DESIGN OF DIFFERENTIAL GPS SYSTEM AND FARM APPLICATIONS

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Abstract : Sensor node deployment in differential GPS is application dependent and affects the performance of the routing protocol. Sensor nodes can be scattered randomly in a specified area or dropped massively over a remote or hostile region in most of the applications.

When the resultant distribution of nodes is un-uniform, optimal clustering helps in Connectivity and enabling energy efficient network operation.

A sensor network generally operates in a dynamic and unreliable environment. The network topology, defined by the sensors and communication links between them, changes frequently because of sensor addition, deletion, damages, node failures or energy depletion. Furthermore, the sensor nodes are linked by a wireless medium, which is noisy, susceptible to errors and time varying. Therefore, routing protocols should consider network topology dynamics to maintain particular application requirements in terms of coverage and connectivity. The current article highlights the design of differential GPS.

Index Terms: Sensor, Node, GPS, Differential

1. INTRODUCTION

Sensor nodes may generate significant redundant data. So, similar packets from multiple sensors can be aggregated to reduce number of transmissions. Data aggregation techniques are used to achieve energy efficiency and to optimize data transfer in the routing protocols.

Since the sensor nodes are battery powered having limited energy capacity, energy is a big challenge for the network designers in hostile environments. For example, in a battlefield, it is almost impossible to access the sensors and recharge their batteries. Also, when the energy of a sensor reaches a certain threshold, it may become faulty and may not be able to function properly, which can have a major impact on the network performance. Thus, routing protocols designed for GPS should be as energy efficient as possible to extend the lifetime of the sensors and hence prolong the network lifetime while guaranteeing decent overall performance.

Another challenge that is faced during the design of routing protocols is to manage the locations of the sensors. Most of the protocols assume that the sensors either are equipped with GPS receivers or use some localization technique to learn about their positions.

Routing protocols should be capable of scaling with the network size. Also, sensors need not necessarily have the same capabilities in terms of energy, processing and communication. So, communication links between sensors may not be symmetric (i.e. .a pair of sensors may not be able to have communication in both directions). This should be taken care of in the design of routing protocols.

A lot of research has been conducted into ways of creating these organizational structures (or clusters). A clustering scheme divides the sensor nodes in a GPS into different virtual groups, according to some set of rules. In a cluster structure, sensor nodes may be assigned a different status or function, such as cluster head or cluster member.

A GPS is an autonomous system of sensor nodes. It has a Base Station and sensor nodes. Sensor nodes collect data from their environment and send it to the Base Station. Heterogeneous sensor network contains high energy sensor nodes as well as low energy nodes. A single-tier network can cause the gateway to overload with the increase in sensors density.

Such overload might cause latency in communication and inadequate tracking of events. In addition, the single-tier architecture is not scalable for a larger set of sensors covering a wider area of interest because the sensors are typically not capable of long-haul communication. Hierarchical clustering is particularly useful for applications that require scalability to hundreds or thousands of nodes. Scalability in this context implies the need for load balancing and efficient resource utilization.

2. WORK STUDY

All nodes in a network can be organized in hierarchical structures called clusters. Each cluster consists of a cluster head and several member nodes. The member nodes collect data and send it to their cluster heads. The cluster head aggregates and transmits the data to the Base Station. The energy consumption of cluster heads is higher than that for member nodes.

In most cases the development of applications is close to operating system, so you must deal with situations involving low level, such as distributed protocols. These capabilities are rare in the current developers. A typical virtual private network consists usually by hundreds and in some cases thousands of nodes. In real situations is very difficult to establish a wired backbone, the that is used for all programming and each of the nodes, turning this into a task of high difficulty

The most efficient, which was tested and evaluated in a wireless network consisting of 40 nodes that detect ammonia leaks in real-time solution determined that the key point is to reduce energy consumption product confirmations and unnecessary retransmissions of data and procedures from the virtual private nodes to the base station. This fact, besides the decrease in energy consumption is a significant savings in the convergence time of the network.

The virtual private module is composed of part, by specific devices that capture data variables such as temperature, humidity, levels radiation, ammonia, methane, etc. and the other, for analog and digital converters. Consumption Power for the module is the execution of operations such as sampling of the signal, the analog / digital conversion or signal modulation. The virtual private module can operate in random mode or on a periodic basis, according to the configuration predetermined by the system administrator. Note that, in general, the operation of this module on a periodic basis is preferred. Assuming that energy consumption in operations open (open), close (close) are constant, the energy consumed by the virtual private can be expressed

3. DISCUSSION

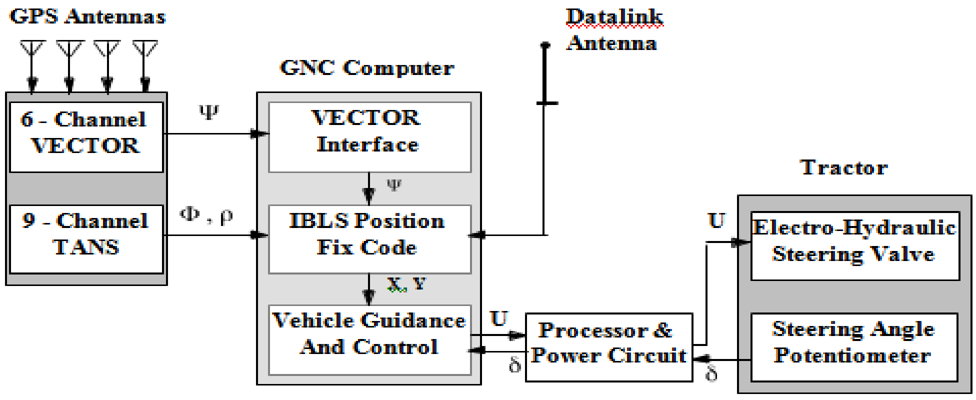
A GPS signal is bent and slowed in its passage through the troposphere. The tropospheric correction must therefore be subtracted from the observed pseudo range. The propagation delay of the troposphere reaches about 2.0-2.5 mtr at zenith.

Since most GPS antennas are omnidirectional, enabling signals from several satellites to be received simultaneously, these antennas are susceptible to multipath because of reflections from nearby objects. Multipath corrupts the pseudo range measurements with systematic, time-dependent sinusoidal signals associated with variable receiver-satellite-reflector geometry over a pass. Low elevation angle observations tend to be most affected, and for this o 0 reason a cut-off angle of 10 -20 above the horizon is usually employed. Multipath can be minimized through use of radio frequency absorbent material around the base of the antenna, mounting antennas close to the ground, and careful site selection, choosing sites well away from planar-reflecting surfaces. Without precautions, range errors due to multipath interference can reach values in the order of 2-10 metres, with a required signal averaging time to remove the multipath cyclical effects of 5-60 minutes.

The carrier phase ambiguity introduces an unknown for each satellite which is being tracked. Phase measurements are therefore not suitable for instantaneous single point positioning. This in contrast with the pseudo range observable. Phase measurements can be used in principle however for static single point positioning. That no actual static single point positioning applications can be found for the phase measurements, is due to the fact that in this case no advantage can be taken from the very high precision of the phase observable (the additional uncertainties in the clocks, the ephemeris and atmosphere, prohibit high precision single point positioning) and also that relatively long observation times are needed to determine the single carrier phase ambiguities (which makes it an unattractive method for the navigator).

It is important to note that both nodes the processor and the GPS components sensors must work cooperatively to perform a computational task; this fact implies the existence of a mutual relationship between all components and, hence, this relation energy consumption affects the entire node. Accordingly, in the calculations of evaluation performance should not be considered linearly independent, but should be account each component to calculate Full of energy consumed by the node.

A. **VEHICLE HARDWARE ARCHITECHTURE :**
B. **BLOCK DIAGRAM OF DGPS**



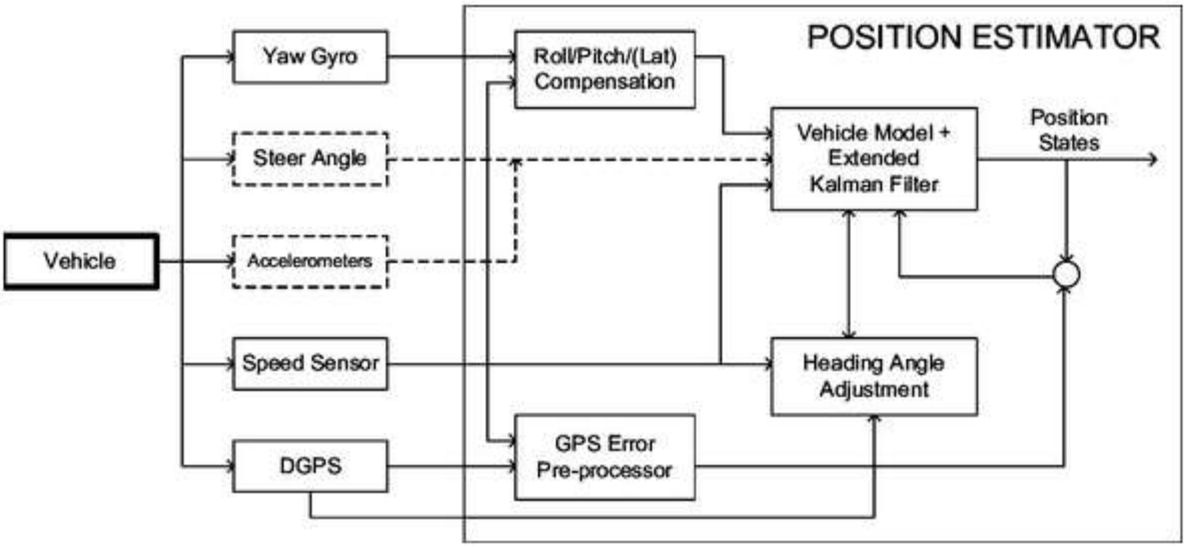


Fig 2: Block Diagram of DGPS for vehicle tractor

4. CONCLUSION

The key to making a successful use of phase measurements lies in the concept of relative positioning. Geodesists and surveyors were the first to realize that relative positioning enables one to eliminate or greatly reduce the errors and therefore obtain position data in the centimeter-level or better which is required for most geodetic and geophysical applications.

The method used for performance evaluation is based on the measurement of energy consumption during the migration process of mobile agents between smart virtual private nodes and calculating the convergence time of the network, defined as the time it takes for the network move from one state to another; in experiments refers to the delay in the change of the sampling time for the entire network.

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