
GIS Application In Civil Engineering

Overview

Hundred years before, the world was looking for the development of mankind through various sections. As a result of that the field of engineering is started through the skills of the past people. They started to explore the solutions for their every simple to solve in a technical way. Because of that the technology of engineering started to rise up in various fields. The influence of that, now the modern world that defines "Engineering makes designs that works with original ideas" (Freeman Dyson, 1981). There are several types of engineering fields that has been developed under the advance of the world. New inventions and logics were become the heart of engineering. With the development of the technology engineering fields are getting advanced now the time. Among those engineering fields the Civil engineering field is the main filed of developing the world with the modern technology. As a result of that most complicated works and designs has become easy and possible. As an example, now, the time most of the works has been done by the computer-based things. For that most of the civil engineering software's has been published for various purposes. GIS application is one of the most using software for civil engineering purposes.

(GIS) Geographic Information System

Geographic Information Systems (GIS) is defined as a system of computer hardware, or software, and it is basically designed to support the combine, analyse, storing and display of spatially referenced data for deal with various problems. "The spatial language is an intellectual filter through which only the necessary information passes" (Witthuhn, 1974). Such as managing design purposes. In addition to these technical gears, a complete GIS must also include a focus on people, officialdoms, and standards. Not only that but also the Geographic Information Systems (GIS) is a gathering of computer hardware and software for capturing, analysing, managing and displaying all forms of geographically referenced data. General purpose of GIS is extracting information's from the raw geographical-data."GIS improves the large datasets to manageable display information in a map/graphical form"(Caitlin,D.1999). These data are collected from sensors, satellites or any other ways and stored in databases and file systems.

The data goes through the clarifying and rendering services and, presented to the users in human detectible formats such as charts, images, graphs etc. A common example of GIS is viewing maps which process layers of geospatial data to create map images. GIS are used in a wide variety of tasks such as urban planning, resource supervision, alternative response planning in case of disasters, disaster management and quick response etc.

GIS workflow

An engineering information system based on creativity GIS technology streamlines activities from many fields of data gathering to project management. With this single in-teractive database, we are connected to all our consumers; construction sites; and rec-ords, system, and

conservation data. A server-based data management environment studies GIS aptitude promotes effective and important workflows in data and project management. It allows us to modernise our work processes in data detention, editing, analysis, picturing, and design. With an ability to interconnect changes to an entire team quickly, GIS gives our entire team access to the most recent information's supporting bet-ter conclusion making. GIS increases workflows in

- Managing projects
- Analysis and design
- Logistics

GIS provides

- Accuracy of data
- Sharing the data
- Analysis aptitude
- Resampling

GIS Application and Civil Engineering

Civil engineering is mainly lies on developing and sustaining substructure facilities. The career covers many areas of interest and a wide range of proficiency. As a result, civil engineers work with a large amount of data from a variety of sources. Geographic information system (GIS) technology provides the gears for creating, managing, analysing, and resampling the data linked with developing and supervision infrastructure. GIS allows civil engineers to manage and share data and turn it into simply understood reports and conceptions that can be analysed and interconnected to others. This data can be related to both a development and its broader geographic framework. It also helps establishments and governments work together to advance policies for sustainable development. Thus, GIS is playing a progressively important role in civil engineering field, supporting all stages of the infrastructure life sequence.

In civil engineering field GIS is used in most of the times for various aspects in map analysis of transportation engineering. Also, in most intelligent transportation systems, smart(sustainable)development concepts are enabled by the GIS application. One of the largest technology for the transportation agencies is GIS-Transportation. GIS provides the significant modernization of the ability to manage data spatially using layers then analyse the overlays to perform spatial analysis. Therefore, a layer of roads can be unified with a layer of land use enabling a buffer analysis within a given distance of the land for the roads. The specific tools were added in GIS for linear data management of transportation data, all these data are very effective among transportation organizations. These data are more important for georeferenced the routes and time points.

Why we use GIS?

GIS software is supporting the several data formats used in civil engineering field .They allow engineers to provide analysed data formats to maintain core.GIS technology gives a main location to maintain the spatial analysis and manageable sources in individual project files to provide accurate points of required places and roads.

The advantages of GIS in data citations and processing include.

- The maps can be produced from deferent virtualization.
- Computerised cartography
- We can analyse the data Spatially.
- The information can be combined by relating spatial and attribute data

GIS helps for,

- Gives the ability maintain and analyse the data information that are not possible manually.
- Attributes can be linked within the context of one system.
- Allow the information's to display exciting ways.
- Combine geographic information to display within a single consistent system.
- Computerized map production and maintenance.
- Provides the data that can easy to access by more than one person.

GIS is mostly used in transportation engineering field. In urban countries the number of vehicles is growing. Because of that people face man problems such as traffic jam, choking and also accidents. But as the solution the world is using the GIS application and it cares about all these limitations people faces in their day to day life. Transportation management is a phenomenon that GIS can be used as a tool which is effective for planning and management of transportation. Many organizations are focused on how GIS can be used in advanced way for shuttling easier urban transportation. There are lots of applications of GIS. Those can be clarified as,

- Chief and Site plans in Transportation,
- That can be planed as multimodal (e.g., travel demand forecasting)
- Management of safety including accident planning.
- Flight path defence/right of way.
- Construction management and Risky cargo or overweight vehicles certification directing.
- The impacts of environment.

A board rang of transportation planning and tasks in effective cost manner can be done by the GIS application. It also uses to build information systems in transportation such as distribution of goods, analysing accidents, sign records and operation planning. GIS supports wide range of analysis of network types for the urban and regional transportation such as streets, bus, rail, subway, high way and multimodal networks. For an example, the demanding of the predictable models is unable to justify accurately for local streets. This absence is overcome by the use of GIS.

It is also used urban transportation planning. The other application of GIS to developing countries is planning of urban transportation in a GIS environment. The significant abilities and critical procedures of GIS described earlier can be used for operative transportation system analysis; including demonstrating. GIS enhances the transportation planning by improving the development with the application of travel request models, providing tools to study supply or demand of the interface, and simplifying system estimation.

With the development of land use Geo-codes have been made based on traffic analysis zones,

districts. Those information's handling within GIS. Other than present land use data future predictions can be included in the data base. It can also include the present proposed transport system as data base context.

Generally, trip generation models are also estimated to apply at any spatial scale, even at the state of the plot of land information can also be gathered to the precinct level. Geo-coded data supports various ways to modelling process travel survey data and predicted source destination trip tables supports for Geo-coded data. Likewise, the technics of modelling improvements can be customised with the GIS transportation environment. But in the planning process we omit some processes since the methods are abstractly same as management of infrastructure. Transportation based applications can also be improved. As examples vehicle routing, collection of garbage, distribution logistics and pare-transiting services can be considered. Throughout the analysis of GIS, distance is minimized by the shortest paths and that can manage time or cost. In the case of risky goods arrangements routs can begin with minimize the population revelation to spills.

Site analysis

GIS quickly incorporates and analyses many types of information and images for site analysis. Highly accurate results displayed geographically provide insight into connections and relationships, and customers relate easily to a recognizable map. The base map can include section maps, zoning and city designations, environmental protection areas, aerial photos, and topographic and soil maps. Overlays of applicable data on population increment, commercial activity, and traffic flow syndicate to rapidly paint a meaningful picture of a site's chances and limitations. Civil engineers use GIS as regional indicator, forecast fail-ure, comity needs, and plan to keep track of multiple urban plans according to guarantee quality of the life in functional societies for everyone . Central, provincial, state, and local planning agencies have realized the influence of Geographic information system to rec-ognize problems, respond to them capably, and share the results with each other. A GIS result provides tools to help engineers to reach their analysing task works while doing more and spending less.

Application of Geographic information system over civil engineering is endless in civil. These are most common applications,

- Structural engineering- For maintain the scheduling work flow and modelling, de-signing of building. GIS geo database is vastly useful for save time in this type of works.
- Environmental engineering- The one field which is deeply dependent on

Geographic Information system. All difficult calculations are simplified using GIS.

Flood modelling, routes for flood canals, assessment of pollution of various sites all these things can be done using GIS. Construction management- In Infrastructure management, GIS can be labouring to calculate the costs, do site appropriateness analysis which saves lot of time. Soil and foundation- Helps in creating soil maps and geology maps of the area that needs to be explored. This Helps greatly in completing the category and depth of foundation, load bearing capacity of the soils etc. But taking a complete decision is not possible without in-situ lab tests of the soil, GIS is absolutely having a support in this respect.

Landslides analysis

Accident Analysis and hot spot analysis: GIS can be used as a tool to minimize accident hazards on roads, the prevailing road network has to be improved and also the road safety actions have to be enhanced. This can be achieved by proper traffic management. By recognizing the accident locations, counteractive measures can be planned by the districted administrations to minimize the accidents in deferent parts of the area. Redirecting design is also very suitable using GIS.

Conclusion

Although there are wide-ranging applications of Geographic Information System in Civil Engineering, there is a lot of value to GIS that is not yet being fully discovered in engineering analysis and planning. There are some recommendations for the upgrading of the Geographic Information System applications:

- GIS is becoming larger based in geographical information systems that include the application of the international locating system and the combination of remote sensing technology.
- GIS can be used in historical data analysis, such as predispositions in computer-ised passenger counts, and graphical analysis of shipment passengers.

Using the geo sensing technology GIS has become a large technological feature in civil engineering field for various analysing and managing aspects.