

# Location Reporting System Using GSM - SMS Services

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**Abstract**—This Paper presents the simpler and efficient location reporting system which is independent of Global positioning system and Smart-Phones. Location Reporting System is used to keep track of the objects which are either stationary or in motion and can tracked when there is a free line of sight communication. The tracking of the vehicle is secured with the help of the GSM-SIM number which is private and secure. Location Reporting System uses a preprogrammed data base of various locations throughout the country containing Location Area Code, Cell ID, Mobile Country Code and Mobile Nation Code, which have a prefixed values and unique for every location. The probability of all the 4 codes to be same is zero.

**Index Terms**—GSM, MCC, MNC, LAC, CID, Latitude, longitude, Location Reporting System, Data, Local Positioning System, AT commands, Raspberry pi.

## I. INTRODUCTION

The Location Reporting System is a concept developed from LOCAL POSITIONING SYSTEM. Local Positioning system is a local phenomenon, unlike a GPS which is a global phenomenon. LPS is restricted to specific area like a district, state or a country. LRS provides location information in all weather, anywhere within the coverage of the network, where there is an unobstructed line of sight. The main motto is to provide location irrespective of weather conditions, when the device is in the range of a GSM network at affordable rates. The GSM mobile network is spread all over India and easily accessible. The technology of GPS is complex and difficult to use without a smartphone or a user interface. LRS uses the modern technology of ARM processor interfaced with a GSM modem to deliver the best results to the user.

Location Reporting System (LRS), employs a micro-computer namely Raspberry Pi equipped with an ARM 11 processor for faster execution and accurate result. LRS interface the GSM module to the raspberry pi which is used for searching and transmitting the location of the device. Raspberry pi receives the request and verifies the authenticity of the user and then only transmits the location. The next chapter discuss about the existing methods in this system.

### EXISTING METHOD

The existing method uses an advanced vehicle monitoring system for monitoring the school vehicle from any location A to location B in real time [1]. [2]The existing system uses a new technology dependent on LINUX Micro-Computer board namely Raspberry Pi and its advanced feature of storing database. The existing system provides a comparative analysis between the current vehicle path and pre-determined path inside the system. Hence if the user violates the path, then an alert message will be sent from the existing system to the vehicle's owner mobile [3]. But the existing method, is completely dependent on Global Positioning System (GPS) and location cannot be determined if the GPS system fails. To overcome this difficulty, the proposed method employs a method without using the GPS networks.

The proposed system works independent from the Global Positioning System, Smart phone and any sophisticated technology. It employs a Micro-Computer and a GSM module for the to-fro communication and works only based on the GSM signals. It enhances the usability to the user and makes the position reporting system a very simple task, simply corresponding through the text messages. So a user even without a smart phone or GPS privileges can access the vehicle with ease

## II. PROPOSED SYSTEM

To reduce the dependency on the GPS, LRS uses only mobile networks for the positioning of the device. Raspberry Pi, the micro-computer acts as the brain of the device. Each and every device has a unique identification number and a different KEYWORD. When a user sends a location request to the respective GSM of the device the processor verifies the authenticity by checking the keyword. If the keyword for the respective device is correct, then the processor sends a request to the GSM for the LAC, CID, MCC, MNC codes using the ATTENTION (AT) commands[8][9]. The SD card contains the database with prefixed codes and location names. Upon receiving the request and after receiving the codes, the processor performs a string search in the database for the respective MCC, MNC, LAC, CID codes. When the four codes are a match, then the location name for the respective codes is retrieved and transmitted to the user in the form of a text message. The Probability of four codes having 2 different locations simultaneously is ZERO.

III. BLOCK DIAGRAM AND FLOW CHART

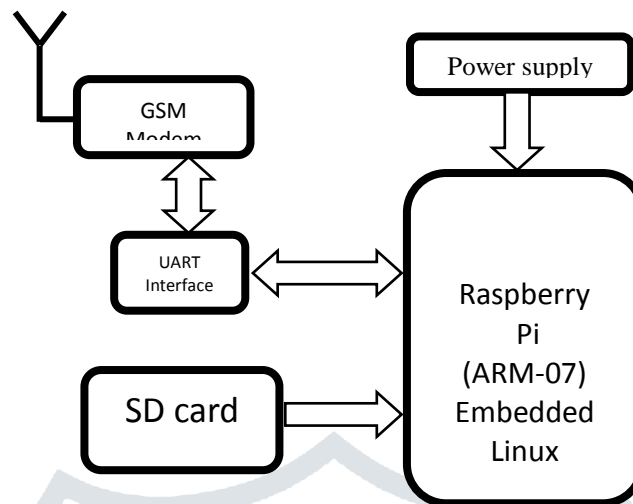


Fig.1 Block Diagram of Location Reporting System

FLOW CHART:

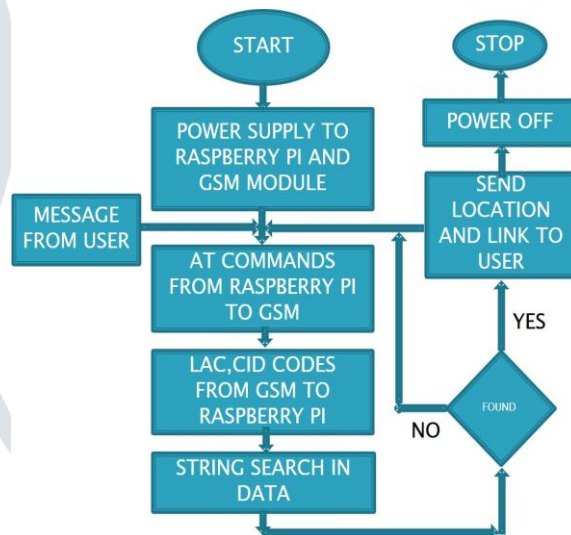


Fig.2 Flow Chart of Location Reporting System

ALGORITHM:

Step 1: Start

Step 2: Power supply to the devices. Raspberry pi boots the operating system and GSM module is ready.

Step 3: Receive the request from the user in the form of a text message containing the Keyword.

Step 4: Processor verifies for the keyword. If it matches ATTENTION (AT) commands are forwarded to the GSM module to retrieve the LAC, CID, MCC and MNC codes.

Step 5: After receiving the codes, processor performs a string search in the preloaded database for the location details. Upon a successful search the processor retrieves the information from the database and transmits the location of the device using the SMS services.

Step 6: User will receive the location name and link in the form of a text message.

Step 7: Stop.

#### IV. HARDWARE DESCRIPTION OF PROJECT

To implement the above project, we are in need of high speed processor and which supports storage capacity. So we use Raspberry pi. To get LAC, CID codes we use GSM module. UART interface is used to connect Raspberry pi and GSM module.

##### 5.1 RASPBERRY PI:

Raspberry pi is a credit card size micro-computer equipped with a Broadcom BCM2836 system on chip. The SoC has a 900 MHz quad core processor for faster calculations and efficient output [10].

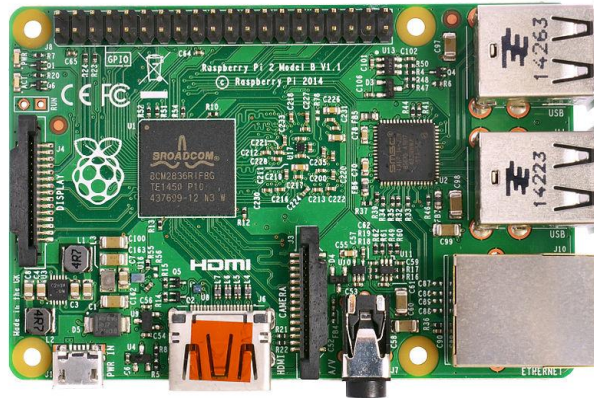


Fig.3 Raspberry pi circuit board

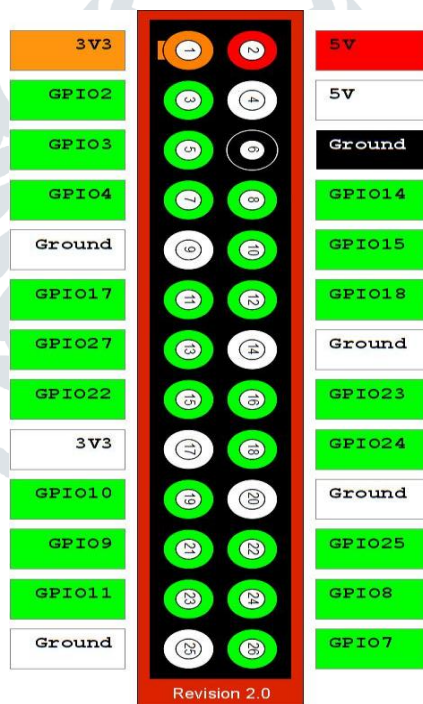


Fig.4 Pin description of Raspberry pi

##### 5.1.2 SPECIFICATIONS:

<b>Feature</b>	
SoC	Broadcom BCM2836

CPU	900 MHz Quad Core ARM Cortex-A7
Memory	1 GB RAM
Power	4.0 W
Micro SD card slot	Expandable up to 32 GB
Ports	4 USB ports Ethernet port Full HDMI port 3.5 mm audio jack Camera interface Display interface
pins	40 GPIO pins
Graphics	Broadcom Video Core IV
Operating system	Raspbian (Linux)

*Table.1 Specifications of Raspberry Pi 2 Model B*

## 5.2 GSM MODULE:

GSM is Global system for mobile communication, which is used for digital mobile communication. SIM 900 is used in this project to avail GSM services and to send Attention commands. Attention command "AT+ COPS" is used to get LAC, CID, MCC, MNC codes. GSM standard sim of any network is inserted in the module. "AT+ COPS" command is used for sim card registration [11].

Technically the working of the module can be known by connecting it to computer and send AT commands, to get the output like Information and configuration related to mobile device and SIM card. Physically it is known by LED indicators.



Fig.5 GSM module

#### 5.2.1 SPECIFICATIONS:

1. Quad-Band of 900 MHz
2. Control via AT commands
3. 1.5 mA of current
4. LED indicators
5. 4.5 V of power supply

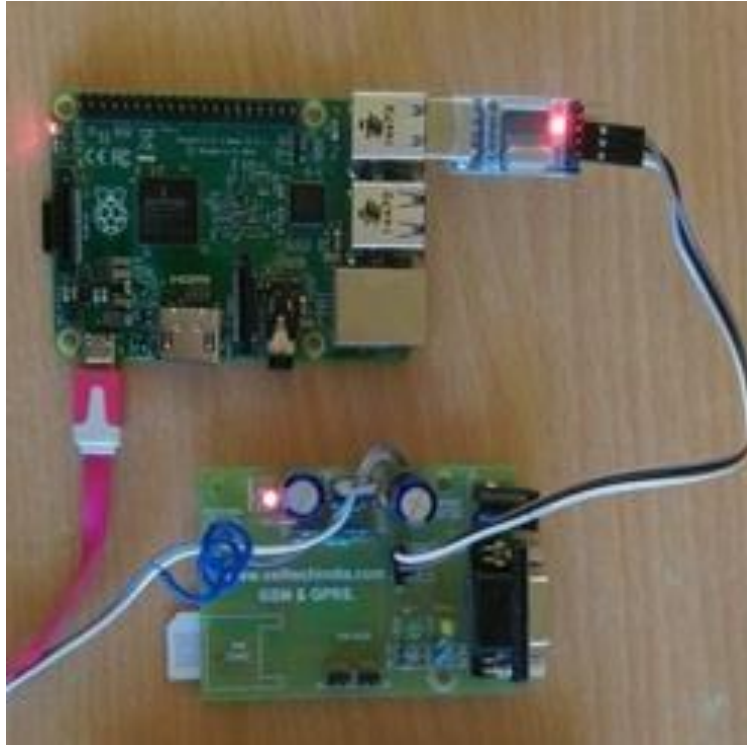
## V. SOFTWARE DESCRIPTION

The raspberry pi operates on a Real Time Operating System (RTOS). RASPBIAN is the operating system used for the real time functioning of the hardware. Raspbian is nothing but an operating system developed close to the DEBIAN operation system, these systems use Linux as their base programming. Raspbian provides more quality and stability to the raspberry pi and works with CPU versions higher than arm7.

The programming language we opted is PYTHON [12]. Python is a high level programming language which has the characteristics of an object oriented programming language and supports graphic user interfaces smoothly. Python is compact compared to other programming languages and gives an edge to the raspberry pi. Integrated Development Learning Environment is used for python.

A NANO-Editor is used to type and execute the programs in the raspberry pi.

## VI. RESULT



*Fig.6 working prototype of location reporting system*

## VII. CONCLUSION

Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced IC's with the help of growing technology, the project has been successfully implemented. Thus the project has been successfully designed and tested.

## VIII. FUTURE SCOPE

By utilizing the potential of raspberry pi and incubating the device with an online server for effective transmission and larger network communications.

Employing the device in a public transportation system like buses or railways for broader approach.

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