

# GIS Based Application in Education for Aurangabad city

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**Abstract:** Education is the basic fundamental of any country. The purpose of this paper is to examine the different categories of schools in Aurangabad city, Maharashtra, India. It checks the compatibility of GIS with education facilities. We classified four different categories of schools in Aurangabad city, mapped them using Google Earth and KML. The categories of schools are classified on medium of the schools. We traced these all schools with their exact longitude and latitude and detail information about the particular school is also shown using Google Earth API. In this paper some management levels are used by assigning some random points anywhere in Aurangabad city. Due to that people get the best schools information from that random point which is nearer. We have assigned some ranking to the schools according to their facilities, infrastructure, admission status, outcome etc. So the people can see covered area about the particular school and area where actual schools are required.

**Keywords:** OGC (Open Geospatial Consortium), GIS (Geographic Information System), KML (Keyhole Mark-up Language), Aurangabad city.

## 1. Introduction

The Smart City is a new concept and mode of city development in recent days, which is the integration of the new generation of ICT application, urban transformation and the extensive use of network applications. Cities are gaining increasingly high importance as a means of making available all the services and applications enabled by ICT to citizens, companies and authorities that are part of a city’s system. It aims to increase citizens’ quality of life and improve the efficiency and quality of the services provided by governing entities and businesses. The construction of Smart City will make the infrastructure more intelligent, the public services more convenient, the social management more sophisticate, the ecological environment more livable and the industrial system more optimize. It will generate a long-term mechanism for sustainable growth, and help the city quickly develop. Smart City is good for industrial; ICT and the city itself simultaneously develop. [1]

<b>SMART ECONOMY</b> (Competitiveness) <ul style="list-style-type: none"> <li>Innovative spirit</li> <li>Entrepreneurship</li> <li>Economic image &amp; trademarks</li> <li>Productivity</li> <li>Flexibility of labour market</li> <li>International embeddedness</li> <li>Ability to transform</li> </ul>	<b>SMART PEOPLE</b> (Social and Human Capital) <ul style="list-style-type: none"> <li>Level of qualification</li> <li>Affinity to life long learning</li> <li>Social and ethnic plurality</li> <li>Flexibility</li> <li>Creativity</li> <li>Cosmopolitanism/Open-mindedness</li> <li>Participation in public life</li> </ul>	<b>SMART GOVERNANCE</b> (Participation) <ul style="list-style-type: none"> <li>Participation in decision-making</li> <li>Public and social services</li> <li>Transparent governance</li> <li>Political strategies &amp; perspectives</li> </ul>
<b>SMART MOBILITY</b> (Transport and ICT) <ul style="list-style-type: none"> <li>Local accessibility</li> <li>Inter-national accessibility</li> <li>Availability of ICT-infrastructure</li> <li>Sustainable, innovative and safe transport systems</li> </ul>	<b>SMART ENVIRONMENT</b> (Natural resources) <ul style="list-style-type: none"> <li>Attractivity of natural conditions</li> <li>Pollution</li> <li>Environmental protection</li> <li>Sustainable resource management</li> </ul>	<b>SMART LIVING</b> (Quality of life) <ul style="list-style-type: none"> <li>Cultural facilities</li> <li>Health conditions</li> <li>Individual safety</li> <li>Housing quality</li> <li>Education facilities</li> <li>Touristic attractivity</li> <li>Social cohesion</li> </ul>

Figure 1: Characteristics of a Smart City.

Smart Cities, define a Smart City by using six characteristics in which such a city “performs in a forward-looking way”: Smart Economy, Smart People, Smart Governance, Smart Mobility, Smart Environment and Smart Living. They use these six

concepts to identify specific factors that can be important when describing a Smart City, which are presented in Figure 1.

The main objective of this project is to locate all the schools such as CBSE, English medium schools, Urdu medium Schools and Marathi medium schools of Aurangabad City through KML on Google API. In this project, the detail information contains address of school i.e. location and website of school if any, contact detail of school, school building image, medium of schools, school facilities. Due to that people or parents may get the actual information about the schools and choose proper schools for their son or daughters. For making the actual growth of students initially choosing right school is very important.

Actual Working with the KML and Google API for locating the available & analyzing their properties for school information system in the Aurangabad city is important. KML is an abbreviation for Keyhole Markup Language, which is an XML format for managing the display of geospatial data for school information system. The format is created by Google and used by Google Earth and Google Maps and by many other geographical & developing a GIS enabled KML for the school mapping of Aurangabad city.

The designing provides school information using Google earth and KML language. Collect the information about the schools and their facilities available in the study region. Analyzing more and more data and generating useful information with help of GIS. The application developed was simple and made in such a way that even a non-GIS professional can use it.

It can be used to develop a model for the education system in Aurangabad city which can help the people to select proper or accurate schools for their children’s for their bright future. Any user can use this application without any restriction.

In this project, people will get the detail information which contains address of school i.e. location and website of school if

any, contact detail of school, school building image, medium of schools, school facilities. It has the ability of mapping on the desktop through graphical display and manipulates the data. GIS applications have a particular relevance since they show firstly, that the technology has direct application in education planning, and also that the results of the spatial and attribute data analysis is having a direct bearing on the kinds of decisions being made.

People don't know anything about the education system because they didn't have any source to see about facilities of schools which are provide by the school. Now a day's people are trying to get actual information for education of their children's. This project is really helpful for the people for choosing accurate school for better education.

Education is often understood to be a means of overcoming handicaps, achieving greater equality and acquiring wealth and status for all (Sargent 1994). Learners can also be motivated by their interest in the subject area or specific skill they are trying to learn. Learner-responsibility education models are driven by the interest of the learner in the topic to be studied. [2]

Education is often perceived as a place where children can develop according to their unique needs and potentialities with the purpose of developing every individual to their full potential. [3]

## 2. Related Work

The case of study Thessaloniki, Greece presents the modeling of the system of educational facilities included in a large city or a municipality, to facilitate a decision regarding the optimum location of a new educational facility. The allocation of a new educational establishments is a multidimensional one and for this reason, a particularly complex decision will have to be made, based on examining a large number of variables, relating both to the deficiencies in areas shown per each educational level, as well as the available land for erecting schools located within the urban area of study. The complexity of this decision necessarily leads to the modeling of the educational system and its management, using GIS. Specifically, the analysis data, which needs to be integrated into the GIS, is presented along with the process of analysis, interpretation and the conclusion drawing relating to the problems of the existing situation in conjunction with the methodology of finding those critical spatial entities, where the construction of a new, and of a particular level, educational installation, is more urgent. For the application of the methodology, the educational system of Thessaloniki, Greece, will be used as a case study. [4]

This study focuses on the planning of educational facilities, using as a case study the educational facilities in the municipality of Thessaloniki in Greece. Specifically, the interest relates to the modeling of the system of educational establishments but primarily to the methodology, which is used to find the optimal location of a planned school. It is important to note that this application has taken into account the specificities of both the Greek education system and the Greek urban planning system, which may differ more or less in relation to those of other countries.

The educational system of Greece is divided into three levels: primary, secondary and higher education. The first level

includes only the elementary schools, to which children aged 6 to 12 are admitted, while the second level includes lower-secondary and upper-secondary schools, which accept children aged 12 to 15 and adolescents between 15 and 18 respectively. According to available accounts, school mapping originated in France in 1963 (Caillods, 1983; DaGraça, 1998; Galabawa, Agu, & Miyazawa, 2002; Govinda, 1999). School mapping (SM) is a normative approach to the micro-planning of school locations. SM is also used to investigate and ensure the efficient and equitable distribution of resources within and between school systems, when large-scale reform or significant expansion of an educational system takes place (Caillods, 1983). Along with SM, geographical information systems (GIS) and public participation GIS (PPGIS) function at an interesting and often paradoxical social and geo-political position. As micro-planning approaches, technologies and/or exercises SM, GIS and PPGIS operate at the confluence of decentralisation efforts and centralised resources and mandates. Specifically, SM, GIS and PPGI can be valuable in decentralised education micro-planning efforts, but they often depend on some significant level of centralised expertise, resources and/or decision-making for their implementation. [5]

The trend towards using GIS and school mapping to support decision making for Ministries of Education and educational facilities are becoming very important for planning purposes. GIS is in the implementation stages in many developed countries of the world, and also in the developing countries. (Yoko, Watanabe 2002) have decided that GIS is a very useful tool to analyse the school-planning situation. Besides the simplification of educational administration, and expansion of compulsory education, enforcing the clear school planning policies, and creating the digital database that can be used in GIS, will have more positive influence on improving school services and qualities for the current and future children. [6]

The application of GIS in Education involves combining statistical inferences to geographic information. Statistics in education might be used with GIS to present a clear picture of educational facilities and activities. Ratio of students to teacher, number of students in a class and student density in school, schools distribution in a district to find lack of schools and in time processing education facilities and so on. GIS might be used for supporting educational decisions by senior administration and how to use statistic for this system. Some approaches in GIS that might be used for education facilities and policy with statistical inferences in the districts of Izmir (Temiz, 2007). [7]

## 3. Methodology

In this project, we have covered maximum schools of Aurangabad city and divided into four different categories. In Aurangabad city, there are more than 100 schools which may be public or private under some educational welfare societies. Population of Aurangabad city is increasing rapidly, it crossed the figure of 15, 00,000 that's why schools have to be increased as per need. Our main purpose of this project is to show the maximum schools with their detail information by using Geospatial technologies. Geospatial technology is the

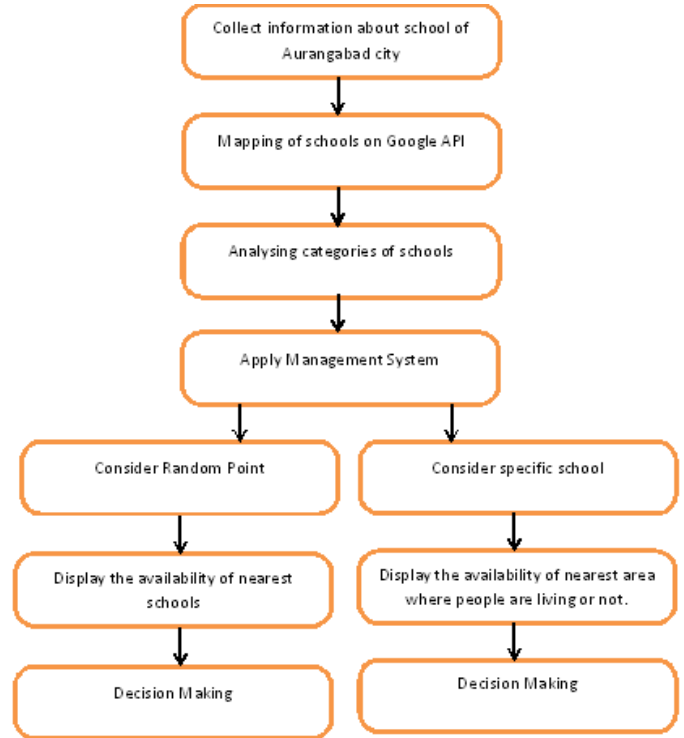
integration of three major tools such as Remote Sensing (RS), Global Positioning System (GPS) and Geographic Information System (GIS). The detail information of single school shows the actual location of school which is identified by longitude and latitude. In this project, there are 18 CBSE, 10 English medium schools, 10 Urdu medium schools and 10 Marathi medium Schools are traced by using Google earth and KML and classified into four categories such as CBSE (Central Board of Secondary Education), English Medium School (State Board of Primary & Secondary Education), Urdu Medium School (State Board of Primary & Secondary Education) and Marathi Medium School (State Board of Primary & Secondary Education).

The table 1 shows different color code system used for different category of school for identification purpose and it's very easy to find the schools.

**Table 1:** Different color code system used for different category of School

Serial No	Category of School	Color Code used for identification.
1	CBSE (Central Board of Secondary Education)	Green
2	English Medium School (State Board of Primary & Secondary Education)	Red
3	Urdu Medium School (State Board of Primary & Secondary Education)	Blue
4	Marathi Medium School (State Board of Primary & Secondary Education)	Yellow

Figure 2 shows the actual working of proposed system of this project. We have to use Google Earth and KML to map it on Google API. Two management systems are applied to implement the actual output in this project. According to these management skill people can take decision in their confirm zone.



**Figure 2:** Process Flow Diagram.

## 4. Experimental Work

### 4.1 CBSE Schools



**Figure3** CBSE Schools located in Aurangabad City

The figure 3 shows 18 CBSE Schools mapped at every location of Aurangabad City. Green color code is used for identification of CBSE schools. Maximum schools are placed at the center of the city. Some schools are placed on Paithan Road and these schools are in demand. Parents are always tried to get admission of their children's in such schools. These schools provide transportation facilities for students. The fees of these schools are very high as compare with other type of schools such as General English Schools, Marathi Schools and Urdu Schools.

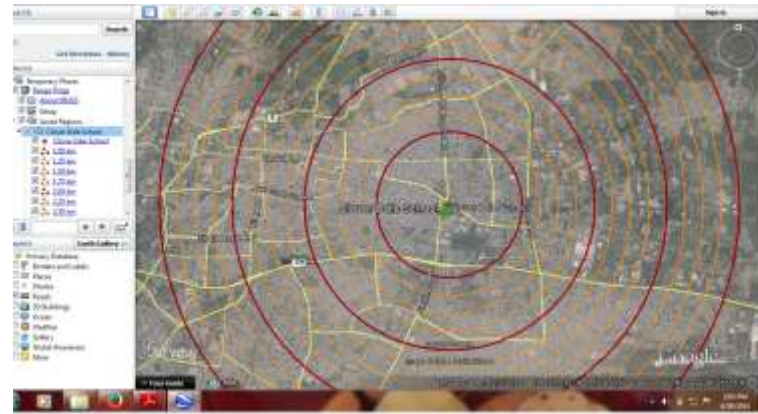
Now a day new schools are established out of the Aurangabad city, where the area is not crowded. Suitable environment for students with some sports complex for their health and pollution free area is there.

**Table 2** List of CBSE Schools

Sr. No	Name of Schools	GPS Locations	
		Latitude	Longitude
1	Ashapura-Tapadia Innovations School	19°52'0.27"N	75°19'55.01"E
2	Riverdale High School	19°50'19.27"N	75°18'34.62"E
3	BSGM English School	19°51'59.57"N	75°21'33.52"E
4	Cambridge School	19°51'53.71"N	75°26'0.82"E
5	Central School (Kendriya Vidyalay)	19°52'24.07"N	75°17'57.20"E
6	Clover Dale School	19°52'51.63"N	75°21'15.53"E
7	Dr. YS Khedkar International School	19°52'46.48"N	75°21'31.56"E
8	Gaikwad Global School	19°51'50.81"N	75°20'42.44"E
9	Good World School	19°54'37.93"N	75°21'15.69"E
10	Green Feild School	19°52'37.30"N	75°19'10.21"E
11	Jain International School Aurangabad	19°51'11.82"N	75°19'58.54"E
12	NathValley School	19°50'17.44"N	75°18'13.88"E
13	Oxford English High School	19°54'20.06"N	75°21'13.56"E
14	Pearson School	19°48'34.34"N	75°17'3.43"E
15	Ryan International School	19°50'33.37"N	75°17'40.77"E
16	Podar International School	19°51'28.57"N	75°20'22.40"E
17	Woodridge High School	19°50'15.94"N	75°17'42.02"E
18	Stepping Stone High School	19°58'34.85"N	75°22'33.12"E

**Figure 4** Location of Jain International School with address

The figure 4 shows the exact locations of Jain International School with address and detail information about the school. So that people can see the information about the school and front picture of the school. The location is traced by using Google Earth with KML with their exact longitude and latitude. Like this we have covered all 18 CBSE School of Aurangabad cities, which show the information and details. Just selecting the school name people will get the details about the schools.

**Figure 5** location of Clover Dale School using Range Rings tool

The figure 5 shows the location of Clover Dale School in Aurangabad city. The Range Ring tool is used along with Google Earth. By using this tool we can see the covered area from traced location. In the above figure more circles are made with two different with some ranges of Kilo Meter. First Red colored circle from the location of Clover Dale School defines 1KM covered area. It means up to 1KM from Clover Dale School maximum crowded area covered, and people from that area have full awareness about the school. Some orange colored circles are made like 1.25KM, 1.50 KM and 1.75 KM etc. Range Ring tool is important tool, used with Google earth to find area from center location.

#### 4.2 English Medium School

**Figure 6** English Medium Schools located in Aurangabad city.

The figure 6 shows the location different English Medium School located in Aurangabad city. These schools are affiliated by Maharashtra State Board, Pune. These schools are some famous school from Aurangabad city. These are located by using Google Earth with KML with its exact longitude and latitude. We have used red color code for identification purpose. Here we can see that all area is covered of the city.

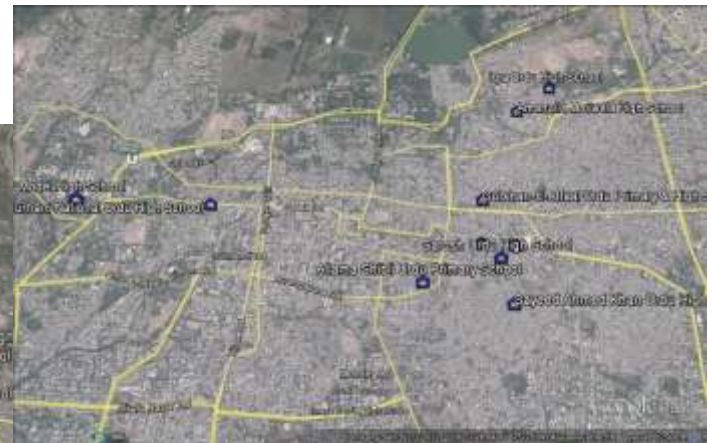
**Table 3** list of English Medium Schools

Sr. No	Name of Schools	GPS Locations	
		Latitude	Longitude
1	Oyster English High School	19°52'30.10"N	75°20'26.60"E
2	B.F.C.I. English School	19°54'2.00"N	75°20'24.32"E
3	Burhani National English High	19°53'17.45"N	75°19'37.28"E

	School		
4	Chhatrapati English School	19°51'42.48"N	75°21'11.38"E
5	Guru Tegh Bahadur English School	19°52'1.52"N	75°19'42.46"E
6	Gurukul English Medium school	19°54'26.79"N	75°21'14.04"E
7	St Xavier's High School	19°52'51.31"N	75°22'9.99"E
8	Holy Cross English High and primary School	19°52'33.83"N	75°18'31.91"E
9	Little Flower High School	19°53'6.85"N	75°18'27.94"E
10	Saint lawrence english high school	19°52'27.78"N	75°22'2.07"E

The figure 8 shows the location of St Xavier's High School in Aurangabad city. The Range Ring tool is used along with Google Earth. By using this tool we can see the covered area from traced location. In the above figure more circles are made with two different with some ranges of Kilo Meter. First Red colored circle from the location of St Xavier's High School defines 1KM covered area. It means up to 1KM from St Xavier's High School maximum crowded Cidco N1 area covered, and people from that Cidco N1 area have full awareness about the school. Some orange colored circles are made like 1.25KM, 1.50 KM and 1.75 KM etc. Range Ring tool is important tool, used with Google earth to find area from center location.

**4.3. Urdu Medium School**



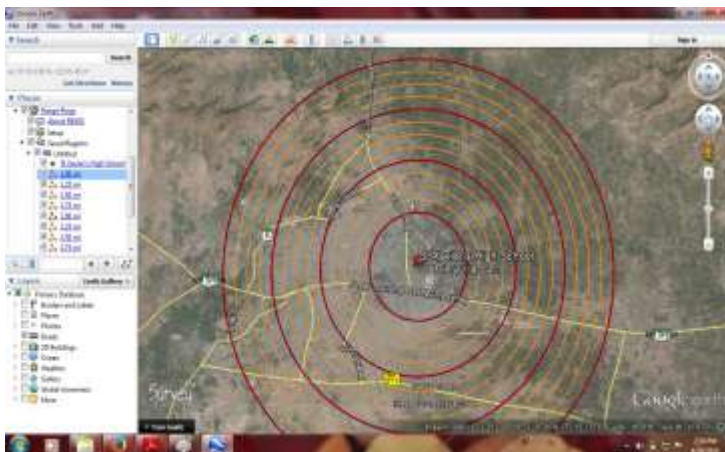
**Figure 9 Urdu Medium School** located in Aurangabad. The figure 9 shows the location different Urdu Medium School located in Aurangabad city. These schools are affiliated by Maharashtra State Board, Pune. These schools are some famous school from Aurangabad city. These are located by using Google Earth with KML with its exact longitude and latitude. We have used blue color code for identification purpose. Here we can see that all area is not covered by these schools of the city. Most of the Urdu medium schools are placed in old Aurangabad city. People are living from last 100 years. That's the actual old area of Aurangabad. After that day by day expansion of Aurangabad had done.

**Table 4** List of Urdu Medium Schools



**Figure 7** location of Oyster English School with address

The figure 7 shows the exact locations of Oyster English School with address and detail information about the school. So that people can see the information about the school and front picture of the school. The location is traced by using Google Earth with KML with their exact longitude and latitude. Like this we have covered more than 10 English Medium School of Aurangabad cities, which show the information and details. Just selecting the school name people will get the details about the schools.



**Figure 8** location of St Xavier's High School using Range Rings tool



Figure 10 Location of Model High School with address

The figure 10 shows the exact locations of Model High School with address and detail information about the school. So that people can see the information about the school and front picture of the school. The location is traced by using Google Earth with KML with their exact longitude and latitude. Like this we have covered more than 10 Urdu Medium School of Aurangabad cities, which show the information and details. Just selecting the school name people will get the details about the schools.

Sr. No	Name of Schools	GPS Locations	
		Latitude	Longitude
1	Model High School	19°53'17.37" N	75°19'9.85"E
2	Amanulla Motiwala high school	19°53'36.36" N	75°20'44.24" E
3	Aurangabad Urdu Primary Schoo	19°53'49.29" N	75°20'45.87" E
4	Burhani National Urdu high school	19°53'16.94" N	75°19'37.96" E
5	Fatema Girls primary school	19°53'8.74"N	75°20'33.70" E
6	Gulshan-e-Atfaal Urdu primary & high school	19°53'17.76" N	75°20'34.94" E
7	Moin - ul - Uloom	19°51'30.74" N	75°18'22.94" E
8	Iqra Urdu boy's high school	19°53'31.26" N	75°20'47.54" E
9	Allama Shibli Urdu Primary School	19°53'1.42"N	75°20'19.95" E
10	Sarosh Urdu High School	19°53'6.21"N	75°20'37.24" E

4.4 Marathi Medium School



Figure 12 Marathi Medium School located in Aurangabad

The figure 12 shows the location different Marathi Medium School located in Aurangabad city. These schools are affiliated by Maharashtra State Board, Pune. These schools are some famous school from Aurangabad city. These are located by using Google Earth with KML with its exact longitude and latitude. We have used yellow color code for identification purpose. Here we can see that all area is not covered by these schools of the city. Most of the Marathi medium schools are placed in old Aurangabad city. Some areas are CIDCO N9, Jinsi, Nirala Bazar, Raja Bazar etc. people are living from last 50 years. That's the actual old area of Aurangabad. After that day by day expansion of Aurangabad had done.

Table 5 List of Marathi Medium Schools

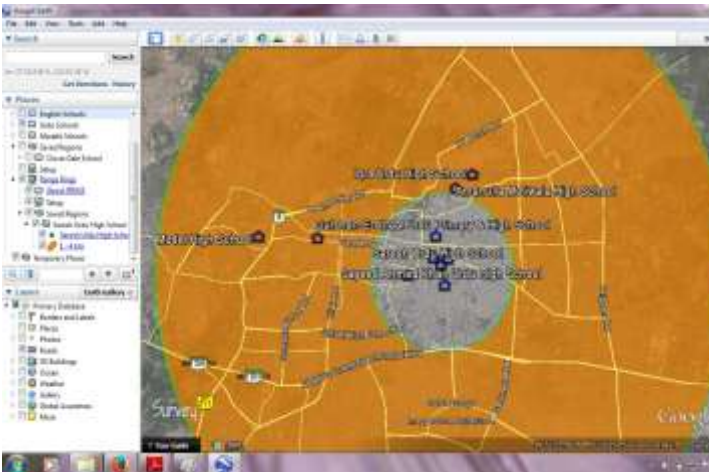


Figure 11 location of Sarosh Urdu High School using Range Rings tool

The figure 11 shows the location of Sarosh Urdu High School in Aurangabad city. The Range Ring tool is used along with Google Earth. By using this tool we can see the covered area from traced location. In the above figure more circles are made with two different with some ranges of Kilo Meter. First green colored circle from the location of Sarosh Urdu High School defines 1KM covered area. It means up to 1KM from Sarosh Urdu High School maximum crowded area like Jinsi, Baijipura, Roshan Gate Qaisar Colony etc., are covered, and people from that area have full awareness about the school. Here we conclude that within 1 KM more than 5 schools are placed, that area is the center of the city. We have to establish more schools apart from this area.

Sr. No	Name of Schools	GPS Locations	
		Latitude	Longitude
1	Baliram Patil Vidyalaya	19°53'47.02" N	75°21'27.47" E
2	ZP School	19°54'8.20"N	75°20'55.81" E
3	Gujarati Kanya Vidyalaya	19°53'5.53"N	75°19'54.57" E
4	Amar High School	19°52'54.54" N	75°20'40.43" E
5	Godavari Public School	19°54'10.03" N	75°20'55.89" E
6	Deogiri Primary School	19°52'41.33" N	75°19'11.81" E
7	Maratha High School	19°53'4.88"N	75°19'59.92" E
8	Shivaji High School	19°52'38.81" N	75°19'53.40" E
9	Saraswati bhuvan High School	19°52'53.91" N	75°19'40.57" E
10	Sharda Mandir Primary School	19°52'56.47" N	75°19'42.94" E



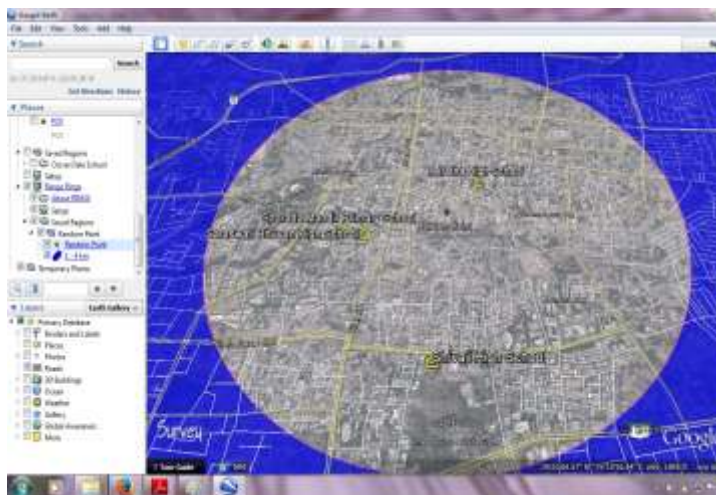
**Figure 13** Location of Baliram Patil High School with address

The figure 13 shows the exact locations of Baliram Patil High School with address and detail information about the school. So that people can see the information about the school and front picture of the school. The location is traced by using Google Earth with KML with their exact longitude and latitude. Like this we have covered more than 10 Marathi Medium School of Aurangabad cities, which show the information and details. Just selecting the school name people will get the details about the schools.

#### 4.5 Locations of all Schools



**Figure 15** All Schools located of Aurangabad city



**Figure 14** Random Point placed using Range Rings tool

The figure 14 shows the location of Random Point. Random Point is placed at particular point and we have to see the how much area covered who had Marathi Medium Schools from that point in Aurangabad city. Here we conclude that, Only 4 or 5 schools are available for the students from that random point at a distance of 1KM to 4KM. The Range Ring tool is used along with Google Earth. By using this tool we can see the covered area from traced location. We have to establish more schools apart from this area.

#### 5. Conclusion

Hence we conclude that this project or model can be used to analyze education system in Aurangabad city which can help the people to select proper or accurate schools for their children's for their bright future. Any user can use this application without any restriction.

It has the ability of mapping on the desktop through graphical display and manipulates the data. GIS applications have a particular relevance since they show firstly, that the technology has direct application in education planning, and also that the results of the spatial and attribute data analysis is having a direct bearing on the kinds of decisions being made.

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