APPs on e-Governance for Solid Waste Management

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***Abstract*— In most of the developing nations, due to the increase in population, solid waste management has become an issue. The district administration, municipal panchayats, town corporations are facing a big problem in managing the municipal solid waste management in an hygienic way. Various environmental audits are carried out by government to solve these problems in solid waste management. This paper proposes an idea of linking the problem with information and communication technology by a system that assists the solid waste management and monitors the dump bins using GIS, and by monitoring the vehicles which collects the waste from the dump bins by using GPS. The aim of this paper is to create an app for the e-Governance, for the municipal solid waste management and make India as one of the model nation to the world in converting the waste into wealth by using Application on Android Mobile.**

Keywords- Municipal Solid Waste Management, GIS, GPS, e-Governance, Environmental

I. INTRODUCTION

India is one of the developing nation with a population of over 1.21 billion which covers the 17.5% of the world population (Source: Census of India 2011) having the problems of managing the municipal solid waste management in an efficient and hygienic way. Waste can be classifies into three types solid waste, semisolid waste and liquid waste. Solid waste can be food waste, vegetable waste, household waste, and non hazardous waste from organizations, industries and hospitals. Semisolid waste is sludge waste and liquid waste is night soil waste. Where hazardous waste from industries and medical are difficult to separate from municipal solid waste . Solid Waste management has become an issue of growing global concern as urban populations continue to increase. However, the growth of the solid-wastes, in the developing countries like India will be increasing the resource scarcity and the availability of new technologies are offering opportunities for turning waste into a resource. Waste is a continually growing problem at global and regional as well as at local levels. Management of solid waste may be defined as that discipline associated with the control of generation, storage, collection, transfer and transport, processing, and disposal of solid wastes in a manner that is in accord with the best principles of public health, economics, engineering, conservation, aesthetics, and other environmental considerations.

The government of India started the 'Swachh Bharat Abhiyan' is a massive mass movement that seeks to create a Clean India. Cleanliness was very close to Mahatma Gandhi's heart. Mahatma Gandhi devoted his life so that India attains 'Swarajya'. Now the time has come to devote ourselves towards 'Swachchhata' (cleanliness) of our motherland. The government of India over the years has taken many initiatives and implemented new technologies and methods. Due to increased public awareness of MSWM, a public litigation was filed and resulted in the Municipal Solid Waste (Management and Handling) Rules, 2000. Government for the first time now has included private organizations in providing this public service. New methods of storage, collection, transportation, processing and disposal are being implemented. Management of solid waste is associated with the control of generation, storage, collection, transfer and transport, processing, and disposal of solid wastes in a manner that is in accord with the best principles of public health, economics, engineering, conservation, aesthetics, and other environmental considerations.

II. METHODOLOGY

In this paper we proposed an Android Application for e-Governing the system for municipal solid waste management. The waste bins and the waste dumping sites are monitored by using GIS and the vehicles which collecting the waste from the bins and waste dumping sites are monitored by using GPS. The collected waste will be separated as recycle and reuse. The recycle waste such as food waste, vegetable waste, cow dung are separated and it will be send to Bio Mass Gasified Plant (Multiple purpose) for generation of power and the power production will be monitored by the Android Apps. The reuse separated waste like plastic, medical, polythene will be collected and it will be sending for the process of recycle. The outcome of these apps is it will be generating MIS reports in Android mobiles and proper tracking of garbage collection vehicles. Monitoring the garbage for quick disposal. These App will be helpful for monitoring the solid waste management for developing countries like India and it will be a source additional income for the government of India.The system provides real time monitoring of waste collection through a mobile based application.

The methodology is based on Global Positioning System (GPS) and Geographical Information System (GPS). These were used for accurate measurements and formulation of geographic data bases for the analysis purpose. GPS is used to create instant local area map and to enclose the desired data base on the point, line and area. This methodology of this project is the GPS and the ultrasonic sensor is fixed in the waste bins. When the waste bins is filled with garbage it automatically informs the in-charge of the respective municipal solid waste administration office and they will be in a position to collect the waste from the bins and segregate to disposal in the bio mass gasification plant. The GIS fixed in the waste bins collecting vehicle to track the location where the vehicle exactly on road.

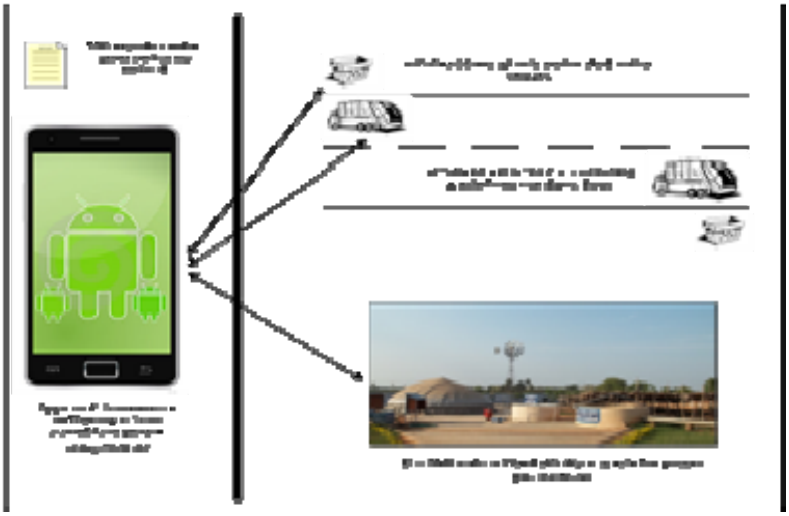

Fig.1 Architecture diagram for APPs on e-Governance for Solid Waste Management

Fig 2. Microcontroller kit fixed along with the waste bin to send sms about the bins

This methodology followed in this App is included survey to collect data and GIS based analysis to find proper location for bins along the roads. Procedure of the study can be summarized as in Fig.3

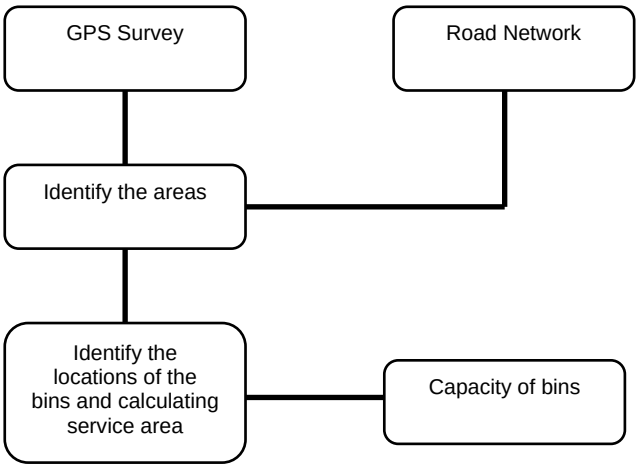

Fig 3. Procedure of the study for fixing Bins using GIS and GPS

A. Data Collection and Description

In order to efficiently manage the municipal solid waste system, detailed spatial information is required. This information is related to the geographical background of the area under investigation as well as to special data related to the waste collection procedure. In co-operation with the municipality and Town panchayat a large database of waste management data should be collected and statistically analyzed, regarding the static and dynamic data of each existing collection program: population density; waste generation rate for mixed waste and for specific waste streams; number, type and positions of waste bins; the road network and the related traffic; the current routing system of the collection vehicles; truck capacities and their characteristics; and, the geographic boarders and characteristics of the waste collection sectors. Thus, for the optimization of the collection process the following data were generated (data source in the bracket):

- Study about the area boundary (Municipality Corporation)
- Detailed urban plan of the municipality (official toposheet plan)
- Population density
- Land use of the study area
- Satellite image of the municipality (Google Map)
- Road network of the study area (official toposheet plan)
- Location of waste bins (Municipality Corporation, field work)
- Capacities of bins (Municipality Corporation)

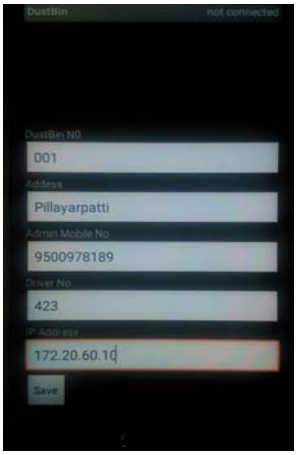

Fig. 4 Fixing IP address to track the bins capacity

III. CONCLUSION

This system is cost effective and the collection of waste from the dumping sites can be easily monitored by GIS, Waste collection vehicles can be easily tracked by GPS. This system helps to maintain a database and helps to develop an ERP for Municipal Solid Waste Management. It also provides and generates employment opportunities and produce income in the development of urban. In future we plan to automate the Power production and it can be monitored and distributed in Bio Methanation plant can be automated because of this system waste can be converted into power by using Bio Methanation Plant.

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