

High Precision on Vehicle Navigation in Urban Environments Using Mem's IMU and Single Frequency GPS Receiver



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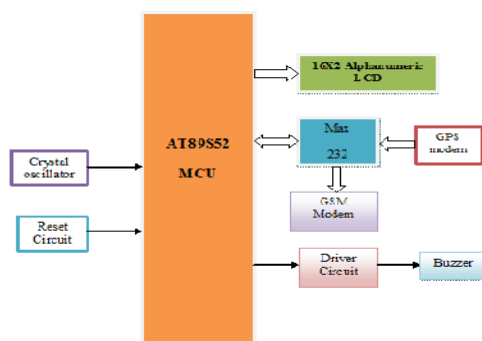
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Abstract:

Reliable high precision navigation is a core functionality for autonomous and safety assisted highway vehicles. This Project presents an automotive localization system using GPS and GSM services. The system permits localization of the automobile and transmitting the position to the owner using internet.

Existing System

This tracking system is composed of a GPS receiver, Microcontroller and a GSM Modem. GPS Receiver gets the location information from satellites in the form of latitude and longitude [1], [3]. The Microcontroller processes this information and this processed information is sent to the user/owner using IoT module. We are using AT89S52 [3], [2] as our controller. This application is a low cost solution for automobile position and status, very useful in journey. The proposed solution can be used is best solution for monitoring. We are using a Mems sensor to identify accident. During such disaster the message will be sent.



Drawback: Traditional using the low-cost single frequency GPS receiver and MEMS inertial measurement unit (IMU), with the application in GPS

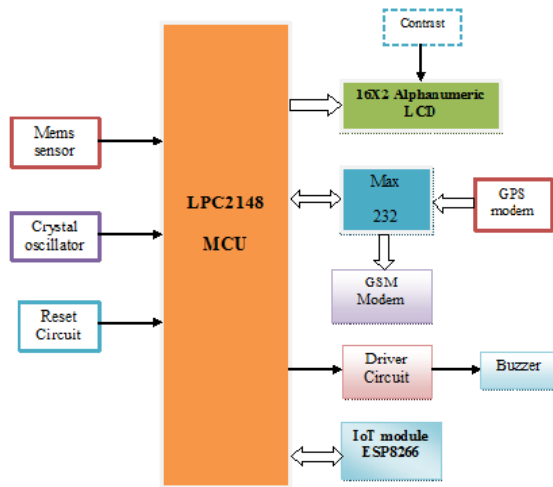
Proposed System

Many applications demand high-precision navigation in urban environments. Two frequency real-time kinematic (RTK) Global Positioning System (GPS) [4] receivers are too expensive for low-cost or consumer-grade projects. As single-frequency GPS receivers are getting less expensive and more capable, more people are utilizing single-frequency RTK GPS techniques [5], [7] to achieve high accuracy in such applications. However, compared with dual frequency receivers, it is much more difficult to resolve the integer ambiguity vector using single-frequency phase measurements and therefore more difficult to achieve reliable high-precision navigation. This paper presents a real-time sliding-window estimator that tightly integrates differential GPS and an inertial measurement unit to achieve reliable high-precision navigation performance in GPS-challenged urban environments using low-cost single-frequency GPS receivers [6]. Moreover, this paper proposes a novel method to utilize the phase measurements, without resolving the integer ambiguity vector.

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Experimental results demonstrate real-time position estimation performance at the decimeter level. Furthermore, the novel use of phase measurements improves the robustness of the estimator to pseudo range multipath error [10].

BLOCK DIAGRAM



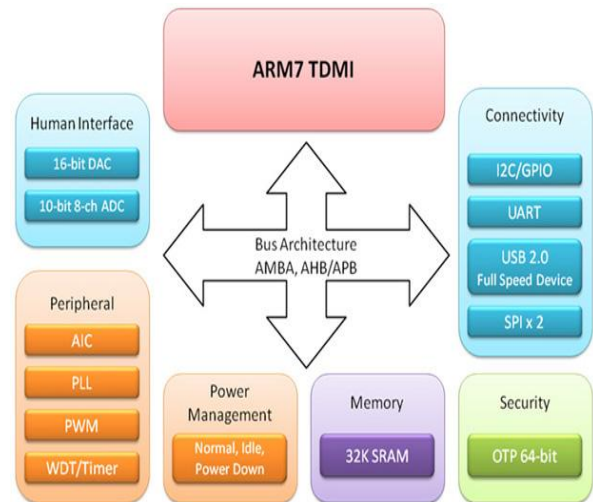
Modules Used in This Project:

The **LPC2148** are based on a 16/32 bit ARM7TDMI-ST[™] CPU [8], [9] with real-time emulation and embedded trace support, together with 128/512 kilobytes of embedded high speed flash memory.

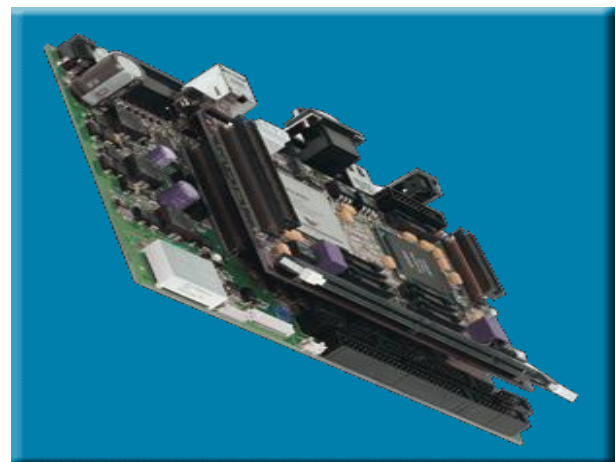
A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at maximum clock rate. For critical code size applications, the alternative 16-bit Thumb Mode reduces code by more than 30% with minimal performance penalty. With their compact 64 pin package, low power consumption, various 32-bit timers, 4- channel 10-bit ADC, USB PORT, PWM channels and 46 GPIO lines [12], [14] with up to 9 external interrupt pins these microcontrollers are particularly suitable for industrial control, medical systems, access control and point-of-sale.

With a wide range of serial communications interfaces, they are also very well suited for communication gateways, protocol converters and embedded soft

modems as well as many other general-purpose applications.



ARMPROCESSOR



ARM7TDMI Processor Core

- Current low-end ARM core for applications like digital mobile phones
- TDMI
 - T: Thumb, 16-bit compressed instruction set
 - D: on-chip Debug support, enabling the processor to halt in response to a debug request
 - M: enhanced Multiplier, yield a full 64-bit result, high performance
 - I: Embedded ICE hardware
- Von Neumann architecture

GLOBAL SYSTEM FOR MOBILE:

Global System for Mobile (GSM) is a second generation cellular standard developed to cater voice services and data delivery using digital modulation [11].

Cellular is one of the fastest growing and most demanding telecommunications applications. Cellular systems using a digital technology will become the universal method of tele-communications.



GLOBAL POSITIONING SYSTEM:

The Global Positioning System (GPS) is a worldwide radio-navigation system formed from a constellation of 24 satellites and their ground stations.

GPS uses these "man-made stars" as reference points to calculate positions accurate to a matter of meters. In fact, with advanced forms of GPS you can make measurements to better than a centimeter! In a sense it's like giving every square meter on the planet a unique address. GPS receivers have been miniaturized to just a few integrated circuits and so are becoming very economical. And that makes the technology accessible to virtually everyone. These days GPS is finding its way into cars, boats, planes, construction equipment, movie making gear, farm machinery, even laptop computers. Soon GPS will become almost as basic as the telephone. Indeed, at Trimble, we think it just may become a universal utility [13].



Directly connects to dry electrode (as opposed to conventional medical wet sensors)

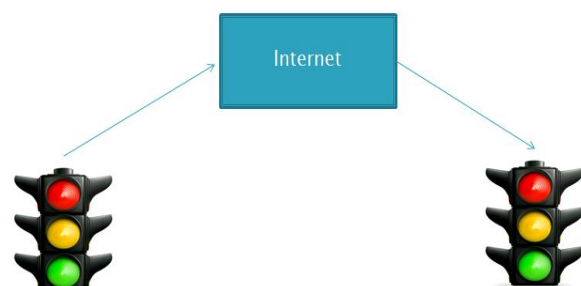
- One EEG channel with three contacts: EEG; REF; and GND
- Improper fit detected through "Poor Signal Quality" warning from ASIC to reset if off the head for four consecutive seconds, or if it is receiving a poor signal for seven consecutive seconds
- Advanced filtering technology with high noise immunity
- Low power consumption suitable for portable battery-driven applications
- Max power consumption 15mA @ 3.3 V
- Raw EEG data output at 512 bits per second

INTERNET OF THINGS

Internet is helping people to communicate each other using different applications



Traffic Light Wants to communicate to other traffic light using internet?



Internet of things helps the things to communicate each other using IoT module

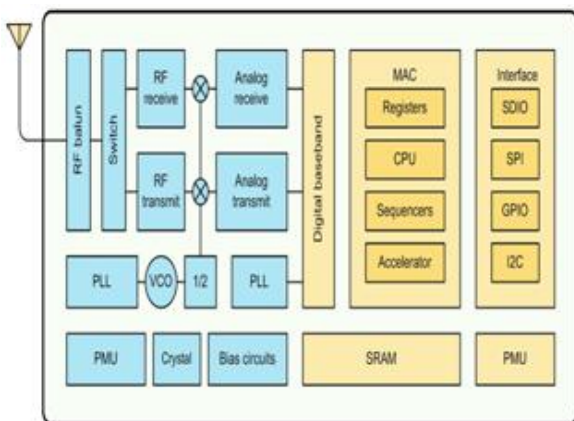
ESP8266EX

The Internet of Things (IoT) is the network of physical objects or "things" embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data.



Wi-Fi module

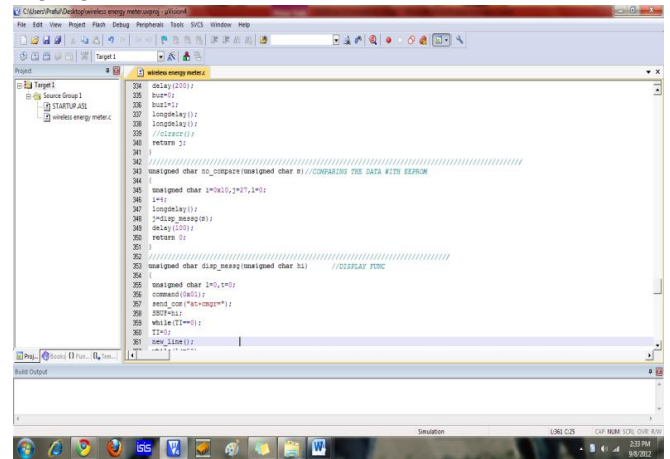
ESP8266EX offers a complete and self-contained Wi-Fi networking solution; it can be used to host the application or to offload Wi-Fi networking functions from another application processor. When ESP8266EX hosts the application, it boots up directly from an external flash. It has integrated cache to improve the performance of the system in such applications. Alternately, serving as a Wi-Fi adapter, wireless internet access can be added to any micro controller-based design with simple connectivity (SPI/SDIO or I2C/UART interface).



Software Tools

Keil compiler is a software used where the machine language code is written and compiled. After compilation, the machine source code is converted into hex code which is to be dumped into the microcontroller

for further processing. Keil compiler also supports C language code.



Flash Magic

Flash Magic is a tool which is used to program hex code in EEPROM of micro-controller. It is a freeware tool. It only supports the micro-controller of Philips and NXP. It can burn a hex code into that controller which supports ISP (in system programming) feature. Flash magic supports several chips like ARM Cortex M0, M3, M4, ARM7 and 8051 [7].



Advantages:

- Sophisticated security
- Monitors all hazards and threats
- Alert message to mobile phone for remote information
- It provides more security than other system.
- From the remote place we can access the system.
- By this we can position the vehicle in exact place.

Applications:

- Security, Remote monitoring, Transportation and logistics
- Field service management

Conclusion

Vehicle tracking during accident is becoming increasingly important in large cities and it is more secured than other systems. Since, now-a-days the cost of the vehicles are increasing they will not step back to afford it.

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