

City Information System Using Internet GIS  
A Case Study of Visakhapatnam City



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**Abstract**

For many years, we have been seeing isolated groups using GIS. These groups include System users, System operators, GIS suppliers, Data supplier, and Application developers. But, In addition to the above groups, a common citizen may also want benefit from GIS. He/she may want internet access to view maps including Locating a ward, Locality, Landmark, Building, Parks, Shortest and Quickest path between two locations, Search buildings or landmarks nearest to his location etc., To fulfil all his needs, the only solution is "Internet GIS".

To meet some of needs of a common citizen, a case study was taken up with Visakhapatnam City. Visakhapatnam, City of Destiny, is located 83°12' E to 83°21' E Longitude and 17°40' N to 17°45' N Latitude. For this project, we have collected data from Visakhapatnam Municipal Corporation, a Local body of Andhra Pradesh State Government. This Corporation has 50 election wards spread over an area of 110 Sq. Km.

This project was taken up with Microsoft Dot net technology for application development with the help of AspMap 3.0, a third-party component. Spatial data used in this project are in Shape file format (Converted from MapInfo Tab files) and non-spatial data is maintained in SQL Server 2000 database. The concept of dynamic maps is used here. All point data such as landmarks, buildings etc., are represented in database tables. Remaining polygon and line data such as city

boundary, ward boundary, localities, road net work etc., are represented on Shape file format.

### **Introduction**

For many years, we have been seeing isolated groups using GIS. These groups include Ssystem users, System operators, GIS suppliers, Data supplier, and Application developers. But, In addition to the above groups, a common citizen may also want benefit from GIS. He/she may want internet access to view maps including Locating a ward, Locality, Landmark, Building, Parks, Shortest and Quickest path between two locations, Search buildings or landmarks nearest to his location etc., To fulfil all his needs, the only solution is "Internet GIS".

### **Study Area**

To meet some of needs of a common citizen, a case study was taken up with Visakhapatnam City. Visakhapatnam, City of Destiny, is located 83012' E to 830 21' E Longitude and 170 40' N to 170 45' N Latitude. For this project, we have collected data from Visakhapatnam Municipal Corporation, a Local body of Andhra Pradesh State Government. This Corporation has 50 election wards spread over an area of 110 Sq. Km.

### **Technology**

This project was taken up with Microsoft .net technology for application development with the help of AspMap 3.0, a third-party component. Spatial data used in this project are in Shape file format (Converted from MapInfo Tab files) and non-spatial data is maintained in SQL Server 2000 database. The concept of dynamic maps is used here. All point data such as landmarks, buildings etc., are represented in database tables. Remaining polygon and line data such as city boundary, ward boundary, localities, road net work etc., are represented on Shape file format.

### **Methodology**

1. Collected spatial data in shape file format. In this case, required shape data is imported from MapInfo tab files.
2. Extracted co-ordinates of building using Universal Translator tool of MapInfo software and stored in Sql Server 2000 database tables for better performance.
3. Collected landmarks information and stored in RDBMS table
4. Web application was built in Asp.net using Aspmap 3.0, a third party component.

### **Find**

For this, road network was built using Road Network builder tool of Aspmap 3.0 component. Prior to this, road class, speed and one-way route information was updated in Roads shape file.

### **Route:**

### **Case Study**

Project URL: [www.saukaryam.com/igis/home.aspx](http://www.saukaryam.com/igis/home.aspx)

## **Scope of Work**

- Build Simple Map Viewer with following features:
- Zoom In - Magnifies an area on the map.
- Zoom Out - Displays a larger portion of the map.
- Pan - Moves the map view in any direction.
- Zoom To Full Extent - Zooms-out to the entire viewing area.
- Identify Objects - Gets database information for features on the map. To get feature information, select the Identify icon and then click on a map feature.
- Show Map Co-ordinates (Longitude and Latitude)
- Map Scale – Graphical Scale

## **Additional Features:**

### **Index Map**

- Represents the whole city with Zoomed Location Mapping. Displays the overview location map. The map shows you where you are zoomed to in relation to the entire map area.
- You Are Here Option, to know the consumer where he is and what he is seeing region in the city map.

### **Ward Map**

- Shows List of Wards in the city
- When User Clicks Ward Link, Location of Ward in the City is shown in the City Map. Later user can zoom / pan the map according to his wish.

### **Search Locality**

- Shows List of Localities in the city
- When User Clicks Locality Link, Location of Locality in the City is shown in the City Map. Later user can zoom / pan the map according to his wish.

### **Search Buildings in Locality**

Buildings like Government, Residential, Commercial, Education, Recreational, Worship, Emergency etc., can be shown which exists in the selected locality.

### **Search Building based on House No**

### **Search Building based Longitude and Latitude**

### **Insert / Draw Graphics**

Basically this option is used to locate an object based on its co-ordinate points. e.g., if user enters the co-ordinates of the building four corners, the building shape can be displayed in the map.

## **BUFFER ANALYSIS**

### **Search Nearest Buildings From Selected Landmark**

Shows List of Buildings of selected building category which are nearer (with in the radius) to a selected landmark in the city.

### **Search Nearest Buildings From Selected House No**

Shows List of Buildings which are nearer (with in the radius) to a required House No. in the city.

## Search Nearest Landmarks From Selected House No

Shows List of Landmarks which are nearer (with in the radius) to a required House No in the city.

### Application Development

1. Operating System
  - Server - Windows 2000 Server
  - Client - Internet Explorer 5.0 and above.
2. GIS Application
  - GIS Software – Map Info 7.5 (To store and manipulate GIS data)
3. Web Application
  - Internet Application developed with ASP.NET.
  - ASPMAP 3.0 - A Third Party Component.
4. Data
  - a. **Spatial Data** Shape files of various themes are used as input in the system. These shape files are imported from MapInfo table using Universal Translator tool.

#### Themes Used:

Theme	Data Type	Description
City Boundary	Polygon	City Boundary – Total 50 wards (as per year 2000)
Wards	Polygon	50 Election Wards in the City
Localities	Polygon	164 Localities in the city
Major Roads	Line	Major Roads like NH 5
Railway Line	Line	
Internal Roads	Line	Two lane and single lane roads
Buildings	Polygon	Building Types like Government, Education, Worship, Commercial, Residential, Hotel, Recreation, Emergency

- b. RDBMS (Non-Spatial Data) – SQL Server 2000

#### Themes Used:

Theme	Description
Landmarks	Name, Longitude and Latitudes
Buildings	Name, Longitude and Latitudes

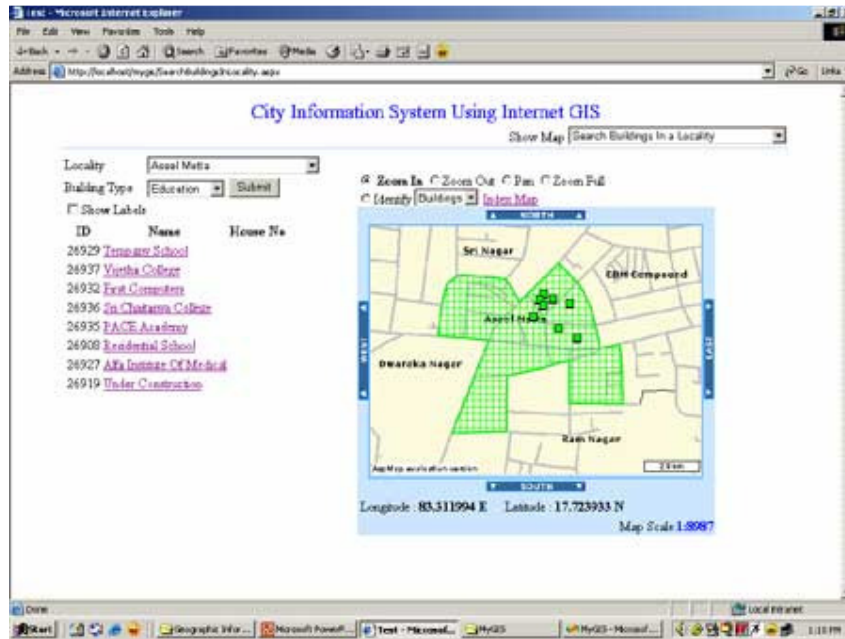
### 5. Advantages

- a. Easy to develop and maintain the software.
- b. Cost of development and maintenance is low
- c. Fit for low data and small organizations.

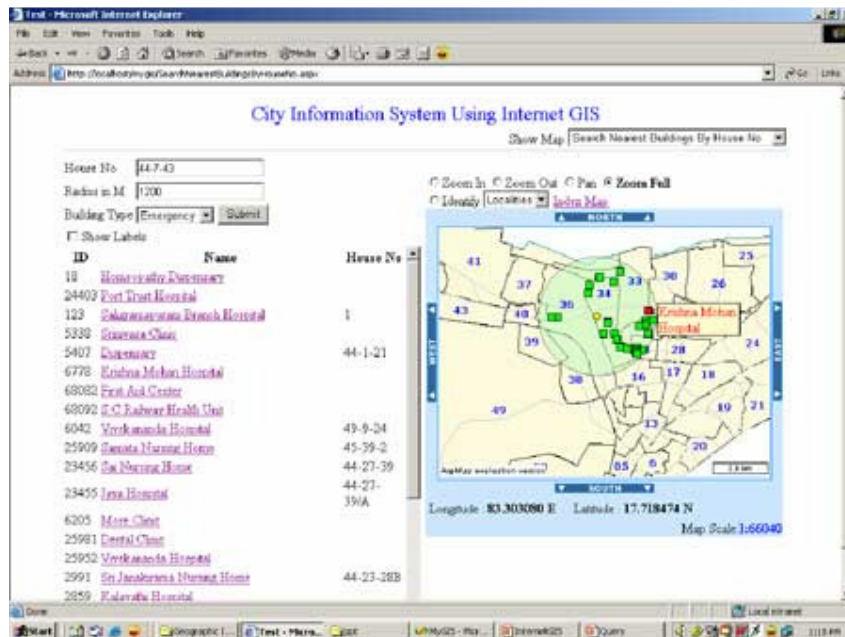
- d. Any point data can be stored in RDBMS tables and used as dynamic layer.

**Disadvantages**

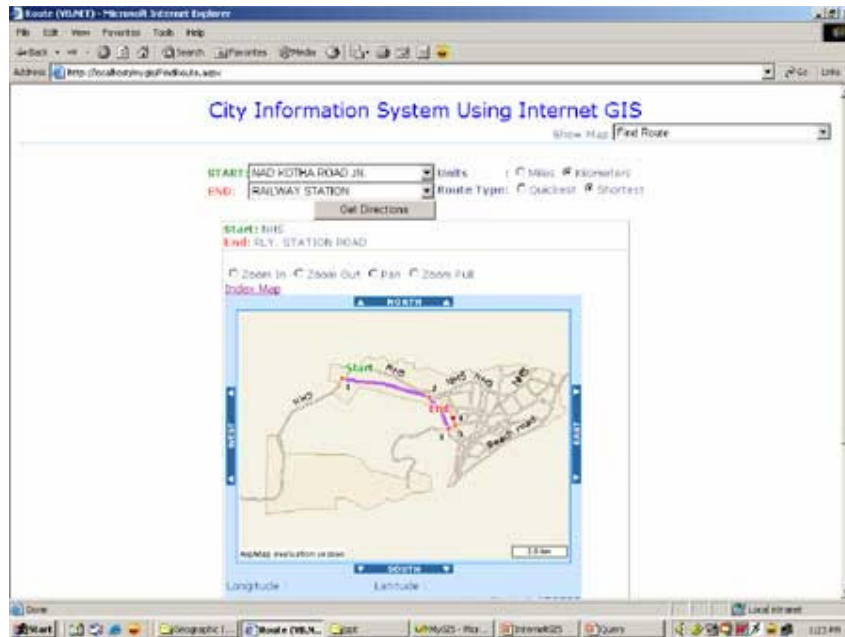
- e. Scalability is low. This application is run using Shape files as input.
- f. Data conversion (from MapInfo tables to shape file) is needed when the source data is modified.



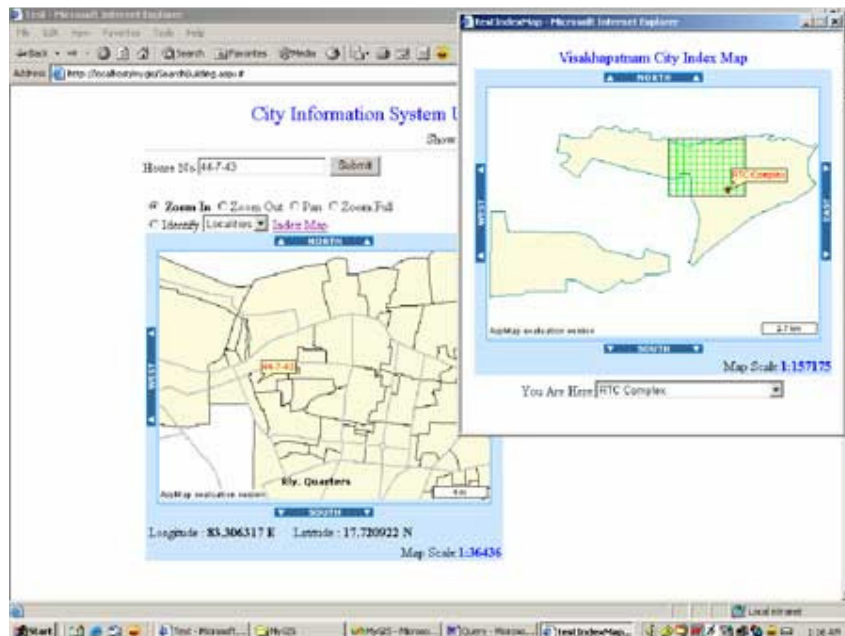
**1. Search Buildings in a selected locality**



**2. Search buildings with in the radius of selected House**



### 3. Find Route between two locations.



### 4. Index Map showing the Point of Interest

#### Further Scope of Work

In addition to the features provided in this project, the following can also be implemented in the interest of citizen.

- Vehicle Tracking
- Find Bus Routes

- Street Lights and Dustbin Monitoring. Citizen can give complaints on-line and the concerned officials can view those complaints and update the status.

### **Conclusion**

Even though it is a very small application, it has great features that can fulfill the need of a common citizen. This application can be built with low cost in short period. Small organizations like minor Municipal corporations, Municipalities etc., can use this to implement to meet their needs.

### **Acknowledgements**

The author expresses his thanks to Dr. G. Jai Sankar, Associate Professor, and Dr. E. Ammineedu, Associate Professor and Head of the department, for their constant encouragement and valuable suggestions throughout the course of this work. The authors are also thankful to the cooperation extended by other Professors in the Geo-engineering department, Andhra University, Visakhapatnam.

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