

Advanced Management System for Educational Institutions

Md Riasath Arif Prodhon, Noor Nabiul Alam Siddiqui, Albert Rozario

Abstract— The education system in this era has some issue and limitation that prevent students, teacher, parents and other stockholders to expend themselves in the area of studying such as the problems are that the students are not serious about education or concentrating in their study, sometimes the teachers are not serious about their teaching and the parents are getting more and more worried for their children's future because they can't find out what's going on. This paper introduces an advance management system for educational institutions which is fully online based and solves a great deal of problems related to the communication between students, teacher, parent and staff. By using the system they all can be acknowledge to each other. Therefore the communication between them will increase sufficiently. The student's academic progress will be well known to the parents. They can share the problems and the ideas with each other very easily without any effort. Therefore in this paper we have proposed an advanced management system to change all the known issue and limitations associated to the education management system.

Index Terms— Education; Management System; Artificial Intelligence; Mobile Application; Smart Communication.

1 INTRODUCTION

ONLINE education system is not an unknown term but we are introducing a similar concept which might be still unknown. We design it for Teachers, Students, Guardians and other direct and indirect stockholders by using GPS technology with mind aping concept of artificial intelligent. Normally they all face different kind of problems. For example the guardians always worry about their children whether they are concentrating in their study properly or not and attending school regularly is also a fact. The students can't communicate with their teacher regarding some fact and the teachers are also facing some problems like maintain the student's attendance in class regularly.

To modify the running headings, select View | Header and Footer. Click inside the text box to type the name of the journal the article is being submitted to and the manuscript identification number. Click the forward arrow in the pop-up tool bar to modify the header or footer on subsequent pages. To solve this, the advanced management system will give them a chance to justify that their children's are doing well in the school. As for the teacher and students their also so much benefits and opportunity's to expend themselves.

The key feature of this project is implementation artificial intelligence in the management system. Which means this system will store all the data and will suggest what to do or what needs to be done in depend on various condition. Such as for example the automatic attendance in classroom and also if a student gets 80% marks in 1st class test but then he/she gets 50% marks in

the 2nd class test. In this case the system will gives a notification for that specific student to get his/her academic status better. This can be directed to that student parents also. In our view this can surely solve some of their problems related to studying system.

2 BACKGROUND RESEARCH

Online management system is not a new concept. This site has been developing for many years. Even online based education system is exists but all concepts related to that are following the same method such as data processing, storing, online feedback system for students. But that cannot solve the lack of communication between students, teachers and parents also there are the student's attendance, whether the students are attending the class regularly. There are no option for parents to know about the student's attendance and the teachers are not always want to directly communicate with the parents about their children irregularity and poor academic status. There are also many possibility for student to not acknowledge their parents about their academic failure. There are several online based school management system currently functioning and those are providing a lot of service including a schools internal management system and maintaining class features. But still there are no function for locating student's location in the campus area and efficient communication between teachers, students and parents. There are a various number of technology for location tracking. The most common and well know is Google map. Google has released an API called Google Earth API which can be used for personal use and for commercial purpose also and for communication the common possible way is email and Bulk sms. The existing technology for locating something in the web is calculating the longitude, latitude and the altitude. For mathematical calculation they can be view as X, Y and Z. Longitude is a geographic coordinate that specifies the east-west position of a point on the Earth's surface.[13][14] It is an angular measurement, usu-

- Md Riasath Arif Prodhon is currently pursuing bachelor degree program in computer science & engineering in Daffodil International University, Bangladesh, PH-+8801737499550. E-mail: riasath@outlook.com
- Noor Nabiul Alam Siddiqui is currently pursuing bachelor degree program in computer science & engineering in Daffodil International University, Bangladesh, PH-+8801915857610. E-mail: ssazal.14@gmail.com
- Albert Rozario is currently pursuing bachelor degree program in computer science & engineering in Daffodil International University, Bangladesh, PH-+8801768384252. E-mail: albert.rozario3@gmail.com

ally expressed in degrees and denoted by the letter lambda (λ). Points with the same longitude lie in lines running from the North Pole to the Pole. Latitude (ϕ) is a geographic coordinate that specifies the north-south position of a point on the Earth's surface. Latitude is an angle (defined below) which ranges from 0° at the Equator to 90° (North or South) at the poles.[7][11] Lines of constant latitude, or parallels, run east-west as circles parallel to the equator. There have been numerous methods to calculate the longitude and latitude. In have sine' formula to calculate the great-circle distance between two points - that is, the shortest distance over the earth's surface - giving an 'as-the-crow-flies' distance between the points

Haversine

$$\text{formula: } a = \sin^2(\Delta\phi/2) + \cos \phi_1 \cdot \cos \phi_2 \cdot \sin^2(\Delta\lambda/2)$$

$$c = 2 \cdot \text{atan2}(\sqrt{a}, \sqrt{1-a})$$

$$d = R \cdot c$$

where ϕ is latitude, λ is longitude, R is earth's radius (mean radius = 6,371km);

note that angles need to be in radians to pass to trig functions!

$$\text{var } R = 6371; // \text{ km}$$

$$\text{var } \phi_1 = \text{lat1.toRadians}();$$

$$\text{var } \phi_2 = \text{lat2.toRadians}();$$

$$\text{var } \Delta\phi = (\text{lat2}-\text{lat1}).\text{toRadians}();$$

$$\text{var } \Delta\lambda = (\text{lon2}-\text{lon1}).\text{toRadians}();$$

$$\text{var } a = \text{Math.sin}(\Delta\phi/2) * \text{Math.sin}(\Delta\phi/2) +$$

$$\text{Math.cos}(\phi_1) * \text{Math.cos}(\phi_2) *$$

$$\text{Math.sin}(\Delta\lambda/2) * \text{Math.sin}(\Delta\lambda/2);$$

$$\text{var } c = 2 * \text{Math.atan2}(\text{Math.sqrt}(a), \text{Math.sqrt}(1-a));$$

$$\text{var } d = R * c; [4]$$

Altitude or height is defined based on the context in which it is used (aviation, geometry, geographical survey, sport, and more). As a general definition, altitude is a distance measurement, usually in the vertical or "up" direction, between a reference datum and a point or object. [11][12] The reference datum also often varies according to the context. Although the term altitude is commonly used to mean the height above sea level of a location, in geography the term elevation is often preferred for this usage. [4] Google release an API to calculate the location of any object called Google Earth API. Using this API it's possible to locate any object with its value of X, Y & Z. [9]

The altitude can be determine with the help of some geometric and trigonometric calculation. Form the figure with the four measured angles and the distance between the observers an equation can be derive to calculate the altitude h of the specific object.

The equation is

$$h = (L * \tan a * \tan d) / (\cos b * \tan d + \cos c * \tan a)$$

Where the tangent (tan) and cosine (cos) are trigonometric function. The L is the distance between the observers. The equation can be also write like this

$$h = (L * \tan a * \sin c) / \sin (b + c)$$

A detailed analysis of this equation indicate the value of h can be obtained by only there angles measurements. [11] Today the common way to communicate with someone is via email, phone call and message. There are numerous use of emails and messages that it cannot countable. In management system emails provide a great solution for commutation

whether the receiver is busy or not. Then the message system is also a great way to communicate where internet connection is unavailable.

3 DHAKA SURVEY 2014 OF MANAGEMENT SYSTEM FOR EDUCATIONAL INSTITUTES

The survey cover overall 80% educational institute in Dhaka area. This includes English and Bangla medium, government, nongovernment and half governmental educational institute. The overall result of the survey is not satisfied because the management system can't meet the requirement to fulfill the students and other stakeholder's needs suitably. The final result of the survey describes the need of an Advance management system for educational institute which can meet most of the requirement to properly manage the system.

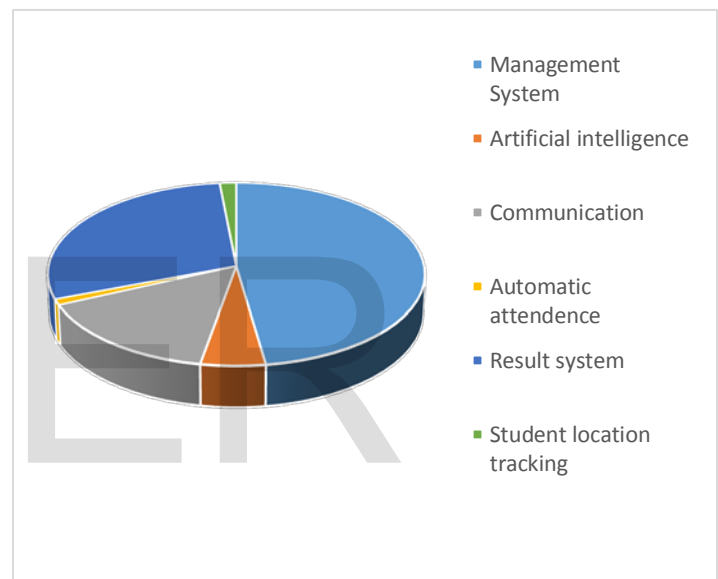


Fig. 1. Survey Result

4 SYSTEM ARCHITECHERE

We are introducing an advanced management system using various technologies like Google Earth API, Communication via emails and bulk sms between students, teachers, and parents and mobile device and application from tracking to communication and implementation of class features for the users.

4.1 Location tracking by Google API

With the help of this system the teachers and the parents can pin point their students and children's location in the campus area weather they are in the class or not. The teachers can take the attendance of his or her class students without any effort or calling out their name. This will be done automatically. It will calculate the total number of the student registered in the specific class and count weather how many of them are in the class. That will take the attendance of daily class automatically and there won't be any chance for cheating. Google release an

API that can locate any object with its longitude, latitude and altitude, which is called Google Earth API.^[3] Using Google Earth API it is possible to pinpoint the student's location depending on their locations. It can also measure their height that can be used to calculate the student's position from the earth surface. Such as to find out whether a student or a teacher is in the campus but there can be several floors and they can be on any floor with no chance of locating their position. So using Google Earth API and with a full structure of the campus that has all the floor design in it so that the object position can be on the specific floor. The Google Earth API measures the Object height from the earth surface in meter. This can help to take the attendance of the students in the classroom in any floor. [16]

4.2 Communicating

Communication is an important way to make progress or achieve good results in any educational institutions. To build up the communication between the students, teachers and the guardian, the management system will use BULK SMS to notify the user about every notification. Whether the student's CGPA decreases and an SMS will be sent to his or her parents about the details. Using emails to communicate in educational institutions is the standard way to communicate between students and teachers. To communicate via emails the receiver must have an internet connection available. But in case of an unavailable internet connection, there are uses of bulk SMS. If the users are unavailable, then the system will notify them with bulk SMS.

4.3 Implementing artificial intelligence

Implementing artificial intelligence in the management system is surely a new idea in the field of education. Artificial intelligence (AI) is the intelligence exhibited by machines or software. So in this management system, the AI will monitor the behavior of the student's academic status and help the teachers sometimes with their class. In details, the AI will help all the user directly or indirectly all the user connected to the advanced management system. Such as if a student's CGPA is always over 3.5 that means he or she is an A-grade student. So if in any exam the CGPA of that student decreases to about 3 that means he or she has some problems which will be notified to the responsible teacher and the student's parents with SMS and emails immediately. So that it will greatly affect the student's academic status. And in case the student is a C-grade student then his or her academic status will be notified to the responsible teacher and the parents again and again until the student makes any progress. The grading of the students will depend on various logical reasons. Such as the student's previous academic status, the first class test, assignment, presentation and the number of attendances of the first week. [1] As shortly described before, the AI system helps the teacher also with their class lecture, taking attendance and assignment or presentation dates fixed. For example, using the mobile as a tracking device, the teacher can pinpoint the location of their student whether they are in the campus or in the classroom. The AI of the management system will automatically calculate the total student number with their student IDs present in the specific

class daily. Therefore, the teacher will not have to take their class time to take the attendance one by one. That is surely a big time-consuming process for any class teacher. If a teacher takes 15 minutes for attendance daily for a class, then in one semester the teacher has 12 hours extra time to teach their students. So implementing Artificial Intelligence in the management system for educational institutions is a big step toward the future of the education system.

Working mythology of this system:

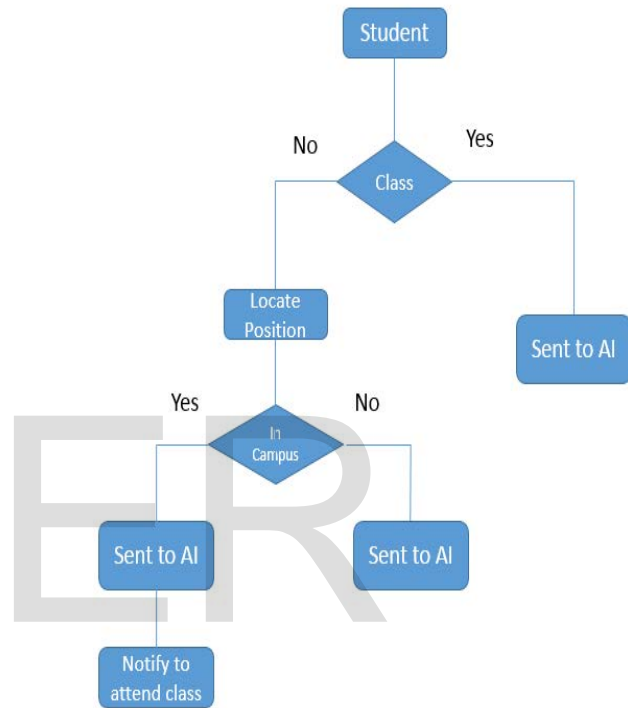


Fig. 2.1. Student Attendance

This is an internal flow chart of AI for student's to control the attendance system.

The AI function will notice if any student is absent in their specific class. The flow chart describes the processing steps to manage the students if they are absent in the class. The student's position can be discovered via pinpointing their Smartphone location using Google API. The AI will calculate that the students are in the Campus area by using the same API by calculating the longitude and latitude of the respective target. The conditions are that if the student is absent in the class search for the student's location and store the data in memory. If location is concealed, store the data. Otherwise, if location is revealed and if the students are in the defined area, then notify them to attend in their specific class and store the data in the memory for further calculation.

Featuring AI function for teacher’s attendance system

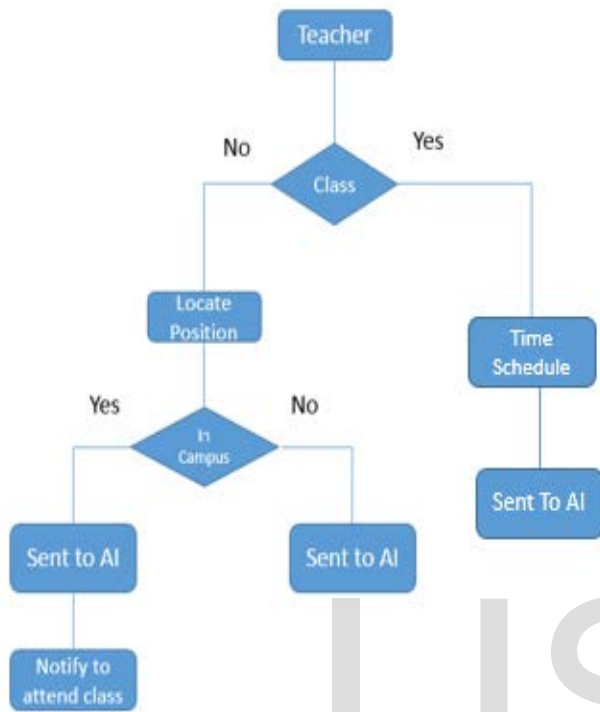


Fig. 2.2. Teacher schedule maintains

This is also an internal flow chart of AI to control the attendance system of teacher’s whether they are attending class by maintaining the time schedule. This process work as the student’s attendance system but it also calculates the time schedule for each class for every course. This concludes that the teachers are pending the schedule time in their class to improve the student’s academic status. It also calculates the extra class and the full time schedule of that course that the teachers are supposed to spend in. So that no class time can be missed. This concludes the maximum class utilization for any course. The condition are like the students attendance system but if the teachers are in the class room the AI will calculate the total class time from start to end and validate it with the define class time schedule.

Featuring AI function for student’s grade system

This flow chart describes the students grade system maintains by Artificial Intelligence which will notify the requirement persons for decreasing of the student’s academic result. The system works in the condition that the students will give a status grade depending of their first academic status and their previous accomplishment. If an A grade students academic result decrease even 0.5% the system will notify the specific

teachers and the students’ parents immediately about that student’s current situation with details about their current class schedule. So that the teacher and the parents may easily find out what cause the reason for decreasing of the student’s academic result and take proper action for removing the cause. The condition is that if the student’s grade decreases even 0.5% or more than a notification will send to the class teacher and the students’ parents for taking possible action. Otherwise of the result continue to increase no notification will be sent but for all output the data will be stored in the memory for further calculation.

Working mythology of this system:

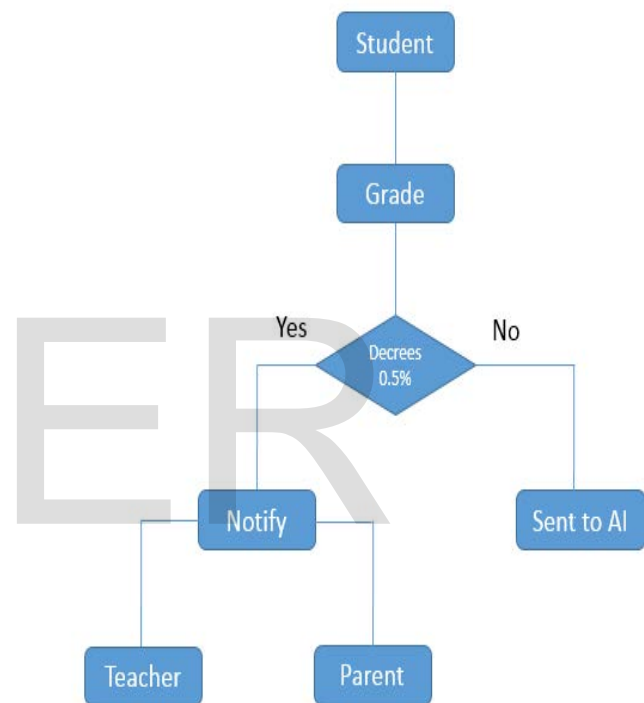


Fig. 2.3. Student grade system

4.4 Mobile Software

All the user will use a mobile software to connect with the management system the software will help them to communicate with each other easily. The teachers can find out about their student personal information if needed, the attendance of his or her class, the specific lecture for the registered course,

The students’ parents contact address and many more. The teacher can acutely contact instantly with any student in emergency. For the student the facility are the same. They can communicate with their teacher for any of their problems related to the class lecture. Again the communication skill in the field of education is highly mandatory for the students and that is the main concern. Most of the student are lacking the

proper communication skill and that is the reason for their academic status and in the future job market. With the help of the software the teacher can calculate the communication skill of the students that who is well in communication and who is not. Therefore the mobile software is one of the main functions of the advanced management system.

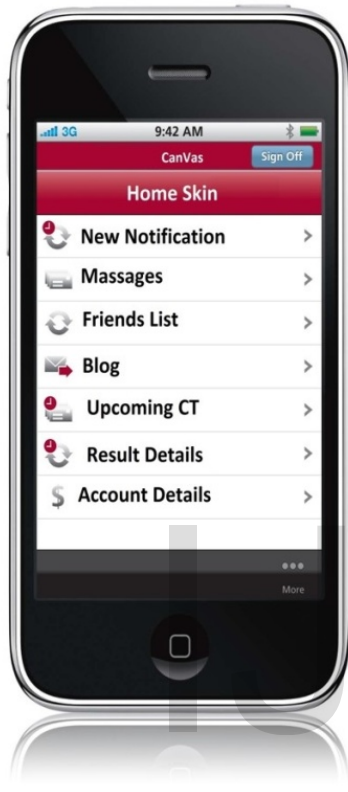


Fig. 2.3. Mobile application prototype

5 POSSIBLE FEATURES FOR THE USERS

There are several possible features for the user of this advanced management system. Some of them had been discussed before in this paper. So these are the details features for the user of this advanced management system-

5.1 The Students

Competitive environment for learning, Increase of the communication skill between teacher and the students, news, notification, friends list, learning & feedback blog, upcoming class test, online result by mobile notification, Accounts.

5.2 The Teachers

Auto attendance, Acknowledge about students, Commutation skill between students and teachers, Create pole for vote,

Share class lectures or slides, find students location if there are in the campus area.

5.3 The Guardian

The guardian can view their children class attendance whether they are making a good progress or not, they can communicate with the teachers for any kind of help, viewing the academic result of the student, and make sure the account section is clear.

5.4 The Staff

The staff can analyze any problems and notify it quickly to the department about it, sharing any announcement between the staff will be very efficient and time consuming so that the specific problem will be solved in less time. To give an example if the class projector is not operating correctly then it takes a lot of class time for the staff to know about it and fix it. That truly takes a lot of time with less time for class lecture. This directly affects the learning process.

6 SCOPE OF IMPLEMENTATION

This advanced management system can be implemented in various education institutions like School, College, and University. The renowned private university will be perfect for this type of technology but schools and college can also be fit for this management system. The number of student is not a problem. This can easily maintain its processing speed without any effort. This can surely implement in the capital of a country or anywhere where internet is available. Since Bangladesh is a developing country and the 3G internet connection is available almost everywhere now. Therefore the percentage of its implementation is increased sufficiently. There are numerous number of educational institutions are operating recently. Most of them are lacking the proper education environment for the students. They have students, teachers, employees to run the institutions but what are they lacking is an organized management system. So there are a lot of opportunity to implement this advanced management system.

7 CONCLUSION

This Advanced management system can be useful and effective for the current education system. In spite of its excellent persona such as simplicity, effectiveness and user friendly, it has some limitations also. The networking and week internet connection can be a negative source for this system. But implementation is only a process to find out the weakness of the system. Endeavor of this, this paper will encourage IT people along with the administrative personnel to look eagerly into this aspect and in future this advanced management system will be able to triumph over a better stable, widely recognized and dynamically applicable in all types of educational environment. The ideas specification of this paper will act as the center point of the researcher's innovation and analysis of different existing techniques will assist them being a knowledge board in their progress of research work.

REFERENCES

- [1] Artificial Intelligence webpage on Wikipedia. [Online]. Available: http://en.wikipedia.org/wiki/Artificial_intelligence
- [2] Google Earth API website on Google Developers. [Online]. Available: <https://developers.google.com/earth/>
- [3] Allen Wyatt's. (2014) Displaying Latitude and Longitude webpage on ExelTips. [Online]. Available: http://excel.tips.net/T003016_Displaying_Latitude_and_Longitude.html
- [4] Mobile Type Script. [Online]. Available: <http://lencooper.com/bearing/Calculate%20distance%20and%20bearing%20between%20two%20Latitude-Longitude%20points%20using%20haversine%20formula%20in%20JavaScript.htm>
- [5] Google Earth Antarctica website. [Online]. Available: <http://www.ig.utexas.edu/outreach/googleearth/latlong.html>
- [6] Geographical Distance webpage on Wikipedia. [Online]. Available: http://en.wikipedia.org/wiki/Geographical_distance
- [7] Longitudeintro webpage on Learner. [Online]. Available: <http://www.learner.org/jnorth/tm/LongitudeIntro.html>
- [8] The Altitude Research Center website. [Online]. Available: <http://www.altituderesearch.org/>
- [9] Altitude webpage on Wikipedia. [Online]. Available: <http://en.wikipedia.org/wiki/Altitude>
- [10] Altitude of a Triangle Tutorial webpage on easycalculation. [Online]. Available: <https://www.easycalculation.com/analytical/altitude-of-triangles.php>
- [11] Determine Maximum Altitude webpage on exploration. [Online]. Available: <http://exploration.grc.nasa.gov/education/rocket/rkthowhi.html>
- [12] Google Maps Find Altitude webpage on daftlogic. [Online]. Available: <http://www.daftlogic.com/sandbox-google-maps-find-altitude.htm>
- [13] Latitude webpage on Wikipedia. [Online]. Available: <http://en.wikipedia.org/wiki/Latitude>
- [14] Longitude webpage on Wikipedia. [Online]. Available: <http://en.wikipedia.org/wiki/Longitude>