

# An Android Application for School Information System Project Guide

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**Abstract**— In today's increasingly competitive environment, parents are often deeply concerned about their ward's schooling. Amidst their daily hassles it becomes stressful for them to keep track of their child's daily activities. Also, teaching staff have a lot more of workload on their hands as compared to years past. Students on the other hand have a lot of different daily tasks to deal with. Traditional methods of schooling are becoming dated and electronic methods of automated school information systems are on the rise. Riding the waves of this change, here we put forth School Information System (SiS), an easy to use, less time consuming, android application that maintains the routine data of Students and enables communication among Students/Parents and Teachers. All the information will be stored in a centralized database. Schools can easily send a notification to every individual in a click. This makes an easy and quick connection with the parents who are busy in their day-to-day life and will keep them informed with the details of their ward. To inform the parent when the bus will arrive for picking up the ward, GPS tracking will be enabled in the bus. Thus, our software would facilitate GPS tracking of the school bus (in-app), which will be accessible to the parents easily.

**Index Terms**—Android application, GPS tracking, centralized database, 3-way communication.

## I. INTRODUCTION

At present, school information system and its effective exchange between entities in most of the schools is manual or at the most semi-automated. But it is important to integrate the different systems such as attendance management, notification system, bus tracking system, etc. into one application so that the users can take benefit of all these features in one place instead of using different softwares. As the system should be accessible to the users from anywhere at anytime, we decided to make the Student Information System as a Mobile Application.

The School Information System (SiS) would be a new way of student data management that would achieve efficiency in processing student information. It would be of great benefit to the administrative personnel, academic personnel or stakeholders, as well as students, in storing, updating and retrieving the details of the students. The Android application that is developed will be used by the parents, students, and teachers who can make changes in the system. The students will use the application to view their Personal, Academic Details, and to View Notices broadcasted by the teachers. The teachers can broadcast the changes in schedules or any new upcoming events (notices). The students, as well as their parents, can be informed about the attendance percentage through the application.

Now a day's most parents are working, hence it has become difficult for them to pick and drop their child every day to school. This is where the problem arises, and hence to combat this our application provides a bus tracking feature which will help the parents to know their child's whereabouts. Hence the software would facilitate GPS tracking of the school bus which will be accessible to the parents easily through the parents module in the app.

The parents have to just log in to their account and they can easily keep a track on their child with the help of this system. They can view their kid's academic progress as well as their daily transit.

## II. SURVEY OF EXISTING SYSTEMS

Currently, the process for student record management and informing them about latest updates are manual and to some extent semi-automated.

Given below is a brief description of the current procedure that is followed in schools for information management:

- The personal, academic records of students currently studying in the school as well as of alumni students are recorded in various files.
- Notifying students about tests and changes in schedules is done personally by the teachers by going to that class.
- No direct means of distributing e-notes to the students.
- Parent's need to be exclusively called to discuss their child's academic progress and attendance details.
- No Bus Tracking Mechanism implemented exclusively in an app with student information system [1].

Largely accepted ways to promote student's overall development is to implement mechanisms for students, parents as well as teachers to monitor the child's activities and success.

Huge part of such monitoring is keeping track of their activities ,actively communicating and analyzing activity records. There are two ways of maintaining and implementing this,manual and electronic. The advantage of electronic over manual is the ability of providing user with results to any queries on the data.

Now the problem occurs when different systems are in place for different modules of data. It becomes difficult to query each separately. Hence,avoiding complex web pages and applications,systems like simple web interfaces capable of being rendered on mobile devices were being considered [2].

Adding to the fact is that India is a cost sensitive market, significantly low cost and effective model for such school management products is required. Hence the system must aims to be

-low cost

-easy to use

-easy to maintain [3].

Tracking systems have evidently shifted more towards being standalone systems deployed in the particular vehicle,here a bus in consideration. These comprise of vehicle mounted tracking system, central server system and a web based application [4]. Systems also propose safety mechanism ensuring data of entry and exit of students is maintained using hardware components like RFID tags,readers etc [5].

### III. PROPOSED SYSTEM

The proposed system is an android application for efficient management of student information and at the same time it takes care of the drawbacks in the existing system. First and foremost the system is a mobile application native to Android environment but easily convertable to cross platform application as well. Each user has a well-defined interface through which he can interact with the system. The interactions of each user with the system depend on who the user is.

The students can view the notices posted by the teacher and ask query to the teacher. Attendance of student can be reported through app. Teachers can mark student's attendance through their mobile using their separate account. Schools can easily send a notification to every individual in a mere click from anywhere and anytime. This notification would be available on individual mobile. This makes an easy and quick connection with the busy parents.

Parents are authorized to view their child's academic, personal and attendance details. They can also view the notices posted by the teachers.

The bus tracking feature is an essential part of the system. This feature gives assurance to both school administration and parents about the safe transit of their ward. Also boarding and de-boarding information available.

The purpose of an admin user is to make this application as a generic product thus enabling it to be reused over the years. This aims to solve the backend problems of the details stored in School Information System. The administrator has the authority to update student details, add/delete users, subjects, clear the previous semester's (Attendance records, teacher to subject mapping, notices).

The developed application will be used by students, teachers, parents and the administrator. The functionalities of the proposed system can be divided into five well defined modules:

Registration and Login: Given that the user has downloaded the application, then the user should be able to register through the application by providing the details required for registration. After registration the user can login into the system by providing the user id and password.

Student Details: It includes two entities-

- Personal details
- Academic details

The students are expected to enter their personal details which will then be verified by the teachers. The personal details include residential address, email address, contact details (students as well as parent's contact details) etc. The teachers are expected to enter the academic details.

Discussion Forum: In the discussion forum, the respective subject teachers can upload notes, respond to student queries. The student can put forth their queries.

Notice Board/Event Notification: Notices can be posted by teachers from their respective login and can be viewed on a notice board section of the application with title for a notice associated with it. The notices for a particular class will be broadcasted to that class only. Any updates performed by the teacher are instantly notified to the users as a notification on their device.

**Attendance:** Subject teachers for each semester are required to enter the attendance details of students. The system should be able to generate attendance for individual student for each subject. The teacher can also view the attendance record of students during a particular interval. If the attendance of some student falls below the threshold value, then the particular student should be notified regarding the same.

**Bus Tracking:** For the security of students, school should track their vehicles. This is possible in this software which can be accessed through app. This feature gives assurance to both school administration and parents pertaining to the student's safety. A basic app is to be in the driver side, which takes live locations and marks child boarded/unboarded.

In order to reduce the cost of a project the android phone enabled with a GPS tracker will be used. The database required to store the details of the buses, routes and student will be done using a free service, Google's firebase.

Features

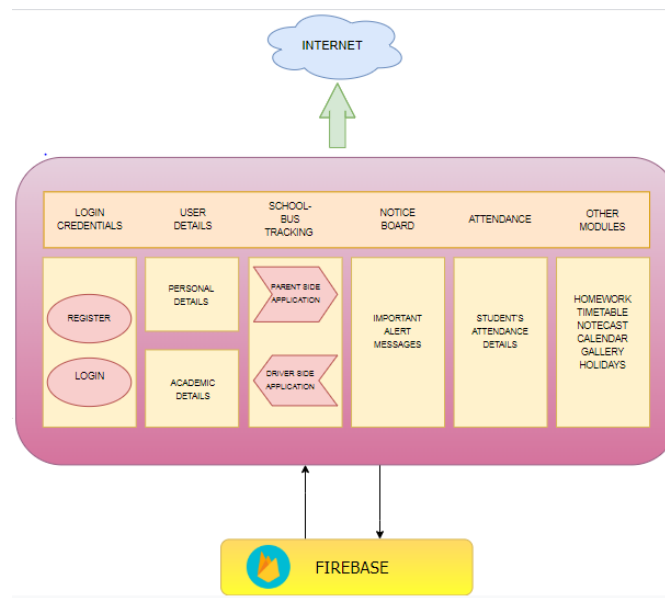
- Vehicle Information Management
- Map route of vehicle
- Tracking of vehicle

#### IV. SYSTEM DESIGN

This deals with the system block diagram and the data flow diagram of the Student Information System.

##### 4.1 Block Diagram

A block diagram is a diagram of a system in which the principal parts or functions are represented by blocks connected by lines that show the relationships of the blocks. It may also show how the system operates, what are its inputs and outputs at various stages, and how the information, and/or materials flow through it. The block diagram for Student Information System is as shown below. The proposed system has a client server architecture. All the information will be kept in an optimized database on the central server. This information can be accessed by the users through the android application (SIS) installed on their smart phones (client machines). Each client machine will have an improved user interface. Each category of user will have a different view of the system on basis of the authorizations bestowed upon him.

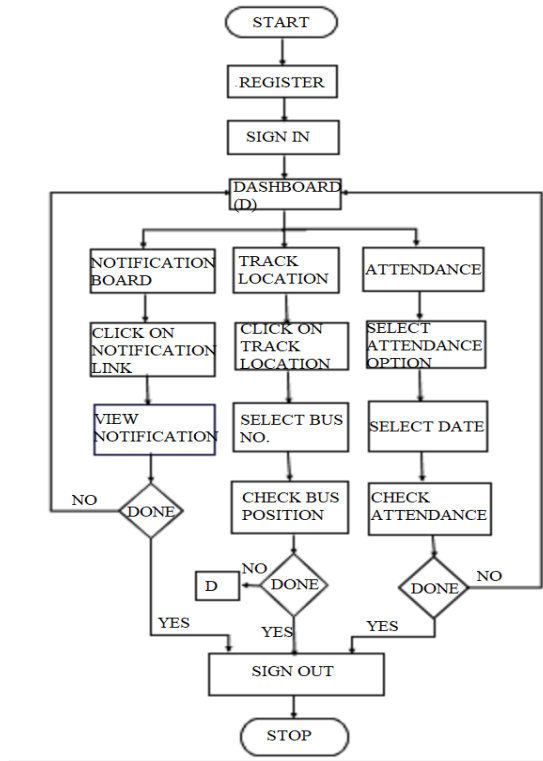


##### 4.2 Flow Chart

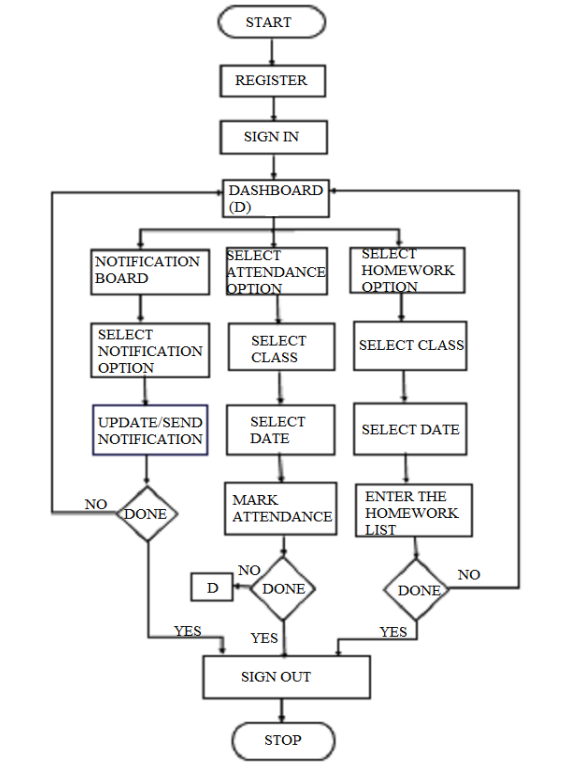
A flowchart is a type of diagram that represents an algorithm, workflow or process, showing the steps as boxes of various kinds, and their order by connecting them with arrows. This diagrammatic representation illustrates a solution model to a given problem.

The flowcharts depicting the actions of each category of users of the SIS are as shown below:

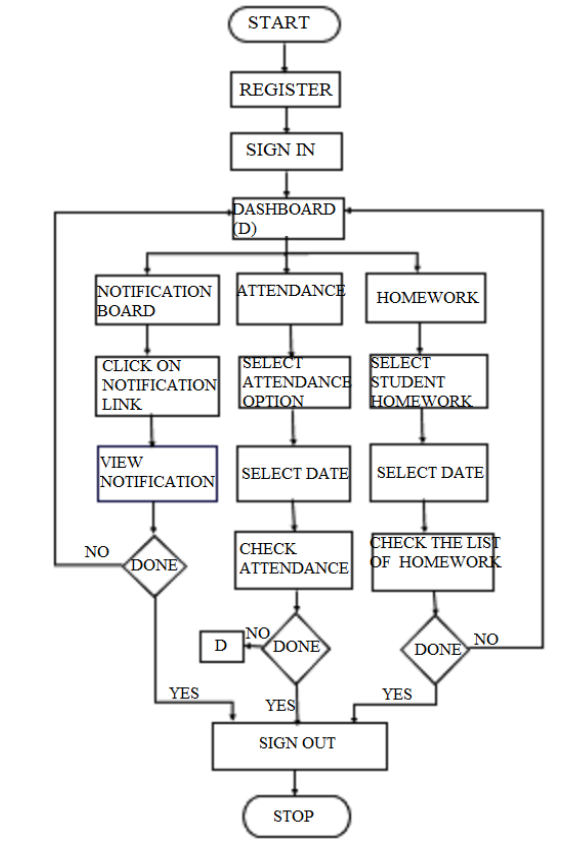
1. Parent module



2. Teacher module



### 3. Student module



## V. IMPLEMENTATION

The SiS app is built using Android studio, having firebase as the backend for the system. Implementation details are discussed in the following sections:

### 5.1 System Requirements

This section discusses the system requirements to be followed for all the different modules while developing the final output.

The app will have other requirements too which are outside the scope of this project. The parent and student modules must only have view access to all the different features.

One of the pre-requisite for the app is that the parents must be registered by a key value in the database so as to check their authenticity at the time they register.

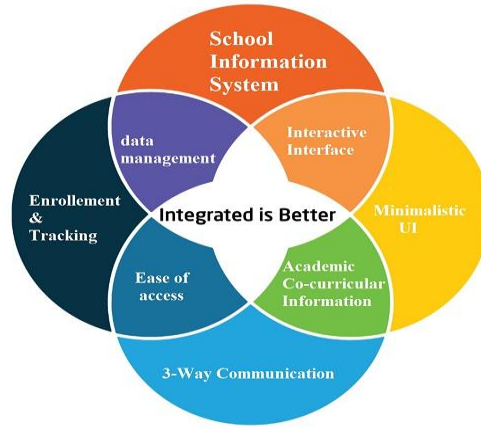
The teacher must be able to view, update and edit the respective modules.

The chat module must be restricted to be class wise. In an event of error in updation or use of any of the modules, the user must be able to rectify and hence the app must have provision to undo the actions.

The UI must be easy to use and user friendly for all three entities entitled to this app. The admin must have knowledge of all the modules as well as backend functioning, and must be someone available to contact at working hours.

And the human entities must use the app correctly in order to make all information flowing easily to avoid any unwanted human error and ensure seamless 3-way transfer of information.

For Bus Tracking a different basic driver side application is required to get locations, mark students present/absent and this is reflected in the SiS application.

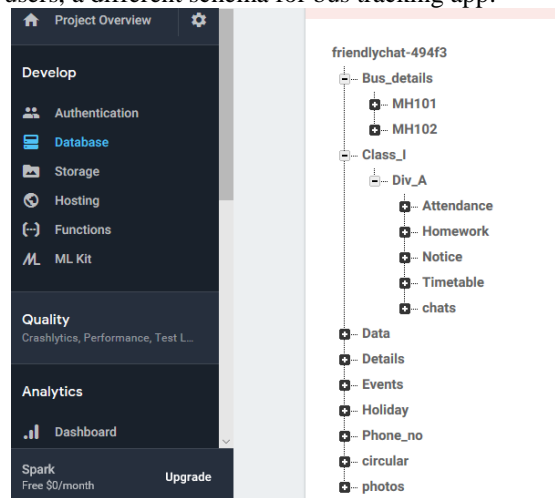


### 5.2 Database Design

Firestore was chosen as the most suitable database for the system keeping in mind all the real-time applications required in the project as well as the features provided by firestore which coincide perfectly with the app's requirements. Some of the features are:

- Fulfills all authentication needs
- In-app messaging
- Push Notifications
- Real time storage retrieval for bus tracking

The design includes 3 different users, a different schema for bus tracking app.



### 5.3 Implementation Details

The application is developed in Java on Android platform using Android Studio as the IDE. Firestore forms the backend database and support. Given below are the details of major modules and their implementation.

### 5.4 Registration and Login

Phone number is verified by OTP. This is done by setting the click listener to the button in which we will get text from phone number EditText and store in phone number variable. Then sign-in flow by passing this phone number to verifyPhoneNumber() method is initiated. This method will send SMS to the provided phone number. It will not send another SMS on button click until original request is timed out. The user will enter the OTP received via SMS and start the verification process. Now the SignInWithPhone() method with credential as parameter is called. If verification successful the user can continue with registration process.

### 5.5 Chat

In EditText field text watcher is added so that empty text doesn't fill up the database. Also , listener is included to message list, thus when message is added it triggers onChildAdded(), which in turn takes the newly added messages, convert them into objects and finally add it to our adapter which will display our list view.

### 5.6 Notecast and Gallery

When the photo picker button is clicked, an intent to android system photo picker is created. Once photo picked, the app will receive the photo data which is send straight to firebase storage, once the file is in firebase storage, we can listen to it using firebase URL. Now this URL is sent to message database which will trigger childEventListener() and adapter displays the photo URL in the app.

### 5.7 Attendance

For teacher side, we extract the roll number for particular division and class. A checkbox is displayed in which teacher can mark the status as present or absent. For displaying, a loop is run from the starting date till the current date, where date is the key value. Using dataSnapshot.getChildren() roll number is obtained which is matched to see the status whether the child is present or absent and the result is displayed by the adapter.

### 5.8 Homework

The homework adapter displays the student's roll number using getAuthorName() who has submitted the homework. The adaptor for teacher shows the total number of submissions done so far.

### 5.9 Circulars and Holiday Lists

For Circulars , the attachment button is an intent to the phone gallery, from where we can upload the pdf file into the firebase storage. The storage URL is send to the firebase database which triggers onChildEventListener() and adapter displays the format, i.e the Name of the pdf and the date it was uploaded. The holiday list adapter, display our list view that contains the date and the list of holidays.

### 5.10 Bus Tracking

Device permission is asked to switch on the user's GPS location. Once the GPS is on Location Listener is used to get the latitude and longitude of the driver's device, which is updated in the firebase. Marker is added at the latitude and longitude position. Whenever new location is updated in firebase, marker is removed from the old location and is added to the current position of the bus. The driver has the list of students assigned to his bus number. Device's message permission is asked to send SMS to the parent's number registered while the students board and deboard the bus.

## VI. TECHNOLOGIES USED

- Android Studio
- Version 3.2
- Google Firebase
- Mapworks

## VII. CONCLUSION

This project assists in automating the prevailing manual system. This is a paperless working model for future educational sector reforms. It can be monitored and controlled remotely. It will reduce the manpower required. It provides accurate information. The data which is stored in the repository may help in making intelligent decisions by the management. All the parents, teachers and management will get the specified data, which exactly facilitates the growing requirement for automation in schooling systems.

## VIII. REFERENCES

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