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DEVELOPMENT OF INTERACTIVES MAP FOR UNIVERSITI TUN HUSSEIN ONN CAMPUS

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ABSTRACT

Finding a location in a campus is a problem, especially during the beginning of the semester for both new students and lecturers. Studies on building location need to be conducted to solve problems by employing Geographic Information System (GIS). The purpose of the study is to design an interactive map by using a web application. In accordance with MS1795 code, the data are divided into various types of building available in the university campus. An interactive map application is designed with information to the fact that classrooms and laboratories are location that is often searched by users. With the ArcGIS 10.2 application, a location query system is developed. The interactive map is designed specifically to the needs of the users which includes students and lecturers. Studies result have shown that GIS is an important device to determine the location on a map. The interactive map is also very useful for location-determining purposes in the university campus and is beneficial to all parties.

Keywords: interactive map, web, location query.

INTRODUCTION

Map is an important reference for finding a place or position desired in an area. It is used by people from various segments of the society who wish to find out how to go to a specific location without using conventional methods such as maps and pamphlets. The advancement in technology enables access to information such as street name, symbols, and the nearest landmarks to a desired location. It is very useful because it can help to avoid problems such as traffic congestion, lengthy journeys and so on. A map represents an earth design concept that links human scale through the facilities and knowledge of a place easily.

According to Doyle, *et al*. (1998), this is made possible with Geographic Information System (GIS) that require various disciplines that emphasizes the aspects of modeling and analysis in a modern environment. It is designed to be a tool for describing the information about the geography of the earth and places in the world from a satellite. In other words, it can be interpreted as a universal medium for communication and representation of the actual image which can be understood by all segments of society without the need to look at the cultural background and language. According to Merriam (1996), GIS map is a summary of an idea on an image and the concept of selective changes of geographic information data.

Inaganti, A (2013) states the used of ArcGIS in the plan was to create geo-referenced map of IIT Hydrebad Campus using GIS environment. It is to create network datasets for roads of the campus and to develop network based geo-processing tool by using Model Builder which is to perform distance based shortest route search. The creation of map was in a map application by using ArcGIS for server to be used in intranet users to read and analyze map features, search a department, find the shortest route between two or more points and print the driving direction along the shortest route. The system presented of basic GIS function and the features can zoom in and out, pan, full extent, measure and identified the identity of the features (Aydinoglu, 2002).

RESEARCH BACKGROUND

Maps had been long used around the world. Along with the development and growth of technology, maps have been used in a variety of methods that allow users to get information quickly anywhere. Various methods have been used to visualize different maps to the user. The most popular method which have been used is the atlas book on the era of the 90's featuring the entire world in a book. Then the more extensive use of this map combine with the internet technology such as websites and also the incorporation of smart phone technology. It is also available in a variety of forms for the society especially the tourists as it can help them in finding certain location as all the information can be obtain in the simplest form of pamphlets and brochures. In the context of this study, the maps are built for continuous use, which will be used by students and lecturers especially to find the location of the classes that usually relocates every semester. To get the position of the existing building facilities in the campus, users need to use the available information such as street name, code number, symbol or the name of the building itself to identify the location and position.

To produce maps that can interact with users, internet service is required. In addition to the web application on the computer, users also can access the network map through the mobile phone. Chan (2009) states that the Internet is naturally a source of information mobile devices to display the best available information. Maps without the internet facility is very difficult because most of the virtual world requires internet services to communicate between internet users and the application itself. Through the Internet, users can have access to worldwide information easily. It can be used to form a powerful computing infrastructure globally (Alexandrov, 1997). Therefore this study was to establish the search a location of buildings on the main campus of Universiti

Tun Hussein Onn Malaysia (UTHM) based on web application. Important details require for the study depends on the building location and roadways in the campus

The location of the building is placed in an area adjacent to each other to simplify matters in an organization. However, the arrangement and placement of the building is dependent on the universities themselves to make sure every building is arranged based on their priorities, or the emptiness of space. Each building has its own identity and unique code. At present, the code is often used to represent each building are letters and numbers. Chan (2003) said that the process of construction and validation of location-based information are carried out by the information providers and service providers. To build a harmonious combination of campus buildings, the combination of letters and numbers used are most for old buildings. While the new building is represented by the name of the department or the faculty itself, under the faculty it will cover the entire unit and classes in the same building. The old buildings, uses code of letters and numbers according to the order of construction of buildings.

The road network is used to facilitate the user to their destination; the name of the street plays an important role for each user as a guide for users to reach to the designated building. The search for buildings is made easier by the availability of street names as a guide. In addition, the combination of route system and parking also makes the search easier for users to find areas that are near to any parking area.

Problem statement

The issues raised in this study is the query of the location on campus and there is no standardized references to provide a more effective search for information. Finding the desired location is an ongoing problem for users at certain periods such as the beginning of a new semester. It also covers the problems when arriving in new areas for new students. Although the UTHM website provides maps of the campus, the information displayed is still inadequate, not updated and still pose difficulties for users to find the desired locations accurately.

Objectives and scope of study

With the increased number of staff and students, there has been more emphasis on location finding, especially in classrooms. Through this study, the objectives that needed to be achieved are; to develop a database of the buildings on campus using GIS; and to design a web application based on buildings and information available in the campus through an interactive map.

The scope of the study is to provide a spatial and attribute information to generate an interactive map. Spatial information required are the location plan which is available in the form of AutoCad format. This includes information related to the attributes of the units, departments, street names, building blocks, lecture rooms and laboratories. Location determination must be done to ensure that the data are in the right building. Among them is the position of classrooms, laboratories and administration which are also placed in the same building. Each building are determined by its own functions in order to ensure optimal use of space. Every detail of the location needed to be specified correctly to avoid confusion among consumers.

INTERACTIVE MAP DEVELOPMENT

This review is for the development of a GIS referral network that can be used in the campus. The study is divided into several stages of designing a database, database development, designing the map and analysing the map. The framework is designed based on the objective to develop a system map that meets the user needs which can be reached through the first phase of web application framework comprises the beginning of the process of problem statement, objectives and importance of the study. Phase 2 consists of the design of the map where the inclusion of the process which contains information that is appropriate for the user. The final phase is conducting an analysis of the maps that have been incorporated into the web application to ensure that the information entered is accurate and easily understood by users.

Therefore the map capabilities transform a static maps into a dynamic map that can be used to proactively managing (Totman, 2012). The maps concept must meet the criteria that it can be used easily by the user and provide the interactive experience where the user can interact with the web. It involves the insertion of attribute data and spatial data. These data have different forms and formats and also different ways of entering it. The steps in designing a database involves the collection of data in a systematic and orderly fashion so that the final result is as expected. Data entry process is performed after the database is created in which the relational data model is selected to design a simple “stored and recovered” processes in the future. The data used are the laboratories, lecture rooms, lecture halls and building blocks.

The selection of buildings as data is intended to allow users to find the location. This is because the data that is build should meet the criteria where the analysis can be carried out effectively. The data must be entered exactly, so there will be no confusion in the system in which fundamentally, the ArcGIS format should be met before starting. For this study, the campus plan technically has to be in DWG format before exchanging it into basic format ArcGIS. Data attributes that have been collected as a block name, street names, are needed to be kept in a database in a spreadsheet format, so it can be used by ArcGIS for analysis phase. For the location, data entered manually has to be done so that every building has its own identity and information. Further examination and observation has been made to ensure the location is accurate.

The characteristics of the research dataset are categorized into three main subjects which are buildings, transportation, and dataset of location. Dataset codes that need to be follow for characteristics and attributes are the

MS 1795 codes. The second phase is the process of entering data involving the insertion of spatial and attribute data. At this stage, the data obtained will be updated to be included in the system development process. By adding a new layer as a point to show the building, the lines are used to create the name of the street and polygons to create areas of buildings, partition and many more.

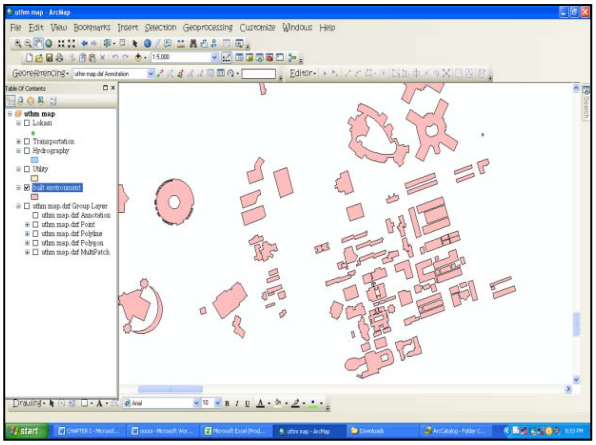

Figure-1. Polygons that represent buildings.

Based on Figure-1, a total of five layers has been designed to suit the characteristics of the information and also the desired map. The figure refers to the polygons that represent buildings in the campus. While Figure-2 shows the marked point of reference to the position of the classes, as well as laboratory unit.

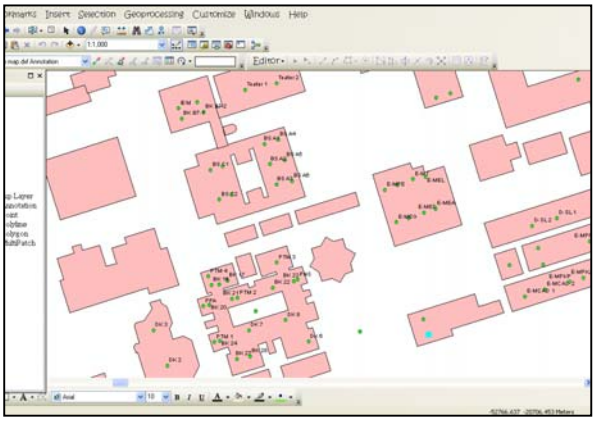

Figure-2. Point representing location.

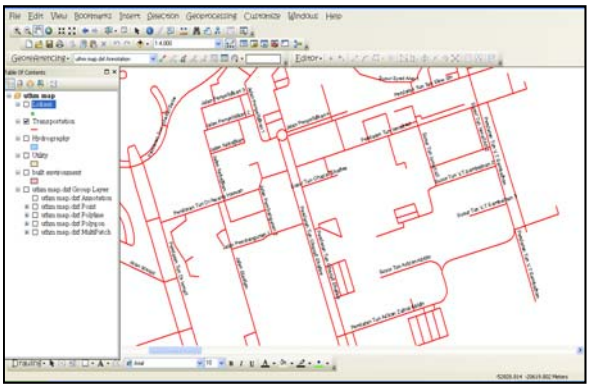

Figure-3. Route network in campus.

Figure-3 shows the route networks in the campus which includes the position of parking areas and road construction plans in the future. The street names are also placed to facilitate the users to identify the routes that have been provided either one-way or two-way.

IN-WEB MAP APPLICATION

The web application used for this study is obtained from MangoMaps which has a search function as required. There are several web applications such as MapQuest and Bing Maps Street but they are unsuitable for showing the map of the campus because it only accepts pre-defined maps as their main map database. With Mangomaps the uploading of data into a web application can be done using basic map of UTHM developed on ArcGIS system. It also allows empty map background and which can be used to show only the campus. Indirectly, the use of in-web map application can help in reducing the use of computer memory throughout the process.

Figure-4. Ensuring the layer is in the correct coordinates.

Figure-4 shows that the map is in the correct region via Mangomaps. This is one way to confirm the campus is in the right location. After that, the background layer can be removed and the display area of study can be shown. This information shows the existing maps but if there is a new area, it can be updated with the latest information.

Figure-5 shows the layer of map that has been incorporated into a new background without the need to overlap with the original map of Mangomaps. This allows users to focus more on exploration only on the UTHM campus. Various analyses can be performed by a database developed. Analysis can divided into several searches involving the status of each category that has been classified as an office, college buildings, administration and so on which can be provided by database that was created in system. From this, the process will be further divided according to status in each category that were defined at the beginning of the program on the official classification of units, buildings, college, administration and so on.

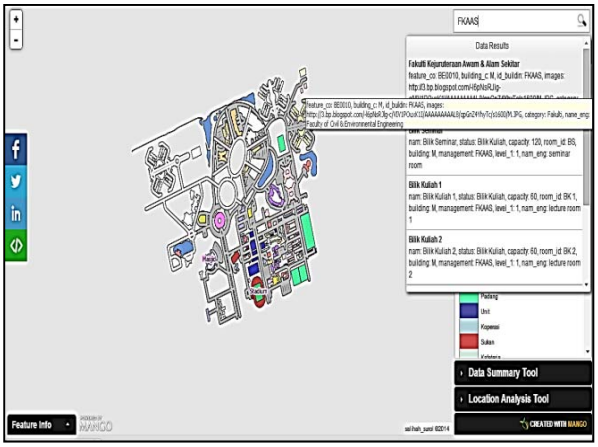

Figure-5. Searching of site using the search button.

Based on Figure-5 use the search button is available for the users to locate FKAAS building. Insights data shows the results of FKAAS building (Figure-6). Data including code, name, picture and other information which allow the users to search the building of FKAAS

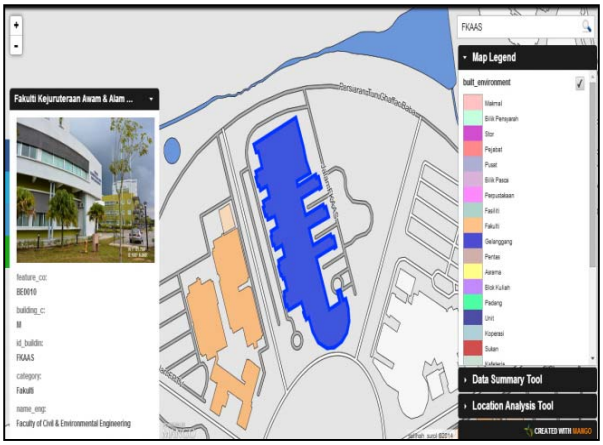

Figure-6. Exposure FKAAS building information.

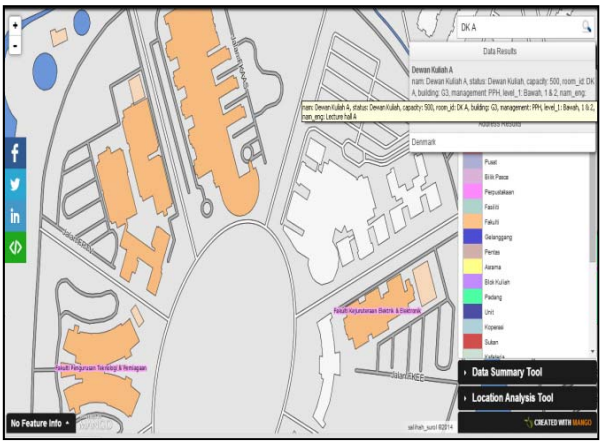

Figure-7. Search location of the classroom.

The use of photos is very helpful for the users to identify the correct buildings. This is a method that let the users to know the location easily. In Figure-7, the picture is displayed randomly on the side of the building. The information also appears roughly to indicate the identity of the existing building which are the name of the building, the building blocks and the structure.

To search more detail of the locations such as classrooms, laboratories, and so on, users only need to enter the name or acronym for the required location. As shown in Figure-8, we can see the searching process of the location of lecture hall (DKA) which is a destination that is often required by the users in UTHM. Location matching system sought to produce relevant information and the user must select and review the information that has been removed from the database system.

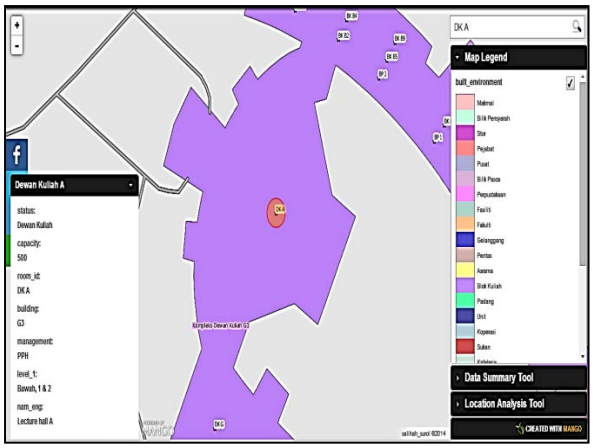

Figure-8. The position location information that was in the 'zoom'.

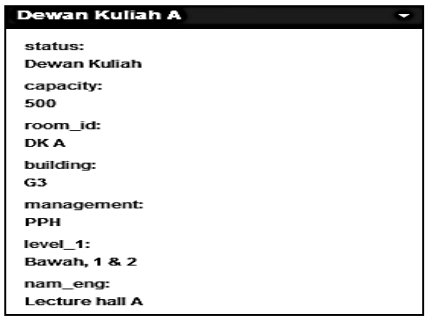

Figure-9. Display of location information.

Users can also type in a code which will be known as the information entered that is the same as the information from the Office of Property Management UTHM. When the location has been marked by the system, the user have to 'zoom' to see the position of the locations searched, more accurately which can be seen in Figure 8 and the information is displayed as shown in Figure-9.

In the system, the parking facility is provided to provide information to users about locations allowed for students and staff. This is used to search for parking areas for students so they can distinguish between public parking areas and parking areas exclusively for the staff. All inquiries and search can be achieved through Mangomaps. Apart from the display called story map, it can be displayed using ArcGIS online application as shown in Figure 10. Story map can be accessed via mobile devices, but users need to download ArcGIS from Google Play store to assess the quality of the map information. It can also be accessed via mobile devices, but for the version of ArcGIS, the uses of mobile phones are required to be installed on the smartphone for the user to access the information. ArcGIS users can download the apps on the Google Play Store for Android to find the map that has been designed. The figure below shows a map in ArcGIS web applications

Figure-10. Application of story map.

CONCLUSIONS AND RECOMMENDATIONS

It can be concluded that, this map is a medium which is very helpful in recommending places and locations that we need to know. It is beneficial for users to reach their destination fast and easily. Web usage is also very relevant in providing information to the user because until now, the use of internet is provided for free in the public places for the public usage. In this study, the objective is to generate a database system that has been achieved by using GIS. With the development of this database, other studies could also be carried out to produce maps that are more compact and solid. Moreover, additional buildings were still in development. They could also be included in the database for additional information in the future. Finally, this study had opened a major step forward to improve the ability of GIS in web applications for students and lecturers in the university community, especially UTHM.

For future research, some of the studies can be done to meet the market requirements of the position location within the campus. With the mobile internet networks such as broadband and telecommunications systems that are widely used, it can be improved to facilitate the service and affordable for all segments of society in ensuring modernization without restrictions.

From the database development, future studies can be done to tap directly into every building on campus, as each level consists of classes, laboratories, each of the areas to be included in the map. This will make the map more interactive and helps to be more realistic in the composition of spaces of the building.

To overcome the problem of internet networks on campus, intranet method can be developed as a platform to reduce the slow internet services during query process. To ensure a more practical use of the map, several kiosks can be placed in several strategic areas so that the user can access the map effectively. More information can be distributed by the kiosk without having to worry about information security within the campus which can be described as confidential information.

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