

# Bus Tracking System Using GPS



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### Abstract

The project aims to develop a low cost vehide tracking system that wil ensure the safe commute Of children. It involves Internet Of Things application that tracks the geographic location of school buses in real time and it on a map in a mobile app. The application gives information about the bus, speed and designated routelt is aimed at a user base Which incudes the faculties, bus drivers anparents. It is expected to solve the problem of students missing the bw and ensure the safe pick up and dro off of students by providing the tracking facility at affordable costs.

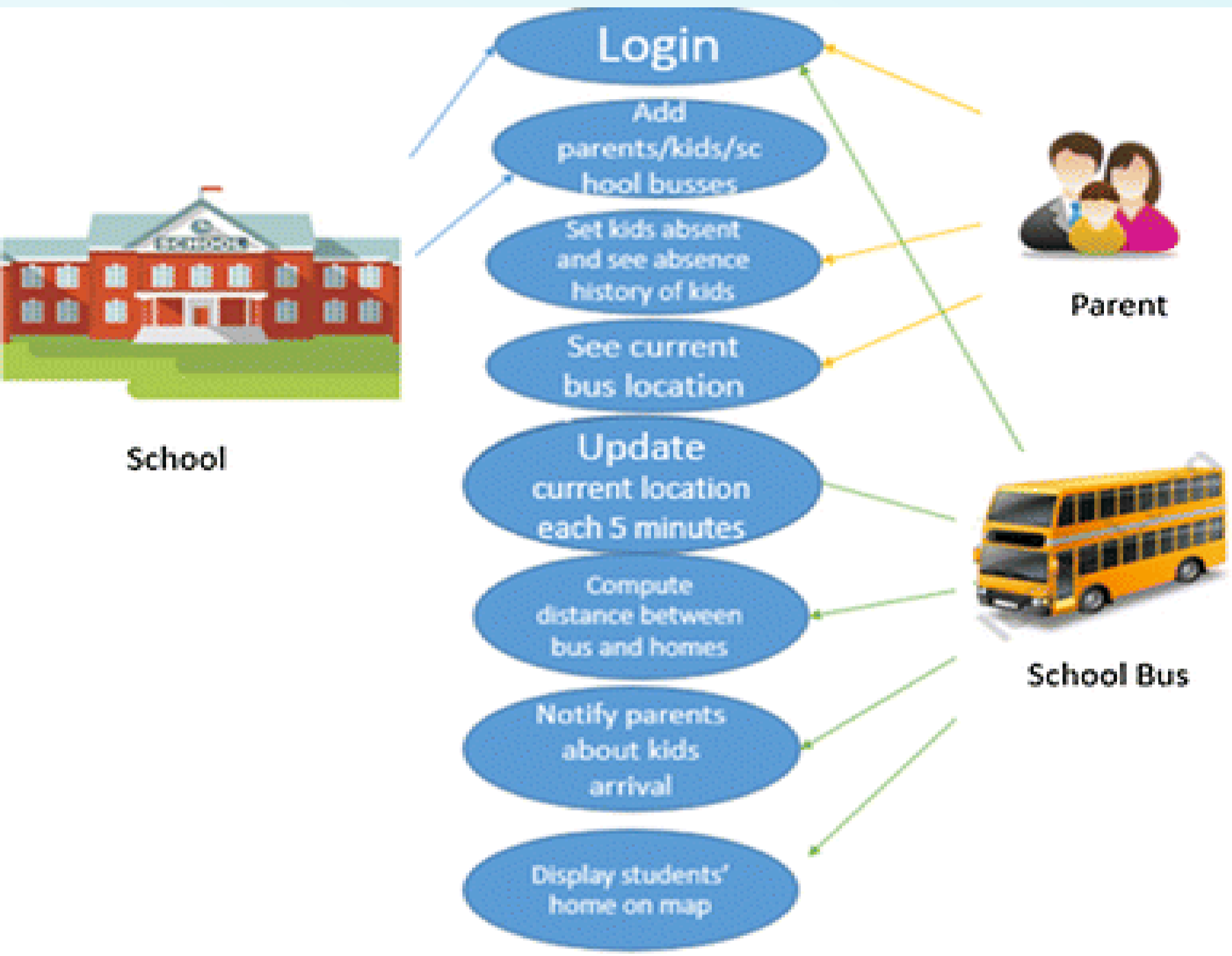
### Introduction

The commute Of students from home to school and back has always been a source of concern for parents. Students often get on the wrong buses and get off at the wrong stops. gus drivers maybe unable to identify all students and will not know in time if a Student is missing. Parents have n0 way of knowing if their ward is safe until the evening when the bus returns. While some schools have already implemented GPS tracking of buses using GSM, that do not give real time updaton or individual information Of students. Raspberry Pi systems have been known to give real time information but the cost is too high for it to be a replacement for GSM systems. This project on implementation, will be a means to monitor school buses comprehensively including the speed, the people adherence to route, time etc.

### Methods And Materials

The components used for the tracker are ESP8266 microcontroller which has a built-in WiFi module, Ublox 6M GPS module and a MFRC522 RFID Reader. The microcontroller constantly uploads the lcxation input by the GPS module to a mysql database hosted on an Apache server. A front-end android application downloads the data from the database and plots the location on a map in real time using Google Maps API for Android. The id cards of students are embedded with an RFID tag. The RFID reader in the tracker which is positioned at the entrance of the bus will automatically identify each student as they board/alight. The microcontroller will then invoke a PHP script which will send a push notification using Firebase Cloud Messaging (FCM) to the respective parents' mobile app, notifying them Of the drop off/boarding location and time.

### Ues Case Diagram



### Resalt

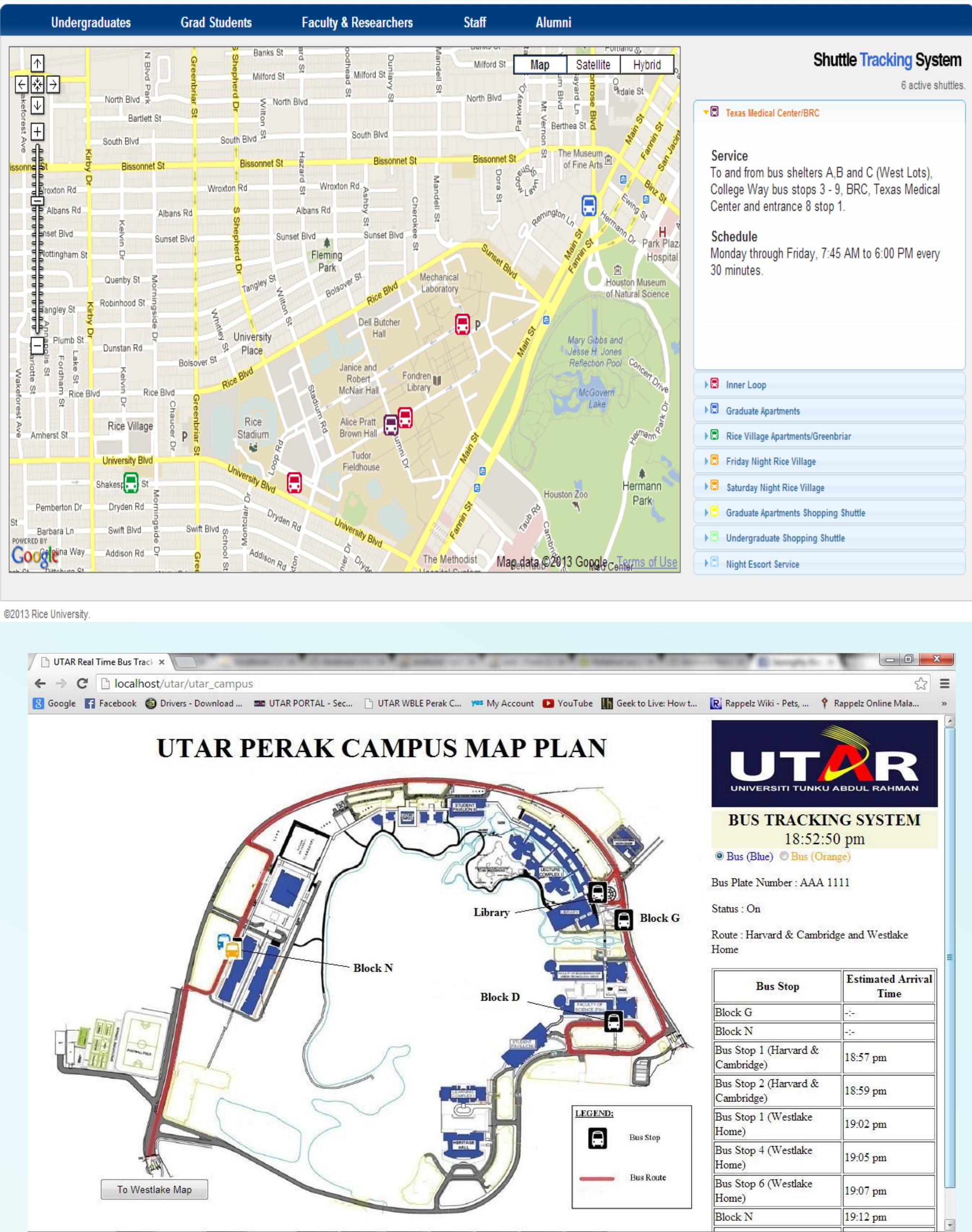
Figures below show the outputs like database trace and app screenshots. The first figure shows the database trace Of the lccation upload. The second figure Shows a push notification informing a parent of his kid's safe boarding. The third figure shows the traversed route and current location plotted on the map.

Options		id	busid	latitude	longitude	speed	time
			342	101	9.680974	76.772496	0.69 2017-03-18 10:15:53
			341	101	9.681196	76.772388	0.69 2017-03-18 10:15:51
			340	101	9.681355	76.772313	0.57 2017-03-18 10:15:48
			339	101	9.681587	76.772281	0.37 2017-03-18 10:15:46
			338	101	9.681778	76.772324	0.17 2017-03-18 10:15:40
			337	101	9.681958	76.772356	0.57 2017-03-18 10:15:36
			336	101	9.682074	76.772431	1.61 2017-03-18 10:15:34

Notifications

Clear

**Smart School Bus**  
Your child has boarded the bus at Erattupetta, 8:39 AM

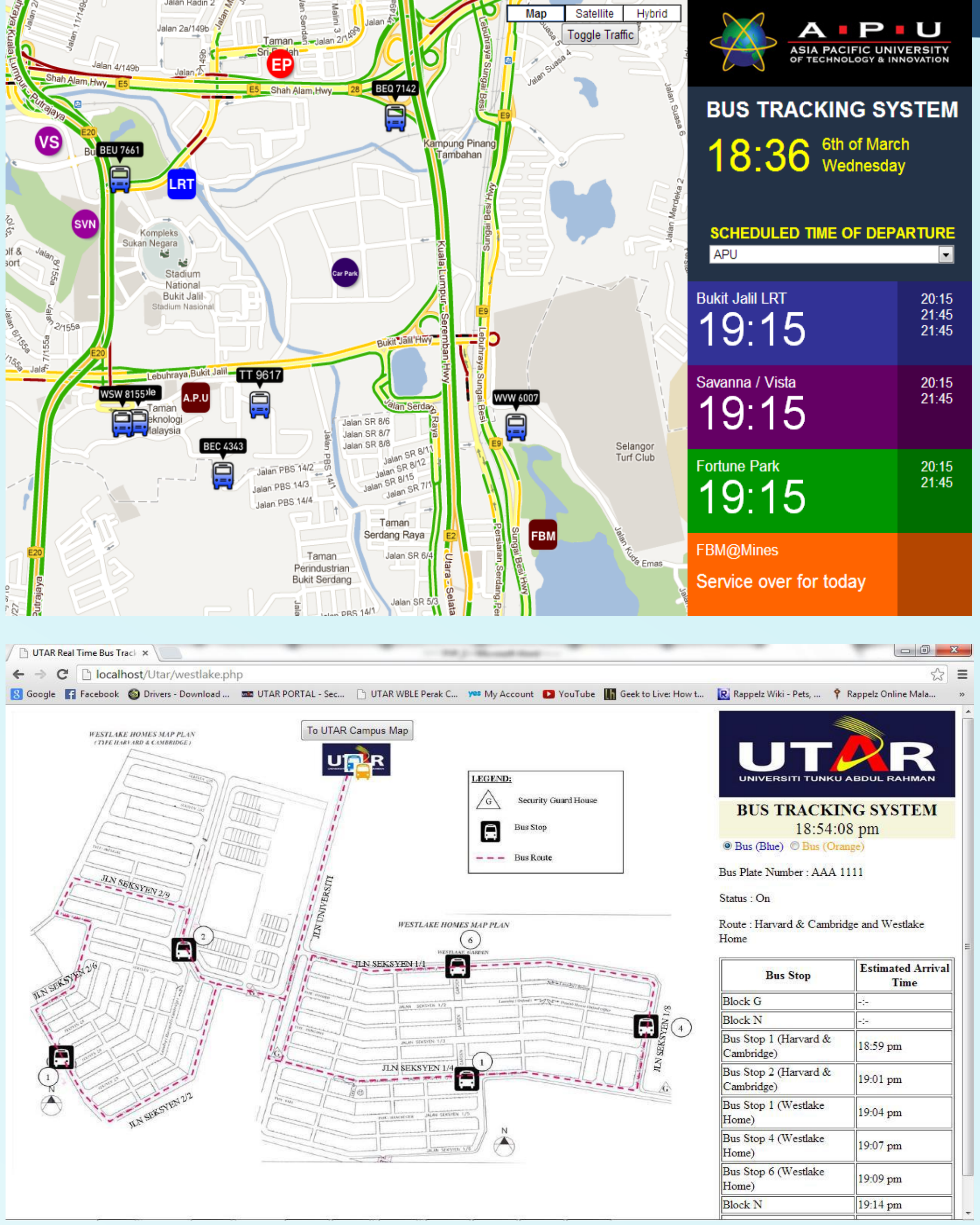


### Conclusion

The aim was to develop a low cost tracking system. The ESP costs 53 when Arduino Costs \$6 and Raspberry pie \$25. The entire system cost less than IJSD20 when Arduino .GSM systems cost USDI and Raspberry Pi systems cost USD 20 Rasptrrry pi systems have been known to show packet loss rates as low as 0-0.50%. Packet IOSS rates Of ESP8& are Close to that Of Arduino at 1-2%.

### DrawBacks

The range of the RFID reader is as low as -cm and hence impractical for commercial purposes. The http connection is not encrypted and hence easily susceptible to hacking. The project assumes WiFi to ubiquitous without which, the system will fail. There is an initial delay of almost 1minute for the GPS module to Startup on power up.



### References

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