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GSM AND GPS BASED BLIND GUIDE

A Project Report

Submitted by

P.S.ARAVINTH - 0710105003

C.ARUN KUMAR - 0710105005

R.SUBHA - 0710105049

C.K.SURIYA - 0710105053

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(An Autonomous Institution Affiliated to Anna University, Coimbatore.)

ANNA UNIVERSITY: COIMBATORE

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BONAFIDE CERTIFICATE

Certified that this project report entitled **"GSM and GPS Based Blind Guide"** is the bonafide work of

P.S.Aravinth	Register No: 0710105003
C.Arun Kumar	Register No: 0710105005
R.Subha	Register No: 0710105049
C.K.Suriya	Register No: 0710105053

Who carried out the project work under my Supervision

Signature of the Head of the Department
DR. RANI THOTTUNGAL,
HOD

Signature of the Supervisor
MR. J. RAM PRABU,
ASST. PROFESSOR.

Certified that the candidate with university Register No. 0710105049 was examined in project viva voce Examination held on 18.04.2011

18/4/2K11
Internal Examiner

External Examiner 18.04.11

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

KUMARAGURU COLLEGE OF TECHNOLOGY, COIMBATORE 641 006

(An Autonomous Institution Affiliated to Anna University, Coimbatore.)

ABSTRACT

This project deals with guiding way for the visually impaired who is helpless. This is done with the help of ARM processor which acts as the heart of the project. The technologies such as GSM and GPS are used for the determination of the position and communication. The GPS receiver obtains the latitudinal and longitudinal values of the location of the visually impaired person with the help of GPS satellites. Also the IR detector which consists of a receiver and transmitter is used to detect the obstacles in the path of visually impaired. The Voice Processor is used to guide the blind when there is an obstacle with the help of preconfigured message. If any obstacle is detected, the GSM modem will send the latitudinal and longitudinal values of the location of the blind person to the care taker. The care taker's number will be fed to the ARM processor and in case of emergency, the care taker can save the visually impaired person.

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ABREVIATIONS

GSM	-	Global System Monitoring
GPS	-	Global Positioning System
ARM	-	Advanced RISC Machine
RISC	-	Reduced Instruction Set Computer
UART	-	Universal Asynchronous Receiver & Transmitter
IR	-	Infra Red Detector

1. INTRODUCTION

1.1 INTRODUCTION OF BLIND GUIDE:

GPS stands for Global Positioning System. GPS was developed by the US DOD to allow the military to accurately determine their precise location anywhere in the world. GPS satellites – there are 24 - orbit at 11,000 nautical miles above the Earth. They are continuously monitored by ground stations located worldwide. The satellites transmit signals that can be detected by anyone with a GPS receiver. GPS satellites circle the earth twice a day in a very precise orbit and transmit signal information to earth. GPS receivers take this information and use triangulation to calculate the user's exact location.

Using the receiver, you can determine your location with great precision GPS receivers can be hand carried or installed on aircraft, ships, tanks, submarines, cars, and trucks. These receivers detect, decode, and process GPS satellite signals

Infrared driver continuously checks for obstacles in the path. If there is any obstacle, the rays get reflect into precision rectifier. In the keyboard a default distance will be stored. The distance at which the obstacle is detected will be written into the microcontroller. The obstacle distance will be displayed in LCD. The default distance and obstacle distance will undergo comparison, if the obstacle distance is greater than that of default distance, buzzer and voice Processor is set on. It helps in warning to the blind. In the voice processor warning voice will be recorded, the output will fetch from the speaker by means of a power amplifier.

The obstacle distance in the LCD display will be given as input to the GSM Modem. This message will be sent to the SIM holder i.e to the cordial relation of the blind. If the blind person is met with an accident, the GPS receiver will provide the entire location of the blind to his cordial relation. Thus the GPS receiver is helpful in detecting suffered one at a remote area to their relation to take immediate action to recover the blind from injury.

1.2 OBJECTIVES

- This project deals with guiding a way for the blind who is helpless.
- The objective of the project is to overcome the disadvantages of conventional cane system.
- This project also makes the visually impaired independent.
- It also reduces the mechanical effort to be put as in case of conventional cane system.

1.3 ORGANIZATION OF THE REPORT:

- Chapter 1 deals with the overview of the project and the objectives
- Chapter 2 deals with the power supply used
- Chapter 3 deals the GPS technology and its detailed explanation
- Chapter 4 deals with the GSM technology and its overview
- Chapter 5 deals with the Voice Processor APR600
- Chapter 6 deals with the ARM processor and its different operating modes
- Chapter 7 deals with IR detector
- Chapter 8 deals with the general hardware description and block diagram
- Chapter 9 deals with conclusion and future scope

2. POWER SUPPLIES

2.1 INTRODUCTION:

The present chapter introduces the operation of power supply circuits built using filters, rectifiers, and then voltage regulators. Starting with an ac voltage, a steady dc voltage is obtained by rectifying the ac voltage, then filtering to a dc level, and finally, regulating to obtain a desired fixed dc voltage. The regulation is usually obtained from an IC voltage regulator unit, which takes a dc voltage and provides a somewhat lower dc voltage, which remains the same even if the input dc voltage varies, or the output load connected to the dc voltage changes.

A block diagram containing the parts of a typical power supply and the voltage at various points in the unit is shown in fig 19.1. The ac voltage, typically 120 V rms, is connected to a transformer, which steps that ac voltage down to the level for the desired dc output. A diode rectifier then provides a full-wave rectified voltage that is initially filtered by a simple capacitor filter to produce a dc voltage. This resulting dc voltage usually has some ripple or ac voltage variation. A regulator circuit can use this dc input to provide a dc voltage that not only has much less ripple voltage but also remains the same dc value even if the input dc voltage varies somewhat, or the load connected to the output dc voltage changes. This voltage regulation is usually obtained using one of a number of popular voltage regulator units.

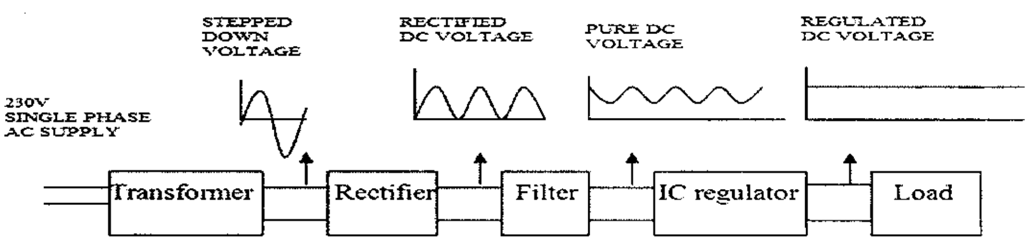

FIGURE 1

2.2 IC VOLTAGE REGULATORS:

Voltage regulators comprise a class of widely used ICs. Regulator IC units contain the circuitry for reference source, comparator amplifier, control device, and overload protection all in a single IC. Although the internal construction of the IC is somewhat different from that described for discrete voltage regulator circuits, the external operation is much the same. IC units provide regulation of either a fixed positive voltage, a fixed negative voltage, or an adjustably set voltage.

A power supply can be built using a transformer connected to the ac supply line to step the ac voltage to a desired amplitude, then rectifying that ac voltage, filtering with a capacitor and RC filter, if desired, and finally regulating the dc voltage using an IC regulator. The regulators can be selected for operation with load currents from hundreds of milli amperes to tens of amperes, corresponding to power ratings from milliwatts to tens of watts.

2.3 THREE-TERMINAL VOLTAGE REGULATORS:

Fig shows the basic connection of a three-terminal voltage regulator IC to a load. The fixed voltage regulator has an unregulated dc input voltage, Vi, applied to one input terminal, a regulated output dc voltage, Vo, from a second terminal, with the third terminal connected to ground. For a selected regulator, IC device specifications list a voltage range over which the input voltage can vary to maintain a regulated output voltage over a range of load current. The specifications also list the amount of output voltage change resulting from a change in load current (load regulation) or in input voltage (line regulation)

The series 78 regulators provide fixed regulated voltages from 5 to 24 V. Figure 19.26 shows how one such IC, a 7812, is connected to provide voltage regulation with output from this unit of +12V dc. An unregulated input voltage Vi is filtered by capacitor C1 and connected to the IC's IN terminal. The IC's OUT terminal provides a regulated + 12V which is filtered by capacitor C2 (mostly for any high-frequency noise). The third IC terminal is connected to ground (GND). While the input voltage may vary over some permissible voltage range, and the output load may vary over some acceptable range, the output voltage remains constant within specified voltage variation limits. These limitations are spelled out in the manufacturer's specification sheets. A table of positive voltage regulated ICs is provided in table 19.1.

Positive Voltage Regulators in 7800 series:

IC Part	**Output Voltage (V)**	**Minimum Vi (V)**
7805	+5	7.3
7806	+6	8.3
7808	+8	10.5
7810	+10	12.5
7812	+12	14.6
7815	+15	17.7
7818	+18	21.0
7824	+24	27.1

TABLE 1

3. GLOBAL POSITIONING SYSTEM

3.1 SIMPLIFIED METHOD OF OPERATION

A typical GPS receiver calculates its position using the signals from four or more GPS satellites. Four satellites are needed since the process needs a very accurate local time, more accurate than any normal clock can provide, so the receiver internally solves for time as well as position. In other words, the receiver uses four measurements to solve for 4 variables - x, y, z, and t. These values are then turned into more user-friendly forms, such as latitude/longitude or location on a map, then displayed to the user.

Each GPS satellite has an atomic clock, and continually transmits messages containing the current time at the start of the message, parameters to calculate the location of the satellite (the ephemeris), and the general system health (the almanac). The signals travel at a known speed - the speed of light through outer space, and slightly slower through the atmosphere. The receiver uses the arrival time to compute the distance to each satellite, from which it determines the position of the receiver using geometry and trigonometry (see trilateration[4])

Although four satellites are required for normal operation, fewer may be needed in some special cases. For example, if one variable is already known (for example, a sea-going ship knows its altitude is 0), a receiver can determine its position using only three satellites. Also, in practice, receivers use additional clues (doppler shift of satellite signals, last known position, dead reckoning, inertial navigation, and so on) to give degraded answers when fewer than four satellites are visible.

3.2 TECHNICAL DESCRIPTION

3.2.1 SYSTEM SEGMENTATION

The current GPS consists of three major segments. These are the space segment (SS), a control segment (CS), and a user segment (US).

3.2.1.1 SPACE SEGMENT

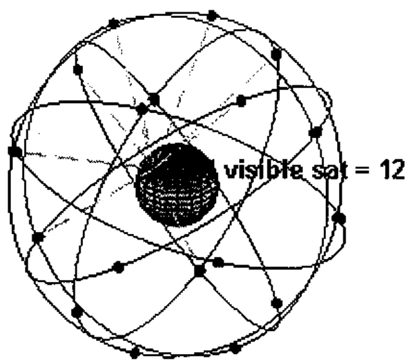

FIGURE 2

A visual example of the GPS constellation in motion with the Earth rotating. Notice how the number of satellites in view from a given point on the Earth's surface, in this example at 45°N, changes with time.

The space segment (SS) comprises the orbiting GPS satellites, or Space Vehicles (SV) in GPS parlance. The GPS design originally called for 24 SVs, 8 each in three circular orbital planes,[6] but this was modified to 6 planes with 4 satellites each.[7] The orbital planes are centered on the Earth, not rotating with respect to the distant stars.[8] The six planes have approximately 55° inclination (tilt relative to Earth's equator) and are separated by 60° right ascension of the ascending node (angle along the equator from a reference point to the orbit's intersection).[2] The orbits are arranged so that at least six satellites are always within line of sight from almost everywhere on Earth's surface.[9]

Orbiting at an altitude of approximately 20,200 kilometers (12,600 miles or 10,900 nautical miles; orbital radius of 26,600 km (16,500 mi or 14,400 NM)), each SV makes two complete orbits each sidereal day.[10] The ground track of each satellite therefore repeats each (sidereal) day. This was very helpful during development, since even with just 4 satellites, correct alignment means all 4 are visible from one spot for a few hours each day. For military operations, the ground track repeat can be used to ensure good coverage in combat zones.

As of September 2007, there are 31 actively broadcasting satellites in the GPS constellation. The additional satellites improve the precision of GPS receiver calculations by providing redundant measurements. With the increased number of satellites, the constellatiowas changed to a non uniform arrangement. Such an arrangement was shown to improve reliability and availability of the system, relative to a uniform system, when multiple satellites fail.

3.2.1.2 CONTROL SEGMENT:

The flight paths of the satellites are tracked by US Air Force monitoring stations in Hawaii, Kwajalein, Ascension Island, Diego Garcia, and Colorado Springs, Colorado, along with monitor stations operated by the National Geospatial-Intelligence Agency (NGA).[12] The tracking information is sent to the Air Force Space Command's master control station at Schriever Air Force Base in Colorado Springs, which is operated by the 2nd Space Operations Squadron (2 SOPS) of the United States Air Force (USAF). 2 SOPS contacts each GPS satellite regularly with a navigational update (using the ground antennas at Ascension Island, Diego Garcia, Kwajalein, and Colorado Springs). These updates synchronize the atomic clocks on board the satellites to within a few nanoseconds of each other, and adjust the ephemeris of each satellite's internal orbital model. The updates are created by a Kalman filter which uses inputs from the ground monitoring stations, space weather information, and various other inputs.[13]

Satellite maneuvers are not precise by GPS standards. So to change the orbit of a satellite, the satellite must be marked 'unhealthy', so receivers will not use it in their calculation. Then the maneuver can be carried out, and the resulting orbit tracked from the ground. Then the new ephemeris is uploaded and the satellite marked healthy again. Even if just one satellite is maneuvered at a time, this implies at least five satellites must be visible to be sure of getting data from four.

3.2.1.3 USER SEGMENT

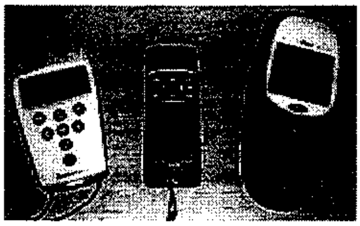

FIGURE 3

GPS receivers come in a variety of formats, from devices integrated into cars, phones, and watches, to dedicated devices such as those shown here from manufacturers Trimble, Garmin and Leica (left to right).

The user's GPS receiver is the user segment (US) of the GPS. In general, GPS receivers are composed of an antenna, tuned to the frequencies transmitted by the satellites, receiver-processors, and a highly-stable clock (often a crystal oscillator). They may also include a display for providing location and speed information to the user. A receiver is often described by its number of channels: this signifies how many satellites it can monitor simultaneously. Originally limited to four or five, this has progressively increased over the years so that, as of 2006, receivers typically have between twelve and twenty channels.

A typical OEM GPS receiver module, based on the SiRF Star III chipset, measuring 15×17 mm, and used in many products.

GPS receivers may include an input for differential corrections, using the RTCM SC-104 format. This is typically in the form of a RS-232 port at 4,800 bit/s speed. Data is actually sent at a much lower rate, which limits the accuracy of the signal sent using RTCM. Receivers with internal DGPS receivers can outperform those using external RTCM data. As of 2006, even low-cost units commonly include Wide Area Augmentation System (WAAS) receivers.

SiRFstar III receiver and integrated antenna from UK company Antenova. This measures just 49 x 9 x 4mm.

Many GPS receivers can relay position data to a PC or other device using the NMEA 0183 protocol. NMEA 2000 is a newer and less widely adopted protocol. Both are proprietary and controlled by the US-based National Marine Electronics Association. References to the NMEA protocols have been compiled from public records, allowing open source tools like gpsd to read the protocol without violating intellectual property laws. Other proprietary protocols exist as well, such as the SiRF and MTK protocols. Receivers can interface with other devices using methods including a serial connection, USB or Bluetooth.

3.2.2 NAVIGATION SIGNALS:

GPS broadcast signal:

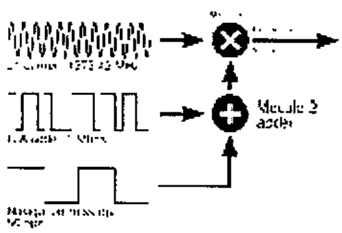

FIGURE 4

Each GPS satellite continuously broadcasts a **Navigation Message** at 50 bit/s giving the time-of-day, GPS week number and satellite health information (all transmitted in the first part of the message), an *ephemeris* (transmitted in the second part of the message) and an *almanac* (later part of the message). The messages are sent in frames, each taking 30 seconds to transmit 1500 bits.

The first 6 seconds of every frame contains data describing the satellite clock and its relationship to GPS time. The next 12 seconds contain the **ephemeris** data, giving the satellite's own precise orbit. The ephemeris is updated every 2 hours and is generally valid for 4 hours, with provisions for updates every 6 hours or longer in non-nominal conditions. The time needed to acquire the ephemeris is becoming a significant element of the delay to first position fix, because, as the hardware becomes more capable, the time to lock onto the satellite signals shrinks, but the ephemeris data requires 30 seconds (worst case) before it is received, due to the low data transmission rate.

The **almanac** consists of coarse orbit and status information for each satellite in the constellation, an ionospheric model, and information to relate GPS derived time to Coordinated Universal Time (UTC). A new part of the almanac is received for the last 12 seconds in each 30 second frame. Each frame contains 1/25th of the almanac, so 12.5 minutes are required to receive the entire almanac from a single satellite[15]. The almanac serves several purposes. The first is to assist in the acquisition of satellites at power-up by allowing the receiver to generate a list of visible satellites based on stored position and time, while an ephemeris from each satellite is needed to compute position fixes using that satellite. In older hardware, lack of an almanac in a new receiver would cause long delays before providing a valid position, because the search for each satellite was a slow process. Advances in hardware have made the acquisition process much faster, so not having an almanac is no longer an issue. The second purpose is for relating time derived from the GPS (called GPS time) to the international time standard of UTC. Finally, the almanac allows a single frequency receiver to correct for ionospheric error by using a global ionospheric model. The corrections are not as accurate as augmentation systems like WAAS or dual frequency receivers. However it is often better than no correction since ionospheric error is the largest error source for a single frequency GPS receiver. An important thing to note about navigation data is that each satellite transmits only its own *ephemeris*, but transmits an *almanac* for all satellites.

Each satellite transmits its navigation message with at least two distinct spread spectrum codes: the **Coarse / Acquisition (C/A) code**, which is freely available to the public, and the **Precise (P) code**, which is usually encrypted and reserved for military applications. The C/A code is a 1,023 chip pseudo-random (PRN) code at 1.023 million chips/sec so that it repeats every millisecond. Each satellite has its own C/A code so that it can be uniquely identified and received separately from the other satellites transmitting on the same frequency. The P-code is a 10.23 megachip/sec PRN code that repeats only every week. When the "anti-spoofing" mode is on, as it is in normal operation, the P code is encrypted by the **Y-code** to produce the **P(Y)** code, which can only be decrypted by units with a valid decryption key. Both the C/A and P(Y) codes impart the precise time-of-day to the user.

Frequencies used by GPS include

1. L1 (1575.42 MHz): Mix of Navigation Message, coarse-acquisition (C/A) code and encrypted precision P(Y) code, plus the new L1C on future Block III satellites.
2. L2 (1227.60 MHz): P(Y) code, plus the new L2C code on the Block IIR-M and newer satellites.
3. L3 (1381.05 MHz): Used by the Nuclear Detonation (NUDET) Detection System Payload (NDS) to signal detection of nuclear detonations and other high-energy infrared events. Used to enforce nuclear test ban treaties.
4. L4 (1379.913 MHz): Being studied for additional ionospheric correction.
5. L5 (1176.45 MHz): Proposed for use as a civilian safety-of-life (SoL) signal (see GPS modernization). This frequency falls into an internationally protected range for aeronautical navigation, promising little or no interference under all circumstances. The first Block IIF satellite that would provide this signal is set to be launched in 2008.

3.2.3 CALCULATING POSITIONS

3.2.3.1 USING THE C/A CODE

To start off, the receiver picks which C/A codes to listen for by PRN number, based on the almanac information it has previously acquired. As it detects each satellite's signal, it identifies it by its distinct C/A code pattern, then measures the received time for each satellite. To do this, the receiver produces an identical C/A sequence using the same seed number, referenced to its local clock, starting at the same time the satellite sent it. It then computes the offset to the local clock that generates the maximum correlation. This offset is the time delay from the satellite to the receiver, as told by the receiver's clock. Since the PRN repeats every millisecond, this offset is precise but ambiguous, and the ambiguity is resolved by looking at the data bits, which are sent at 50 Hz (20 ms) and aligned with the PRN code.

This data is used to solve for x,y,z and t. Many mathematical techniques can be used. The following description shows a straightforward iterative way, but receivers use more sophisticated methods. (see below)

Conceptually, the receiver calculates the distance to the satellite, called the pseudorange.

Calculation of Distance:

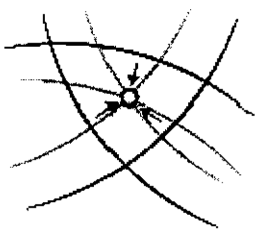

FIGURE 5

Overlapping pseudoranges, represented as curves, are modified to yield the probable position

Next, the orbital position data, or ephemeris, from the Navigation Message is then downloaded to calculate the satellite's precise position. A more-sensitive receiver will potentially acquire the ephemeris data more quickly than a less-sensitive receiver, especially in a noisy environment.Knowing the position and the distance of a satellite indicates that the receiver is located somewhere on the surface of an imaginary sphere centered on that satellite and whose radius is the distance to it. Receivers can substitute altitude for one satellite, which the GPS receiver translates to a pseudorange measured from the center of the Earth.

When pseudoranges have been determined for four satellites, a guess of the receiver's location is calculated. Dividing the speed of light by the distance adjustment required to make the pseudoranges come as close as possible to intersecting results in a guess of the difference between UTC and the time indicated by the receiver's on-board clock. With each combination of four satellites, a *geometric dilution of precision* (GDOP) vector is calculated, based on the relative sky positions of the satellites used. As more satellites are picked up, pseudoranges from more combinations of four satellites can be processed to add more guesses to the location and clock offset. The receiver then determines which combinations to use and how to calculate the estimated position by determining the weighted average of these positions and clock offsets. After the final location and time are calculated, the location is expressed in a specific coordinate system, e.g. latitude/longitude, using the WGS 84 geodetic datum or a local system specific to a country.

There are many other alternatives and improvements to this process. If at least 4 satellites are visible, for example, the receiver can eliminate time from the equations by computing only time differences, then solving for position as the intersection of hyperboloids. Also, with a full constellation and modern receivers, more than 4 satellites can be seen and received at once. Then all satellite data can be weighted by GDOP, signal to noise, path length through the ionosphere, and other accuracy concerns, and then used in a least squares fit to find a solution. In this case the residuals also gives an estimate of the errors. Finally, results from other positioning systems such as GLONASS or the upcoming Galileo can be used in the fit, or used to double-check the result. (By design, these systems use the same bands, so much of the receiver circuitry can be shared, though the decoding is different).

3.2.3.2 USING THE P(Y) CODE

Calculating a position with the P(Y) signal is generally similar in concept, assuming one can decrypt it. The encryption is essentially a safety mechanism: if a signal can be successfully decrypted, it is reasonable to assume it is a real signal being sent by a GPS satellite.[citation needed] In comparison, civil receivers are highly vulnerable to spoofing since correctly formatted C/A signals can be generated using readily available signal generators. RAIM features do not protect against spoofing, since RAIM only checks the signals from a navigational perspective.

3.2.4 ACCURACY AND ERROR SOURCES

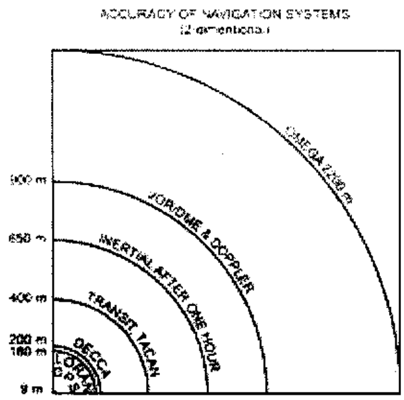

FIGURE 6

Sources of User Equivalent Range Errors (UERE)

Source	**Effect**
Ionospheric effects	± 5 meter
Ephemeris errors	± 2.5 meter
Satellite clock errors	± 2 meter
Multipath distortion	± 1 meter
Tropospheric effects	± 0.5 meter
Numerical errors	± 1 meter

The position calculated by a GPS receiver requires the current time, the position of the satellite and the measured delay of the received signal. The position accuracy is primarily dependent on the satellite position and signal delay.

To measure the delay, the receiver compares the bit sequence received from the satellite with an internally generated version. By comparing the rising and trailing edges of the bit transitions, modern electronics can measure signal offset to within about 1% of a bit time, or approximately 10 nanoseconds for the C/A code. Since GPS signals propagate at the speed of light, this represents an error of about 3 meters. This is the minimum error possible using only the GPS C/A signal.

Position accuracy can be improved by using the higher-chiprate P(Y) signal. Assuming the same 1% bit time accuracy, the high frequency P(Y) signal results in an accuracy of about 30 centimeters.

Electronics errors are one of several accuracy-degrading effects outlined in the table below. When taken together, **autonomous civilian GPS horizontal position fixes are typically accurate to about 15 meters (50 ft)**. These effects also reduce the more precise P(Y) code's accuracy.

3.3 TECHNIQUES TO IMPROVE ACCURACY

3.3.1 AUGMENTATION

Augmentation methods of improving accuracy rely on external information being integrated into the calculation process. There are many such systems in place and they are generally named or described based on how the GPS sensor receives the information. Some systems transmit additional information about sources of error (such as clock drift, ephemeris, or ionospheric delay), others provide direct measurements of how much the signal was off in the past, while a third group provide additional navigational or vehicle information to be integrated in the calculation process.

Examples of augmentation systems include the Wide Area Augmentation System, Differential GPS, Inertial Navigation Systems and Assisted GPS.

3.3.2 PRECISE MONITORING

The accuracy of a calculation can also be improved through precise monitoring and measuring of the existing GPS signals in additional or alternate ways.

After SA, which has been turned off, the largest error in GPS is usually the unpredictable delay through the ionosphere. The spacecraft broadcast ionospheric model parameters, but errors remain. This is one reason the GPS spacecraft transmit on at least two frequencies, L1 and L2. Ionospheric delay is a well-defined function of frequency and the total electron content (TEC) along the path, so measuring the arrival time difference between the frequencies determines TEC and thus the precise ionospheric delay at each frequency.

Receivers with decryption keys can decode the P(Y)-code transmitted on both L1 and L2. However, these keys are reserved for the military and "authorized" agencies and are not available to the public. Without keys, it is still possible to use a *codeless* technique to compare the P(Y) codes on L1 and L2 to gain much of the same error information. However, this technique is slow, so it is currently limited to specialized surveying equipment. In the future, additional civilian codes are expected to be transmitted on the L2 and L5 frequencies (see GPS modernization, below). Then all users will be able to perform dual-frequency measurements and directly compute ionospheric delay errors.

A second form of precise monitoring is called **Carrier-Phase Enhancement** (CPGPS). The error, which this corrects, arises because the pulse transition of the PRN is not instantaneous, and thus the correlation (satellite-receiver sequence matching) operation is imperfect. The CPGPS approach utilizes the L1 carrier wave, which has a period 1000 times smaller than that of the C/A bit period, to act as an additional clock signal and resolve the uncertainty. The phase difference error in the normal GPS amounts to between 2 and 3 meters (6 to 10 ft) of ambiguity. CPGPS working to within 1% of perfect transition reduces this error to 3 centimeters (1 inch) of ambiguity. By eliminating this source of error, CPGPS coupled with DGPS normally realizes between 20 and 30 centimeters (8 to 12 inches) of absolute accuracy.

Relative Kinematic Positioning (RKP) is another approach for a precise GPS-based positioning system. In this approach, determination of range signal can be resolved to a precision of less than 10 centimeters (4 in). This is done by resolving the number of cycles in which the signal is transmitted and received by the receiver. This can be accomplished by using a combination of differential GPS (DGPS) correction data, transmitting GPS signal phase information and ambiguity resolution techniques via statistical tests—possibly with processing in real-time (real-time kinematic positioning, RTK).

4. GLOBAL SYSTEM MONITORING

4.1 INTRODUCTION:

Global System for Mobile Communications, or GSM (originally from *Groupe Spécial Mobile*), is the world's most popular standard for mobile telephone systems. The GSM Association estimates that 80% of the global mobile market uses the standard.[1] GSM is used by over 1.5 billion people across more than 212 countries and territories.[3] This ubiquity means that subscribers can use their phones throughout the world, enabled by international roaming arrangements between mobile network operators. GSM differs from its predecessor technologies in that both signaling and speech channels are digital, and thus GSM is considered a *second generation* (2G) mobile phone system. This also facilitates the wide-spread implementation of data communication applications into the system.

The GSM standard has been an advantage to both consumers, who may benefit from the ability to roam and switch carriers without replacing phones, and also to network operators, who can choose equipment from many GSM equipment vendors.[4] GSM also pioneered low-cost implementation of the short message service (SMS), also called text messaging, which has since been supported on other mobile phone standards as well. The standard includes a worldwide emergency telephone number feature (112).[5]

Newer versions of the standard were backward-compatible with the original GSM system. For example, Release '97 of the standard added packet data capabilities by means of General Packet Radio Service (GPRS). Release '99 introduced higher speed data transmission using Enhanced Data Rates for GSM Evolution (EDGE).

4.2 TECHNICAL DETAILS:

GSM is a cellular network, which means that mobile phones connect to it by searching for cells in the immediate vicinity. There are five different cell sizes in a GSM network—macro, micro, pico, femto and umbrella cells. The coverage area of each cell varies according to the implementation environment. Macro cells can be regarded as cells where the base station antenna is installed on a mast or a building above average roof top level. Micro cells are cells whose antenna height is under average roof top level; they are typically used in urban areas. Picocells are small cells whose coverage diameter is a few dozen metres; they are mainly used indoors. Femtocells are cells designed for use in residential or small business environments and connect to the service provider's network via a broadband internet connection. Umbrella cells are used to cover shadowed regions of smaller cells and fill in gaps in coverage between those cells.

Cell horizontal radius varies depending on antenna height, antenna gain and propagation conditions from a couple of hundred meters to several tens of kilometres. The longest distance the GSM specification supports in practical use is 35 kilometres (22 mi). There are also several implementations of the concept of an extended cell,[11] where the cell radius could be double or even more, depending on the antenna system, the type of terrain and the timing advance.

Indoor coverage is also supported by GSM and may be achieved by using an indoor picocell base station, or an indoor repeater with distributed indoor antennas fed through power splitters, to deliver the radio signals from an antenna outdoors to the separate indoor distributed antenna system. These are typically deployed when a lot of call capacity is needed indoors; for example, in shopping centers or airports. However, this is not a prerequisite, since indoor coverage is also provided by in-building penetration of the radio signals from any nearby cell.

The modulation used in GSM is Gaussian minimum-shift keying (GMSK), a kind of continuous-phase frequency shift keying. In GMSK, the signal to be modulated onto the carrier is first smoothed with a Gaussian low-pass filter prior to being fed to a frequency modulator, which greatly reduces the interference to neighboring channels (adjacent-channel interference).

4.3 GSM CARRIER FREQUENCIES:

GSM networks operate in a number of different carrier frequency ranges (separated into GSM frequency ranges for 2G and UMTS frequency bands for 3G), with most 2G GSM networks operating in the 900 MHz or 1800 MHz bands. Where these bands were already allocated, the 850 MHz and 1900 MHz bands were used instead (for example in Canada and the

United States). In rare cases the 400 and 450 MHz frequency bands are assigned in some countries because they were previously used for first-generation systems.

Most 3G networks in Europe operate in the 2100 MHz frequency band.

Regardless of the frequency selected by an operator, it is divided into timeslots for individual phones to use. This allows eight full-rate or sixteen half-rate speech channels per radio frequency. These eight radio timeslots (or eight burst periods) are grouped into a TDMA frame. Half rate channels use alternate frames in the same timeslot. The channel data rate for all 8 channels is 270.833 kbit/s, and the frame duration is 4.615 ms.

The transmission power in the handset is limited to a maximum of 2 watts in GSM850/900 and 1 watt in GSM1800/1900.

4.4 VOICE CODECS:

GSM has used a variety of voice codecs to squeeze 3.1 kHz audio into between 5.6 and 13 kbit/s. Originally, two codecs, named after the types of data channel they were allocated, were used, called Half Rate (5.6 kbit/s) and Full Rate (13 kbit/s). These used a system based upon linear predictive coding (LPC). In addition to being efficient with bitrates, these codecs also made it easier to identify more important parts of the audio, allowing the air interface layer to prioritize and better protect these parts of the signal.

GSM was further enhanced in 1997 with the Enhanced Full Rate (EFR) codec, a 12.2 kbit/s codec that uses a full rate channel. Finally, with the development of UMTS, EFR was refactored into a variable-rate codec called AMR-Narrowband, which is high quality and robust against interference when used on full rate channels, and less robust but still relatively high quality when used in good radio conditions on half-rate channels.

4.5 NETWORK STRUCTURE:

The structure of a GSM network

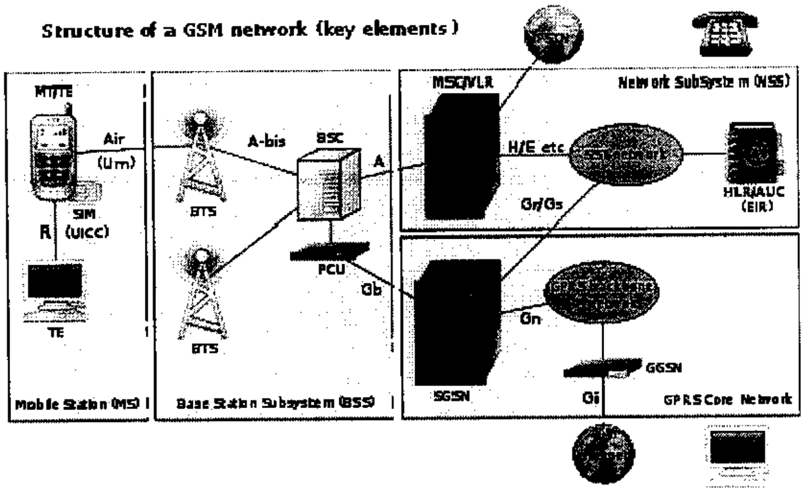

FIGURE 7

The network is structured into a number of discrete sections:

1. The Base Station Subsystem (the base stations and their controllers).
2. The Network and Switching Subsystem (the part of the network most similar to a fixed network). This is sometimes also just called the core network.
3. The GPRS Core Network (the optional part which allows packet based Internet connections).
4. The Operations support system (OSS) for maintenance of the network.

4.6 SUBSCRIBER IDENTITY MODULE (SIM):

One of the key features of GSM is the Subscriber Identity Module, commonly known as a SIM card. The SIM is a detachable smart card containing the user's subscription information and phone book. This allows the user to retain his or her information after switching handsets. Alternatively, the user can also change operators while retaining the handset simply by changing the SIM. Some operators will block this by allowing the phone to use only a single SIM, or only a SIM issued by them; this practice is known as SIM locking.

4.7 PHONE LOCKING:

Sometimes mobile network operators restrict handsets that they sell for use with their own network. This is called *locking* and is implemented by a software feature of the phone. Because the purchase price of the mobile phone to the consumer is typically subsidized with revenue from subscriptions, operators must recoup this investment before a subscriber terminates service. A subscriber may usually contact the provider to remove the lock for a fee, utilize private services to remove the lock, or make use of free or fee-based software and websites to unlock the handset themselves.

In some territories (e.g., Bangladesh, Hong Kong, India, Malaysia, Pakistan, Singapore) all phones are sold unlocked. In others (e.g., Finland, Singapore) it is unlawful for operators to offer any form of subsidy on a phone's price.

5. VOICE PROCESSOR

5.1 FEATURES:

1. Single-chip, high-quality voice recording & playback solution
    - -No external ICs required
    - -Minimum external components
2. Non-volatile Flash memory technology
    - -No battery backup required
3. User-Selectable messaging options
    - -Random access of multiple fixed-duration messages
    - -Sequential access of multiple variable-duration messages
4. User-friendly, easy-to-use operation
    - -Programming & development systems not required
    - -Level-activated recording & edge-activated play back switches
5. Low power consumption
    - -Operating current: 25 mA typical
    - -Standby current: 1 uA typical
    - -Automatic power-down
6. Chip Enable pin for simple message expansion

5.2 GENERAL DESCRIPTION:

The APR9600 device offers true single-chip voice recording, non-volatile storage, and playback capability for 40 to 60 seconds. The device supports both random and sequential access of multiple messages. Sample rates are user-selectable, allowing designers to customize their design for unique quality and storage time needs. Integrated output amplifier, microphone amplifier, and AGC circuits greatly simplify system design. the device is ideal for use in portable voice recorders, toys, and many other consumer and industrial applications. APLUS integrated achieves these high levels of storage capability by using its proprietary analog/multilevel storage technology implemented in an advanced Flash non-volatile memory process, where each memory cell can store 256 voltage levels. This technology enables the APR9600 device to reproduce voice signals in their natural form. It eliminates the need for encoding and compression, which often introduce distortion.

5.3 PIN OUT DIAGRAM:

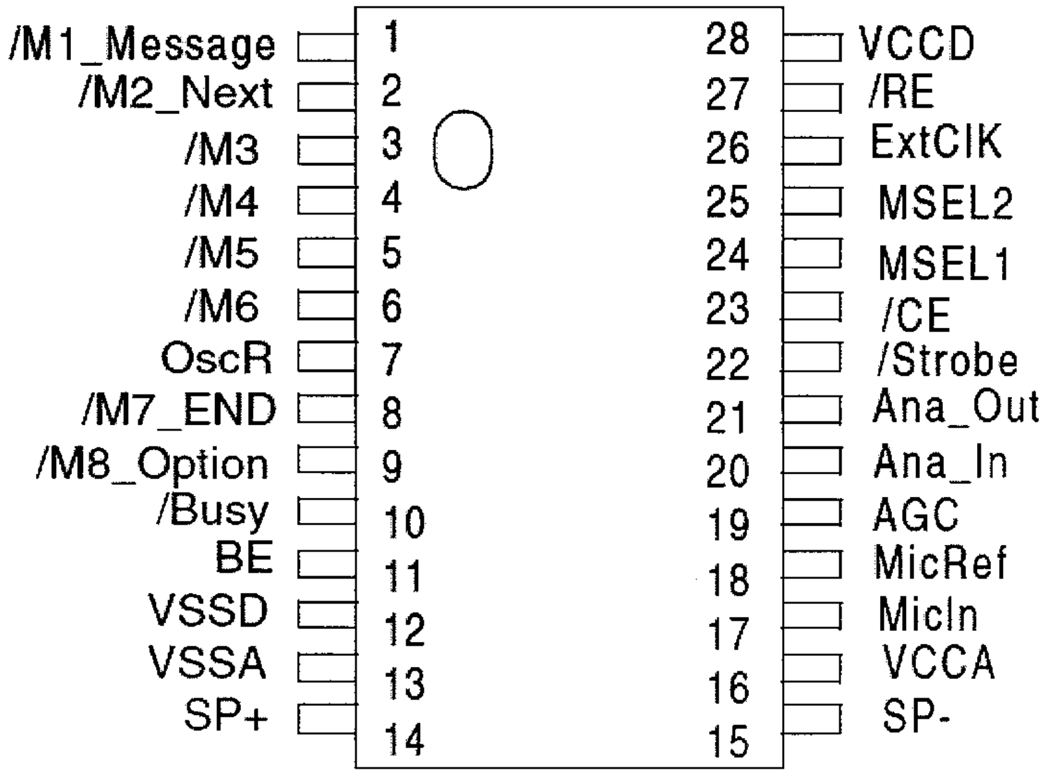

FIGURE 8

5.4 FUNCTIONAL DESCRIPTION:

The APR9600 block diagram is included in order to give understanding of the APR9600 internal architecture. At the left hand side of the diagram are the analog inputs. A differential microphone amplifier, including integrated AGC, is included on-chip for applications requiring its use. The amplified microphone signal is fed into the device by connecting the Ana_Out pin to the Ana_In pin through an external DC blocking capacitor. Recording can be fed directly into the Ana_In pin through a DC blocking capacitor, however, the connection between Ana_In and Ana_Out is still required for playback. The next block encountered by the input signal is the internal anti-aliasing filter. The filter automatically adjusts its response according to the sampling frequency selected so Shannon's Sampling Theorem is satisfied. After anti-aliasing filtering is accomplished the signal is ready to be clocked into the memory array. This storage is accomplished through a combination of the Sample and Hold circuit and the Analog Write/Read circuit. These circuits are clocked by either the Internal Oscillator or an external clock source. When playback is desired the previously stored recording is retrieved from memory, low pass filtered, and amplified as shown on the right hand side of the diagram. The signal can be heard by connecting a speaker to the SP+ and SP- pins. Chip-wide management is accomplished through the device control block shown in the upper right hand corner. Message management is controlled through the message control block represented in the lower center of the block diagram. More detail on actual device application can be found in the Sample Applications section. More detail on sampling control can be found in the Sample Rate and Voice Quality section. More detail on message management and device control can be found in the Message Management section.

5.5 BLOCK DIAGRAM:

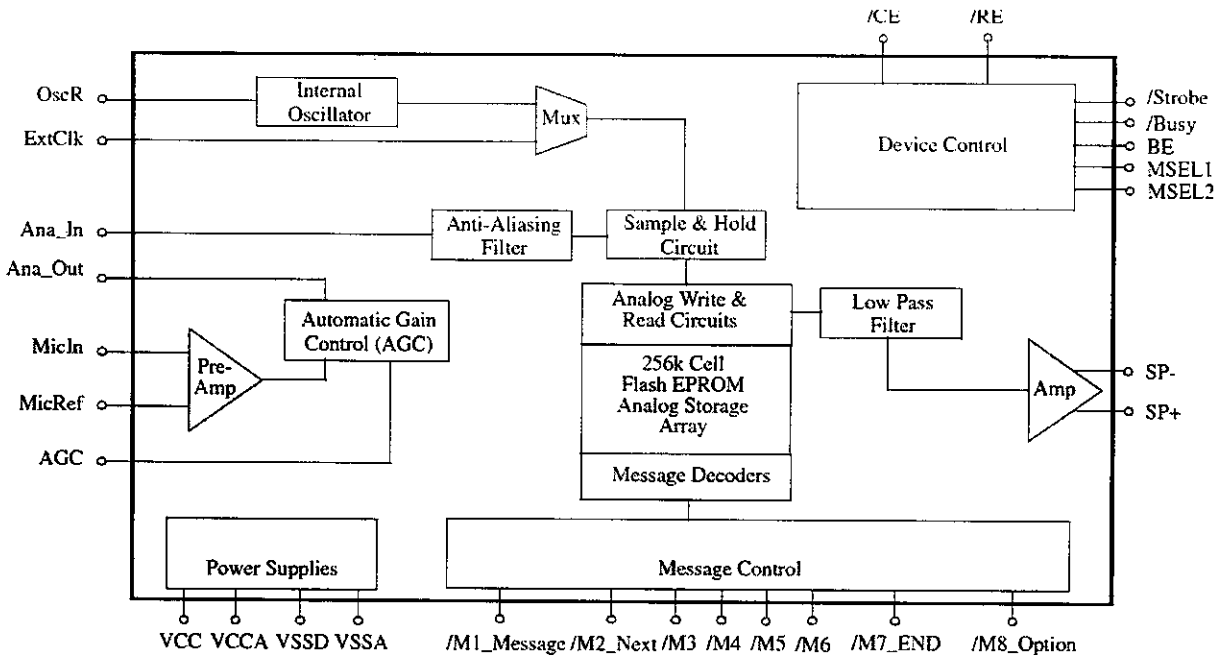

FIGURE 9

5.6 MESSAGE MANAGEMENT GENERAL DESCRIPTION:

Playback and record operations are managed by on chip circuitry. There are several available messaging modes depending upon desired operation. These message modes determine message management style, message length, and external parts count. Therefore, the designer must select the appropriate operating mode before beginning the design. Operating modes do not affect voice quality; for information on factors affecting quality refer to the Sampling Rate & Voice Quality section. The device supports three message management modes

1. Random access mode with 2, 4, or 8 fixed-duration messages
2. Tape mode, with multiple variable-duration messages, provides

two options:

- Auto rewind
- Normal

Modes cannot be mixed. Switching of modes after the device has recorded an initial message is not recommended. If modes are switched after an initial recording has been made some unpredictable message fragments from the previous mode may remain present, and be audible on playback, in the new mode. These fragments will disappear after a record operation in the newly selected mode. Table defines the decoding necessary to choose the desired mode. An important feature of the APR9600 message management capabilities is the ability to audibly prompt the user to changes in the device's status through the use of "beeps" superimposed on the device's output. This feature is enabled by asserting a logic high level on the BE pin.

Mode	MSEL1	MSEL2	/M8_Option
Random Access 2 fixed duration messages	0	1	Pull this pin to VCC through 100K resistor
Random Access 4 fixed duration messages	1	0	Pull this pin to VCC through 100K resistor
Random Access 8 fixed duration messages	1	1	Becomes the /M8 message trigger input pin
Tape mode, Normal operation	0	0	0
Tape mode, Auto rewind operation	0	0	1

TABLE 2

5.7 MICROPROCESSOR CONTROLLED MESSAGE MANAGEMENT:

The APR9600 device incorporates several features designed to help simplify microprocessor controlled message management. When controlling messages the microprocessor essentially toggles pins as described in the message management sections describe previously. The /Busy, /Strobe, and /M7_END pins are included to simplify handshaking between the microprocessor and the APR9600 The /Busy pin when low indicates to the host processor that the device is busy and that no commands can be currently accepted. When this pin is high the device is ready to accept and execute commands from the host. The /Strobe pin pulses low each time a memory segments is used. Counting pulses on this pin enables the host processor to accurately determine how much recording time has been used, and how much recording time remains. The APR9600 has a total of eighty memory segments. The /M7_END pin is used as an indicator that the device has stopped its current record or playback operation. During recording a low going pulse indicates that all memory has been used. During playback a low pulse indicates that the last message has played. Microprocessor control can also be used to link several APR9600 devices together in order to increase total available recording time. In this application both the speaker and microphone signals can be connected in parallel. The microprocessor will then control which device currently drives the speaker by enabling or disabling each device using their respective /CE pins. A continuous message cannot be recorded in multiple devices however because the transition from one device to the next will incur a delay that is noticeable upon playback. For this reason it is recommended that message boundaries and device boundaries always coincide.

5.8 SIGNAL STORAGE:

The APR9600 samples incoming voice signals and stores the instantaneous voltage samples in non-volatile FLASH memory cells. Each memory cell can support voltage ranges from 0 to 256 levels. These 256 discrete voltage levels are the equivalent of 8-bit (28=256) binary encoded values. During playback the stored signals are retrieved from memory, smoothed to form a continuous signal, and then amplified before being fed to an external speaker.

5.9 SAMPLING RATE & VOICE QUALITY:

According to the Shannon's sampling theorem, the highest possible frequency component introduced to the input of a sampling system must be equal to or less than half the sampling frequency if aliasing errors are to be eliminated. The APR9600 automatically filters its input, based on the selected sampling frequency, to meet this requirement. Higher sampling rates increase the bandwidth and hence the voice quality, but they also use more memory cells for the same length of recording time. Lower sampling rates use fewer memory cells and effectively increase the duration capabilities of the device, but they also reduce incoming signal bandwidth. The APR9600 accommodates sampling rates as high as 8 kHz and as low a 4 kHz. You can control the quality/duration trade off by controlling the sampling frequency. An internal oscillator provides the APR9600 sampling clock. Oscillator frequency can be changed by changing the resistance from the OscR pin to GND. Table 2 summarizes resistance values and the corresponding sampling frequencies, as well as the resulting input bandwidth and duration. performance..

Reference ROSC Value & Sampling Frequency:

Ref Rosc	Sampling Frequency	Input Bandwidth	Duration
84 K	4.2 kHz	2.1 kHz	60 sec
38 K	6.4 kHz	3.2 kHz	40 sec
24 K	8.0 kHz	4.0 kHz	32 sec

TABLE 3

5.9.1 SAMPLING APPLICATION:

The following reference schematics are included as examples on how a recording system might be designed. Each reference schematic shows the device incorporated in one of its' three main modes, Random Access, Tape mode – Normal option, and Tape mode - Auto Rewind option. Note that in several of the applications either one or all of the /Busy, /Strobe, or /M7_END pins are connected to LEDs as indicators of device status. This is possible because all of these pins and signals were designed to have timing compatible with both microprocessor interface and manual LED indication. Figure shows the device configured in tape mode, normal operation. This mode is the minimal part count application of the APR9600. Sampling rate is determined by the resistor value on pin 7 (OscR). The RC network on pin 19 sets the AGC "attack time". A bias must be applied to the electret microphone in order to power its built in circuitry. The ground return of this bias network is connected to the normally open side of the record push button. This configuration gates power to microphone so that it is biased only during recording. This configuration saves power when not recording by shutting off power to the electret microphone. Both pins 18 and 19, MicIn and MicRef, must be AC couple to the microphone network in order to block the DC biasing voltage.

Tape Mode, Normal Option

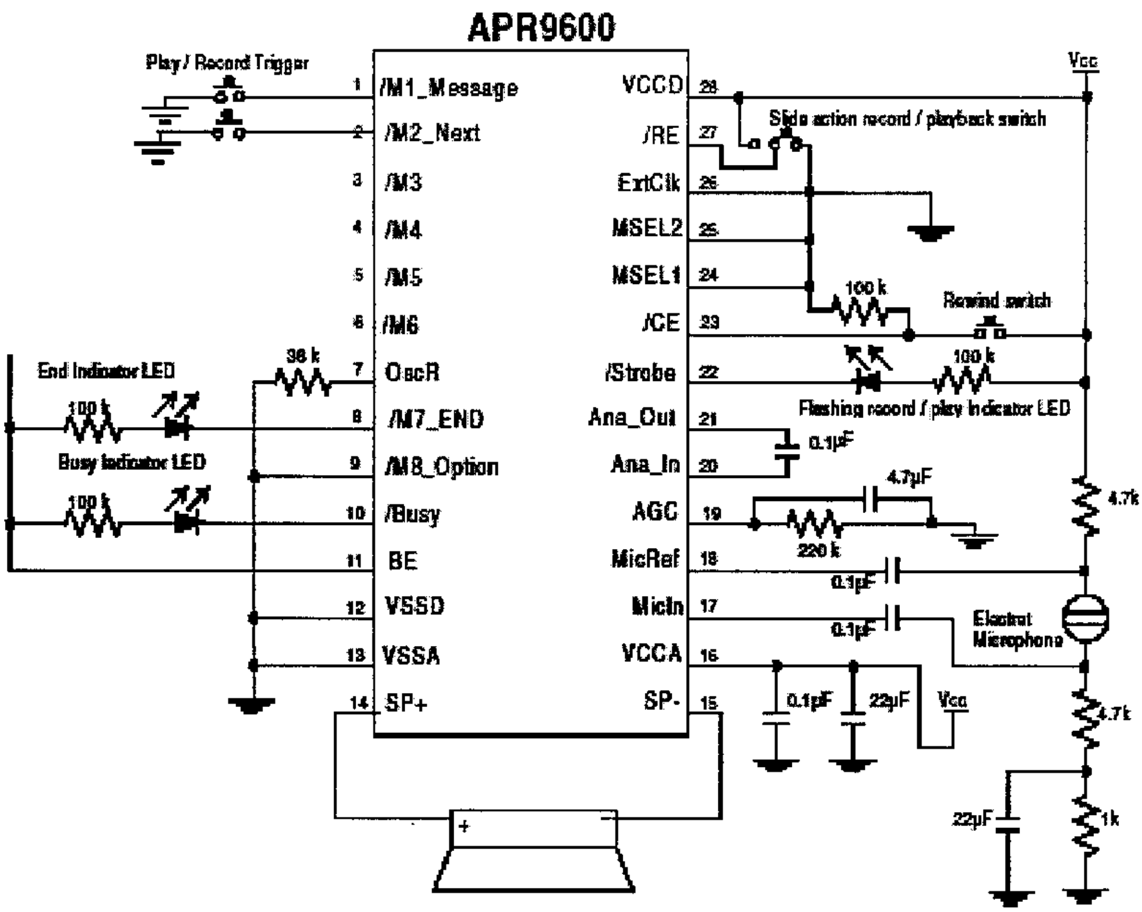

FIGURE 10

Tape Mode, Auto Rewind Option

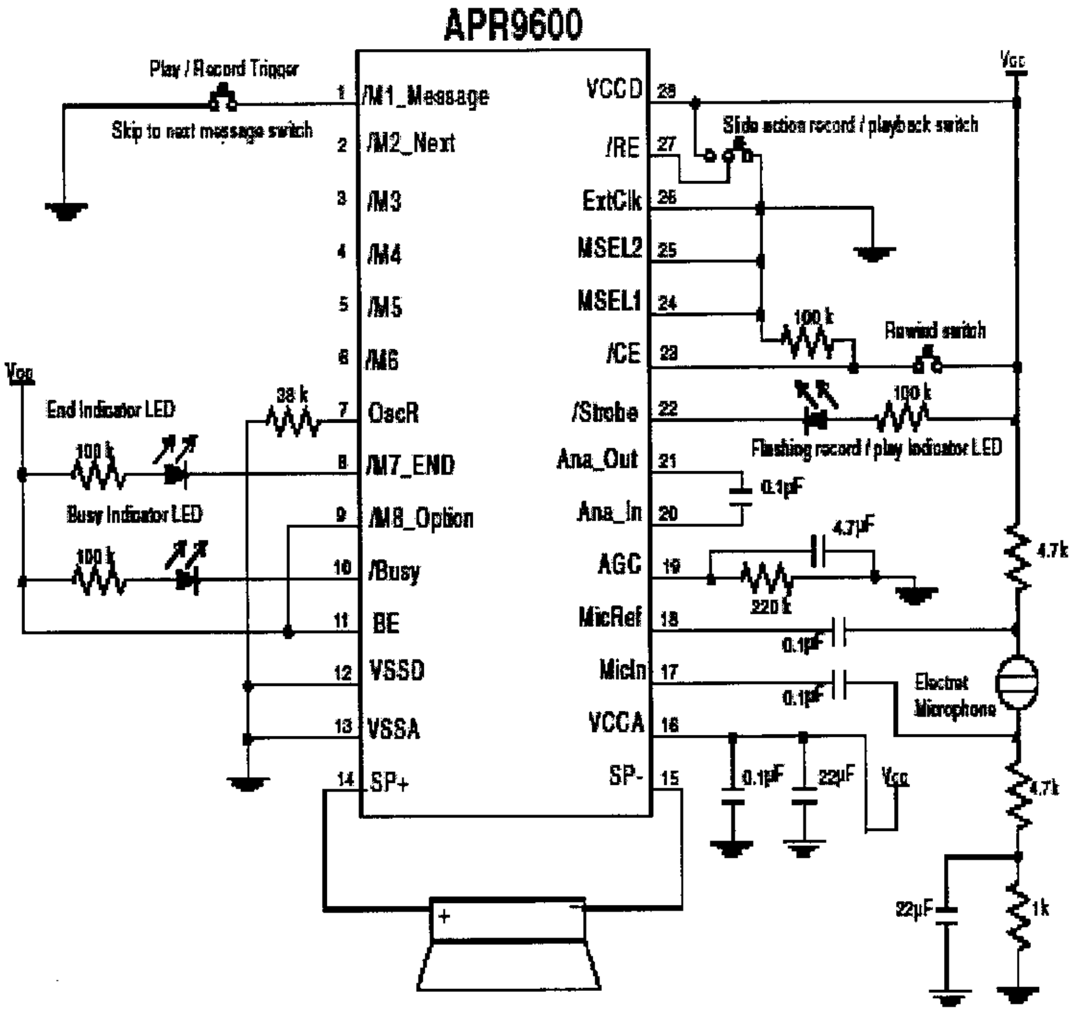

FIGURE 11

Random Access Mode

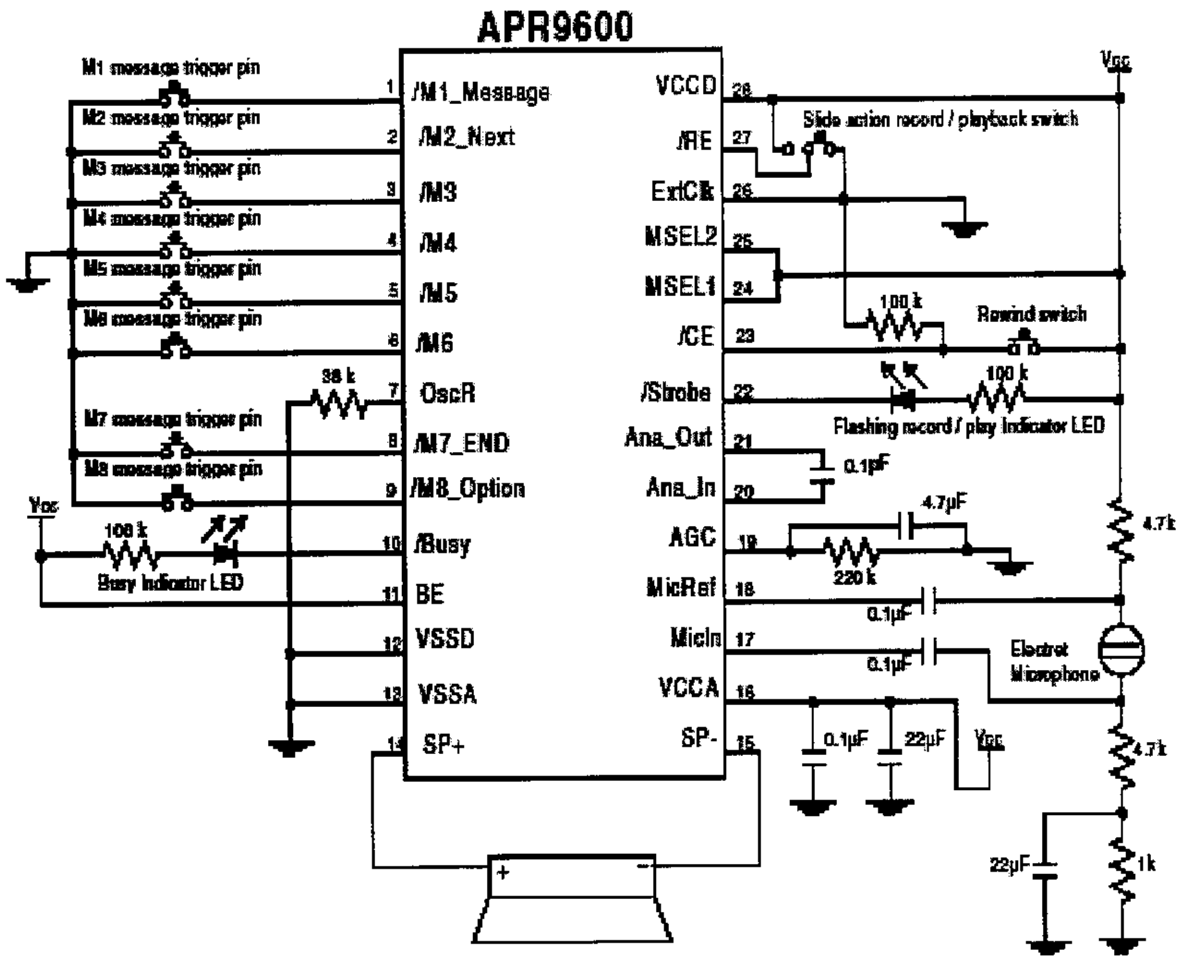

FIGURE 12

6. ARM PROCESSOR

6.1PRODUCT FEATURES:

6.1.1 32-BIT RISC PERFORMANCE:

-32-bit ARM® Cortex™-M3 v7M architecture

- Thumb®-compatible Thumb-2-only instruction set
- 50-MHz operation
- Hardware-division and single-cycle-multiplication
- Integrated Nested Vectored Interrupt Controller
- 26 interrupt channels with eight priority levels

6.1.2 ON-CHIP MEMORY:

-32 KB single-cycle flash

- 8 KB single-cycle SRAM

6.1.3 GENERAL-PURPOSE TIMERS:

-Three timers, each of which can be configured: as a single 32-bit timer, as a dual 16-bit timer, or to initiate an ADC event

- Real-Time Clock (RTC) capability

6.1.4 WATCHDOG TIMER:

-32-bit down counter

-Separate watchdog clock with an enable

-Programmable interrupt generation logic

-Lock register protection from runaway software

6.1.5 UART:

-Two fully programmable 16C550-type UARTs

-Separate 16x8 transmit (TX) and 16x12 receive (RX) FIFOs to reduce CPU interrupt service loading

- Programmable baud-rate generator

6.1.6 ANALOG-TO-DIGITAL CONVERTER (ADC):

-Single- and differential-input configurations

-Four 10-bit channels (inputs)

-Sample rate of 500 thousand samples/second

- Flexible, configurable analog-to-digital conversion

6.1.7 I^{2}C:

-Master and slave receive and transmit operation with transmission speed up to 100 Kbps in Standard mode and 400 Kbps in Fast mode

-Interrupt generation

-Master with arbitration and clock synchronization, multimaster support, and 7-bit addressing mode

6.2 TARGET APPLICATIONS:

-Factory automation and control

-Industrial control power devices

-Building and home automation

-Stepper motors

6.3 PROCESSOR MODES:

The ARM has seven basic operating modes:

User : unprivileged mode under which most tasks run

FIQ : entered when a high priority (fast) interrupt is raised

IRQ : entered when a low priority (normal) interrupt is raised

Supervisor : entered on reset and when a Software Interrupt

instruction is executed

Abort : used to handle memory access violations

Undef : used to handle undefined instructions

System : privileged mode using the same registers as user mode

6.4 THE REGISTERS:

1.ARM has 37 registers all of which are 32-bits long.

-1 dedicated program counter

-1 dedicated current program status register

-5 dedicated saved program status registers

-30 general purpose registers

2.The current processor mode governs which of several banks is accessible. Each mode can access

-a particular set of r0-r12 registers

-a particular r13 (the stack pointer, sp) and r14 (the link register, lr)

-the program counter, r15 (pc)

-the current program status register, cpsr

3.Privileged modes (except System) can also access

-a particular spsr (saved program status register)

6.5 PROGRAM COUNTER:

1.When the processor is executing in ARM state:

-All instructions are 32 bits wide

-All instructions must be word aligned

-Therefore the pc value is stored in bits [31:2] with bits [1:0] undefined (as instruction cannot be halfword or byte aligned).

2. When the processor is executing in Thumb state:

-All instructions are 16 bits wide

-All instructions must be halfword aligned

-Therefore the pc value is stored in bits [31:1] with bit [0] undefined (as instruction cannot be byte aligned).

3. When the processor is executing in Jazelle state:

-All instructions are 8 bits wide

-Processor performs a word access to read 4 instructions at once

6.6 CONDITION CODES:

The possible condition codes are listed below:

Suffix	Description	Flags tested
EQ	Equal	Z=1
NE	Not equal	Z=0
CS/HS	Unsigned higher or same	C=1
CC/LO	Unsigned lower	C=0
MI	Minus	N=1
PL	Positive or Zero	N=0
VS	Overflow	V=1
VC	No overflow	V=0
HI	Unsigned higher	C=1 & Z=0
LS	Unsigned lower or same	C=0 or Z=1
GE	Greater or equal	N=V
LT	Less than	N!=V
GT	Greater than	Z=0 & N=V
LE	Less than or equal	Z=1 or N=!V
AL	Always	

TABLE 4

7. INFRARED SENSOR

7.1 INFRARED DETECTION:

An **infrared detector** is a photodetector that reacts to infrared (IR) radiation. The two main types of detectors are thermal and photonic.

The thermal effects of the incident IR radiation can be followed through many temperature dependent phenomena. Bolometers and microbolometers are based on changes in resistance. Thermocouples and thermopiles use the thermoelectric effect. Golay cells follow thermal expansion. In IR spectrometers the pyroelectric detectors are the most widespread. The response time and sensitivity of photonic detectors can be much higher, but usually these have to be cooled to cut thermal noise. The materials in these are semiconductors with narrow band gaps. Incident IR photons can cause electronic excitations. In photoconductive detectors, the resistivity of the detector element is monitored. Photovoltaic detectors contain a p-n junction on which photoelectric current appears upon illumination.

8. HARDWARE DESCRIPTION

DESCRIPTION:

The infra red driver can detect obstacles up to a distance of 1-2 metre.

The GSM module is used to send and receive messages between blind person and care taker.

The GPS module is used to locate the position of the blind person.

Voice processing unit along with speaker guides the blind person about obstacles and position.

Care taker can get the exact location of the blind person by sending preconfigured message.

These modules are interfaced with the ARM processor which provides overall control.

OPERATION:

When there is an obstacle in the path of the blind person within 3 metre the IR detector sends signal to processor.

Then the processor activates voice processor and corresponding warning message is played by the speaker.

The message helps the blind person to take alternative direction and guides throughout the path.

Also the message "OBSTACLE DETECTED" is showed in the LCD display.

The same message is sent to the care taker.

8.3 HARDWARE KIT:

FIGURE 14

9. CONCLUSION AND FUTURE SCOPE

9.1CONCLUSION:

This project replaces conventional cane system and assists visually impaired wherever they go. The advantage of blind guide is that it does not require much mechanical effort as that of conventional cane system. But the cost of the blind guide is high when compared to the cane system. It can be made as low as possible in the future so that even the common people can afford to get it. Thus in short the "BLIND GUIDE" makes the visually impaired independent.

9.2 FUTURE SCOPE:

The future scope of the project is to provide entire navigation for the visually impaired and to make the size of the kit compact so that it can be carried easily.

We are using IR driver which needs the transmitter to move accordingly as the blind person.

So the person can use this part inside the house where there are IR transmitters located around the room and receiver attached to the blind.

This can be expanded to the outside world also by using any reflecting type drivers which have both transmitter and receiver attached to blind.

Now we can detect only the latitude and longitude of position and not the name of the place.

So usage of GPRS along can find the place and guide the blind person.

REFERENCES:

http://www.aplusinc.com.tw

www.datasheetcatalog.com

http://iec.org

http://www.neevia.com

http://www.leadtek.com

http://howstuffworks.com

http://gcn.com

http://www.simcom-sh.com

http://www.nskelectronics.com

APPENDIX I:

```
// PA 019---GPS & GSM BASED BLIND GUIDE---------------------------------------

// Photo Electronic Sensor-----------------through GPIOB_PIN_0------pin 29-----

// Buzzer-----------------through GPIOB_PIN_1----------------------pin 30-----

// GSM---Tx Polling---through UART0-----------------------------------------CHANGE MOBILE
NUM---dupno

// GPS Reception-------------------through UART1------------------------------


#include "hw_memmap.h"

#include "hw_types.h"

#include "hw_ints.h"

#include "debug.h"

#include "gpio.h"

#include "sysctl.h"

#include "interrupt.h"

#include "uart.h"

#include "hw_uart.h"

#define ENTER(sel) UARTCharPut(UART0_BASE,sel)
```

```
typedef unsigned char UC;

unsigned int stay=0,status=0,gpsflag=0,gpsstart=0,jj=0,r,r1,r2,r3,r31,r4,mmfrac=0;

unsigned int i=0,j=0,y=0,yy=0,x=0,xx,mm;

UC b,ch1,dupno[10]="9944100018",dupmsg[23]="Met With Accident At ",data[100];

UC title1[]="GPS & GSM BASED ",title2[]="BLIND GIUDE     ";

UC north[14],east[15],direct[27];

void digital_init(void);

void lcd_connect(void);

void lcd_init(void);

void delay(unsigned int);

void lcd_command(unsigned char);

void lcd_data(unsigned char);

void lcd_display(unsigned char *);

void uart0_poll_init(void);
```

```
void uart1_poll_init(void);

void gsm_uart0_init(void);

void gsm_uart0_rx_opt(void);

void gsm_uart0_tx(void);

void gps_uart1_rx(void);

void uart0_send_data( UC *Buffer0 )

{

  while(*Buffer0!='\0')

   {

    UARTCharPut(UART0_BASE,*Buffer0);

    Buffer0++;

   }

 *Buffer0=0;

}


 void uart1_send_data( UC *Buffer1 )

 {

   while(*Buffer1!='\0')

    {
```

```
    UARTCharPut(UART1_BASE,*Buffer1);
    Buffer1++;
   }
*Buffer1=0;
}

void GPIOBIntHandler(void)
{
   IntDisable(INT_GPIOB);
   status=1;
   GPIOPinWrite(GPIO_PORTB_BASE,GPIO_PIN_1,GPIO_PIN_1);//Buzzer ON
 lcd_command(0x20);lcd_command(0x00);// lcd cmd 0x80
 delay(50000);delay(50000);
 lcd_display("Object Detected ");
// lcd_command(0x30);lcd_command(0x00);// lcd cmd 0xC0
//delay(50000);delay(50000);
 //lcd_display("Buzzer ON        ");
 delay(50000);delay(50000);
   delay(50000);delay(50000);delay(50000);delay(50000);
```

```
  delay(50000);delay(50000);delay(50000);delay(50000);

  GPIOPinWrite(GPIO_PORTB_BASE,GPIO_PIN_1,0);//Buzzer OFF

 lcd_command(0x20);lcd_command(0x00);// lcd cmd 0x80

 delay(50000);delay(50000);

 lcd_display("                ");

// lcd_command(0x30);lcd_command(0x00);// lcd cmd 0xC0

// delay(50000);delay(50000);

// lcd_display("Buzzer OFF      ");

}


void UARTSend(const unsigned char *pucBuffer, unsigned long ulCount)

{

   //

   // Loop while there are more characters to send.

   //

   while(ulCount--)

   {

      //

      // Write the next character to the UART.
```

```
    //
    UARTCharPutNonBlocking(UART0_BASE, *pucBuffer++);
  }
}



int
main(void)
{
    SysCtlClockSet( SYSCTL_USE_OSC | SYSCTL_OSC_MAIN | SYSCTL_XTAL_4MHZ);


    lcd_connect();


    lcd_init();


  while(1)
  {
      stay=1;
      status=0;
```

```
status=1;
//digital_init();// GPIOB_ Interrupt_ Pin_ Enable

lcd_command(0x20);lcd_command(0x00);// lcd cmd 0x80
delay(50000);delay(50000);
lcd_display(title1);
lcd_command(0x30);lcd_command(0x00);// lcd cmd 0xC0
delay(50000);delay(50000);
lcd_display(title2);

while(stay==1)
{

if(status==1)
{
 uart1_poll_init();
 gps_uart1_rx();
 if(gpsflag==1)
 {
```

```
    UARTDisable(UART1_BASE); //uart 1 disable

//==============storing north in google earth format============================

 delay(50000);

  delay(50000);



    uart0_poll_init();

    gsm_uart0_init();// through uart 0

    gsm_uart0_tx();// through uart 0

    gpsflag=0;

    status=0;

    stay=0;

  delay(50000);

  delay(50000);

  delay(50000);

  delay(50000);

  delay(50000);

  delay(50000);

  mm=0;

 UARTDisable(UART0_BASE);
```

```
}//gpsflag close
//gsm_uart0_rx_opt();// through uart 0
}//status close
}//stay close
}// while 1 close
}// main close

//--------------------Function Definition-----------------------------------
//--------------------LCD---------------------------------------------------
void digital_init(void)
{
 SysCtlPeripheralEnable(SYSCTL_PERIPH_GPIOB);
 GPIODirModeSet(GPIO_PORTB_BASE,GPIO_PIN_0,GPIO_DIR_MODE_IN);
 GPIOPinTypeGPIOInput(GPIO_PORTB_BASE, GPIO_PIN_0);

 GPIOPinTypeGPIOOutput(GPIO_PORTB_BASE, GPIO_PIN_1);

 GPIOIntTypeSet(GPIO_PORTB_BASE, GPIO_PIN_0,GPIO_HIGH_LEVEL);
```

```
GPIOPinIntEnable(GPIO_PORTB_BASE, GPIO_PIN_0);

IntEnable(INT_GPIOB);

IntMasterEnable();

GPIOPinWrite(GPIO_PORTB_BASE,GPIO_PIN_1,0);

}

void lcd_connect(void)
{
  SysCtlPeripheralEnable(SYSCTL_PERIPH_GPIOA);
  SysCtlPeripheralEnable(SYSCTL_PERIPH_GPIOB);
  GPIOPinTypeGPIOOutput(GPIO_PORTB_BASE, GPIO_PIN_2);// rs
  GPIOPinTypeGPIOOutput(GPIO_PORTB_BASE, GPIO_PIN_3);// en

  GPIOPinTypeGPIOOutput(GPIO_PORTA_BASE, GPIO_PIN_2);// Data lines
  GPIOPinTypeGPIOOutput(GPIO_PORTA_BASE, GPIO_PIN_3);
```

```
GPIOPinTypeGPIOOutput(GPIO_PORTA_BASE, GPIO_PIN_4);

GPIOPinTypeGPIOOutput(GPIO_PORTA_BASE, GPIO_PIN_5);

}

void lcd_init(void)

{

    lcd_command(0x08);lcd_command(0x20);// lcd cmd 0x28

    delay(50000); delay(50000);

    lcd_command(0x00);lcd_command(0x04);// lcd cmd 0x01

    delay(50000);delay(50000);

    lcd_command(0x00);lcd_command(0x18);// lcd cmd 0x06

    delay(50000);delay(50000);

    lcd_command(0x00);lcd_command(0x30);// lcd cmd 0x0c

    delay(50000);delay(50000);
```

```
    lcd_command(0x20);lcd_command(0x00);// lcd cmd 0x80

    delay(50000);delay(50000);


}


void lcd_command(unsigned char x)

{

        GPIOPinWrite(GPIO_PORTA_BASE, (GPIO_PIN_2|GPIO_PIN_3 |

                    GPIO_PIN_4|GPIO_PIN_5),x);

        GPIOPinWrite(GPIO_PORTB_BASE, GPIO_PIN_2, 0);

        GPIOPinWrite(GPIO_PORTB_BASE, GPIO_PIN_3,GPIO_PIN_3);

        delay(50);

        GPIOPinWrite(GPIO_PORTB_BASE, GPIO_PIN_3, 0);


}


void lcd_data(unsigned char y)

{

        GPIOPinWrite(GPIO_PORTA_BASE, (GPIO_PIN_2 | GPIO_PIN_3 |
```

```
                GPIO_PIN_4 | GPIO_PIN_5),y);

        GPIOPinWrite(GPIO_PORTB_BASE, GPIO_PIN_2,GPIO_PIN_2);

        GPIOPinWrite(GPIO_PORTB_BASE, GPIO_PIN_3,GPIO_PIN_3);

        delay(50);

        GPIOPinWrite(GPIO_PORTB_BASE, GPIO_PIN_3, 0);


}


void lcd_display(unsigned char *ch)

{

 while(*ch !='\0')

  {

   b= *ch;  b=b&0xf0;  b=b>>2;

   lcd_data(b);

   b= *ch;  b=b&0x0f;   b=b<<2;

   lcd_data(b);

   delay(50000);delay(50000); delay(50000);

   ch++;

  }
```

```
}

//------------------------------end of lcd--------------------------------------

void delay(unsigned int del)

{

unsigned int kkk;

  for(kkk=0;kkk<del;kkk++);



}

//----------------------------UART0------------115200bps for GSM----------------

void uart0_poll_init(void)

{

   SysCtlPeripheralEnable(SYSCTL_PERIPH_UART0);


   GPIOPinTypeUART( GPIO_PORTA_BASE, GPIO_PIN_0 | GPIO_PIN_1 );


   UARTConfigSetExpClk(UART0_BASE,SysCtlClockGet(),9600,UART_CONFIG_WLEN_8
|UART_CONFIG_STOP_ONE | UART_CONFIG_PAR_NONE );
```

```
UARTFIFOLevelSet(UART0_BASE,UART_FIFO_TX7_8,UART_FIFO_RX7_8);

UARTEnable(UART0_BASE);

}
// GSM ---Tx Polling---through UART0------------------------------------------
void gsm_uart0_init(void)
{
  uart0_send_data((UC *) "AT+CSQ=?" ); // Signal Strength
  ENTER(0x0D); //ENTER(0x0A);

  delay(50000);  delay(50000); delay(50000);        delay(50000);

  uart0_send_data((UC *) "AT+CSDH=1" );// Sel TEXT mode
  ENTER(0x0D); ENTER(0x0A);

  delay(50000);  delay(50000); delay(50000);        delay(50000);

  uart0_send_data((UC *) "AT+CMGF=1" );
```

```
  ENTER(0x0D); ENTER(0x0A);

  delay(50000);  delay(50000); delay(50000);        delay(50000);

}

void gsm_uart0_tx(void)
{
   uart0_send_data((UC *) "at+cmgs=" );// Msg sending Option

   UARTCharPut(UART0_BASE, '"');
   uart0_send_data(dupno);// mobile no
   UARTCharPut(UART0_BASE, '"');
   ENTER(0x0D);
   delay(50000);delay(50000); delay(50000);delay(50000);delay(50000);

  UARTSend((unsigned char*)"lat:",4);
  for(mm=14;mm<23;mm++)
```

```
{
UARTCharPut(UART0_BASE,data[mm]);
}
UARTCharPut(UART0_BASE,',');
delay(500);
  ENTER(0x1A); //Ctrl+Z
delay(50000);delay(50000);
}
 // uart0_send_data((UC *)"Present Position is  ");// message
 //  uart0_send_data(direct);// message of google earth position
 //  ENTER(0x1A); //Ctrl+Z
 //  delay(50000);delay(50000); delay(50000);delay(50000);delay(50000);


 //  lcd_command(0x20);lcd_command(0x00);// lcd cmd 0x80
 //  delay(50000);delay(50000);
 //  lcd_display("Sent To :       ");
 //  lcd_command(0x30);lcd_command(0x00);// lcd cmd 0xC0
 //  delay(50000);delay(50000);
 //  lcd_display(dupno);
```

```
//  lcd_display("      ");

//------------------------------UART1------4800bps for GPS----------------------

void uart1_poll_init(void)

{

   SysCtlPeripheralEnable(SYSCTL_PERIPH_GPIOD);

   SysCtlPeripheralEnable(SYSCTL_PERIPH_UART1);

   GPIOPinTypeUART( GPIO_PORTD_BASE, GPIO_PIN_2 | GPIO_PIN_3 );

   UARTConfigSetExpClk(UART1_BASE,SysCtlClockGet(),4800,UART_CONFIG_WLEN_8
 |UART_CONFIG_STOP_ONE | UART_CONFIG_PAR_NONE );

   UARTFIFOLevelSet(UART1_BASE,UART_FIFO_TX7_8,UART_FIFO_RX7_8);

   UARTEnable(UART1_BASE);
```

```
}

//GPS Reception through UART1---------------------------------------------------

void gps_uart1_rx(void)

{

 gpsstart=1;

 while(gpsstart==1)

 {

   while(! UARTCharsAvail(UART1_BASE));



   ch1=UARTCharGetNonBlocking( UART1_BASE );



   if(ch1=='$')  r=1;



     else if ( r== 1)

       {

        if(ch1=='G'){ r1=1;r=0;}

       }

    else if(r1==1)
```

```
{
 if( ch1=='P'){ r2=1;r1=0;}
}
else if(r2==1)
 {
   if(ch1=='R'){r3=1;r2=0;}
 }

 else if (r3==1)
 {
     if(ch1=='M'){r31=1;r3=0;}
 }
else if (r31==1)
 {
     if(ch1=='C'){r4=1;r31=0;}
 }
else if(r4==1)
{
  data[i]=ch1;
```

```
    i++;
    if(i==62)
    { gpsstart=0;gpsflag=1; r=0; r1=0; r2=0; r3=0;r31=0; r4=0; }
  }
 }
}
```