GPS TECHNOLOGY

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Abstract—GPS, formally known as the Navstar Global Positioning System, is operated and maintained by the United States Department of Defense. The National Space-Based Position, Navigation, and Timing Executive Committee manages GPS. The deputy secretaries of the Departments of Defense and Transportation lead the committee, which has a permanent staff that is responsible for the development of GPS. GPS was initiated in 1973 to reduce the proliferation of navigation aids. By overcoming the limitations of many existing navigation systems, GPS became attractive to a broad spectrum of users. It was initially used as a navigational aid by military ground, sea, and air forces. In more recent years, GPS has been used by civilians in many new ways, such as in automobile and boat navigation, hiking, emergency rescue, and precision agriculture and mining. Precise satellite-based navigation and location system originally developed for U.S. military use. GPS is a fleet of more than 24 communications satellites that transmit signals globally around the clock. With a GPS receiver, one can quickly and accurately determine the latitude, the longitude, and in most cases the altitude of a point on or above Earth's surface. A single GPS receiver can find its own position in seconds from GPS satellite signals to an accuracy of one meter; accuracy within one centimeter can be achieved with sophisticated military-specification receivers. This capability has reduced the cost of acquiring spatial data for making maps while increasing cartographic accuracy. Other applications include measuring the movement of polar ice sheets or even finding the best automobile route between given points.

Index Terms—

1 INTRODUCTION

THE GPS (Global Positioning System) is a constellation of 24 well-spaced satellites that orbit the Earth and make it possible for people with ground receivers to pinpoint their geographic location. The location accuracy is anywhere from 100 to 10 meters for most equipment. Accuracy can be pinpointed to within one (1) meter with special military-approved equipment. GPS equipment is widely used in science and has now become sufficiently low-cost so that almost anyone can own a GPS receiver. The GPS is owned and operated by the U.S. Department of Defense but is available for general use around the world. Briefly, here's how it works:
First, 21 GPS satellites and three spare satellites are in orbit at 10,600 miles above the Earth. The satellites are spaced so that from any point on Earth, four satellites will be above the horizon. Second, each satellite contains a computer, an atomic clock, and a radio. With an understanding of its own orbit and the clock, it continually broadcasts its changing position and time. (Once a day, each satellite checks its own sense of time and position with a ground station and makes any minor correction.)
Third, on the ground, any GPS receiver contains a computer that triangulates its own position by getting bearings from three of the four satellites. The result is provided in the form of a geographic position - longitude and latitude - to, for most receivers, within 100 meters.

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Fourth, if the receiver is also equipped with a display screen that shows a map, the position can be shown on the map.
Fifth, if a fourth satellite can be received, the receiver/computer can figure out the altitude as well as the geographic position.
Sixth, if you are moving, your receiver may also be able to calculate your speed and direction of travel and give you estimated times of arrival to specified destinations.

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2 How can use GPS technology

Global Positioning System (GPS) technology is changing the way we work and play. Everyone can use GPS technology in many fields such as: driving, flying, fishing, sailing, hiking, running, biking, working, or many different things.
Here are some examples of how GPS technology can be use:
Get the closest location of your favorite restaurant if you are out of town.
Find the nearest airport or identify the type of airspace in which you are flying.
Pinpoint the perfect fishing spot on the water easily relocate it.
Know precisely how far you can have run and at what tracking your path so you can find your way home.
The GPS is being used in science to provide data that has never been available before in the quantity and degree of accuracy that the GPS makes possible. Scientists are using the GPS to measure the movement of the arctic ice sheets, the Earth's tectonic plates, and volcanic activity.(1)

3 The purpose of GPS

The purpose of this article to introduce the GPS and its use as a tool for dual sport riding and touring. The description of how it works was kept simple and to the point. A number of terms; waypoints, routes, trackback, and go to were explained to help you understand GPS operation.
To allocate the position and get the destination to make the driving , flying , sailing , or exploring more easier.
These days the vast organizations and companies using GPS. Thats because to monitor them drivers to be sure they are discipline in work

4 How does GPS work?

GPS receiver collects information from the GPS satellites that are in view.
GPS receiver determines your current location, velocity, and time..
GPS receiver displays the applicable information on the screen.
The control segment constantly monitors the GPS constellation and uploads information to satellites to provide maximum user accuracy.
GPS receiver accounts for errors.
GPS receiver can calculate other information, such as bearing, track, trip distance to destination, and sunrise and sunset time.(1)

5 The Benefits of using GPS

The GPS is a tool that should supplement good map reading skills. The GPS will make navigation easier and more precise over terrain that is not well mapped. It can help one determine trail heads, side roads and generally make navigation more enjoyable when landmarks are not well defined. It certainly provides a degree of security if one becomes disorientated (lost) and in an emergency situation it could make the difference in finding medical help quickly if a riding buddy were to become injured. The more one uses a GPS the more one finds additional uses that make travel more enjoyable!(1)
The most important benefit for using GPS is to save your time and your money.

6 Who uses GPS?

GPS used from many specializations such as:
Military : Military aircraft , ships , submarines , tanks , jeeps , and equipment use GPS technology for many purpose including basic navigation , target , designation , close air support , weapon technology , and rendezvous.
Agriculture: farmers they use it to monitor the fertilizer and pesticides. Also for marking areas of disease or weed infestation.
Environment: GPS technology helps survey

disaster areas and maps the movement of environmental phenomena like forest fires, oil spills, or hurricanes.
Ground transportation: GPS technology helps with automatic vehicle location and in-vehicle navigation systems. Many navigation systems show the vehicle location on an electronic street map, allowing drivers to keep track of where they are and look up other destinations.
Public safety: Emergency and other specialty fleets use satellite navigation for location and status information.
Surveying: surveyors use GPS technology for simple task like defining property lines or for complex tasks such as building infrastructures in urban centers.
Aviation: Aircraft pilots use GPS technology for en route navigation and airport approaches. Satellite navigation provides accurate aircraft location anywhere on near the earth.
Marine: GPS technology helps with marine navigation, traffic routing underwater surveying navigational hazard location, and mapping commercial fishing fleets use it to navigate to optimum fishing locations and track fish migrations.
Rail: precise knowledge of train location is essential to prevent collisions, maintain smooth traffic flow, and minimize costly delays digital maps and onboard inertial units allow fully-automated train control.
Space: GPS technology helps track and control satellites in orbit future booster rockets and reusable launch vehicles will launch, orbit the earth, return, and land, all under automatic control. Space shuttles also use GPS navigation.(1)

7 How Accurate is GPS?

GPS technology depends on the accuracy of signal that travels from GPS satellite to GPS receiver. The accuracy can increase by ensuring that when use or at least when turn on the GPS receiver. When first turn on the GPS receiver .should stand in an open area for a few moments to allow the unit to get a good fix on the satellites especially if you are heading into an obstructed area. This gives better accuracy for longer period of time.(1)

8 GIS concept

Geographical information systems (GIS) are powerful tools capable of organising, analysing, and displaying large, spatially explicit datasets. To date, GIS has been applied for regional, national or sectoral studies of aquaculture where human resources, specific sites, economics, markets and sociocultural resources have been considered. (4, 5, 6, 7)
A number of large-scale and sectoral studies have been carried out, for example, in the African continent. (7, 4)
A number of studies have further exploited the modelling capacity of GIS, including the development of a model for sitting salmon cage culture on the West Coast of Scotland; an exploration of the potential for rice-fish and fish culture in the Red River Delta, Vietnam.(8)

9 Comparison of GPS and GIS

Introduction: Current methods of assessing routes taken during active transport rely on subjective recall of trip length and barriers encountered enroute or the utilization of objective measures (Geographic Information Systems [GIS]) that may not represent actual travel patterns. This study examined the utility of Global Positioning Systems (GPS) to measure actual routes taken compared with GIS-estimated travel distance and barriers encountered.
Methods: Comparisons between GPS and GIS routes were performed for 59 of 75 children who wore a GPS during the journey to school on a single occasion. Home and school addresses were reported by parents and geocoded in GIS. Children were provided with a GPS and were instructed to travel their normal route to and from school. Data were collected between March and November 2005 and exported to the GIS to determine travel distance, number of busy streets crossed, and the ratio of busy streets to the total streets traveled on. Data analysis was performed in August 2006.
Results: No differences were observed between GPS-measured journeys to and from school on any of the examined variables. No differences were observed between GIS and GPS measures of travel distance.

Conclusions: Geographic Information Systems provides estimates of travel distance similar to GPSmeasured actual travel distances. Travel routes estimated by GIS are not representative of actual routes measured by GPS, which indicates that GIS may not provide an accurate estimate of barriers encountered. The continued use of GPS in active transport research in encouraged.(3)

10 Conclusion

In conclusion, the purpose of this article has been to introduce you to the GPS and its use as a tool for dual sport riding and touring. The description of how it works was kept simple and to the point. A number of terms; waypoints, routes, trackback, and goto were explained to help you understand GPS operation. While collection of GPS data has become considerably easier over the past few years, and it is now possible to collect large quantities of GPS data on personal travel, vehicular travel, etc., the amount of data that may need to be managed and manipulated is larger than many professionals realize. As a result of this enormousquantity of data, it is necessary to develop procedures for managing and manipulating the data, so that useful information can be provided, and so that ready access can be provided to the resulting files. In this paper, we have described a series of procedures that have been developed to manipulate data collected from GPS devices carried by people or placed in personal vehicles, and used to produce records of the trips made over a period of days or weeks. By setting up various algorithms and rules, we have found it to be possible to break the data up into trips with approximately a 95 percent correct rating in identifying real trips. We have developed procedures to correct some of the major potential problems encountered in using GPS devices, such as the cold start problem and urban canyons. Our procedures in these two cases have been found to provide a high degree of accuracy in completing partial records from GPS devices. As a result, we are able to obtain a more complete picture of where a person or vehicle travelled while using the GPS device. Finally, we have developed procedures that allow us to infer the mode and purpose of the majority of the recorded trips. This procedure has allowed us to analyse the data without the need to undertake further questioning of respondents, thereby providing this as a low burden method of data collection. The automation that has been permitted by programming these rules has not only been effective in managing the data and providing ready information to those who may need to review the data. The automation has also provided a potential reduction in the time and effort required to process data on the order of a reduction of 75 to 80 percent of the amounts of time required for a manually assisted procedure.(2)

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References

[1] Htpp://www.Garmin.com
[2] Peter Stopher a,*, Camden FitzGerald b,1, Jun Zhang a,2
[3] Mitch J. Duncan, B.HMSc (Hons), W. Kerry Mummery, PhD
[4] Kapetsky, J.M., 1994. A strategic assessment of warmwater fish farming potential in Africa. CIFA Technical Paper 27. Food and Agriculture Organization, Rome, Italy.
[5] Kapetsky, J.M., Nath, S.S., 1997. A strategic assessment of the potential for freshwater fish farming in Latin America. COPESCAL Technical Paper 27. Food and Agriculture Organization, Rome, Italy.
[6] Kapetsky, J.M., Hill, J.M., Dorsey, W.L., 1988. Geographical information system for catfish farming development. Aquaculture 68, 311 320
[7] Nath, S.S., Bolte, J.P., Ross, L.G., Aguilar-Manjarez, J., 2000. Applications of Geographical Information Systems (GIS) for spatial decision support in aquaculture. Aquacultural Engineering 23, 233 278. Overseas Development Administration, 1985. The Sundarbans Mangrove Forest Inventory Project, Bangladesh, scale 1: 10,000.
[8] SWMC, 1996. Interim Salinity Report. Surface Water Modeling Centre, Dhaka, Bangladesh. Tran, N.T., Demaine, H., 1996. Potentials for different models for freshwater aquaculture development in the Red River Delta (Vietnam) using GIS analysis. Naga 19 (1), 29 32. Viju, I.C., 1995. Issues in the management of the environment and natural resources in Bangladesh. Journal of Environmental Management 45 (4), 319 332.