CLOUD BASED SMART WASTE MANAGEMENT FOR SMART CITY OF DAVANAGERE

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ABSTRACT: *The objective of this study is to go past a programmed Waste container and utilize distributed computing worldview to develop a progressively vigorous and powerful brilliant waste administration instrument. Shrewd waste administration isn't constrained to informing the rubbish level. There is a term related with it in the event that it is to be called 'keen' from a genuine perspective. Waste the executives is connected to various sorts of elements, one of which is partners. Further, the next objective is to finding optimal route for waste collection using arcgis software.*

1. INTRODUCTION

The goal here is to develop automatic waste bin and make use of cloud computing paradigm to evolve a more robust and effective smart waste management mechanism. Smart waste management is not limited to notifying the trash level.

There is a lot associated with it if it is to be called 'smart' in a true sense. Waste management is linked to different types of entities, one of which is stakeholders.

Different stakeholders, including recyclers, importers and exporters, food industry, healthcare, research, environment protection and related organizations and tourism industry are a few examples to mention.

Fig 1: Cloud based SWM Architecture
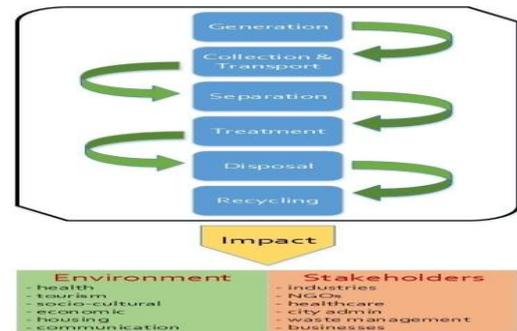
Fig 2: SWM Generic Workflow

1.1 PROBLEM STATEMENT

Major problem almost the cities are facing is to manage the waste that are generated daily. Currently emptying of the bin is done by corporation vehicles they need to visit the bin every day in a specified route, sometime bin will be overflowing by the garbage which attracts dogs and cattle's these animals will make the garbage to spill on the road. Secondly people won't go near to bin to throw their waste due to overfilled bins, Currently there is no bin is monitored remotely so complete automation is needed to monitor the bins remotely by the concerned persons and can inform the collecting vehicle to empty the bin when its full, by doing in these method fuel can be saved and spill over of waste can also be avoided.

1.2 OBJECTIVES

The main objectives of the project include:

➢ Design a unit of Smart dustbin with dedicated apparatus.
➢ Extract the bin position using Gis Module.
➢ To provide gateway from Smart dustbin through WIFI module and microcontroller for secured communication.
➢ Send the information regarding Smart dustbin to Cloud platform.
➢ Configuring the available THINGS SPEAK app from internet for the project for extraction and processing of information.
➢ Send a tweet or trigger using THINGS SPEAK when the Channel meets a specific condition.
➢ The approach for optimizing the route of collection system using GIS data collection and analysis.

1.3 STUDY AREA

➢ The study area Davanagere city is situated in central part of of Karnataka located at around 260 km from Bangalore on Pune Bangalore National Highway No. 4. Davanagere being the sixth largest city in the state. Population of 4.35 lakh as per 2011 census. Temperature: maximum of 41°C to minimum. Longitude 75°55'E and latitude 14°28'N. Altitude: 550m. Average rainfall: 644 mm. City areas: 60.88 sq.kms. At present Davangere generates around 168 tons per day of municipal solid waste which is collected by the City Corporation.
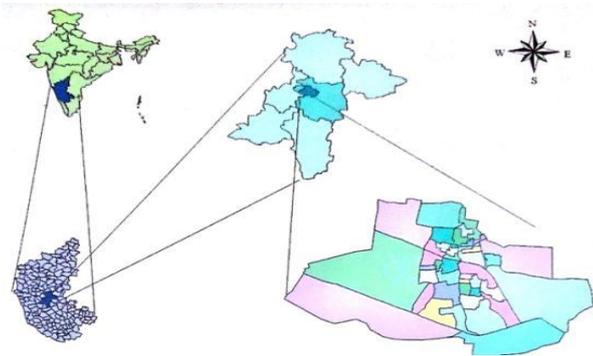
Fig 3: Location Map of Study Area

1.4 MATERIALS

1. GARBAGE CONTAINER

A waste container is a container for temporarily storing waste and is usually made out of metal or plastic. The curb side dustbins usually consist of three types:

1. Trash cans 2. Dumpsters 3. Wheelie bins

Fig4: Garbage Container Fig 5: Microcontroller

2. MICROCONTROLLER

The microcontroller is ample for taking up data from sensors and sending them to the internet through a network interface. Microcontroller useSd is **ARDUINO.**

3. ULTRASONIC SENSOR

An Ultrasonic sensor is a device which measures the distance to an object by using a sound wave. The ultra-sonic sensor used is **HC-SR04.**

Fig6: Ultrasonic Sensor   **Fig7: Wifi Module**

4. SOFTWARES USED

a. ARDUINO IDE

It contains a word processor for making code, a message zone, a substance comfort, a toolbar with gets for normal limits and a development of menus

b. THING SPEAK APPS

Thing Tweet - This enables you to present messages on twitter by means of Thing

5. WIFI MODULE

The data collected must be sent to a server via a wireless link. We adopted Wi-Fi as network access technology. We have used Wi-Fi serial module ESP 8266/GSM module. The Wi-Fi module gives splendid coupling with the microcontroller used.

6. LCD

LCD is electronic display which is used in many applications. Most frequently used is 16x2 LCD where 16 represents columns and 2 represents rows or lines.

7. BUZZER

Bell is an electronic flagging gadget for the most part utilized as a part of vehicles and machines.
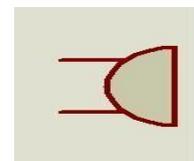
Fig 8: LCD Display   **Fig 9: Buzzer**

8. MOTOR DRIVER

In order to avoid the decaying smell produced inside the dustbin harmless chemical sprinkler is used. By using motor driver, chemical will be sprayed. Here the chemical used is Baking Soda,

9. GPS MODULE

A GPS navigation device calculates geographical location by receiving information from GPS satellites and sends it

to the Central Web Server. It provides real- time data and location updates for each vehicle.

2. METHODOLOGY

Main phases of smart waste management

➢ Collecting and sending data from the waste bins
➢ Finding optimal route for waste collection.

The block diagram consists of ultrasonic sensor, Arduino Uno board, LCD, power supply, Wi Fi module. In the proposed Cloud SWM, each bin is equipped with sensors to notify its waste level. Figure shows the smart bin with (a), (b), and (c) show different bins for each category of waste,namely: organic, plastic/paper/bottle, and metal. The block diagram consists of ultrasonic sensor, Arduino Uno board, LCD, power supply, Wi Fi module. In the proposed Cloud SWM, each bin is equipped with sensors to notify its waste level. Figure shows the smart bin with (a), (b), and (c) show different bins for each category of waste,namely: organic, plastic/paper/bottle, and metal. In this way, each type of waste is already separated and status, it is known that how much of waste is collected and of what type. Ultrasonic sensor is utilized to identify the rubbish level in clean canister and dustbin level data go to the microcontroller. Microcontroller is fundamental port in the venture, every one of the sensors like ultrasonic associated with the microcontroller. LCD is yield device. LCD show the rubbish level in dustbin in cm. The information collected by sensors is sent over the internet to a server where it is stored and processed. Wi-Fi module ESP8266 is utilized to transfer the dustbin level to the cloud. This information is then used for monitoring the waste bins and proper decision is made by choosing the right waste bin to be picked up. The cloud server is an open-source. "Internet of Things" application and application programming interface (API) to store and to retrieve data from things speak app over the internet. Thing Speak gives the different number of administrations who are focused to build the IOT applications.
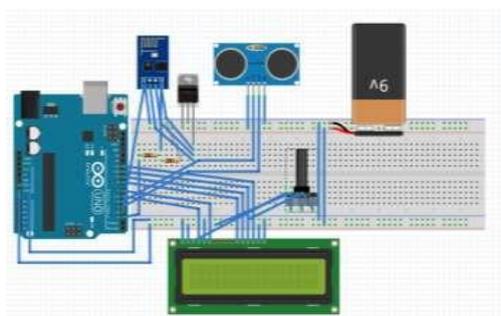
Fig 10 : System Design Implementation
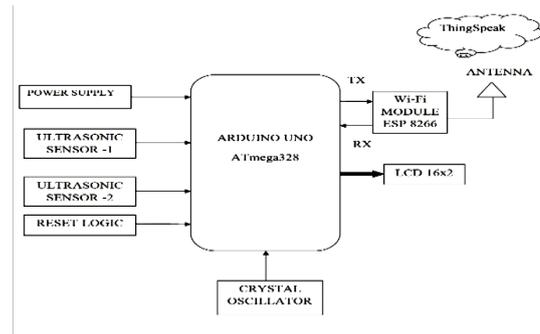
Fig 11: The Block Diagram System

2.1 RESULTS AND DISCUSSION

Waste level is effectively decided. Consummately transmit the data to the cloud. Cloud send data to the authority constantly. In the wake of arriving at a specific degree of the canisters, Wi-fi module which is associated with Arduino sent SMS to the approved more clean. Authority effectively affirmed the cleaning by the cloud**.**

Fig12: Smart Dustbin
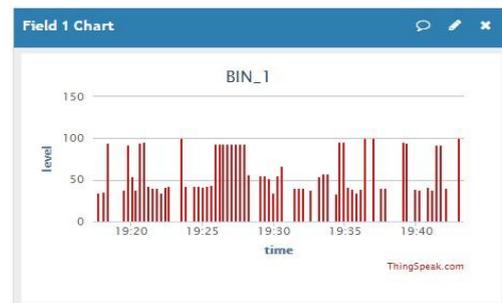
Fig 13: Data Visualization

3. CONCLUSION

It extreme assists with keeping cleanness in the general public. We have frequently observed trash overflowing from dustbins on to lanes and this was an issue that necessary prompt consideration. Smart dustbin causes us to diminish the contamination. Commonly trash dustbin is flood and numerous creatures like pooch or rodent enters inside or close to the dustbin. This makes a terrible scene. Likewise a few winged animals are

additionally attempting to take out trash from dustbin. This task can evade such circumstances.

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