

3D REALITY PLANNER FOR UNIVERSITY OF HAIL USING ARCGIS

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ABSTRACT - The aim of this research is to develop model for University of Hail especially for female branch campus planning using ArcGIS 10.3 ("Geographic Information System"), a program dealing with maps and link with Google Earth. The ArcGIS platform provides the perfect platform for analysis of sustainable supplies, situational awareness for the protection of life and property, and analysis of environmental sensor predictions. It gives us the tools to manage your networks. It provides collaboration with other entities for a smarter, safer, and more environmentally responsible community. With the proliferation of smart phones allowed on campus, it serves the guest, student and teacher to find the desired building using the shortest path with less time, by identifying from source to destination. Guests preserve their destination using this and find out the nearby gate before arriving on campus. This augments visitors' experience and helps them to save their time and physical effort.

KEYWORDS - Geographic Information System, ArcGIS, 3D Reality Planner, University of Hail.

INTRODUCTION

The ArcGIS platform is based on Web GIS which heavily uses web services. Web services provide a simpler way of creating apps and maps. By setting this data free, it is possible to mash it up with other data to turn it into valuable information—the kind of information that decision makers need to make informed decisions. The result is context sensitive planning and decision making based on desired outcomes rather than emotions or gut feelings. This improves transparency and accountability making it easier to justify planning and policy decisions. It can drastically improve, not only the numbers of citizens who engage in the planning process, but the diversity of voices heard. Web maps and apps, available anywhere, anytime, and on any device is the future. It is now what people expect, and planning departments are going to have to modernize to meet this demand. The good news is that it is highly scalable. Planning in 3D is also becoming a need to have, as opposed to a nice to have. This is a new and exciting application for interactive exploration of GIS and other tabular information. One can immediately envision simple applications such as Dashboard for ArcGIS or Story Maps apps fed with real-time data.

GeoPlanner for ArcGIS brings the power of ArcGIS Online and a geodesign workflow to land-based planning activities with a JavaScript-based web application that allows users to create, analyze, and report on alternative planning scenarios in support of better, more informed decision making. Universities and other organizations with campus site licenses already have access to this app via an ArcGIS Online Organizational Account. Insights for ArcGIS, a new experience added to ArcGIS to enable iterative and exploratory analysis with our data in a geographic context. Through one fluid and simple drag-and-drop interface, we can quickly answer questions with data from enterprise data warehouses, Excel spreadsheets, Big Data, and ArcGIS services. ArcGIS is used to address a wide series of problems and scenarios.

The University of Hail – female branch is the public universities in Hail. It contains buildings more than 80 buildings for Colleges, Hospitals, Auditorium, Prayer Halls, Cafeteria and gates. ArcGIS provides an open computing platform for maps and geographic information, making it easy to create and share our work as useful, interactive GIS maps, data layers, and analytics. The big breakthrough with the Web GIS pattern is all of the advanced geographic intelligence that we can create as data, maps, and analytical models can be mashed up and delivered as online maps and apps and shared with others who can put them to work—both within our organization and beyond. The people who need their information can work with easily configured apps on their computers, tablets, and smart phones to leverage our geographic information in their work. The GIS professional working on the desktop creates and shares information to the Web GIS (which can be in the cloud, on our secure enterprise network, or both. Knowledge workers, executives, citizens, developers, and other GIS users can build upon and leverage your work. In turn, you can leverage other users' layers for your own work as well.

The rest of this paper is organized as follows. In Section 2, we describe related literature. In Section 3 and 4, we briefly present the need of 3D reality planner of University of hail and Methodology and Research Proposal is explained in detail respectively and Section 5 concludes the paper with a discussion on this research finding and on possible future work.

LITERATURE REVIEW

3D map is one of the main topics in the GIS (Geographic Information System). There are many research efforts in the area of developing 3D maps. Numerous of researchers are carrying their research in this. There are selected related literatures are listed here.

Ibra, Sami et.al., used ArcGIS Desktop and ArcGIS 3D Analyst to build a master plan for the University of Khartoum campus to better understand and organize its utilities infrastructure to find a suitable procedure for acquiring geospatial information and made it, accessible to administration, visitors, and students. Also in this study there was to explore the capabilities of current technology software such as ArcGIS to link the spatial information about the building features and utilities within the map. In addition, they discussed the methodology and implementation steps which build a unified geospatial information system that can be used as an interactive system that supports planning decisions. The results the importance of campus planning as a focus in this work in order to demonstrate the effective use of 3D GIS modeling in the decision making process, a way to very quickly communicate ideas that help to make better decisions. The conclusion showed that the 3D GIS enable users to visualize complicated urban planning information in the 3D way, to evaluate the allowable capacity of the block and to simulate building plans. With visualization and analysis capability, 3D-GIS are considered a powerful tool to solve various issues which modern cities confront

Shiliang Zhang et.al., created 3D model of Multipach by programming ArcObject or by loading models in other software for Ningde Normal College, the methods to establish virtual campus are studied based on 3D modelling, image processing and database, such as using 3D MAX to create 3D model and putting on the texture image, and redeveloping specific function by ArcGIS spacial analysis and C#, so as to perfect the function of the system. It provided more reliable guarantee for the campus planning and sustainable development. Virtual campus was developing in domestic colleges and universities, which has played a positive role for campus planning, publicity and internal management. At the same time, the related theory and applied research of 3D GIS systems was carried out quickly, however, many profound problems have not been systematically and comprehensively solved.

Abdulla Al-Rawabdeh et.al., discussed the concept of 3D GIS modeling techniques using a simple procedure to generate a university campus model (real 3D GIS model) which showed the effectiveness of this approach. The 3D GIS model provides access to mapping data to support planning, design and data management. Intelligent GIS models and GIS tools help community planning and apply regional and discipline-specific standards. Integration of GIS spatial data with campus organization helps to improve quality, productivity and asset management. The following study built 3D GIS map and all utility information for Al al-Bayt University campus as an example. The primary objective was to improve data management (e.g., maps, plans, usage of facilities and services) and to develop methods using 3D spatial analysis for specific applications at the university.

Dr. Guoping Huang., focused on the technical side of 3D Interoperability across three programs: ArcGIS, SketchUp, and CityEngine. Examples from Richmond riverfront view shed project and Virtual Lhasa project will show the benefits of working with different programs.

Qing Wang et.al., established 3D Geographic Information implementation method of 3D digital map based on SketchUp and ArcGIS which greatly reduced the time and cost of building 3D digital map with its simplicity and quickness, and speed up the application of 3D Geographic Information System technology. This method can be widely used in the construction of 3D scene on campus, 3D shows of the overall effect of residential communities, and the realization of 3D electronic map in small and medium sized cities.

WHY 3D REALITY PLANNER OF UNIVERSITY OF HAIL?

The University of Hail - female campus has more than 20 academic buildings and more than 7 gates to enter the buildings. Chiefly the new students, faculties and visitors have a hard-hitting time to find appropriate locations. Also they have the problem to find nearest Colleges, Auditorium, Prayer Halls, Cafeteria and which gate is near their location and how to navigate from one place to another based on shortest path. So it is necessary to build a 3D model of University of Hail particularly initially we describe only for The University of Hail – female branch campus in this paper. Knowing that implementing a project of this size and continuing to maintain so many buildings would require a comprehensive understanding of every aspect of the campus—its landscape, people, buildings, and infrastructure—university planners relied heavily on ArcGIS and GeoDesign principles to help analyze and evaluate the impacts of design alternatives early in the development process. Three-dimensional landscape displays, mainly achievement by changing the data symbol (symbol selector) of the point, line and area data.

The preparation of modeling of field buildings and reference the overall campus plan map to draw architectural Sketches, but the height and ratio of those buildings must match to the fact object. Drawing model, rendering them with surface texture material and lighting effects. Follow-up the modeling After drawing the models, to establish in their own style library and import them and must be carrying their surface texture material. We can easy let map layers for show, hide, add, delete and statistical by ArcGIS controls that connect to the

database. Scene display and navigation Conventional operation contains zoom, move, rotate and others, It can fully show the status of geographic information on campus, including all types of buildings, pipelines spatial location, distribution and mutual relations, even the campus three-dimensional panorama as a whole. The methodology and research proposal is explained in next section.

METHODOLOGY AND RESEARCH PROPOSAL

The University of Hail – female branch campus is a multipart infrastructure. Especially new students, faculties and visitors because they have a tough time to orientating themselves and finding places. The campus of the University of Hail – female branch has different buildings with up to different number of floors high most of these buildings are far from each other. Even if there are maps at some points on campus, users do not have continuous help to get to their destination. They can try to figure out a way to get to their target on these static maps, but as soon as they start walking in the target direction they are without help any more. So, how is it possible to help freshmen and other inexperienced people to orient them on the university campus and how can they be supported using modern tools. The campus was selected to be generating as 3D model which would include the campus buildings and infrastructure layers. The location and the satellite image of The University of Hail – female branch campus are shown in Figure 1 and Figure 2.



Figure 1: The University of Hail – female branch location Campus on Hail Map.



Figure 2: The University of Hail – female branch on Satellite view .

In this study, 3D modeling of the university campus consists of following steps: data acquisition, generation of a 3D model, visualization of the 3D model. Detailed information on these works is presented in the following section.

The entire campus master plan is being integrated into the 3D model as a time-enabled 3D feature class. The user will have a time slider that will move the model forward through time, showing the plan phasing—building demolition and construction, roadway realignments, growth of landscaping, etc. This is an extremely powerful visualization and planning tool, remarkably effective at presenting complicated three-dimensional and time-phased information.

ArcGIS is a GIS system which is used to store, retrieve, map and analyze geographical data. This system stores any kind of information which is related to a geographical location. The spatial features are stored in a coordinate system which references a certain place at the surface on the earth. The main use of geographic information systems is resource management, development planning and scientific research. ArcGIS is the most important program in the GIS application. Nowadays, the ArcGIS supports the virtual reality program, additionally with ArcScene and ArcGlobe can be considered as a type of virtual reality software (with some lack), the ArcGIS supports all types of data, such as all statistical data that must be joined with the features and stored in a database. The proposal of this project is illustrated in the following steps:

1. Image of the University of Hail was captured from Google earth, and then feed in the ArcGIS 10.3 program.
2. Digitize each campus building, which is a table containing the names of buildings.
3. Network Analysis for each street; even serve the shortest path also.
4. Find the shortest path from one building to other building with the help of step 3.
5. 3D for buildings using ArcScene 10.3.

To help students and visitors easily find their way around campus, the university developed an interactive room-finder application using institutional data. Users can input the building name and room number they wish to find, and the application generates a detailed map showing the floor plan with the desired room highlighted. Visitors can look up their destination using the online tool and determine the nearest gate before arriving on campus. This enhances visitors' experience and helps them save time. The interactive room finder will soon become available on mobile devices. Users will be able to take a picture of a wall marker to determine their current location and then enter their new destination. The map will show several route options—shortest path, indoor or outdoor routing. The model is depicted in figure 3, 4,5 and 6.

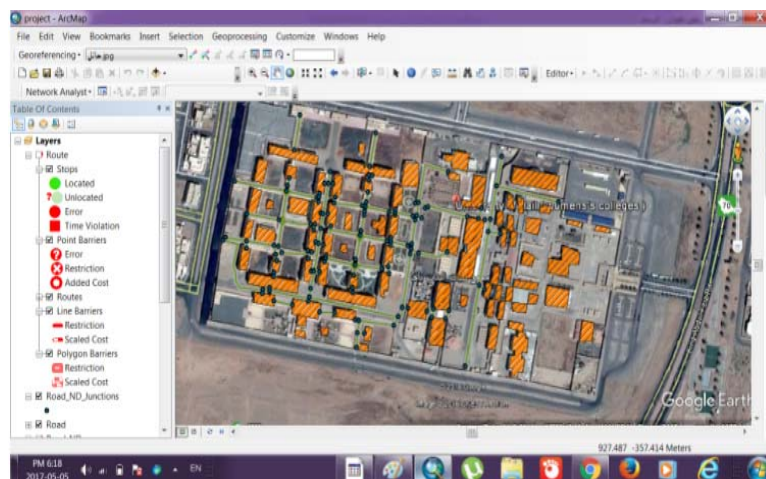


Figure 3: Green space 3D models with color texture using 2D vector layer in the ArcScene environment.

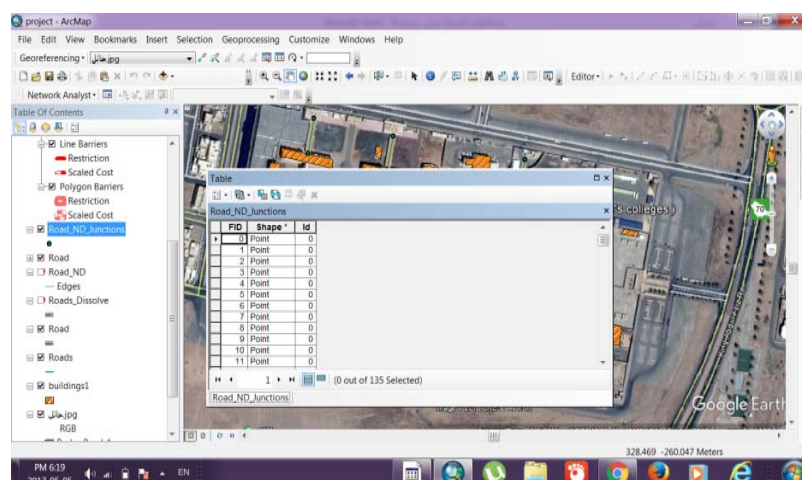


Figure 4: The interactive room finder provides the ability to determine the user's current location and find the best path to a new destination

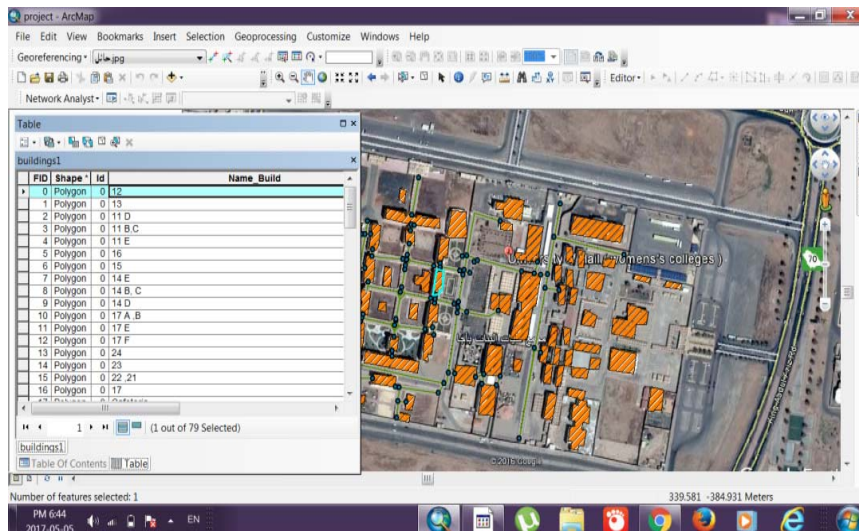


Figure 5: Identify tool in the 3D view and 3D campus model with roads networks layer.

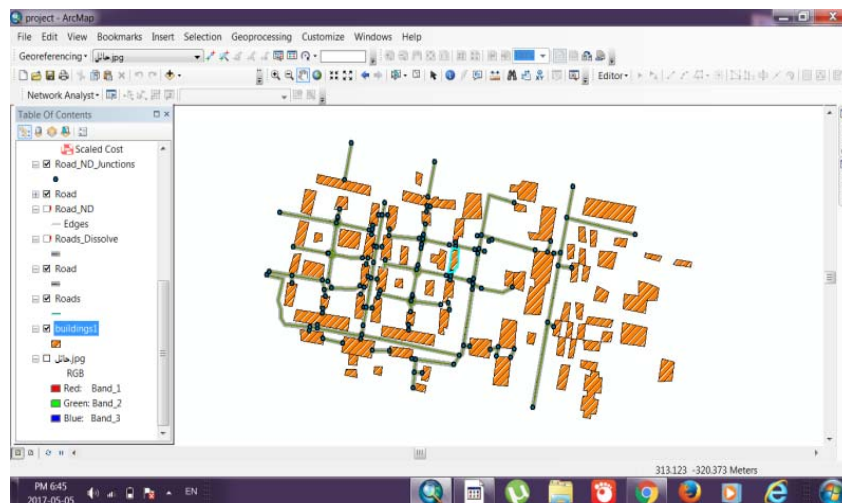


Figure 6: overall view

CONCLUSION

Using ArcGIS, we design a model for University of Hail – female branch to locate from one place to another place and new visitors, students, faculties can locate their destinations before entering into campus. It is useful for indoor and out also. Because University of Hail – female branch has more than 7 gates and numerous of buildings. So, the visitors can know the gate which is near to their destinations before entering the campus. Even though it is not implemented entirely, another future project will use administrative data to help students select classes based on spatial proximity. An application is being developed that will allow students to enter their ID numbers and generate maps that show their classroom locations, as well as the proximity to the next class, based on a specific time and day. This will help students familiarize themselves with the campus and select a schedule that offers reasonable travel times between classes. Also in this work, shortest path is computed by as it is in ArcGIS, so in near future the work can be extended with any best shortest path algorithm like Bellman Ford Algorithm. As well as, it will extend to locate the main campus of University of Hail. In addition, the most frequent visited buildings such as Library, Prayer Hall, Copy center, Cafeteria could be highlighted.

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