

# Vehicle Positioning System Using GPS GSM Modem

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**Abstract:** This paper presents an automotive system using GPS and GSM modems. The system permits localization of the Automobile and transmitting the position in the form of Latitude and Longitude to the owner on his mobile phone as a short message (SMS).

**Keywords:** GPS, GSM, Satellites, Latitude, Longitude.

## 1. Introduction

The Global Positioning System (GPS) is a space-based satellite navigation system that provides location and time information in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. The system provides critical capabilities to military, civil and commercial users around the world. GPS was created and realized by the U.S. Department of Defense (D o D) early in 1960s and It was maintained by the United States government, but now is freely accessible to anyone with a GPS receiver. The GPS determine the position using 24 satellites around earth's surface, it visualize 3 or more in each time and determine the position by finding the cross point of the visual satellites (1).

### 1.1 GPS Structure

The current GPS consists of three major segments. These are the space segment (SS), a control segment (CS), and a user segment (US)(2)The U.S. Air Force develops, maintains, and operates the space and control segments. GPS satellites broadcast signals from space, and each GPS receiver uses these signals to calculate its three-dimensional location (latitude, longitude, and altitude) and the current time(3).

#### a- the space segment:

The space segment is composed of 24 to 32 satellites in medium Earth orbit and also includes the payload adapters to the boosters required to launch them into orbit. The control segment is composed of a master control station (MCS), an alternate master control station, and a host of dedicated and shared ground antennas and monitor stations. The user segment is composed of hundreds of thousands of U.S. and allied military users of the secure GPS Precise Positioning Service, and tens of millions of civil, commercial, and scientific users of the Standard Positioning Service.

#### b- Control segment:

**The control segment is composed of:**

- 1- a master control station (MCS)
- 2- an alternate master control station
- 3- Four dedicated ground antennas, and six dedicated monitor stations.

The Operation Control Segment (OCS) currently serves as the control segment of record. It provides the operational capability that supports global GPS users and keeps the GPS system operational and performing within specification.(4)

#### c- User segment:

The GPS User Segment consists on L-band radio receiver/processors and antennas which receive GPS signals, determine pseudoranges (and other observables), and solve the navigation equations in order to obtain their coordinates and provide a very accurate time.(5 )

#### 1-3 GSM modem:

A GSM modem is a specialized type modem which accepts a SIM card, and operates over a subscription to a mobile operator, so it functions like a mobile phone. When a GSM modem is connected to a computer, this allows the computer to use the GSM modem to communicate over the mobile network. While these GSM modems are most frequently used to provide mobile internet connectivity, many of them can also be used for sending and receiving SMS and MMS messages (6).

## 2. Methodology

A graphical programming language package (Flow code v5) has been used to program the a microcontroller. The major advantage of this program it allows those with little experience to create complex electronic systems in minutes. More feature that it saves time and cost, Easy to interface, fast and flexible, It has a capability to compile to HEX or C to program the microcontroller.

### 2.1 the basic components of the system:

Here bellows are the main components which in their combination and integration compose the whole system

#### a- GPS modem:

The GPS modem is a communication modem used to locate the vehicle's position to enable monitoring and observation to the motion of the vehicle, since the change in the position means change in the location.

When the vehicle is turned on the GPS modem is turned on to start positioning. First it checks if the current incoming GPS

**b- GSM Modem**

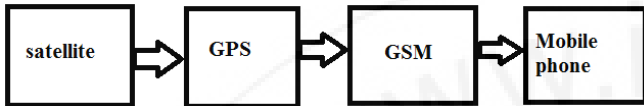
The GSM modem is responsible for receiving and sending SMS or MMS to and from other mobile devices.

**c- The Cell Phone:**

Is used receive message from the GSM modem.

**2.2 System block diagram**

The figure (1) below shows the block diagram of the system, it consist of three blocks; the satellite, the GPS, GSM, and the mobile in sequences



**Figure 1: System Block Diagram**

**2.3 Circuit operation**

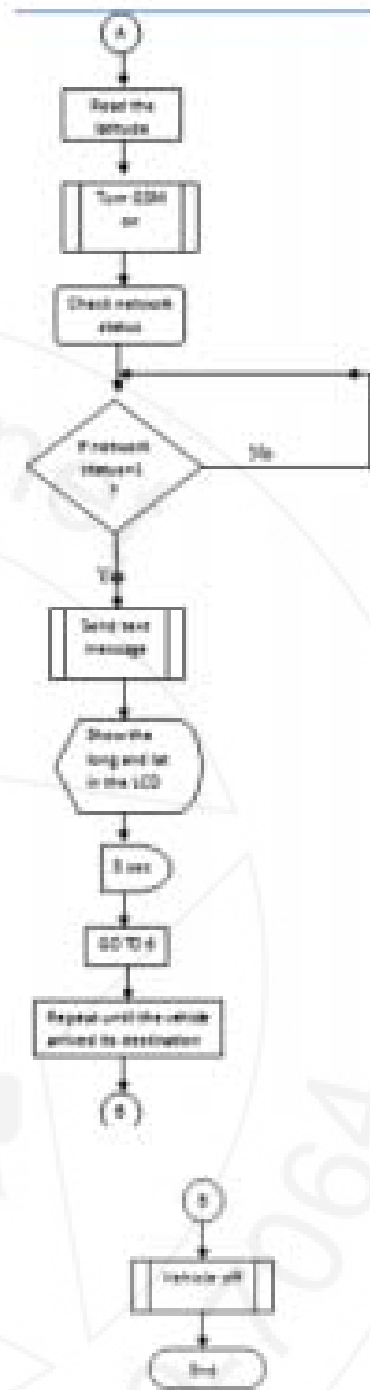
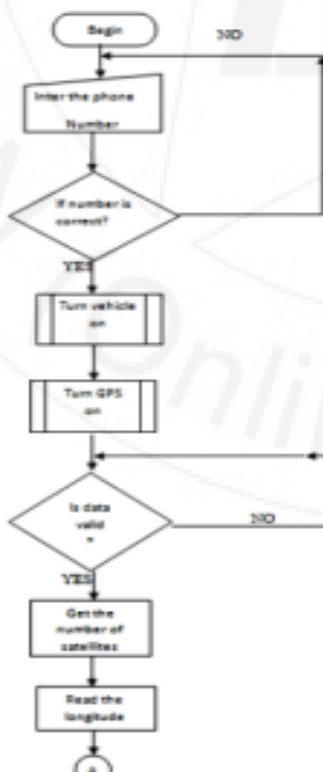
When the system start switch is enabled the satellite determines the positions of the vehicle by definition of the longitude and the latitude then the GPS passes these data to the GSM which in turns sends the data to a mobile phone.

**3. The global positioning System of the Advantages**

The following sections present the positioning system of its advantages

**3.1 System Flow Chart:**

The flow chart represents the sequences of the program and overall steps and procedure followed to determine the vehicles position



**Figure 2: Program flow chart**

The following figure shows the flow code vehicle positioning system

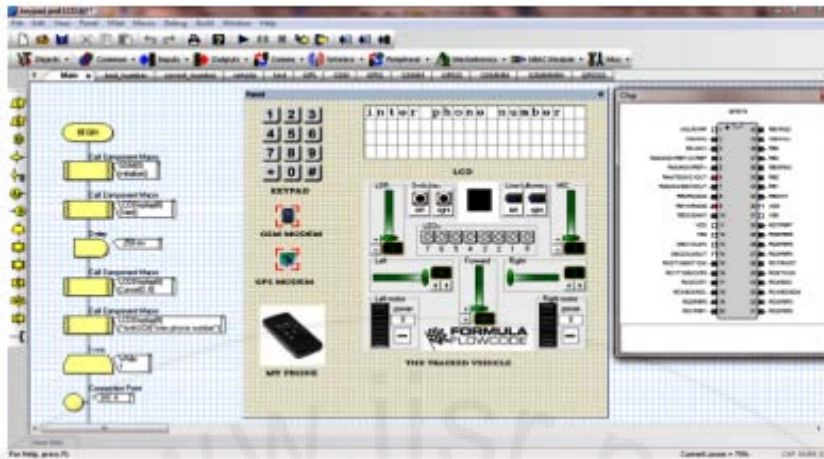


Figure 3: the flow code program

### 3.2 GPS advantages

- GPS is extremely easy to navigate as it tells you to the direction for each turns you take or you have to take to reach to your destination.
- GPS works in all weather so you need not to worry of the climate as in other navigating devices.
- The GPS costs you very low in comparison other navigation systems.
- The most attractive feature of this system is its 100% coverage on the planet.
- It also helps you to search the nearby restaurants, hotels and gas stations and is very useful for a new place.
- Due to its low cost, it is very easy to integrate into other technologies like cell phone. (7)

### 4. Conclusion

This paper presents an automotive system using GPS and GSM modems. The system permits localization of the Automobile and transmitting the position in the form of Latitude and Longitude to operator on a mobile phone via GSM as short message (SMS).

This system is used in many applications such as:

1. School Transport Tracking
2. Theft Protection

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