CAMPUS MAPPING AND MONITORING SYSTEM OF ANNA UNIVERSITY USING GEOSPATIAL TECHNIQUES

M.Mohamed Nasurudeen [1], B.Yugesh Kumar [2]

[1]. Assistant Professor, Department of Civil Engineering, V.S.B Engineering College, Karur,Tamilnadu,India

[2]. Assistant Professor, Department of Civil Engineering, V.S.B Engineering College, Karur,Tamilnadu,India

Ph: 9600051353, Email id:najru.deen@gmail.com

Abstract

GIS-based maps and visualizations greatly assist in understanding information about the location. This system mainly deals with location mapping and monitoring of the wide area and also develop their infrastructure facilities. Satellite images and shape files can be used to create 3D models, but they cannot provide a realistic view due to the lacking of texture and other information. The objective of this study is to develop a map and visualization 3D Model using open source software. And it is available in .exe format. This Interaction between the user and the system for a time could be in a predefined digital animation and this system could be used for viewing data and performing analysis. Since 3D data is very high cost software for to do analysis. An effort has been taken to overcome this problem and to develop the Campus Monitoring System. This system caters the needs of common people as well as administrators in planning and future developments. This system is developed for Anna University.

Key words: 2D Map, 3D Model, Google SketchUp, Google Earth, 3D Explorer.

Introduction

Nowadays geospatial technologies are expanding in various applications. Geographic Information System is a consistent tool in creating and providing rectified geo-referenced information, which can be used by different groups of people depending on their requirements. Campus mapping and monitoring system uses geospatial technology to provide information and services to end users or other information systems. It is a software application having the purpose of publishing and maintains data. It includes development which will contribute considerably to the fulfilment of any of the objectives of the Spatial approach or any regional planning guidelines for an area or which would have considerable effects or the area of more than one planning authority. Here we have taken Anna University Guindy, Campus as our object for implementation to campus monitoring system. We

integrated spatial layers information in QGIS Platform in which we will be using satellite image, building height information and 3D point features.

This model will be published through both online and offline to visualize the layers. Visualization is used to organize spatial and non-spatial data and their features that can be analyzed and displayed as maps, three dimensional scenes and attribute tables.

Campus Mapping and Monitoring system is mainly used to integrate the building information and its 3D visualization. This system contains 2D campus map, 3D building models, Campus Monitoring system and offline 3D explorer system. There are various open source software's are used Such as Google Earth, Quantum GIS, Google SketchUp and Action scripts. Quantum, GIS is used to create 2D map and their shape file format. The shape file contains all the attribute features of the selected area.3D building models are created by using Google SketchUp. Google Earth is providing a realistic view of SketchUp model with their 3D features. Finally the whole model will be converted into .exe file using action script. This system helps to explain how 3D models can be visualized in online and offline. The main benefit of the system is that deals with infrastructure and resource management.

Objectives

The main objective of this study is to know the implementation of technology behind development of Campus mapping and monitoring system by using open source software and standards. Our objectives will be mapping the existing and proposed infrastructure of Anna University campus. The followings are the main aspects,

- Creation of 2D map with their spatial features of Anna University campus, Chennai.
- Designing the campus monitoring system which includes creating a base of 3D model which has 3D Buildings,

Roads, Land use, and all 3D features using Google Sketch up.

- Developing the 3D Explorer system which includes different modules such as flythrough module, walkthrough module and graphical user interfaces.

Further similar techniques are used to develop the Campus mapping and monitoring system.

Study Area

The study area of Anna University campus, Chennai is located in Tamilnadu and approximately lies within latitudes 13°0'34.09'' –13°1'4.91''N and longitudes 80°13'41.83"S-80°14'27.59"S.The campus has a rich geographical area is about 122 acre with continuous changes and developments happening in building / extending the infrastructure.
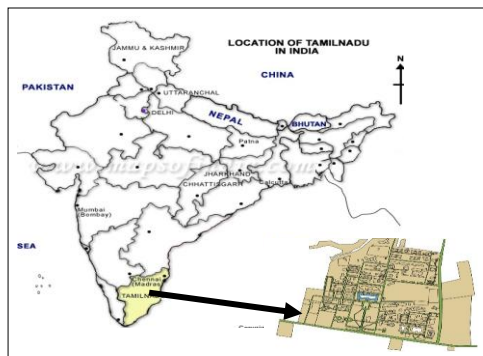

Figure 1: Study Area

Methodology

This below methodology includes creation of 2D campus map, shape files, 3D building models and designing of graphical user interfaces.
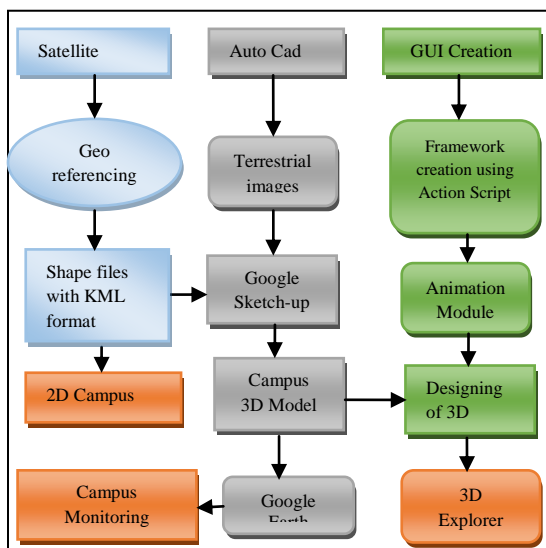

Figure 2: Flow chart describing step by step process

A. Creation of 2D Campus Map

Initially the satellite image is taken from Google earth and imported into open source Quantum GIS software. The individual images are registered and geo-referenced with the ground control points. Thematic layers are created through screen digitization using QGIS software. All the point information collected from the campus map was maintained with several attributes including feature name, street address and location, user type, service, and handicap accessibility(*Figure 1*).A map layer including campus roads, new buildings, correct building locations or building shapes, parking layers to provide further reference for location (*Figure 2*).

Figure 3: Shape files with layers

Figure 4: 2D campus map of Anna University

B. Creation of 3D Modelling

The process of designing 3D building models is carried out by using Google SketchUp software. This SketchUp tools are mainly used to integrate the spatial location of buildings and its height information. It has following process

1. Initially shape files are converted into different KML format by using Shape to KML converter, and then import it into Google SketchUp.
2. SketchUp tools are used to import the CADD files of the feature layers directly into Google SketchUp and by giving extrusion with correct height information.
3. Terrestrial images are directly imported into a particular face of the building and added as uniform textures.
4. Finally it is converted into geo-referenced format (KML), animation file and video files.

Figure 5: Controller of Examination Building

Figure 6: Red Building Anna University

Figure 7: Birds Eye view of Anna University

C. Campus Monitoring System

Campus Monitoring Systems is a Google earth based system. Google Earth is one of the software to provide a realistic view of 3D model in online. It has various navigation options such as street view, flight mode etc. The whole campus model was imported into the Google earth. Google Earth is used to visualise the 3D features which are created by the user input. These 3D models can be viewed by all the users of the software. The buildings visualised in Google Earth, are generally created through open source software such as SketchUp or other 3D modelling software and imported as KML/KMZ file formats. The Campus Monitoring System which assists the public, students and staffs to get basic information about the university in an interactive way, such as location of various departments, offices, auditoriums etc. Each interface has its own data accessibility and levels of information displayed.

Figure 8: Campus monitoring system

D.3D Exploration System

3D explorer displays the model as well as allows interaction with the final model. This includes movement as well as a number of other display options. It features customizable input methods using the keyboard and mouse, as well as an interface to interact with various program variables. It contains walkthrough and flythrough module. This 3D model is also useful for Navigation. Walkthrough module fixed initial position within the 3D campus model and then allows her to walk around the campus using standard VRML navigational controls. Flythrough module fixed initial position in the air above the campus allows her to use VRML navigational controls to fly around the model and hence gain a birds-eye perspective. Graphical user interface module has different no of 3D display options and shortcuts. The application provides relevant information to the user as they are using it, and they are gaining useful information about the Anna University Guindy, campus.

Figure 9: Home page of 3D Explorer system

Figure 10: Walkthrough of 3D Explorer system

Figure 11: Flythrough of 3D Explorer system

Results and Discussion

The 2D campus map created for our study area could be used as the source data for generation of broad framework of the 3D buildings. This shows that out methodology is found to be correct and hence we can realize this model and can be customized for our future references. This methodology can be used for any university for generating campus monitoring

system. This campus mapping and monitoring system consists of different modules which include zooming options flythrough, walkthrough etc. Building details and spatial locations include in the graphical user interface along with message window showing the brief details when any spatial feature is clicked.

Conclusion

The Campus Mapping and Monitoring system has been successfully developed by adding spatial locations to the existing feature. All users can access the spatial information efficiently in a common platform and can visualize the same information continuously. This model can be exported in various formats for various applications like Multimedia and .exe format. Built up area, height and number of stories analysis have been carried out. The developed campus monitoring system has good 3D visualization and useful for 3D simulation and modelling of Anna University campus in online. The developed 3D explorer system of the campus is very much useful for future planning of infrastructural facilities and to manage the resources of the campus in offline.

Acknowledgement

References

[1] Chulmin Jun, lnhye Park, Keun-Won Ryu and June-Hwan Koh (2006), '3D GIs Data Model for Indoor Route Finding' *International Journal Of Urban Sciences*Volume no.2, pp. 87-95.

[2] Diersch, H. J. G. (2002), 'Preparation Of 3d Digital City Model Development Technology Based On Geoinformation Systems' *Geodesy and Cartography* Volume no.3,pp. 90-97.

[3] IHongchao Fan &LiqiuMeng (2012), 'A three-step approach of simplifying 3D buildings modelled by CityGML' *International Journal of Geographical Information Science*, Volume no.6,pp 1091-1107.

[4] Li Deren ,Wang Yandong ,Zhu Qing & Gong Jianya (1999),'Data model and visualization of 3D city landscape based on integrated databases'*Geo-spatial Information Scienc*e, Volume no.2, pp. 21-25.

[5] Marcus Goetz (2013),'Towards generating highly detailed 3D CityGML models from OpenStreetMap'

International Journal of Geographical Information Science, Volume no.27, pp. 845-865.

[6] Navatha.Y, K.Venkatareddy, Deva pradap (2011),'3D Modeling of   NIT Warangal Campus using GIS and High Resolution Satellite Data'*International Journal of Earth Sciences and Engineering* Volume no.4, pp. 355-358.

Biographies

M.Mohamed Nasurudeen has received the B.E. degree in Computer Science and Engineering from the Anna University Trichy, Ramanathapuram, Tamilnadu, in 2011, the M.Tech. degree in Remote Sensing from College of Engineering Guindy, Anna University Chennai, Chennai, Tamilnadu, in 2014. Currently, He is an assistant Professor of Civil Engineering at V.S.B Engineering College, Karur. His teaching and research areas include Remote sensing and GIS application in Geographical Research. He has presented 2 papers in National Conference and attended 4 workshops and Training programmes. M.Mohamed Nasurudeen may be reached at najru.deen@gmail.com.

B.Yugesh Kumar has received the B.E. degree in Computer Science and Engineering from the Anna University Trichy, Trichy, Tamilnadu, in 2011, the M.Tech. degree in Remote Sensing from College of Engineering Guindy, Anna University Chennai, Chennai, Tamilnadu, in 2014. Currently, He is an assistant Professor of Civil Engineering at V.S.B Engineering College, Karur. His teaching and research areas include Remote sensing and GIS application in Geographical Research. He has presented 1 paper in National Conference and attended 4 workshops and Training programmes. B.Yugesh Kumar may be reached at yugeshkumar01@gmail.com.