

# IoT Enabled Smart School Bus Tracking System

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**Abstract** - In concern with child safety, parents always worry about their children when they send off their child to school. Numerous kids stuck inside a bus within the transport stopping area subsequent to nodding off on their route to the educational institute, missing the transport, or leaving at the inappropriate stop. This attempt allows parents to track their child and ensure the safety of the child.[10] This exploration utilizes the appropriateness of Radio Frequency Identification (RFID) innovation for following the child (i.e. student) and monitoring them to and fro school. This solution gives alert to parents if their child is mistakenly dropped on another bus stop. GSM is used to transmit the data and GPS will give the current location of the bus. This will help parents to know if the child is in the right place.

**Key Words:** Global Position System (GPS), Radio Frequency Identification (RFID), Global System for Mobile Communication (GSM), ARDUINO, WIFI - MODULE, IOT-CLOUD.

## 1. INTRODUCTION

At the current point in time, because of more number of kidnap and mishap cases, guardians consistently stress over their kids, even their children using school bus for transportation. The proposed system recommends SMS based application which consists of guardians to follow their youngsters' area continuously. GSM (Global System of Mobile Communication) utilized for posting the alarm note. [1] Many students got to travel from their home to class each day. So, children's safety is a very big issue for their parents. Nowadays all area units are significantly conscious of protection issues. Simultaneously, guardians can send their youngsters to educational institutes which have high notoriety and offices. These days all schools have transport offices, in any event, when their youngster is going to class through school transport, guardians have some stress over their kid, regardless of whether they came to securely or in a risky circumstance. [2] This framework gives an alarm message when a youngster loads up furthermore, leaves the vehicle using the RFID label worn by the child by putting that tag before the RFID reader. The sensors and RFID reader are associated with Arduino. Each RFID tag has information of the transport and each adolescent who was identified by a RFID reader which communicates contrasting information with their gatekeepers using GSM. [4] The yields of this Arduino board are imparted to the GSM module. This GSM

module can send the messages and calls to affirmed individuals as shown by the got data.

## 2. LITERATURE SURVEY

There are so many and different-different kinds of School bus tracking and monitoring systems that have been proposed so far.

Aditya Kaushik recommends an Uber-like Android app which will provide real-time location using GPS module and ETA of college buses. This application provides two functionality one for the driver side and another for the student side. App also has online bus routes. The app is intelligent enough to handle both the cases, that is a single app will be made for the driver side and riders side. They have utilized firebase as our backend and simply track the area of the bus with the goal that individuals who are hanging tight for the bus can get to the specific area of the bus and use their time till the appearance of the bus.[3]

Juan Zambada proposed that school transport is utilized by many kids around the world. However, not many efforts are done to make the existing school transport system better. This paper presents the improvement of an IoT based scholar bus checking framework that through limitation and speed sensors will permit numerous partners, for example, guardians, the administration, the school and numerous different specialists to keep continuous track of the scholar bus conduct, bringing about a superior controlled scholar bus.[7]

Shruti Kamtekar says that following school transports and students have become a standard issue in light of the fact that the choice of whether it is faster to sit tight for the appearance of a school bus or to enlist a taxi as the transport is late/missed arriving at school.[13] In this way, this venture means to help in the bus appearance implication by getting an application that will help in effectively following the school bus and the kid locally available. The application can also be used to inform the parents whether their child has boarded the school bus as well as arrival at school. Their application uses RFID and GPS based Android Phone where the tracker is utilized for finding the current geographic situation of the bus and RFID (Radio Frequency Identification Device) is utilized to particularly distinguish each kid.[8]

Shaun Kollannur also proposed a system for tracking the school child for their safety. Their project consists of a Smart children safety system in school bus transport using RFID and Android. It includes an app for Parents to track children in case of emergencies. The Demo uses a school bus RFID system but works well in a public network architecture of IoT devices like GPS, etc.

### 3. REMEDIAL SOLUTION

#### 3.1 Notation:

To design a system for parents who want real-time information about the children and school bus by means of tracking its location. Use of a centralized server to share the information with the parents in a convenient way.

#### 3.2 Solution:

In this system, Arduino Uno has been utilized. The framework comprises an all-out three-unit: Transport unit, Education unit and Parent unit. Transport unit comprises RFID Reader, various sorts of sensors and GSM module. The GSM module is utilized to give the alarm messages to guardians when their kids load up or leave the bus.[10] In this project, School vehicle following and checking have proposed RFID is utilized for distinguishing proof of every student. Every student has their own RFID tag. With this, every parent can observe their child just as by school. At whatever point the student enters the transportation bus or exits from it the RFID reader records the information and stores that information into the database. For each section and leave, the RFID tag is detected by the RFID reader.[9] Here the front door of the school bus is considered as an entry as well as an exit point. The setup of Arduino and other IoT devices is fixed at the door. A single individual can enter or exit from the transport at once.

The RFID reader reads the tag and sends an alert message to their individual watchmen through GPS and GSM module. The accompanying structure little print will be dispatched to the worker at the staff side for capacity and on the cell phone cell phone to the watchmen. The records of understudies are taken care of in an information base at a school head. The GSM and GPS module in the arrangement is utilized to send the alarm messages to the guardians and all the while to the school unit. Likewise, the LED light is constant at the college transport unit. So, when a student enters the bus it gives the distinguishing proof of the student to the driver by squinting. [14]

The proposed framework is utilized to give an alarm message to guardians about their kid boarding to the school transport. The framework recognizes the issue looked at by the guardians about the wellbeing of their youngster while going to class and returning from school. The framework incorporates RFID for one of a kind ID of every student and

GSM for message sending. The Complete information of t children is going to store in the database. [6]

### 3.3 ARCHITECTURE

The proposed system consists of a hardware part and a Simple message application for parents. This solution is split into three major parts given below:

1. Transport unit
2. Parent unit
3. Education unit

#### 1. Transport Unit:

The Bus Unit assumes a significant job in examining understudies ID (i.e. RFID cards). What's more, sends the information to the education institute just as the Parent unit. The Transport Unit consists of the following hardware and the set is made as shown in fig. 1 as follows:

- a. RFID (Radio Frequency Identification Detection) Reader and RFID Tag.
- b. GSM (Global System for Mobile Communication) Modem
- c. Switch
- d. Arduino Uno.

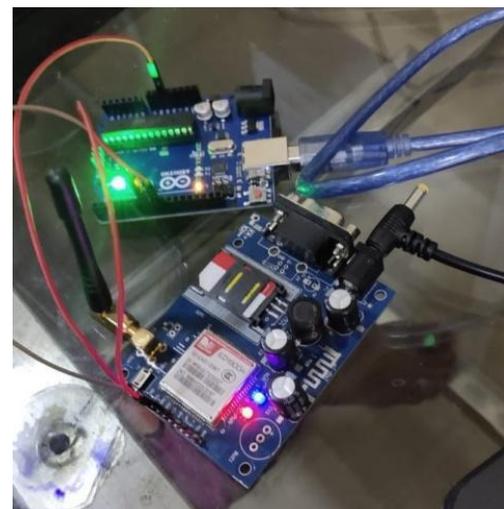


Figure. 1: Prototype

The capacity of RFID reader is coordinated with RFID labels. The RFID Reader put in the entryway the school transport and the RFID Reader fills in as a transmitter similarly as a beneficiary of the radio repeat signals. The RFID tag is associated with the understudy's ID card.[11] The GSM/GPRS Modem is used for correspondence with the worker by methods for GPRS and GSM SIM.

#### 2. Parent Unit:

The parent unit consists of a simple SMS application. At the point when an understudy enters/exits from the transport the SMS alert is sent to their folks on that SMS application. Firstly, parents must give their number to the school administrators so that they can configure a particular number with their child and get alert messages. This SMS

application is used here to overcome the drawback that some parents are not using Smartphones, so they simply get the message of their child safety on their simple phone also. [13]

**3. Education Unit:**

The education unit involves a Web application where the Admin does all the expert Entries like Add, Delete, Update, Modify the nuances of understudies. This all data is taken care of on the cloud. The education unit keeps the records of the understudies, and transports similarly as the general history with kids in/out, time into/from the vehicle. Following figures, figure. 2 and figure.3 shows the flow chart for the suggested solution and block diagram for a receiver.

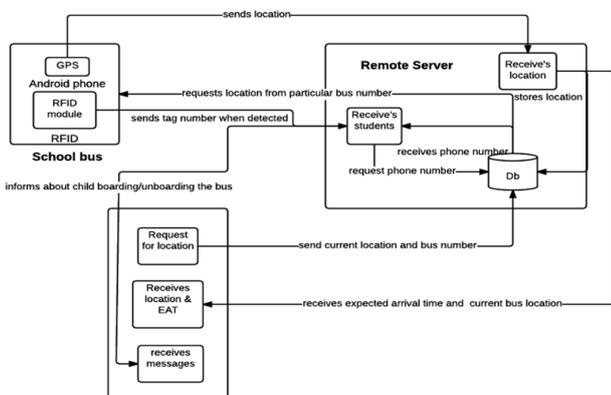


Figure. 2: Flow chart

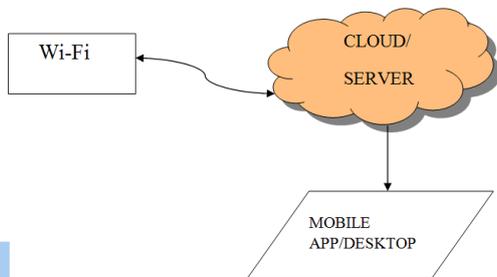


Figure. 3: Block diagram of a receiver

**4. RESULTS ANALYSIS**

- 4.1. This arrangement will give a moment to make the message aware of guardians about school transport.
- 4.2. The solution will inform them through an application when the kid gets into the transport and gets off from it or enters/leaves the school.
- 4.3. The arrangement is more valuable than the current arrangement. It gives more prominent execution than the current one.
- 4.4. Graphs in Figure. 4 and Figure. 5 below shows the results obtained
- 4.5 Figure. 4 shows the data entry of student through RFID. Each dot represents the time and date of the student's entry

4.6 Figure. 5 represents the location of bus regarding to particular date and time.

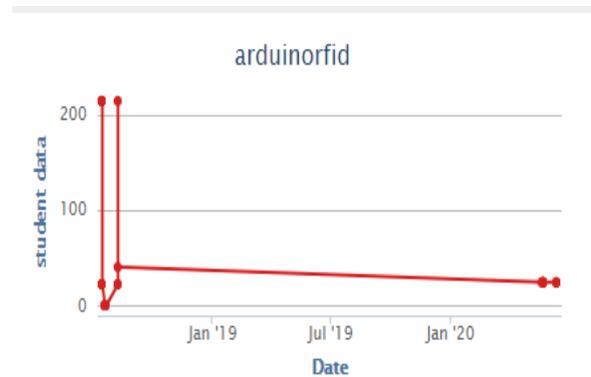


Figure. 4: Graph of data entry of student through RFID

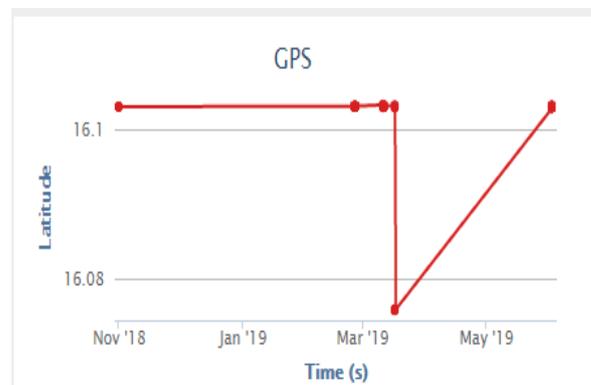


Figure. 5: Bus Location graph



Figure. 6: SMS alert to the parent

**5. CONCLUSION AND FUTURE SCOPE**

This structure targets upgrading the wellbeing of kids during everyday transportation. RFID Reader situated inside the

transport identifies the RFID labels of the kid. It sends a moment notice with the pertinent information from the educational institute database server through IoT Cloud Platform. The parents can get a message and call as soon as children scan the RFID.[8] Additionally, this framework can be upgraded for managing the parking of vehicles. The framework can be stretched out for full-time observation of kids which might be useful for guardians at least expense.

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