GIS Based Land Information System for CMR Group of Institutions
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Abstract— This research work is dedicated to create a land information system on areas of CMR GROUP OF INSTITUTIONS, Medchal Road, Hyderabad. The main task of the work is to establish a land information database which is based on an Open Source Geographic Information System. The main function of the work is starting with acquisition of existing geo data and information, maintenance, utilization and transferring of data. This research work will be helpful to establish a structured database, multi user access to the database, avoid data redundancy of different organization and follow international standards for geographic information. In this paper, applications of Remote Sensing and GIS for various advance classification techniques together with their accuracy based on performance evaluation, on land use studies are given emphasis. The study has been conducted on CMR GROUP OF INSTITUTIONS, a part of Rangareddy district, Telangana, INDIA. The results obtained have been used to generate final land use map of the college. The framework of a national land use and land cover classification system is presented for use with remote sensor data. The establishment of a land information system for CMR GROUP OF INSTITUTIONS will contribute to the National Land Information System. The project demonstrates that Land Information Systems can be created using Open Source GIS software. Promoting the use of Open Source GIS software, enhancing data quality and knowledge exchange are the main aims to be followed further. The results will promote good governance and provide fact based information to decision makers and government.

Keywords— Remote Sensing, Open Source GIS, Land Valuation, Land Information System, Geo-spatial database.

I. INTRODUCTION
It is important to learn and use Geographic Information Systems and Remote Sensing data for our profession nowadays. Modern technologies like geo-data processing and earth observation data processing and analysis are needed for young researchers and students. This research work is dedicated to create a land information system of CMR GROUP OF INSTITUTION. The main task of the work is to establish a land information database which is based on an Open Source Geographic Information System. The main function of the work is starting with acquisition of existing geodata and information, maintenance, utilization and transferring of data [1-3]. This research work will be helpful to establish a structured database, multi user access to the database, avoid data redundancy of different organization and follow international standards for geographic information.

II. HEADINGS
Remote sensing technique is defined as – The science and art of acquiring information about objects from measurements made at a distance without any physical contact with the objects. In modern usage, the term generally refers to the use of aerial sensor technologies to detect and classify objects on earth (both on the surface and in the atmosphere and oceans) by means of propagated signals (e.g. electromagnetic radiation emitted from aircraft or satellites). Remote sensing makes it possible to collect data on dangerous and inaccessible areas. Remote sensing applications include monitoring deforestation, depth sounding in coastal regions stand-off collection of data about dangerous border areas for military purposes, land use studies etc[3,5]. Remote sensing also replaces costly and slow data collection on the ground, ensuring in the process that areas or objects are not disturbed.
GIS: In the strictest sense, a GIS is a computer system capable of assembling, storing, manipulating, and displaying geographically referenced information, i.e. data identified according to their locations. Practitioners also regard the total GIS as including operating personnel and the data that go into the system.

A Geographic Information System (GIS) is a system designed to capture, store, manipulate, analyze, manage, and present all types of geographical data. The acronym GIS is sometimes used for geographical information science or geospatial information data to refer to the academic discipline or career of working with geographic information systems and is a large domain within the broader academic discipline of Geoinformatics [6]. In the simplest terms, GIS is the merging of cartography, statistical analysis, and computer science technology. The elements of Geographic Information system are shown in the table 1.

Table 1: Elements of Geographic Information System

<table>
<thead>
<tr>
<th>S. No</th>
<th>Elements of GIS</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Hardware</td>
<td>Type of computer platforms: Modest personnel computers High performance workstations Minicomputers Mainframe computers <strong>Input devices:</strong> Scanners, Digitizers, Tape drivers, CD, Keyboard, Graphic monitor <strong>Output devices:</strong> Plotters, Printers</td>
</tr>
<tr>
<td>2.</td>
<td>Software</td>
<td>Input modules Editing Manipulation/Analysis modules Modelling capability</td>
</tr>
<tr>
<td>3.</td>
<td>Data</td>
<td>Attribute data Spatial data Remote sensing data Global Database</td>
</tr>
</tbody>
</table>

**DATA MODELS:**

It represents the linkage between the real world domain of geographic data and computer representation of these features. Data models are of two types: Raster and Vector. In raster type of representation of the geographical data, a set of cells located by coordinate issued; each cell is independently addressed with the value of an attribute[6,7]. Vector data model uses line segments or points represented by their explicit x, y coordinates to identify locations. Connecting set of line segments forms area objects. Vector data models require less storage space, outputs are appreciable.

**1.2.3 DATA SOURCES**

**Primary Data sources are:**
1. Remote sensing data
2. Aerial Photographs
3. Global position System

**Secondary Data sources:**
1. Topographic Sheet

**III. DESCRIPTION OF THE STUDY AREA**

**3.1 LOCATION AND EXTENT**

CMR Group Of Institutions of Rangareddy district is located in the Telangana State, situated within the geographic co-ordinates of 17°35’ to 17°36’ North latitude and 78°29’ to 78°30’ Eastern longitude. CMR Groups of Institutions is located in the North-Western part in the Google map. The details of the areas are given in the following table (Table 3.1)

**DETAILS:**
1. Ground
2. Canteen
3. Parking
4. Basketball Ground
5. Blocks
6. Free space
7. Technical Campus
8. Post office Shed CMR shed
9. Girls hostel
10. Main Area
11. Auditorium
12. Bus bay
3.2 PREPARATION OF BASE MAP:
The base map is the essential requirement for any mapping using remote sensing techniques or by ground methods. It is the map which is used for collection and representing the thematic (resource) information on a common uniform scale. The major features like important town or villages, rivers, reserved forest area and transport network are required to trace. The base map has been prepared mainly using the geocoded satellite imagery and SOI toposheets on 1:50,000 scale. The detailed base map of the study area is shown in figure (Fig 3.1).
3.2.1 PHYSIOGRAPHY
The study area has an altitude of about 602 metres (1975 ft.) above sea level. In terms of topographic features, the area is mostly flat with gentle slopes. The higher elevation points and drainage pattern can be easily spotted on the satellite image[16]. The groundwater availability is about 2275 ha.m.

3.2.2 AGRICULTURE
There is more agriculture land surrounded by the CMR College. In agriculture land rice is cultivated mostly. So this again proves the college gives the pleasant atmosphere. So college is surrounded by some fresh air.

IV. BACKGROUND LITERATURE AND DATA USED

4.1 BACKGROUND AND LITERATURE
RangaReddy District was formed on 15th August, 1978 by carving out some portion of Hyderabad Urban Taluks & the merger of the entire Rural and Urban Areas of the remaining Taluks of Erstwhile Hyderabad District. This District is primarily the rural hinterland for Hyderabad City feeding the powerful commercial centre with various raw materials, agriculture produce and finished products. It was named after Deputy Chief Minister of Andhra Pradesh Sri K.V. Ranga Reddy. RangaReddy District is at the cross roads of India geographically, historically and has been the meeting ground for the fusion of various civilisations, religions, races, cultures, languages and traditions with the twin cities of Hyderabad and Secunderabad as itscore.Prior to 25-5-1985, the District was administered with 3 Revenue Divisions and 11 taluks. These Taluks had been further sub-divided into 42 Firkas, each of which in turn consists of a Number of Villages. However 11 erstwhile Taluks were delimitied into 10 PanchayatSamithis, almostcoterminus with the taluks except for a few minor changes in respect of Medchal, Hayathnagar, Ibrahimpatnam, Maheshwaram and RajendranagarTaluks.

4.2 DATA SETS USED
a) IRS ID LISS III FCC Scale 1:50,000
b) Published Reports and Literature.
c) Ground Data.

4.3 SOFTWARES USED
A general idea regarding the different kinds of software’s that were brought into use for the present study can be perceived below:
   a) ArcGIS 9.3.1
   b) Global Mapper
   c) Google Earth.

Geocoded IRS – 1 D LISS III standard false color composite generated from bands 2,3 and 4 on 1: 50, 000 scale and Survey of India toposheets have been used to prepare the integrated maps[15].The satellite image was interpreted by using standard interpretation keys such as color / tone, texture, composite, pattern of drainage and size, shape to prepare land use / land cover map. We can find the satellite image of the study area in the given figure (Fig.5)

All the conventional information collected during the field checks were used in the finalization of the maps. The selected field checks were carried out for the validation of the results.

4.4 GLOBAL MAPPER
Global Mapper is a geographic information system (GIS) software package developed by Blue Marble Geographic that runs on Microsoft Windows. The GIS software competes with ESRI GeoMedia, Manifold System, and MapInfo GIS products[8]. Global Mapper handles both vector, raster, and elevation data, and provides viewing, conversion, and other general GIS features. Global Mapper has an active user community with a mailing list and online forums.

4.5 GOOGLE EARTH:
Google Earth is a virtual globe, map and geographical information program that was originally called Earth Viewer 3D, and was created by Keyhole, Inc, a Central Intelligence Agency (CIA) funded company acquired by Google in 2004. It maps the Earth by the superimposition of images obtained from satellite imagery, aerial photography and GIS 3D globe. The product, re-released as Google Earth in 2005, is currently available for use on PC windows 2000 and above, Mac OS X10.3.9 and above, Linux Kernel 2.6 or later (released on June 12, 2006), and Free BSD. Google Earth is also available as a Browse plug-in which was released on May 28, 2008. The release of Google Earth in June 2005 to the public caused a more than tenfold increase in media coverage on virtual globes between 2004 and 2005, driving public interest in geospatial technologies and applications [9, 10]. Google Earth supports managing three-dimensional Geospatial datathrough Keyhole Mark up Language (KML/KMZ). Google Earth is simply based on 3D maps, with the capability to show 3D buildings and structures (such as bridges), which consist of users’ submissions using Sketch Up, a modelling program software. Google Earth can be used to view areas subjected to widespread disasters if Google supplies up-to-date images. One can create custom image overlays on handheld GPS units. The main methodology of the research is to prepare thematic maps with the application
of remote sensing and GIS software. The flow chart
showing the methodology of land resources analysis is
given in Fig 4.1.

Fig 4.1: Flow chart of the methodology followed
in the preparation of report
The handling of spatial data usually involves processes of
data acquisition, storage and maintenance, analysis and
output. For many years, this has been done using analogue
data sources, manual processing and the production of
paper maps. The introduction of modern technologies has
led to an increased use of computers and information
technology in all aspects of spatial data handling.

4.6 BASE MAP
Base maps are provided by governments or commercial
firms in digital format for use in GIS. We can get base
map layers in unprojected, geographic coordinates of
latitude and longitude[11-13]. These can be projected on
any flat projection surface. It is a map showing certain
fundamental information, used as a base upon which
additional data of specialized nature are compiled or
overprinted and also, a map containing all the information
from which maps showing specialized information can be
prepared [17-18].

V. RESULTS AND DISCUSSIONS
On the basis of the image interpretation and limited field
checks, thematic maps such as land use/land cover was
prepared to study the various land resources in the study
area.

5.1 LAND USE/ LAND COVER OF THE CMR
GROUP OF INSTITUTIONS
The land use/land cover categories of the study area have
been explained by taking every college as consideration
such as CMR Technical Campus, CMR College Of
Engineering and Technology, CMR Institute Of
Technology, CMR Engineering College and CMR
Pharmacy College.

CMR COLLEGE OF ENGENDERING AND
TECHNOLOGY
This college consists of two blocks. It consists of ground
in which students can play cricket, football etc. It consists
of many classrooms and labs. It has an auditorium in
which we conduct conferences, guest lectures etc. It has a
big canteen and stationary. For vehicles parking it has
separated the parking area into four wheeler parking and
two wheeler parking.

CMR INSTITUTE AND TECHNOLOGY
This institute is located at the back side of CMRCET. It
has several areas like ground which is used to play. It has
many classrooms and labs. It has seminar hall and parking
area is also have. Stationary and canteen also located in
this area.

CMR TECHNICAL CAMPUS
This college has four blocks namely A,B,C,D. In the block
A all first year classes, admin office, director room,
chairman room, exam cell etc. In block B all class rooms
and labs as well as in C also. In block D it has library, all
MBA related classes, auditorium, seminar halls etc. Apart
of this it has a big ground which is exactly in front of
college. In this college CMR Girls hostel is also present.
Canteen facility and stationary also ATM facilities are
there. For bus parking also available. Two wheeler and
four wheeler parking is available in this college.

CMR ENGINEERING COLLEGE
This college is also have ground area and two blocks
which have classrooms, labs, library, seminar hall etc. It
has stationary and also canteen facility is available as the
data took in the year 2014-2015.

CMR PHARMACY COLLEGE
This college consists of two blocks and it has very wide
ground that is used to park all the busses. In this
pharmacy block one is used for training and placement
block mean in that block all placements will be happened.
It has also canteen and stationary facility.

VI. CONCLUSIONS
The present study reveals that in the study area the land
use-land cover pattern fall under the broad categories of
built-up land, agricultural land, forest land and waste land.
The important point to be considered in this study is, there
is 16 per cent of scrub forest and forest plantation. The area
covered by forest is drastically decreasing in the last few
years because people use this forest for fuel, fodder
purposes and over grazing of the animals. Therefore
fencing of the forest boundary is much needed. Agro
forestry system has been suggested on hilly terraces, and
some waste land areas to meet the needs of local people
for fuel and fodder. In the study area some of the villages
are without proper roads and the situation is worst in the
case of communication facilities. So provision of basic
infrastructure for socio economic development is much
needed.

REFERENCES
Planning by using GIS  A case study of cuddapah
district  IJARF Volume 2, Issue 1, January 2015.
[3] 3. Dr. M. Sunandana Reddy  Image Processing and
DEM of Spatial Information Technology in Landslide
Table.3.1: Details of the entire area

<table>
<thead>
<tr>
<th>NAME</th>
<th>ENCLOSED_A</th>
<th>FLOORS</th>
<th>CATEGORY</th>
</tr>
</thead>
<tbody>
<tr>
<td>bus bay</td>
<td>2219.6 sq m</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>cmrtechnical campus</td>
<td>40177 sq m</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>main area</td>
<td>178570 sq m</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>main ground</td>
<td>28586 sq m</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>pharmacy ground</td>
<td>2422 sq m</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>pharm baketbal court</td>
<td>455.15 sq m</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>empty land</td>
<td>1043.9 sq m</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Pharmacy</td>
<td>1395.9 sq m</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Cmrec</td>
<td>2157.6 sq m</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>CMREC Basketball court</td>
<td>550.81 sq m</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CMREC ground</td>
<td>9376.6 sq m</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>cmrec ground</td>
<td>3872.9 sq m</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>CMREC New Block</td>
<td>1185.5 sq m</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>cmrec block</td>
<td>2229.8 sq m</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>CMRG New Auditorium</td>
<td>4812.7 sq m</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>NAME</td>
<td>LENGTH</td>
<td></td>
<td></td>
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<tr>
<td>-----------------------------------</td>
<td>----------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pharm canteen</td>
<td>574.83 sq m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>free space</td>
<td>3486.3 sq m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>placement block</td>
<td>1807.3 sq m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>main parking</td>
<td>640.55 sq m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postofice</td>
<td>262.54 sq m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shed</td>
<td>484.51 sq m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cmritbasktbl court</td>
<td>568.24 sq m</td>
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</tr>
<tr>
<td>cmrit ground</td>
<td>8767.1 sq m</td>
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<tr>
<td>cmrit parking</td>
<td>443.02 sq m</td>
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<td></td>
</tr>
<tr>
<td>cmrit</td>
<td>7084.3 sq m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cmrit stationary</td>
<td>292.93 sq m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>free land</td>
<td>1376 sq m</td>
<td></td>
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</tr>
<tr>
<td>cmrit canteen</td>
<td>797.27 sq m</td>
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</tr>
<tr>
<td>CMrcet</td>
<td>6481.8 sq m</td>
<td></td>
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<tr>
<td>CMRCET new block</td>
<td>3700.1 sq m</td>
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<td></td>
</tr>
<tr>
<td>CMRCET canteen</td>
<td>1296.1 sq m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cmrcet shed</td>
<td>339.83 sq m</td>
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<td></td>
</tr>
<tr>
<td>cmrcet ground</td>
<td>7261 sq m</td>
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<td></td>
</tr>
<tr>
<td>cmrcet</td>
<td>2804 sq m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cmrcet basketball court</td>
<td>303.34 sq m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cmrtc</td>
<td>6395.3 sq m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cmrtc ground</td>
<td>16683 sq m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cmrtcbasktbl ground</td>
<td>528.46 sq m</td>
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<td></td>
</tr>
<tr>
<td>cmrtc D block</td>
<td>2198.9 sq m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cmrtc girls hostel</td>
<td>1330.3 sq m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cmrtc parking</td>
<td>499.18 sq m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cmrtc canteen</td>
<td>715.15 sq m</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3.2: Details about the line measurement
Flow Chart of the Proposed System

Fig.4.1: Flow chart of the methodology followed in the preparation of report

<table>
<thead>
<tr>
<th>Distance</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>cmrct to Pharm Rd</td>
<td>209.23m</td>
</tr>
<tr>
<td>pharm to cmrtc Rd</td>
<td>1.979km</td>
</tr>
<tr>
<td>pharm to cmrtc shortcut rd</td>
<td>112.49m</td>
</tr>
<tr>
<td>ccmrtc main gate to second gate</td>
<td>240.98m</td>
</tr>
</tbody>
</table>