

3-D ROAD SENSOR NETWORK ANALYSIS BASED ON DEM IMAGES AND UBICONSEYE

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ABSTRACT: UbiConsEye a "construction site automatic control system" as a more convenient and construction of the surrounding terrain and varied spatial object features and locations to investigate and measure the actual construction work on site is in progress the field situation, the desired time and field installation of terrain and facilities in place of the status information that can be configured in real time based on time-based ubiquitous system of management is to develop a construction site. Information on the status of the construction area is connected to a GPS location information with digital images and photos by sensor nodes that point, the analogy of temperature, humidity, and light intensity, wind direction and obtain the necessary information in real time by linking up by the transfer, if necessary smart mobile phone for this configuration to enable the joint is the real time unification of the vector via digital image mapping and raster via exactness evaluation is transformed to make it possible to trace the model of generated 3-dimensional downtown building with long distance for 3D tract model generation.

Keywords : *Spatial Image, DEM, 3D, Road Network Analysis, UbiConsEye, Ubiquitous, Sensor Network, GPS*

1. INTRODUCTION

Construction of the situation to know exactly which to analyze the design to reflect the traditional paper maps and digital map Planar analysis relies on a precise topography of the analysis is very uncomfortable and a lot of making mistakes, so the current real-time information to get into space by modifying the 3-D terrain you can easily visualize and analyze images based on the ubiquitous mobile systems will be developed and applied to one. Every year thousands of construction projects underway throughout the country, which Surveying and design and construction stage of the development of this product in development is completed as planned, if the construction progress at the construction site often because you can see by identifying more precise and more concrete and realistic Reasonable progress of construction is expected to be able to reviews. A simple three-dimensional imaging system based on smart mobile crime scene photos and GPS location information in an integrated manner can be used to develop additional systems and construction Climbing mobile space

will contain video content based on the construction of a new ubiquitous use of the active site to the terminal management .In this paper, the evolving wireless communication technology capable of USN and graphics-based programming can be applied to a microprocessor (LM3S8962) and by construction of interfaces for wireless communications; sensor information acquired from the environment and represent the information fusion technology on the PC implemented. Sensors capable of wireless communication in the construction of a single sink sensor node, depending on the environment (Sink Sensor Node) and the measurements of multiple sensor nodes (Measuring Node) is composed from these measurements information on each of the wireless sensor nodes communication is possible through the USN through microprocessor-based programmable graphics automatically be converted at compile C Program is to obtain information. The results from the sensor data measured TCP / IP (Transmission Control Protocol and Internet Protocol) is processed in accordance with the

method TinyOS-based PC (Windows) on the screen as an image by indicating the change of environment information, situational awareness and the progress of the construction site is feedback of design changes and can be used, etc..

2. Procedure and DEM Generation and USN data collection

After preparation of images and data, which is suitable for the purpose of this study, we've got to find the precise geographic coordinate of target district on the images. For this reason, we carried out Geometric Correction using to make three images, which are different from each other in resolution, fit into Geographic Coordinate and after that, carried out Close Ortho Correction using TM Coordinate, a geographic coordinate especially used for the current construction design. The basic map projection method for Ortho Correction Image Mapping is TM E002 Projection. And that is the map projection method being used by National geographic institute (NGI) for mapping. For data Input, The primary satellite image used in this study is the images from Arirang-2 (hereinafter KOMPSAT)and aerial photos by NGI. Prepare HDF formatted Panchromatic Band 1 captured by EOC sensor and calculate the orbit information of the moving satellite. And then, for DEM Creation, the Convert DXF formatted file of 1/5,000 Topographic Map to GIS formatted file.

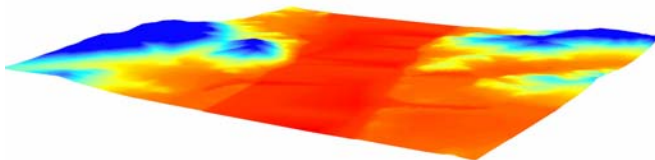


Fig.1. DEM of RGB expression

For ortho Correction Image Mapping, we processed of Collecting GCP To get precise ortho-correction image, we collected coordinate values of GCP corresponding to specific points of satellite image using files of 1/5,000 Topographic Map and DEM files. In this study, once we found the location of a fixed construction such as a building roof, end point of a bridge and a corner of road, we could get TM coordinate and the altitude of the construction on digital map.

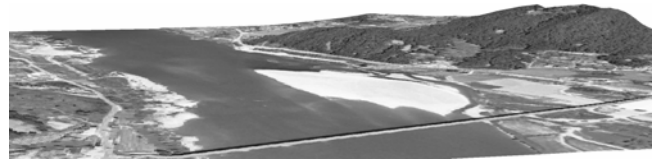


Fig.5. Perspective road view from the aerial Photos

First experimental construction site to collect images of the digital maps and photos, and able to match the basic geospatial field around the edited video of the three-dimensional space to create the database. Ubiquitous sensor network (USN) based on the construction site and surrounding area prior to a survey by the various space image data directly at the crime scene and the International Table, John qualified Zigbee module to transfer data while re-editing a new category makes the location information based on the automatic matching. This system is specially created three-dimensional space, the scene of the latest development of the spatial information in real time by the attached system should be set in a mobile environment. In other words, construction technology, Edition 3-D spatial information using mobile phones and related site information a variety of sensors that can be used on a construction site by site investigation and construction management for the management to take advantage of the system from anywhere. 1) The destination selected and the USN configuration, 2)The region's existing digital maps and spatial image information using the three-dimensional Building construction, 3)The data collected from the sensor board temperature, humidity and illumination of the real-time database design and development proceeds in the order of was. Figure 1 is capable of wireless communication and microprocessor Ad-Hoc USN (LM3S8962) shows the system to interface with USN 3 capable of wireless communication from one measurement sensors measured temperature, humidity and light intensity data on the environmental information through the sink sensor node UART.

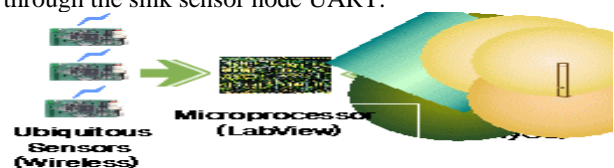


Fig. 3. Interface with USN and Microprocessor System

3. 3D Roads Sensor Network Mapping on the DEM and Images apply with UbiConsEye

For Perspective Image Mapping, we used the image creation techniques based on Projection View Method. As preliminaries to Perspective Image Mapping, it prepared information like table1. and set up fusion-image mode to express textures of terrain softly.

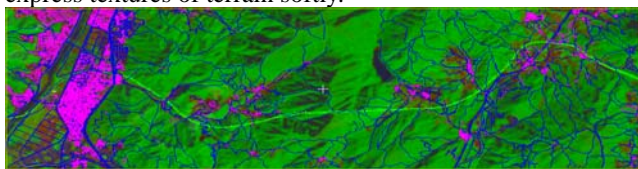


Fig.4. RGB DEM + vector roads

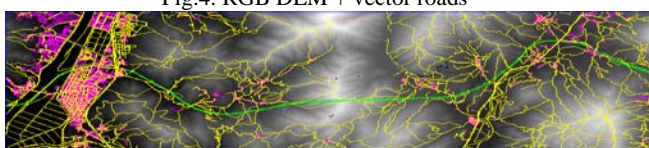


Fig5. DEM + vector roads



Fig. 6. USN Surveying results on construction site

4. Results and Prospect

This study has been accomplished as a experimental study for 3D Perspective Image Map analysis of terrain along the 10km long section for a new construction planning technique and for the most reasonable optimum route selection. Lately, as various sensors of satellite and aircraft made collecting of spatial information easier and we can easily get spatial information with high resolution, and more than 3D spatial analysis techniques and time-spatial analysis techniques are being developed Ubiquitous sensor networks for wireless communications, micro-processor system is configured as a graphics based programming technique by using the convenience and ease of programming can be of advantage. Not only that sensor node for wireless communications in Ad-Hoc network configuration by using the existing AP (Access Point) Infra-Structure by a measure of the network more convenient ways you can tell. USN wireless communications technology and graphics processing based on fusion of the benefits and convenience of a micro-

processor system, the city construction sites to identify and change the course of providing the information necessary for the peak of construction information can be de-backs may be allowed to goals. Ubiquitous sensor network (USN) based on the construction site and surrounding area prior to a survey by the various space image data directly at the crime scene. Zigbee module to transfer data while re-editing a new category makes the location information based on the automatic matching

REFERENCES

- [1]Sangho Yeon, "A study on the stereo image map generation of Chuncheon area using satellite overlay images", Journal of the Korea Association of GIS, Vol.3 No.4, pp.1-10, 2000.
- [2]Paul Mather, "Computer Processing of Remotely-Sensed Image", John Wiley Sons pp.189-202, 1987.
- [3]Sang-ho Yeon, "Application of spatial information for survey and analysis of market authority of mid and small city"
- [4]Hanbaec Electronics Research Lab, "u-sensor network system using ZigbeX", ISBN 978-89-90758-12-5, 2008.
- [5]D. Gay, P. Levis, R. von Behren, M. Welsh, E. Brewer and D. Culler, "The NesC Language: A Holistic Approach to Networked Embedded Systems", Proceedings of Programming Language Design and Implementation, June 2003.