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Garbage Monitoring System Using IoT

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Abstract – *In the present scenario, we see the garbage bins being overloaded and all the garbage spills out resulting in pollution. The detection, monitoring and management of waste is one of the primary problems of the present era. The traditional way of monitoring the wastes in waste bins is complex, cumbersome process which takes more human effort, time and cost which is not compatible with the present day technologies in any way. Hence our problem statement is to design a system based on microcontroller using zigbee methodology for collecting garbage from particular area whose garbage bins are overflowing with prior concern. This method is advanced in which garbage management is automated. This project Garbage Monitoring system using IOT is a very innovative system which will help to keep the cities clean. Waste management is all the activities and actions required to manage waste from its inception to its final disposal This includes collection, transportation, treatment and disposal of waste together with monitoring and regulation. Waste collection methods vary widely among different countries and regions. Domestic waste collection services are often provided by local government authorities. Curbside collection is the most common method of disposal in most countries, in which waste is collected at regular intervals by specialized trucks. Waste collected is then transported to an appropriate disposal area. Now days, cities with developing economies experience exhausted waste collection services, inadequately managed and uncontrolled dumpsites and the problems are worsening. Waste collection method in such countries is an on-going challenge and many struggle due to weak institutions and rapid urbanization.*

Keywords *-IoT , Smart dustbin, node MCU,GSM, Arduino IDE*

I -INTRODUCTION

By 2030, almost two-third of the world's population will be living in cities. This fact requires the development of sustainable solutions for urban life, managing waste is a key issue for the health.

Efficient and energy-saving waste management, reducing CO2,air pollution and vehicle exhaust emissions—these are just a few examples for the demands of future cities. In views of that, the efficient use and responsible handling of resources become more important. Effectively managing waste is important in developed countries. Waste management may swallow up to 50% of a city's budget, but only serve a small part of the population.

Sometimes, up to 60%of waste is not being collected, it is often simply burned by the roadside. It can pollute drinking water; it can spread disease to people living nearby. Even with great route optimization, the worker must still physically go to the dustbin to check waste levels. Because of this, trucks often visit containers that do not need emptying, which wastes both time and fuel.

Waste management prevents harm to human health and the environment by reducing the volume and hazardous character of residential and industrial waste.

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The smart, sensor based dustbin will judge the level of waste in it and send the message directly to the municipal corporation. It can sense all the type of waste material either it is in the form of solid or liquid. According to the filled level of the dustbin, the vehicles from the municipal corporation will choose the shortest path with the help of the cloud server, which will save their time. It emphasizes on "DIGITAL INDIA". The system is simple. If there is any problem with any equipment in the future, that part is easily replaceable with new one without any difficulty and delay.

Things (Embedded devices) which are connected to Internet and sometimes these devices can be controlled from the internet is called as Internet of Things. In our system, the Smart dust bins are connected to the internet to get the real time information of the smart dustbins. A proper waste management system is required to keep the city clean and hygienic. There are multiple dustbins situated across the city or the Campus (Educational Institutions, Companies, and Hospitals etc.).These dustbins are connected with micro controller, Ultrasonic Sensors and GSM modules where the Ultrasonic sensor will detect the level of the dustbin and will send the signals to micro controller. The data received will be analyzed and processed and accordingly the dustbin level can

II -METHOLOGY

The main controller is Node MCU which is having inbuilt wifi ESP8266 which can connect to cloud server via IP address. The ultrasonic sensor will detect the level of the Bin and accordingly the SMS will send if the bin is full and data will update on the cloud server.

The cloud server is with the database and the system will update time to time to monitor the area and the bin collector agency performance

Keyword Spotting Technique:

Hardware use

ULTRASONIC SENSOR

A special sonic transducer is used for the ultrasonic proximity sensors, which allows for alternate transmission and reception of sound waves. The sonic waves emitted by the transducer are reflected by an object and received back in the transducer. After having emitted the sound waves, the ultrasonic sensor will switch to receive mode. The time elapsed between emitting and receiving is proportional to the distance of the object from the sensor.

Ultrasonic sensors generate high-frequency sound waves and evaluate the echo which is received back by the sensor, measuring the time interval between sending the signal and receiving the echo to determine the distance to an object.

Node Microcntroller ESP8266

NODE MCU

The board we are using is called "NodeMCUi" and has an ESP8266 module on it, which we will be programming. It comes with the latest version of MicroPython already setup on it, together with all the drivers we are going to use.

The D0, D1, D2, … numbers printed on the board are different from what Micropython uses – because originally those boards were made for a different software. Make sure to refer to the image below to determine which pins are which.

It has a micro-USB socket for connecting to the computer. On the side is a button for resetting the board. Along the sides of the board are two rows of pins, to which we will be connecting cables.

III -DESIGN

Arduino IDE

Programming and Software

To program Wemos we use Arduino IDE,

The compilation process

The arduino code is actually just plain old c without all the header part (the includes and all). when you press the 'compile' button, the IDE saves the current file as arduino.c in the 'lib/build' directory then it calls a makefile contained in the 'lib' directory.

This make file copies arduino.c as prog.c into 'lib/tmp' adding 'wiringlite.inc' as the beginning of it. this operation makes the arduino/wiring code into a proper c file (called prog.c).

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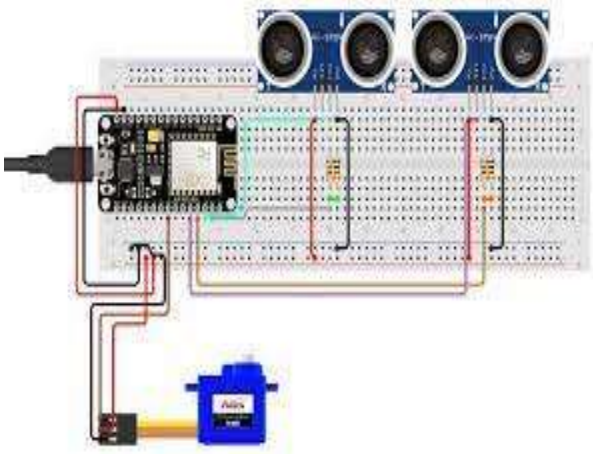
After this, it copies all the files in the 'core' directory into 'lib/tmp'. these files are the implementation of the various arduino/wiring commands adding to these files adds commands to the language.

The core files are supported by pascal stang's procyon avr-lib that is contained in the 'lib/avrlib' directory.

At this point the code contained in lib/tmp is ready to be compiled with the c compiler contained in 'tools'. If the make operation is succesfull then you'll have prog.hex ready to be downloaded into the processor.



IV- CONCLUSION

We live in the beautiful world and want beauty all around us. We dream of clean sustainable smart world. The main goal of smart garbage systems is to maintain a clean surrounding in the city and to create a better living environment. Computers will help us a lot in this endeavor. Through this software research initiative coupled with data analytics and block chaining, we can monitor the level of garbage in dustbins. Once a particular dustbin has reached a full level, the municipal authorities can be notified and can take immediate steps to get the garbage away. The users can search which garbage dustbins are empty and it saves a lot of time. The proposed AI system along with IOT can be used to transmit message with the GPS location to the local authorities. Ultrasonic sensors are used to check the level of garbage in dustbins. Currently the proposed system can be used in some select areas but as soon as it passes its reliability test, it can be used in all major areas. In the near future, a dedicated team can be constituted to manage and maintain the smart garbage system and to control and maintain its maintenance. Throughout the world, efficient waste management is a major challenge and a hurdle in hygiene. Latest technology and advances has been put into use to provide better ways to get rid of garbage in most of the areas of the city. Every citizen is cooperating and giving full support in maintaining clean localities and environment. Sustainable smart city will need cleanliness all over the places. In our research project, future enhancements can be done too. We can make use of two dustbins which can be employed to accumulate two different types of garbage in different dustbins- wet and dry. We can further decompose wet garbage to use it as biogas . Further all components and the control unit can be embedded and put into in the bin. We can make a better GUI based interface so that even a layman can understand. We have worked for a village in native village of UP under the scheme Unnat Bharat and the results have been promising.

V- ACKNOWLEDGEMENT

The main objective of the Smart Garbage Monitoring System using IoT is to reduce the usage of the resources and efforts and to improve the city's smart vision. By using a sensor and GSM the environment is clean and hygienic and ensures environmental cleanliness. Improper disposal and storage of household waste creates problems for public health and pollution. Smart Garbage Monitoring System using IoT is developed using ultrasonic sensor as distance measuring sensor, GPS will help in sending the location of the garbage box and GSM will help in sending the message to the municipal authorities with the current location. The Smart Garbage Monitoring System using IOT was developed using Adruino IDE as IDE Tool and Google API as software tool.

Video Link for Smart Garbage Monitoring System using IOT.

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