_____

# A Low-Cost GPS & INS Integrated System Based on ARM 7

A.H.Ansari

Pravara Rural Engineering Collage
Loni, Ahmednagar, Maharastra India
*ahameeda@rediffmail.com*

D.V.Pande

Pravara Rural Engineering Collage
Loni, Ahmednagar, Maharastra India
*durga.pande1@gmail.com*

*Abstract*— GPS is that the technology that is employed in an exceedingly sizable amount of applications. One among the applications is navigation it may be following the vehicle. This following system will inform the place and route traveled by vehicle. This paper describes the event of a cheap loosely Coupled GPS/INS integration supported system using ARM-7, that additionally shows the direction for the movement to realize the target. Here also GSM system is incorporated to make the system more flexible. This adds the extra feature than the navigation. If the person who is using this module find in any panic situation can inform the message to any specified person.

*Keywords-* *Inertial Navigation System (INS), Global positioning system (GPS), Google maps, ARM7, GSM*.

_____*****_____

## I. INTRODUCTION

The International Positioning System (GPS) may be a space-based Global Navigation Satellite System (GNSS) that gives reliable location. Information regarding time, weather and in the least times and anyplace on or close to the world in this four or a lot of GPS satellites are used. The Global Positioning System consists of 24 satellites, that circle the globe once every 12 hours, to provide worldwide position, time and velocity information. GPS makes it possible to precisely identify locations on the earth by measuring distance from the satellites. GPS allows you to record or create locations from places on the earth and help you navigate to and from those places. It's maintained by the US government and is freely accessible by anyone with a GPS receiver [1]. GSM and GPS primarily based trailing system can offer effective, real time person location, and coverage. GPS is one in every of the technology that's employed in an enormous range of applications these days. One of the applications is trailing vehicle and keeps regular watching on them. It can also be used to tack the target as is done in RADAR system. So this paper describes the event of a inexpensive Loosely Coupled GPS/INS integration with a unique standard platform supported ARM-7 that presents tiny size, low power consumption design, it's additionally versatile and features a low risk system style methodology that may be helpful in many applications. The paper organization is as, Section- I is elaborating about the introduction of topic, and in Section-II related study is reviewed. The proposed system is discussed in the III- Section. In the succeeding IVth section algorithm of work is explained and section V is dealing with the results and nest conclusion and references are given in section VI and VII.

## II. RELATED STUDY

Navigation is the important role in the tracking system. It is useful in variety of fields like Transport, Military security etc.

Pankaj Verma et.al gives the detail about the GSM and GPS based tracking system using Google map. In this the route travelled by vehicle and its location is tracked by GPS and GSM [1]. R. Ramani, et.al uses the authentication algorithm in tracking system for vehicle protection form theft. Microcontroller is used to send the control the engine depending upon user instruction [2]. G.Bharathi et.al proposed a method to stop the crime with the children. This method can be used for person or vehicle tracking by ARM controller which is used to controls the LCD, GPS module and GSM modem. The ARM controller will poll GPS module information (Latitude & Longitude) of vehicle location to and send to person over GSM network [3].

Mahesh Kadibagil et.al puts a friends or family member tracking system by using mobile client, web portal and map services. Information obtain is can be viewed on both mobile and web portal [4]. Abid khan et.al [5] designed a cost effective vehicle tracking system in which a massage about the position of the vehicle is received on the mobile in the form of latitude and longitude is developed in [5].

A man less vehicle driving system by using arm and navigation system is suggested by R. Mohanapriya. Ultrasonic sensor are used for obstacle detection on the road. To find the particular geographical area it uses the Digital compass. It use magnetic sensor to measure the earth magnetic field [6]. But considering all the suggested work and technologies still there is lot of scope of work pending to be done in this area.

## III. PROPOSED SYSTEM

This is a GPS/INS integrated system based on ARM-7, to show the direction, to find the route also gives the exact location of target. Fig.1. Shows the block diagram of the proposed method. In this ARM LPC2138 along with other peripherals like switches, LCD, LED's, GPS module and GSM module are present. LCD JHD16X2A is interfaced with ARM microcontroller through port 1 and port 0. Variable commands like waiting for keys, panic keys, latitude, longitude, etc, are displayed on LCD during execution of complete system. Three switches are connected to microcontroller ports to indicate the left and right direction along with panic condition. Switch 1 is connected to PORT 1 PIN 20 which specifies the left direction. Similarly switch 2 is connected to PORT 1 PIN 26 which specifies the right direction. Panic switch is connected to PORT 1 PIN 18. GPS module is interfaced with microcontroller through MAX232 driver IC to serial port. Also GSM module is attached with microcontroller through MAX232 driver IC to serial port. LED's are interfaced with the circuit to indicate the left right direction. For the left direction, LED is connected to PORT 0 PIN 12 and for the right direction, LED is connected to PORT 0 PIN 10.

5811

_____

The navigation pages mostly include a digital compass, an odometer showing distance travelled since the counter was reset, with a current speed indicator, a maximum speed and average speed for a trip.
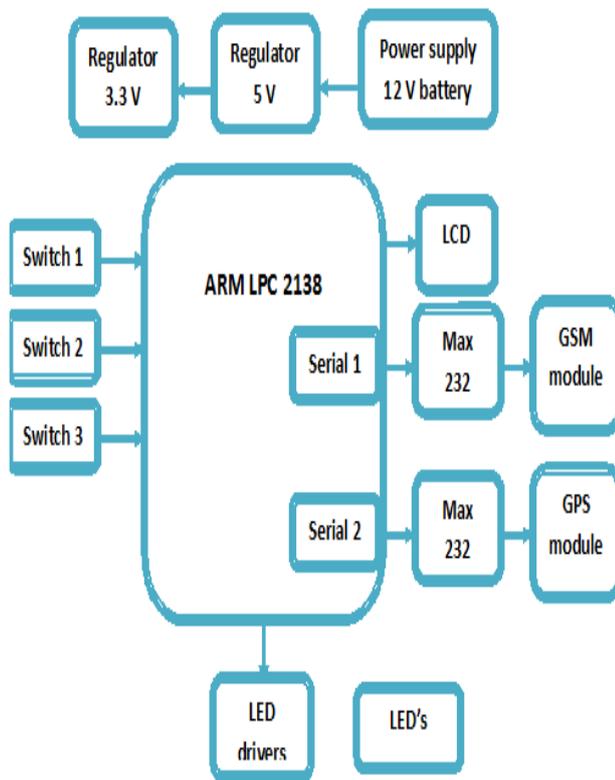


*Fig. 1: GPS and INS system*

The navigation page can also be tailored to show a variety of other statistical data e.g. to show how far is remaining until an objective is reached. Some high-end sets include a magnetic compass and a barometric altimeter. These are generally more accurate than the satellite determined heading and elevation. GPS receivers can also display the time of sunrise and sunset at a given location.

GPS is used to monitor the person's position anywhere in the earth. The person who wants to monitor has to have the GSM modem with SIM GPRS enabled. The GPS consists of GPS antenna and GPS receiver which uses satellite ranging to triangulate your position.  The GPS unit simply measures the travel time of the signals transmitted from the satellites, then multiplies them by the speed of light to determine exactly how far the unit is from every satellite its sampling. By locking onto the signals from a minimum of three different satellites, a GPS receiver can calculate   your latitude and longitude.

The distance of the satellite calculated by the trigonometry relation as

Distance to the satellite $= C * (T_r - T_{to})$

Where C= speed of light in air, $T_r$= time at the receiver, $T_{to}$= time at the origin. The Proposed method flow chart is as shown in Fig. 2,
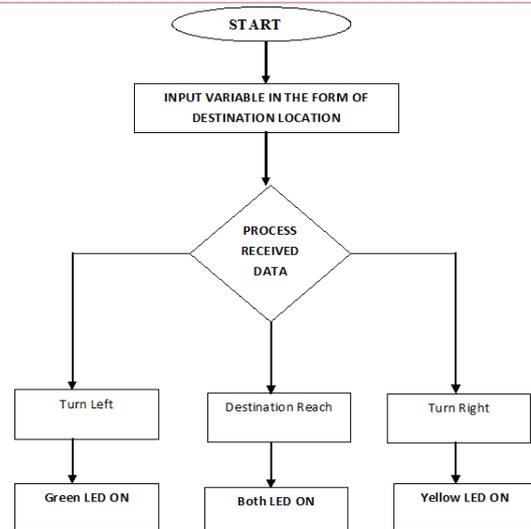


*Fig.2. Flow Chart of execution*

## IV.    ALGORITHM

1. Start the system.
2. Fix the Destination location by putting longitude and latitude.
3. Start to travel from source to destination.
4. Gives the direction according to LED ON and massage display on LCD.
5. Then follow the direction according the LCD message.
6. Both LED glow when reach to destination and message also display on LCD.
7. Stop

## V.    RESULT AND DISCUSSION

In this work three conditions are possible. We have to track location at destination from source. If we press the reset key then for some time requires for getting GPS range. If green LED is on it will display the message "RIGHT" on LCD and the right turn is required to take as shown in Fig. 3.
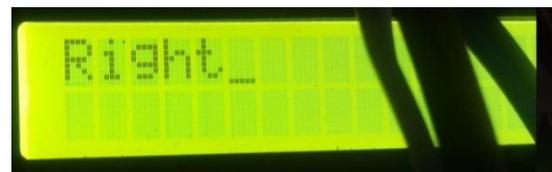


Fig.3. Right Message on LCD

If yellow LED is on it will display "LEFT" on the LCD and left turn has to take as shown in Fig. 4.



Fig.4. Left Message on LCD

When we reached at destination point by taking left and right path suggested by the system, then both LEDs yellow, and green will be on & the message will be displayed "DESTRCHD" as shown in Fig. 5.



Fig.5. DESTRCHD Message on LCD

When the person is in panic situation and need any help, he can press the panic switch, it this switch is pressed then the message "I need Help" will send to the mobile number which is stored. Fig. 6 shows the message with the latitude and longitude position of the person on mobile.
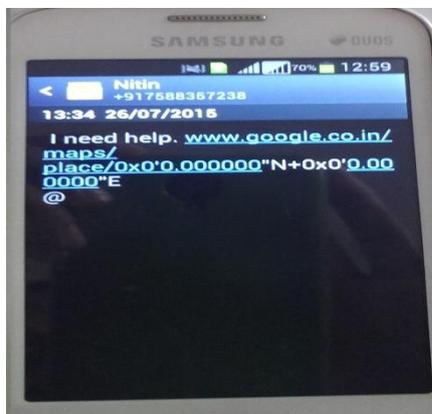


Fig.6. Tracking Message on Mobile

In this, we have discussed about the entire tracking system. Fig. 7 shows the GPS/GSM enabled personal tracker system. GPS has LED shows that GSP stable or unstable. SIM 900 GSM modem also has the small LED shows that SIM getting in the network. Both the SIM 900 GSM modem and GPS interfaces with board of ARM-7 (LPC 2148).
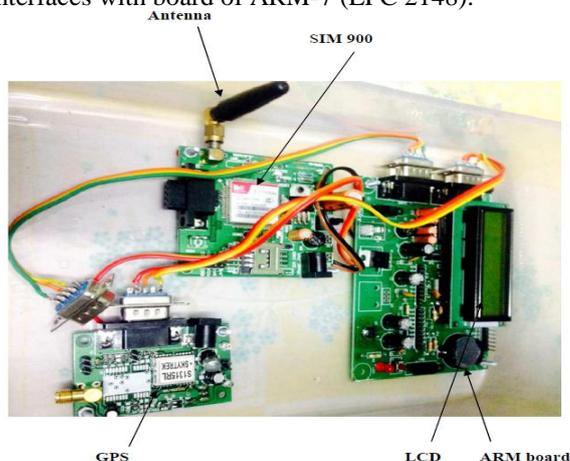


Fig.7. Tracker System

## VI.   CONCLUSION AND FUTURE SCOPE

The scope of this work is to review and style the GPS/GSM enabled Personal chase system that may offer associate output of the knowledge like time, position and speed from the GPS receiver. This may be helpful for vehicle chase. From this pursuit system, this location of someone is going to be displayed via Google earth with the assistance of GPS info and GSM. Thus, we will simply monitor the creature anyplace on the planet with high accuracy.

In future, this whole chase system may be tries to create in compact size, lightweight weight, a lot of accuracy and in real time response. Pursuit system is changing into more and more vital in massive cities like in varied applications embrace pursuit of faculty youngsters and other people will watch them by staying in their home.

## VII.   COPYRIGHT FORMS AND REPRINT ORDERS

You must submit the IEEE Electronic Copyright Form (ECF) per Step 7 of the CPS author kit's web page. THIS FORM MUST BE SUBMITTED IN ORDER TO PUBLISH YOUR PAPER.

Please see Step 9 for ordering reprints of your paper. Reprints may be ordered using the form provided as <reprint.doc> or <reprint.pdf>.

## ACKNOWLEDGMENT

The preferred spelling of the word "acknowledgment" in America is without an "e" after the "g". Avoid the stilted expression, "One of us (R.B.G.) thanks . . ." Instead, try "R.B.G. thanks". Put applicable sponsor acknowledgments here; DO NOT place them on the first page of your paper or as a footnote.

## REFERENCES

[1]    Pankaj Verma , J.S Bhatia,  "Design AND Development OF GPS-GSM Based Tracking System With Google Map Based Monitoring  " , International Journal of Computer Science, Engineering and Applications (IJCSEA) Vol.3, No.3, June 2013.

[2]    Francis EnejoIdachaba, "Design of a GPS-GSM based tracker for the location of stolen items and kidnapped or missing Person in Nigeria", ISSN: 1819-6608 vol.6, No.10, Oct 2011.

[3]    Kunal Maurya, Mandeep Singh, Neelu Jain, "India Real Time Vehicle Tracking system using GSM and GPS Technology an Anti-theft  tracking system", ISSN 2277-1956 V1N3-1103- 1107.

[4]    Mahesh Kadibagil & Dr. H S Guruprasad,  "Position Detection and Tracking System", IRACST - International Journal of Computer  Science and Information Technology & Security  (IJCSITS), Vol. 4, No. 3,June 2014.

[5]    Abid khan, Ravi Mishra, "GPS-GSM Based tracking system", International Journal of Engineering Trends and Technology Volume3 Issue2- 2012.

[6]    Yuan, M. J., "Enterprise J2ME developing mobile JAVA applications (MJY)", Pearson Education, Inc. Publishing as Prentice Hall Professional Technical Reference Upper Saddle River, New Jersey, U.S.A., 2004

[7]    Asaad M. J. Al-Hindawi, Ibraheem Talib, "Experimentally evaluation of GPS-GSM based system design", Journal of Electronic Systems Volume 2 Number 2 June 2012.

                                                                                                        **5813**

[8]   Vikram Kulkarni and Viswaprakash Babu, "Embedded smart car security system on Face Detection", Special issue of IJCCT, ISSN: 2231-0371, ISSN: 0975-7449, volume-3, Issue-1.

[9]   V. Ramya, B. Palaniappan, K. Karthick, "Embedded Controller for vehicle in-front Obstacle Detection and Cabin Safety Alert System", International Journal of Computer Science & Information Technology (IJCSIT) Vol4, No 2, April 2012.

[10]  Chen Peijiang, Jiang Xuehua, "Design and Implementation of Remote monitoring system based on GSM," vol.42, pp.167-175. 2008.

[11]  Albert Alexe, R.Ezhilarasie, "Cloud computing based vehicle tracking information systems", IRACST - International Journal of Computer Science and Information Technology & Security (IJCSITS), Vol. 4, No. 3,June 2014.

**Mr. A. H. Ansari** is ME and pursuing Phd in the field of Communication, working as an Associate Professor in PREC, LONI, India. His field of interest is communication.

**Miss D. V. Pande** is the student of ME, ETC at PREC, Loni Maharashtra, India and working as the lecturer in PDVPIET, Loni.