Data Acquisition and Tracking System Using Cloud Computing for Kid's Safety

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Abstract - An efficient Data Acquisition and Tracking system using Cloud Computing is designed and implemented for tracking the movement of school vehicle from any location at any time. The proposed system made good use of popular technology that combines a web technologies and smartphone application with a Microcontroller. A Radio Frequency Identification (RFID) cards will utilize RFID technology and store child details. The device is embedded inside a vehicle whose position is to be determined and tracked in real time. A microcontroller is used to control the Global Positioning System (GPS) and Global system for mobile communication (GSM)modules. GPS module is used to get geographic co-ordinates at regular time intervals & GSM module is used to transmit and update the vehicle location to a database. A web technology and smartphone application are also developed for continuously monitoring the vehicle location on google map and notify parents & school admin on the location of the child. Once the identification card (RFID) is used, the child parent & school admin is notified of their location, bus routes, estimating speed of bus and regular route of the bus if changes it will notify also if bus has some issues like accident or engine fails it start notification to both. The system will control the entry and exit of child to and from the bus using RFID and GSM technologies to ensure the entering and exiting of all children to and from the bus in a safer manner. Thus, parents will be able to monitor a school vehicle using the Smartphone application & determine estimated distance & time for the vehicle to arrive at a given destination.

Key Words: Data Acquisition, Tracking, Cloud Computing, RFID, GPS, GSM, Web Technology, Smartphone-application.

1. INTRODUCTION

In this world Child Crime ratio has increased. According to National crime Report Bureaus 8 Children goes missing every hour in India, more than 73000 children reported to be missing across India in 2019. India is a home of 400 million children Out of which child crime comprise of 55% of population. Till 2019 as many as 1,19,617 children went missing. Child Safety is a major concern for every parent. The Technology has advanced greatly over the recent years. The primary concern for every parent is child safety. Sending off

their kids can be scary things for parents. If the school bus is little late Parent's mind Starts Racing. By seeing such Crimes question arises, Is the School buses are safe when the children board the big yellow bus...? Which route does the bus takes to school...?, What time does the bus get to and leave the school...? This project aims to minimize the crime by developing a kid safety system which will track and share the location of student through RFID, GSM-GPS and mobile application. By this Parents and School admin can track the location of bus on Google Map. In this the RFID Reader with GPS-GSM Module is kept in bus; it will read the serial no of Tag that contains the detail of Student. The Information Read is stored in microcontroller and sent to database server via GSM modem. The system will track the student while entering or leaving the bus and the location status will be sent to Android App and to school website.
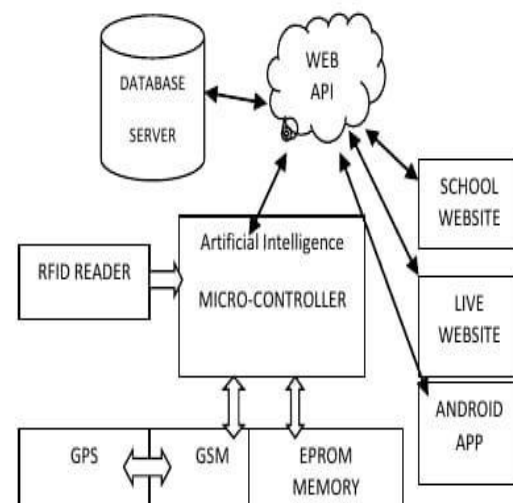

Fig-1: Internal Architecture of Proposed System

2. LITERATURE SURVEY

The Economic Tracking clears the idea on how GPS GSM can be used economically for tracking. Moving units can be tracked easily and the SMS is received at GSM shield of type SIM900 from SIMCOM attached to ATmega328p microcontroller and passes it to PC then PC extract the coordinates and locate on MAP. GPS-GSM predicted vehicle tracking generates the coordinates of the vehicle, a GSM

modem for receiving requests from the user and sending the coordinates of the vehicle via SMS. Application of XOR and PRNG Protocol along with Binary ECC protocol at two different stages shows us the application of multilevel security without affecting the operational speed of tracking. Using Cloud Computing for cloud computing-based apps requires some of the major challenges such as designing of the architecture, cost cutting, low level designing etc. There are major cloud vendors such as Azure, AWS, Google cloud using which a app can be developed keeping in mind the importance of privacy, security and cost. Using the RFID tracking System for Vehicles (RTSV) we can develop tracking vehicles for developing tracking system for vehicles and using this method, we can address problems such as that of traffic signal timing, density of traffic on road and theft of vehicle. There are many existence systems models available that read the student detail using RFID code attached given to the student and send over the server to store the entry via GSM modem once tag is read by reader it simultaneously send message to parent in the form of text about board information of the student and latitude and longitude of the vehicle.

3. METHODOLOGY

This work helps in assuring parents after entering, exit, path change, pinpoint real time location over map, engine off and accident occurs notification. The school being informed there after children during transit. The data can be used by schools to know the child presenting school, how long they took to get to the school and how many trips they have taken with the bus. It can also be a guide for billing by the bus owners in case they are contracted. RFID system is now an emerging technology in various fields, which is well known for its compact size, processing speed etc. It also plays a leading role in security and process management. The RFID technology is a means for uniquely identifying an object with a wireless radio link allowing data to be stored on an RFID tag and retrieved in remote application at a later point of time. The details about the student like his/her name, roll number boarding place will be recorded in the computerized database and also on the RFID tag. Radio Frequency Identification (RFID) is a common term used to depict a system utilizing radio waves by which the object or person is identified by means of a unique serial number. The microcontrollers are very useful to an extent in communicating with the devices such as displays, sensors, etc. The GPS base system help in tracking the vehicle also GSM to send data over internet to the server into the database for back track and real-time location, RFID technology is used to identify the student uniquely from many for the boarded the bus so parents can access only relevant student information This security system is simple and cost effective.

Every student has been assigned with RFID sticker which is stick to his school identification card contains unique code which help to get his name, phone number and all relevant detail from the database, same card code will be inserted into the device microcontroller EEPROM memory for identification and validation of the student it will done online updating of the device. Once children swap his card over the

device it read the information over the card and compare with EEPROM information once validation complete it give green light with beep signal to him and read data will be sent over the server for storing into the database so school or parent can fetch entry information of the student with data time and location of the student. GPS installed into the devise get real-time location coordinated and send over the server if device read same coordinate for particular period of time it Raise the alert notification to parents and school admin that bus has been stopped or bus puncture or some accidental issue so they can call the relevant person to know the reason of stop. If vehicle change the regular path assigned to the Vehicle, then also it raises the alert notification to both. Application gives estimate time to reach the bus at pickup or dropping point so parents can be Prepare to get his child without prior or Post delay.
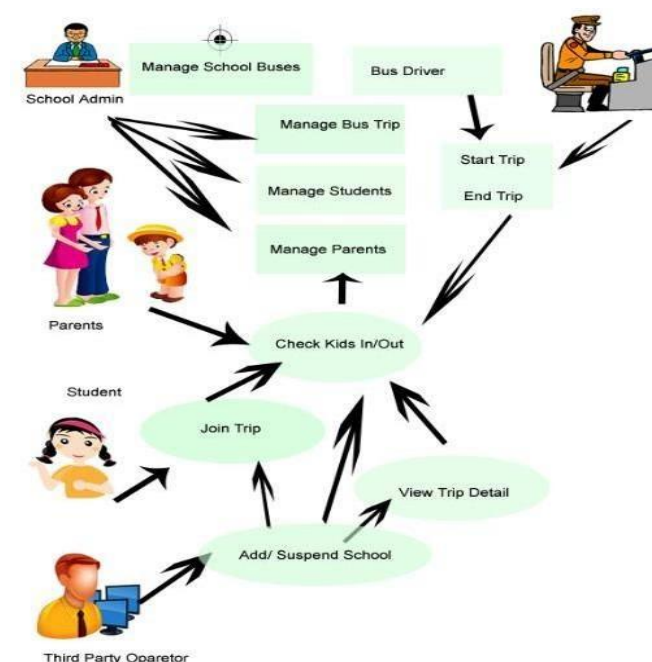

Fig -2: Workflow of proposed model

Driver console has server data so he can assure that all boys get into the bus and no one missed if someone missed to pick it will Notified the driver that child missed at pickup point. The Architecture of Proposed Model is shown in fig 2 The hardware and software used are RFID card stickers 13.65 MHz ,RFID Card Reader 13.65 MHz, GPS module with GNSS support ,GSM module with HTTP supports, Arduino Microcontroller Core, Battery Management System, Battery ,Arduino IDE to develop Arduino code, C++ Compiler, MySQL Database, Webserver with PHP API support ,Web Console for School, jQuery for Google Map , Android App for Parents, Android App for Driver , Android Studio for app Development.

4. RESULTS

A device consist of RFID reader which read the RFID unique byte from the RFID tag which has been place over the reader RFID tag does have its own power source it will be charged by reader antenna power radiation and send 12 byte store in the form of Manchester coding to the reader, Reader reads the code and save into the Hex format to pass on the Micro

controller, GSM / GPS module is the combo version of GPS and gsm technology which is known as SIM808 module its run by AT command send via controller to wake the GPS and get data from GPS in the form for NEMA string which will be pass to the controller and send over the network for storage into the database on webserver GSM is Network provider which consist SIM module for Subscriber Identity to use data packet to send data or receive data over the dedicated server. Arduino Uno controller core is used to synchronous working with GPS, GSM and RFID reader. It follows the protocol that queuing the process and provides control signal to the various peripherals by IO signals it is low power module.

Database is the major part of the whole child tracking system it Store all data come from device, school admin and parents in the form of string that all will be stored into the table. MySQL works on the PHP platform that need PHP server as known as Xamp for local host development purpose. All data table will be internally connected with SQL queries that perform CRUD operation i.e. create, read, update, and delete operations. In MySQL we have to create database after that we have create table which are known as Entity in MySQL in NF1 and NF2 form database.

School login is Propose for school admin who are responsible to CRUD operations i.e., Adding student information, provide login authorization to the parent, tracking all all vehicle of the school watch over the mileage of the vehicle, Student's boarder and exits, watch over drivers and insert its profile over the system etc. that all features will need proper authentication to access the dashboard of tracking system control. School logins use cryptographic key for authorization for school admin to access precious information of whole tracking system.
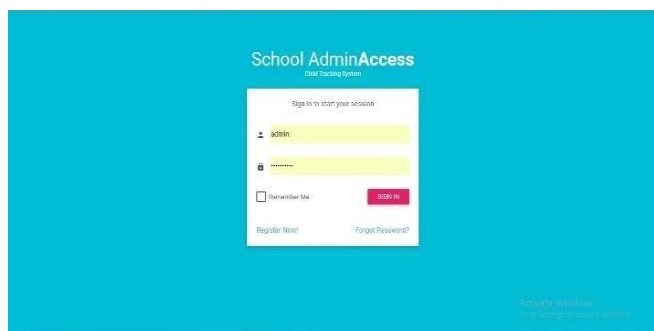

Fig -3: School Admin Login

The school has its own data serve namely school webhosting it contain MySQL server with SQL query database operation can be Performed, it consists of entities in the form of tables with ER- relation with Joining of Table. Entities which contain student information, RFID code, student id, pick and drop location, bus detail, driver and conductor information, bus location, users, parent information, etc. This server can be accessed by the parents anytime to know the entry and exit of their children and the current location of the bus with proper authorization they can only read the information they have known right to edit or delete information.

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System has been implemented in PVC TED box below

mention all hardware in detail, System work absolutely fine with pic port data collection without latency.

The school has its own login portal that's helping to track all buses location, total vehicles, total children in the buses, running and stop status of the buses. the bus has sent all required information to school server that admin can view all relevant information by fetching the database it helps to track all activity related to child safety. If bus acquires wrong route or stop somewhere more that assigns time that will blow the notification to admin to find out the problem and take necessary precaution before any incident happened.

The school admin can add student information like student contact information, pickup point, drop point, RFID code, bus route, bus No etc. this information will help school admin to track student and buses for particular student boarding information.
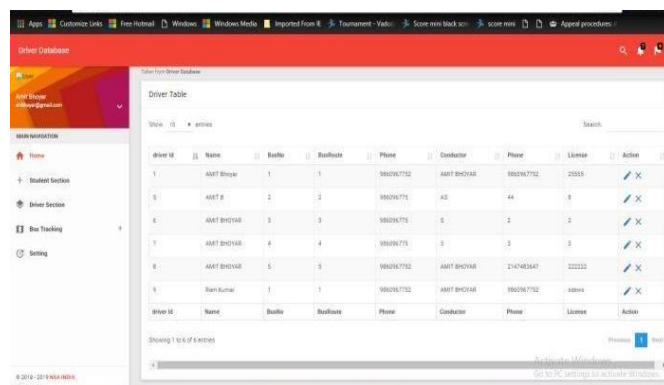

Fig-4: Details of Student

The school admin can add driver and conductor information which requires security protocol and complete license and bus registration that will be formulated for tracking purpose, school admin should have all information related to child safety.

The School admin have tracking page for location of the all the buses running or halted it also show distance travelled by the buses with assign speed detection it will help get location of the bus and maintains tracking, Google map will show all information in the form marker which will updated in the real time by web socket

Parents has android console app to track real-time location of the bus where their child. This app will require authorization that will indicate authorized person only can see the child location for more safety this app shows only relevant child.
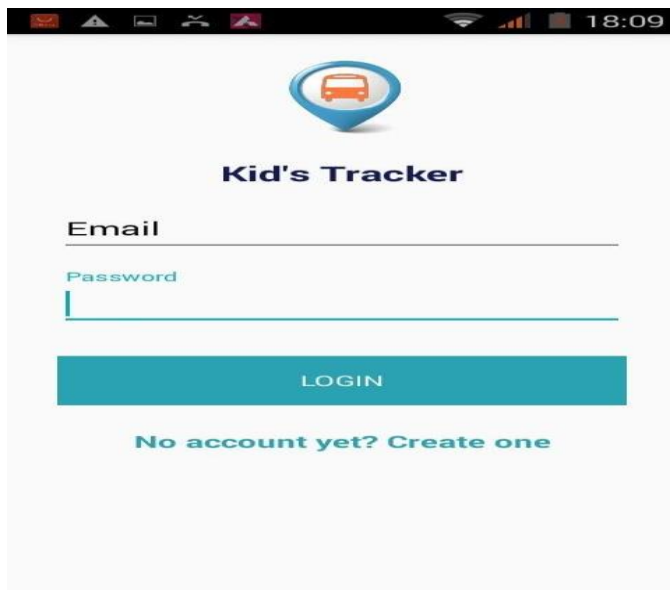
Fig 6: Location Tracking of Bus

Fig-5: Parent App Login Screenshot

Fig-7: School Admin, Google Map location, Notification on Parents Phone

App has driver profile screen if any delay or any emergency occurs in the bus it will help to call driver or conductor directly from this app by one tap. Profiles also have detail driver information with his license and residential information.

Once children arrived at given drop point app broadcast the notification that children had reach at assigned point so please pick your child it will help to parent to get exact time to reach the pickup point that reduce unwanted wasting of time if parents are busy in their work or they can send servant to receive the child.
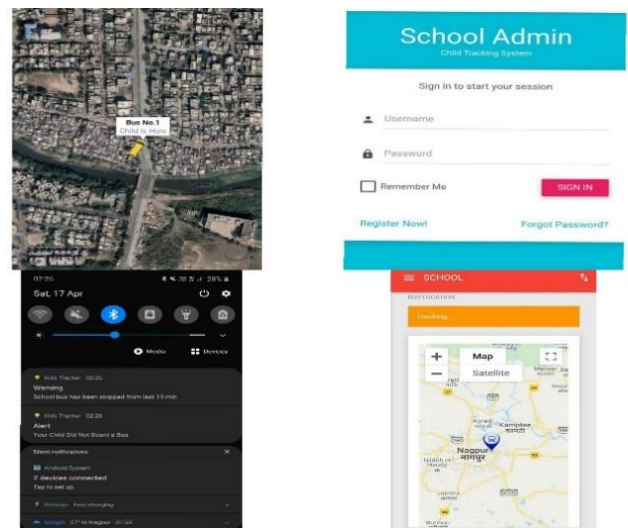
5. CONCLUSION

This system gives overall safety Transportation for the school Children during daily school time. The system uses RFID which help to identify whether Students boards or leave the bus along with notify parents and school in the form of notification simultaneously GPS gets all the coordinates from satellite and send it to database server by using GSM service module with highly precise and encryption format. The GPS used is to track the position of the bus if it goes other than the usual path. Device has Specialty to detect unusual route taken by school bus driver or bus has stopped somewhere due to any reason this system starts broadcasting alert messages to both the authority (i.e., parents and school admin). It has live identity adder with master card having features adding, deleting and erasing Function. This system gives us high level of security for students as well as school. These society advantages are Real-Time Monitoring of the School Bus by Institution and Parents, School Bus Scheduling and Route Planning for Fuel Efficiency and Prevents Unauthorized Usage of the School Bus.

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