Structured Query Language)

PHP is a High level programming language installed on a web server which receives inputs from user via internet and processes these inputs to produce dynamic outputs. A PHP can access databases which are installed on server. It can able to receive inputs (Serial number, ID number etc.) from clients and get the entire information associated with it and sent it back to the client. It also validates the information before processing the same. MySQL is a language used to control the functioning of a database. It supports several data operations such as storing new data, updating, deleting, retrieving etc. It requires a *User Name and password for the authorization to access the database.*

5.3 NET Framework (.NET)

.NET Framework (.NET) means it is a software development framework from Microsoft. It provides a controlled programming environment where software can be developed, installed and executed on Windows-based operating systems.

Features

Interoperability: This allows for .NET-developed programs to access functionalities in programs developed outside .NET

- Common language infrastructure specifications (CLI) allow for the exchange of data types between two programs developed in different languages.
- Security: Programs developed in .NET are based on a common security model.



Fig.7.Admin Panel



Fig.8 Admin Panel

6. RESULTS AND DISCUSSION

A. Student enquiry process

Step 1: Scanning College ID card

The scanned ID number is transferred to Arduino Uno from barcode scanner through USB host shield.



Fig.9. Scanning College ID card

Step 2: Display of Student's Profile

It collects the information from database maintained in a web server through GSM/GPRS module and display on the LCD screen.

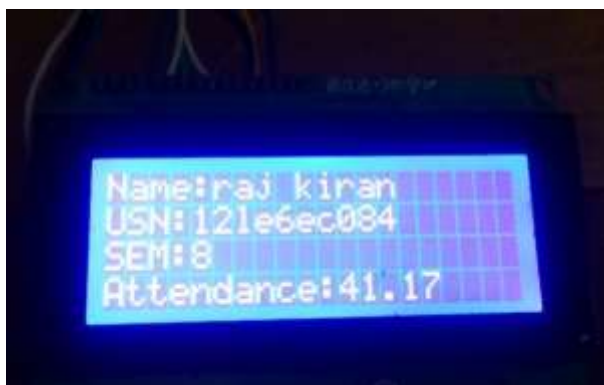


Fig.10. Display of Student information

Step 3: Overall Attendance displayed on LCD

Attendance is displayed on the LCD corresponding to the ID number received by the GSM/GPRS module .



Fig.11. Display of Student attendance

Step 4: Overall Lab Attendance displayed on LCD

Lab Attendance is displayed on the LCD corresponding to the ID number received by the GSM/GPRS module.



Fig.12. Display of Student lab attendance

Step 4: Marks displayed on LCD

Marks are displayed on the LCD corresponding to the ID number received by the GSM/GPRS module.



Fig.13. Display of Student marks

B. SMS Enquiry System Process

Step 1: Initiation

Prototype is ready to receive input from SMS or barcode scanner.



Fig.14. Prototype is ready to receive input

Step 2: Request of message from client

Parent/Gaurdian sending a message which contains college ID number to therequest number mentioned.

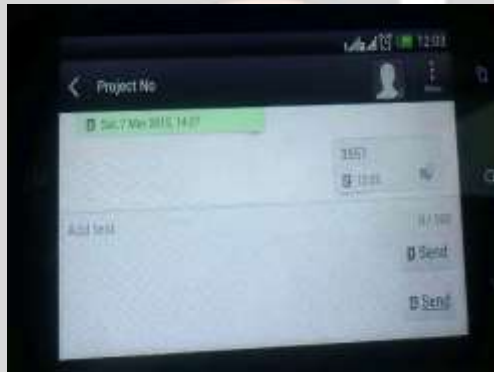


Fig.15. Request of colleg ID number from Parent

Step 3: Processing SMS data Arduino will process the SMS content received by GSM/GPRS module.



Fig.16. Processing SMS data

Step 4: Receiving SMS data Identifies the mobile number of the Parent/Guardian.



Fig.17. Identifying the number from SMS received

Step 5:Connecting to Internet

The GSM/GPRS module is connected to internet for collecting the Student's information.



Fig.18. Connecting internet through GPRS/GSM module

Step 6:Processing Data

It process the data received from the student database, stored in web server.



Fig.19. Processing the data

Step 7:Student's Information

Student's profile is displayed on LCD which is received from database.



Fig.20. Display of students profile

Step 8:SMS sent successfully

SMS is sent to the Parent's/Gaurdian's mobile as an acknowledgment.



Fig.20. SMS sent to Parent mobile

Step 9: Received SMS on Client mobile

The Student overall attendance, marks is received on Parent's/Gaurdian's mobile which is sent from GSM/GPRS module.



Fig.21. SMS received on Parent's mobile

7. CONCLUSION AND FUTURE SCOPE

This work describes an information management system of students, which uses barcode technology. It shows the potential applications of using digital barcodes to carry useful information, how the system can be helpful in providing information to the users. The developed Web-Based Student Enquiry System using Barcode and GPRS/GSM technology will significantly improve the current manual process of student attendance, results enquiry and tracking system of a university or school environment. The system promotes a semi-automated approach in enquiry of any information related to his academics, i.e. by having the students to flash their college Identity cards to the Barcode reader. Then he can view the data of his desire on the LCD display. In addition, a number of other advantages are gained by having an online web-based system, acting as a central repository of student database record. Firstly all processes of managing the student database record such as USN, Department, Attendance status, Internal Assessment score, Provisional results of particular semester and other resources too are performed online, allowing administrators and lecturers to view or modify the users' data through any computer via the web browser through admin panel which is developed using .net with admin password. This way, no specific software installation is required. The student data are also processed and analyze automatically with less risk of data loss, compared to a manual filing approach. Although the student database management module is not fully integrated to the system and used on real time, the system prototype demonstrates easy navigation and data are stored in a systematic way. Overall, efficiency has improved and work processes simplified. Although all the objectives have been met, the system still has room for improvement. The system is robust and flexible enough for future upgrade using advanced technology and devices.

This system is flexible, which means that it may be extended by adding more modules. The developed system can be improved and upgraded further, e.g. by extending the system with new features and modules or by improving the web-interface layout with new display style. Better yet the system can be enhanced further to offer another significant enhancement where the system can be extended to monitor staff database record. In the developed prototype we designed with GPRS module, the response time of GPRS is more so it can be updated with WIFI

module in order to access and store database on the server. And also we can update to touch screen with high resolution screen for display purpose. We can conclude that GPRS based students database system is chipper as well as reduced complexity up to 70% that of using barcode technology.

8. REFERENCES

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