

GPS Navigation and Tracking Device

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Abstract—Since the introduction of GPS Navigation systems in the marketplace, consumers and businesses have been coming up with innovative ways to use the technology in their everyday life. GPS Navigation and Tracking systems keep us from getting lost when we are in strange locations, they monitor children when they are away from home, keep track of business vehicles and can even let us know where a philandering partner is at all times.

Because of this we attend to build a GPS tracking device to solve the mentioned problems.

Our work consists of the GPS module that collects data from satellites and calculates the position information before transmitting them to the user's PC (of Navigation system) or observers (of Tracking System) using wireless technology (GSM).

Index Terms—Navigation, Tracking, GPS, Target and Observer.

I. INTRODUCTION

Nowadays global positioning system and wireless communication system became the most usable techniques all over the world, due to their many advantages and applications. Wireless technology also introduces the principles of mobile communication that can be also be used in some applications.

This paper consists of two Parts:

1. GPS Navigation Device.[1]
2. GPS Tracking Device

The GPS Navigation device is a PC required system that will display position information to user; this Position information can be put on Google Maps or any mapping software. In order to make this part we used the GPS module and connect it to PC.

The GPS Tracking Device is a small device which plugs into mobile phone to make a GPS tracker .The Tracker responds to text message commands, and sends you its exact position in SMS (or Email) mode, ready for Google Maps or your mapping software, in order to make this part we used GPS module that provide the position data which was processed by a microcontroller, this microcontroller is connected to a Motorola phone that sends the position information to the observer by an SMS.

Figure 1 shows the block diagram of our design.

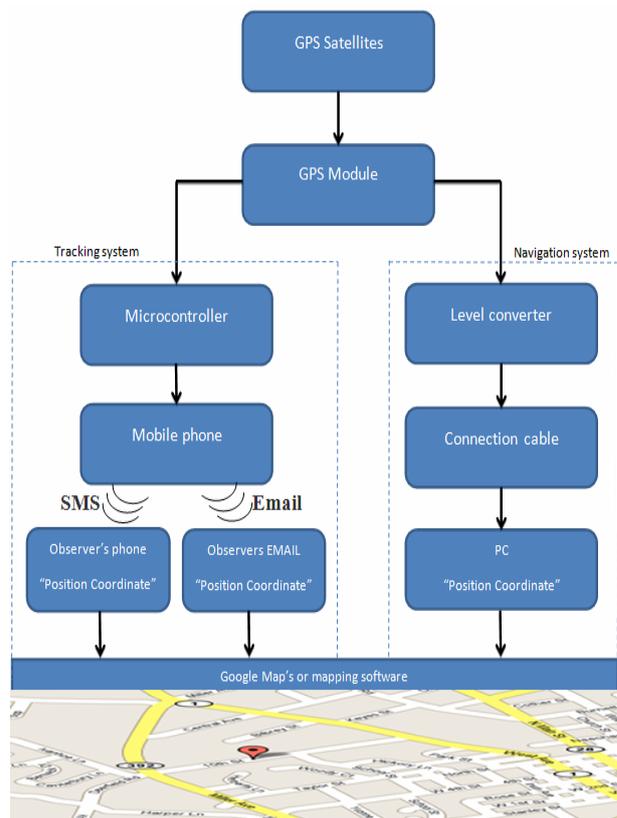


Figure 1. Design Block Diagram

II. PART 1: GPS NAVIGATION DEVICE

This system has four parts:

- GPS module EM 408.
- Level converter MAX3232.
- PC connection RS232 (9 pin).
- PC

As we mentioned in the block diagram, one of the applications that we want to apply on our project is connect PC with the GPS module, which receives the coordinate information. Then the level converter converts voltage level from TTL level to CMOS level. After that the PC receives position information and gives it to user. The user uses it to know his position on the Google maps or mapping software.

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The software that support the GPS receiver is:

- BSGPS.
- Sirf(DEMO).

BSGPS: We used this program because this software is free and user friendly, and have the ability to detect the GPS module by scanning the PC ports, and have an integrated Maps in the same program. In figure 2 [2] we could see that the position is obtained after waiting a few minutes. We noted that the accuracy is very high. The system was taken inside a building.

Sirf(DEMO): This is the second Program that we used in our project. We used this program because it's free and user friendly, and have an additional features like GPS radar which show the satellites in view.

After selecting the PC port then click in the connect button on the program, it is start receiving data from the GPS and after a few minutes the location is maintained. The figure 3 shows the program screen after the location is obtained.[3]



Figure 2. BSGPS program interface (Navigation device)

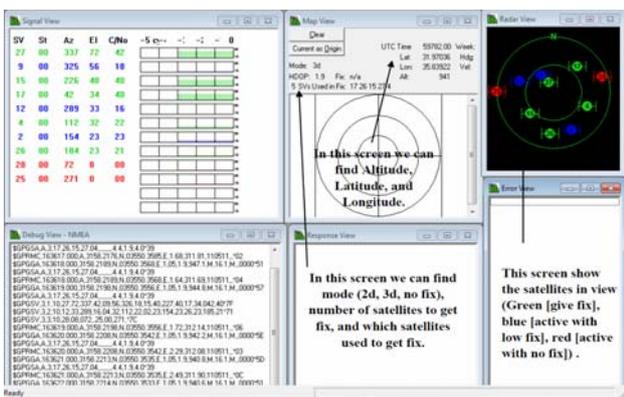


Figure 3. Sirf DEMO program interface (Navigation device)

III. PART 2: GPS TRACKING DEVICE

This system have three parts:

- EM 408 GPS module.
- ATMEL Attiny84 Microcontroller.
- Motorola C168 phone.

As we mentioned in the block diagram, one of the applications that we want to apply on our design is the Tracking system and here is a short summary of how it works:

GPS module receives data from GPS satellites. The module calculates the exact position of the Tracker in the form of NMEA Data. The output data (NMEA) of the GPS module will be received by the MCU, and then the MCU will process an SMS (or Email) have the coordinate of GPS (longitude, latitude, time and date) then the MCU command the Motorola phone to send that SMS (or Email) to the destination (observer).

The observer will receive an SMS containing the exact position of the tracker (longitude, latitude, height, date and time....).Figure 4 shows the received message.

Figure 5 shows the complete circuit of our design

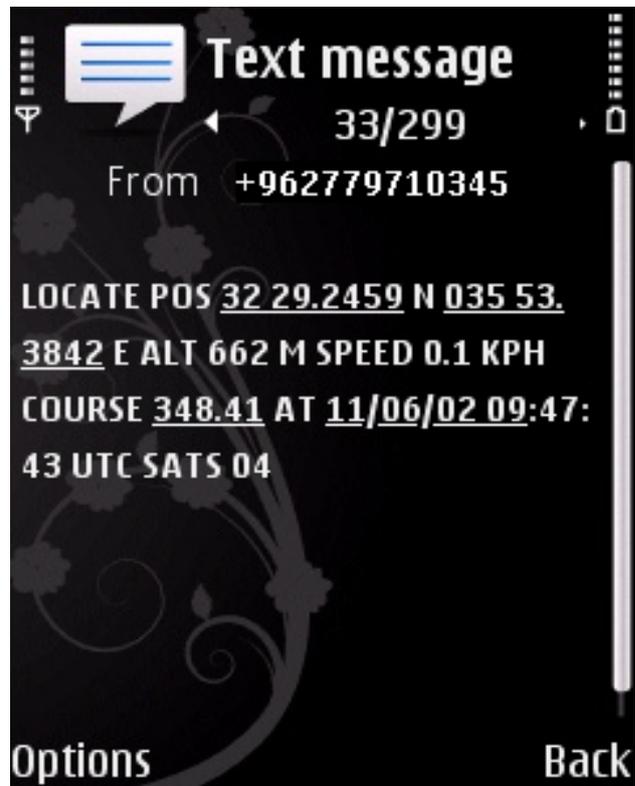


Figure 4. Message received by the observer containing the position of the tracker

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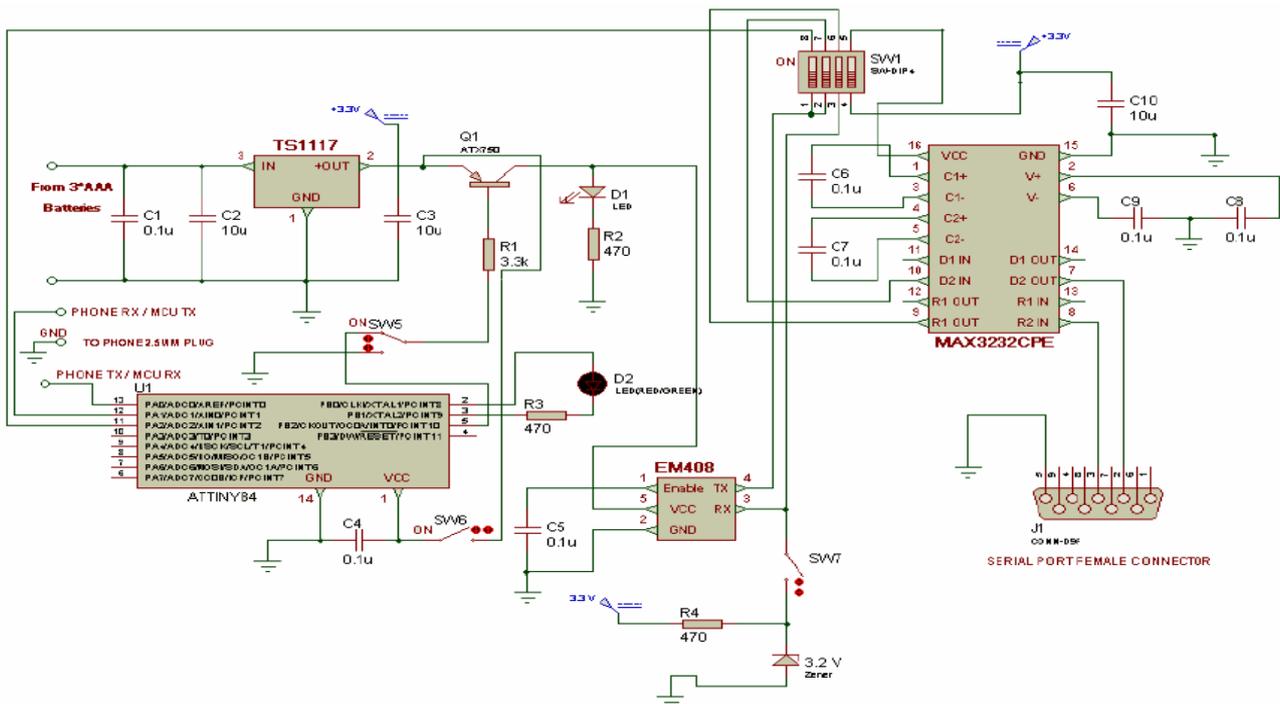


Figure 5. circuit diagram of our design

IV. CONCLUSION

1. Our GPS Navigation and Tracking device is a very precise positioning device use in local (Navigation mode) or remotely (Tracking mode).
2. GPS Navigation and Tracking systems are very important for our daily life (business, vehicle and people).
3. GPS Tracking device must be used safely and put in good hands so it will not be used by bad staff.

V. FUTURE WORK:

We will try to add new features (operations) for our tracking device like security and give the observer more commands to control the operation of the tracker.

REFERENCES

- [1] <http://forum.sparkfun.com/viewtopic.php?t=6623>
- [2] http://www.afterdawn.com/software/desktop/navigation_maps/bsgps.cfm
- [3] <http://www.4shared.com/file/rN3PDFs1/SiRFdemo.htm>

AUTHORS

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