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QR Code Based Student Smart Identity Card

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***Abstract*-- Security is the known issue in digital world since it preventing organized crime. Nowadays a drastic changes in information technology, all education institution are still lagging behind. Education institution in developing countries is a tremendous sector and it is expanding drastically. For identification of a student they still relay on the manual handwritten identity cards and files. An identity card authentication system is established then it would be much easier to recognize a student and can trap his/her progress. A Smart Identity Card is considered to be a secured and time saving to authenticate identity of an individual without the need of Computer/Internet. In account to that, we implemented a Smart Identity Card with QR Code for a student. QR Code is implemented in Student Identity Card to detect details of a student by scanning the QR Code with smartphone. Nowadays smartphones are user friendly devices so any one can use QR Code scanning applications in their smartphones. QR Code is said to be the next generation of barcode. This paper is specifically designed to implement QR Code in normal identity cards. That is introducing a new era of identity cards as a Smart Identity Cards. We tried the level best to make a right implementation of QR Code. A student Smart Identity Card will be absolute use of latest technology in progressing countries.**

Keywords- Smart Card, QR Code, Smartphone

I. INTRODUCTION

Information technologies are increasing day by day in the world and provide the solution of different issues and their problem. Student Smart Identity Card application helps to students as well as staff to manage the student details in education institutions. Nowadays with drastic growth of population, people need to be recognized and now it is must for every organization from a company to large country to have the Identity Card for each individuals. Identity Card is said to be the summary of any student indeed. It is extremely important for an educational institute to provide an Identity Card to each individual student of it. Therefore, now for all educational institutions an Identity Card for each individuals is compulsory.

The QR Code was mainly created to overcome the limitation of barcode. QR Code is implemented as student Smart Identity Card and student details can be found by scanning the QR Code with smartphones. Mobile technology is developing and spreading world wide at a very high speed. Therefore, there is a huge demand for tools like "QR Code" that can help mobile phones to have an easier and faster access to information. Presently smartphones are user friendly devices so we can easily scan the QR Code with smartphones. This paper includes "QR Code Based Student Smart Identity Card" is being created to decrease the effort of human as we know before people use the hand written Identity Card. Smart Identity Card produced software that captures both student pictures and QR Code of individual student.

For example, business card does have only QR Code facility. But this software will had all the feature in one Identity Card and Identity Card will be act as the Smart Identity Card. Another important point it can be found as open source that means it will be available for free. QR Code can be scanned with any smartphones and it will show the information of the student including – medical details like blood group and progress of the student.

II. IDENTITY CARD AND GENERATION

Identity Card will help to make the proper verification of the identity of a person [4]. Identity Card is the small standard size card and usually called the Identity Card. A Card can show the data of the student as like name, id number, course, date-of-birth, age, address, photo. These types of identification are used commonly in the place of educational institutes for the student and companies for the employees. Therefore, student Identity Card is said to be summary of student information

.

As we can compare the student normal Identity Card of any progressing country then it only contains the details of a student which is handwritten. By this handwritten details of Identity Card anyone can make the fake Identity Card. Handwritten Identity Cards can be filled with errors and mistakes. Sometimes he or she made the mistakes of writing wrong name with spelling and so on. Here is an example of previous handwritten Identity Card of the student.

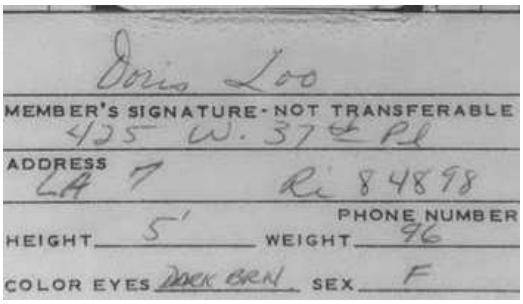


Fig .1 A handwritten student identity card

Identity card is using the regular barcode for some extra information of student. But there is a problem here as it does not contain all the information of student in detail. Here is an example of normal student Identity Card implemented with barcode. Matrix type of barcode is one dimensional. Barcode scanning requires the special device called barcode reader. Scratched barcodes may cause the problems while scanning. Barcode scanner or reader works with the computer terminal.

Fig. 2 Student Identity Card with Barcode

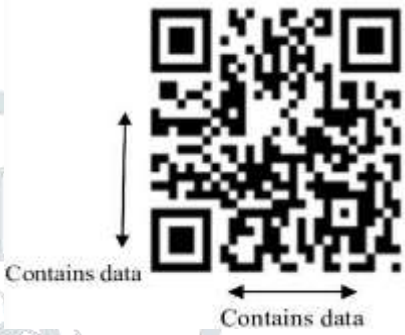
3. QR CODE

QR Code is said to be an Quick Response Code. The matrix type of QR Code is multi dimensional. QR codes are two dimensional barcodes that visually encode bits of information represented as black square dots placed on a white square grid. Presently everywhere it is used because of its large storage capacity, fast readability, lower implementation cost and technical simplicity. It is not difficult to read a QR Code even if they are partially damaged and they are easy and fast to read with a camera-based device. As a result of escalation of smartphones across many areas, reading and decoding QR codes as become much easier than using system based on complex technology.

Fig. 3 QR Code

A.Functions & Algorithm of QR Code

Normally the QR Code provides the functions which have 8 major parts:



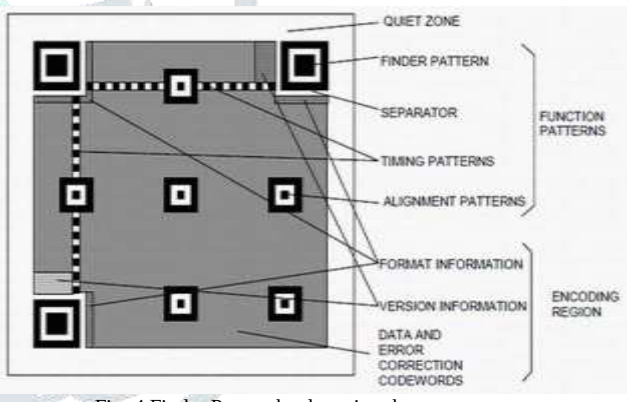


Fig. 4 Finder Pattern by detecting three corners

1) Finder Pattern

Finder patterns are the square markers at three corners of a QR Code. At the three corner out of the four corners the three codes are located which are called Finder patterns.They indicate the direction in which the code is printed.

2) Timing Pattern Code

Timing Pattern are two lines,one horizontal and one vertical of attending dark and light modules. In order to identify the location of each and every cell inside the QR Code, timing pattren code is greatly used. All the things are done by the decoder

application. Using these lines, the scanner determines how the large the data matrix is present.

3) Alignment Pattern

When code is being curved then the QR Coder make the correction for the distortion. The alignmesnt corner is in the corner of lower right[8]. If the QR Code is large, this additiponal elements helps with orientation.

4) Quiet Zone

Quiet Zone is the part of the QR code. This spacing is important for the scanning program in order to distinguish the QR code from its surroundings and this zone is used for isolation of code from the information of different packaging these are also called Buffer zone.

5) Separator

These are one pixel wide white lines that are used to separate the QR Code from other elements in the pixel. They are located at the edges of the finder pattern as shown in figure.

6) Data and error correction codewords

These patterns hold the actual data. If(x1,x2,…..xn) is the input sequence of the values of n in a field F then the codebook will be the input sequence of n.
Distinct values over the finite field f; then the codebook C will be

C={(f(x1),f(x2),…,f(xn))|f ∈ F[x],deg(f)<k},

Here,F[x]=polynomial ring The input sequence (x1,x2,…,xn) of values n=N is made as $(0,\alpha^0,\alpha^1,\ldots\ldots,\alpha^{N-2})$,here,α=primitive root[11].

7) Version Information

These specify the QR Code version that is being used and the dots within the QR Code contain format and Version information as well as the content itself. QR Code must include an 18-bit version information string in the bottom-field and top-right corner of the QR Code. The Version Information is placed beside the Finder Pattern no matter how large the QR Code is present. For marketing purposes,versions 1-7 are normally used.

8) Format Information

The Format Information encodes which error correction level and which mark pattern is in use in the present QR Code. Format patterns contains information about the error tolerance and the data mask pattern and make it esier to scan the Code.

B. Adding QR Code to System

Student Identity Card is using the regular barcode for some extra information of the student. But there is a problem here as it does not contain all the information in details. But if the barcode can be replaced by QR Code than one can easily insert or make a link to more information. For example the QR Code can be link to the web address are some other web link so that anyone can get more information easily. Point to be noted the QR Code is totally free. Lots of popular business companies are already started the using of QR Code. So adding the QR Code to the identity card will make a new era to have more information of the student.

C.Advantages of QR Code

QR Code can be scanned anytime, anywhere using Smartphones. For example the QR Code can be linked to the web address are some other web links so that anyone can get more information easily. The main advantages of QR Code is its versatility, there is no need to write vital details down. A simple scan capture the desired information. Provides quick access to additional information. It gives directly effective way of delivery enhanced information. They are also benificial for both customers and business. For example, a business saves money and advertising cost by distributing a QR Code to their website or URL. A Customer can scan this QR Code and this allows them to store the information for future reference.

D.Disadvantages of QR Code

User must have camera phone and right kind of software installed to Smartphone, which makes it costly for common users to afford. Problem is only the work can be done using the Smartphone that can take and read the image of QR Code[2]. Many people have Smartphone with cameras but the cameras are unable to read and phone does not support QR reading software[1]. QR Code requires installation of the QR Code reader software or application in order to scan the QR Code image, this is not possible in the Smartphones. Lack of awareness and familiarity of the QR Code among people.

E.Uses of QR Code

1) Versatile areas of applications

QR Code provide a direct link in the online world, this produces countless possibilities to engage users in a possitive way. From simple information, such as contact details, event dates and product descriptions, special promotions, such as sweep stacks, coupons and voting. Can offer the customers virtually anything can display in web browser. All of this with a single scan.

2) Application in the Field of E-ticketing

Fig. 5 Japanese airline E-Ticketing

Any time we can go and show the QR Code and then the result of the scan will be come out quickly. The airline of the japan is using the QR Code scanner at the gate where ticket is required.

3) Intelligent advertising

URL of any web pages can be linked with the QR Code and in this way the organization can use the QR Code for their advanced advertising. In the bill board they can add in a corner side the QR Code and then the people can the scan it at any time.

4) Use as Current Mainstream

Today QR Codes is using for the e-info or e-marketing. The companies are using the code just next to their product for the viewers. If someone is interested then he or she just scan the QR Code and then code get linked with a web page and the weavers can easily have a look of the details of the company's product. QR Code can give lots of information of any product and its configuration within very early shortest time[5].

Fig.5 An advertisement on bus using QR Code

5) System for Loyalty points

The famous Coca Cola is now using the technique of QR Code to give free drinks to the Japanese customers to redeem collected points of loyalty. Here they have a CMODE vending machine with the QR Coding system.

6) Connecting Brick and Mortar

People shopping in a stores can codes on products or in-store collateral and sign up for special discounts and contests. This can help you capture in-store traffic and built your online reach for re-marketing and targeting. For example, if the same person who scanned the blue jeans ad earlier is now in a physical store and buying your jeans, you can use a code to offer them a discount at your online shop. This way, you can then maximize your exposure to that targeted customer.

F. Difference between QR Code and bar code

A Bar code can be defind as the generic that is used for the information of visual display and it will be as the series of bars or lines. QR Code or quick response was made for the method of gathering more information into a specific area for the use of inventory controls and shipping purposes. The barcode has a vertical bar like structure. They are black and white in color. As the size of the information increases the number of bars in the barcode also increases. On the other hand, the QR Code has square patterns in them. Usually they are black and white. But now these can be in colored form also. They can be customized as per the users need and however the user likes. QR Code has better storage capacity as takes up lesser space compared to a Barcode. Unlike barcodes, the QR Codes can be scanned from ant angle. Also, the QR Codes can be scanned from any angle. Also, the QR Codes can encode numeric, alphanumeric, binary and characters, this will be good for new marketing opportunities. Whereas, the barcodes can only encode numeric and alphanumeric characters. Bar codes are cheaper but the QR Code is totally free. One can make one's own QR Code using the QR Code generator. Therefore, the main difference of bar code and QR Code is the storing capacity where QR Code contains more information than that of bar code.

G. Choosing QR Code instead of bar code or RFID:

Like bar code there is also another code which is also used widely and it is RFID. RFID can be used for tracking of large amount of items for the physical distance travelling. The department of defense of USA and popular Wal-Mart use RFID. But it is more expensive than even barcode and also it is not useful for small business purposes.

Fig. 6 Clear image of Bar Code

Fig. 7 Clear image of RFID

As we can see that the bar code and RFID is expensive and they are not good for small business purposes. Therefore the choosing of the QR Code is the best idea to get all the facilities including the free of expense and the modern facilities.

H. Relevant research work:

1) For the medical emergency in order to get the critical information of any person https://www.myinfo911.com/

Fig. 8 In USA medical card is QR Code for emergency purpose

It is used in U.S.A. Using the smart phone application the QR Code can be scanned and then the information of the people will show automatically. For this they are asking $9.95 for each of the Identity Card which will be expensive for the ordinary people from the developing countries.

2) The Japanesh proposed future national Identity Card using QR Code. In this proposed system the Japanesh Identity Card will contain IC chip with extra QR Code.

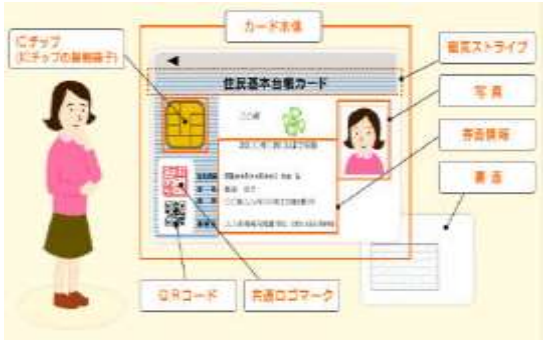


Fig. 9 Japanese proposed identity card with chip

3) For making any business card: http://www.tec-it.com/online-demos/Business-Cards/Free-Business-Cards.aspx

Fig. 10 Personal Business Card with attached QR Code contains link of individual website

Lots of online based companies are producing business card by adding the QR Code. We will use it to some developing countries to be implemented in each and every organisation for free to identify anyone with more information.

III. DESIGN

A student Identity Card generally deals with the fields:Students Name, Class Roll Number, Registration, Number, Session, Name of the department, Hall name. To demonstrate the administrative requirements we need to meet the administration requirements the following parameters: Basic student information, The feature, Add or remove department name and hall name, Take student snap from a real time video streaming, Checking the printable form, Editing total amount of information, Going to printing process, Find student information using Identity Card number.

A .Use Case Diagram

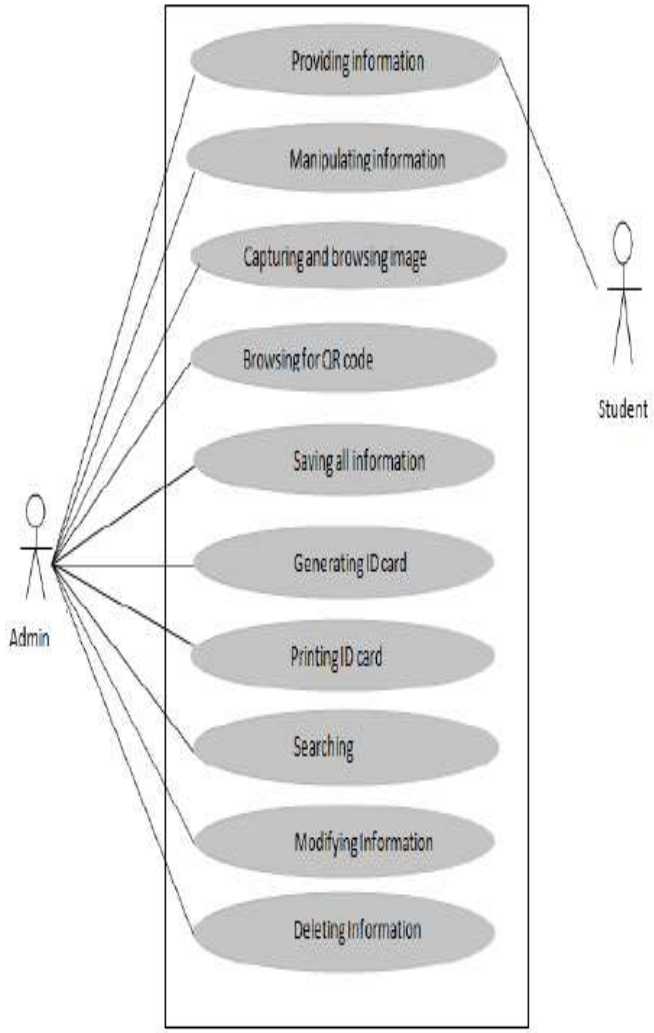


Fig. 11 The Use Case Diagram of QR Coded Automated Student Identity Card Generation

B. Class Diagram

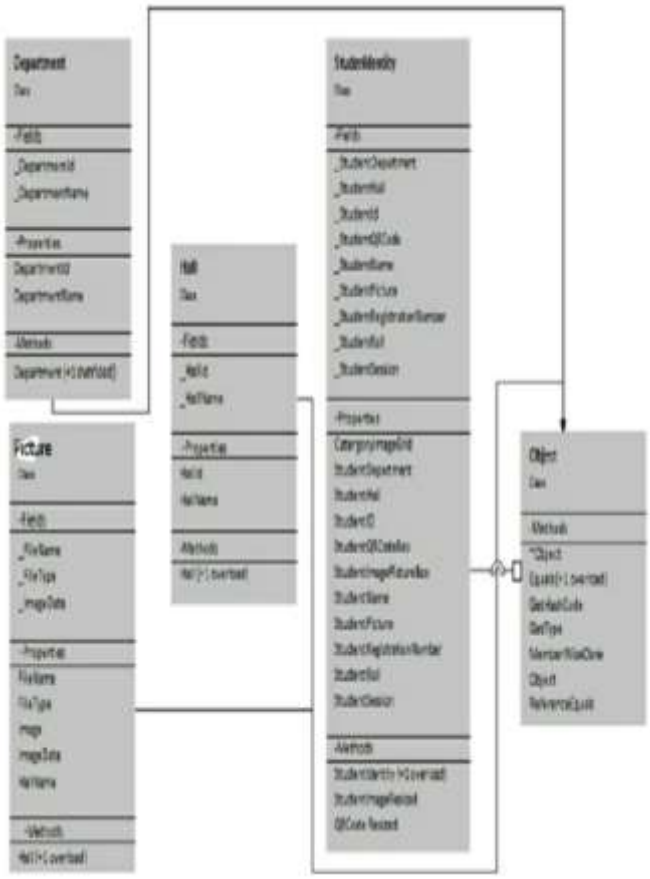


Fig. 12 The Class Diagram of Student Identity Card Generration

C. Using Microsoft visual studio 2008 and SQL server management studio express:

To make the whole system we need to use the software and for coding we take the Microsoft visual studio and for connection of database we took the SQL server management studio exspress. Visual studio supports different types of programming languages that can allow the debugger and code editor for supporting the programming language including C, C++, VB.NET, Basic .NET. We can configure and managing within Microsoft SQL Server. SQL server can add the graphical tools and script editors and they can easily work with object and features.

D. Semacode/QR Reader and Code Reader:

Semacode or QR Reader are softwares in order to scan QR Code. They can be compatible with the smart phones specially iphone. But Sema code is comparatively faster than QR Reader. The software can be found for free. Once we install it into the phone then we can scan the QR Code anytime. The code Reader is to scan barcode when we will compare QR Code Identity Card with barcode Identity Card.

IV. IMPLEMENTATION

For Implementation of the system we need to do three important steps system construction, support plan and software user interface. In the system construction it is required to validate new system for acceptance of the whole system. The system is also need to be tested carefully.

A. Installation

Microsoft windows 8, Vista, 7 and all XP versions are easily compatible for installing of the software. For supporting plan, three parts are included back-end implementation, front-end implementation and last of all is the combination of the front and back-end implementation. The back-end implementation is for storing the data as the user does not know the number of tables in the database. In the front-end implementation of the system the front-end user can read the data and also they can modify or enter data without any concept of database.

B. Software User Interface

In the software user interface we can show the user interfaces of the whole project.

C. Starting up Screen

Here we can see that into the data entry part we can add the name, roll, registration number, session, department and hall of the student. There is an capture option for taking picture and in below there are the other buttons available save, browse for QR Code, print and close. By clicking the browse for QR Code we can get the QR Code. All the information can be stored by clicking save and can be printed by the print option.

D. Capturing the picture of student

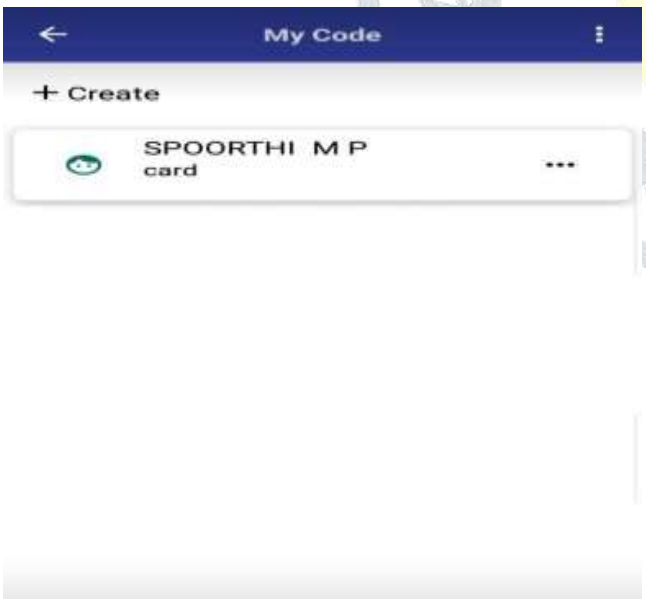
Once we click the capture option then we can take the live picture of the student and then it can be saved into the box of the image.

E. Browsing file QR Code and Generating Identity Card

We can browse for QR Code to get the picture of it. All the data was taken here and then we can see the format of the Identity Card including the picture, QR Code and other details of the student.

F. Save to Database

After providing all information, capturing image and generate the Identity Card demo the following interface appeared and once procedure had been completed then Identity Card was ready to print.



G. Scan QR Code of student

QR Code was made from the www.smartytags.com. By opening account we made QR Code for individual student and it was linked to the website: www.qrcodesample.webs.com. The link website is our educational sample website where administrator will have student's secured data access using login details. The website will only show the general information of a student on homepage currently and student's data can be shown using SQL server. Butin future, in orderd to access data from anywhere, there will be some work by using Windows Azure when it is available in bangladesh. Moreover, we can make our own QR Code using JSERVELET programme. Now if someone scans the above QR Code then it will give the following seen output on the iphone.

Here we can see all the details of student by using the phone. Therefore, the implementation of the advanced QR Code automated student Identity Card has been done successfully.

VI. EVALUATION

Data will be then collected and will be analysed to get the best result from the requirements of the users of the system. Then we can compare our Identity Card with other market available Identity Card and comparing all the facilities as well, see Table 1. Therefore it can be said that QR Code is much better than anything to make the Identity Card perfect

TABLE 1.COMPARING QR IDENTITY CARD AND OTHER IDENTITY CARD

Subject	Traditional Identity Card	Normal Identity Card	QR Code based Identity Card
Type of Identity Card	Handwritten	BarCode Identity Card	QR Code Identity Card
Cost	Free	Not Free	Free
Scan speed of barcode from smart phone	Do not have any facility	2.5 seconds	3 seconds
Price of each code	No Code	05 pence	0 pence
Swapping speed to open security gate	Not valid	3 seconds	1.5 seconds
Information in each code	Do not have any	Hundreds of characters only	5000 characters
Picture taking option	No	Yes	Yes

VII. CONCLUSION

By viewing all of the above analysis and result it can be said that the product is a GUI based system with highly efficiency. After completing the project we can make the surety of overcoming the problems of the existing system. Advanced QR Coded Student Identity Card Generation is being made computerised to increase efficiency and reducing of error of human being. All records and data are stored in Microsoft SQL Server management studio express database and from which respective data can be deleted and retrived easily. Editing is made also flexible as the authority only need to give the required information and then print Identity Card with the image of student with real time video streaming and added QR Code is introduced that contains detailed information of student which can be scanned in a single second using the smartphone. Computerisation of Advanced QR Coded Student Identity Card Generation will not only reduce the human stress but also improve human stress and advanced system with the modern QR Code and all the things can bee got free. Getting the modern technologies free is a great advantage for developing countries as they can introduce the system to their many different and different educational institutions. At present in Bangladesh some institutions have started using our system and get benefitted greatly.

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