Team Details

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c. Problem Statement: Sensors Track Garbage Level And Notify Cleaning Staff.

Introduction

The main problem with our current society is the accumulation of solid waste matter. It will be having a greater impact on the health and environment of our society. The detection, monitoring and management of these wastages is one of the primary problem of the present era.

IoT Smart Garbage Management System

WHY DO WE NEED THE INTERNET OF THINGS (IOT)?

The Internet of Things (IoT) connects everyday devices to the Internet, enabling them to collect, exchange, and analyze data. Here are some of the reasons why we need IoT:

- REAL-TIME DATA
- IMPROVED QUALITY OF LIFE
- STRONGER-DATA-DRIVEN INNOVATION
- EFFFICIENCY IN BUSINESS OPERATIONS
- ENHANCED CONSUMER EXPERIENCES
- HEALTHCARE TRANSFORMATION
- FUTURE-READY INFRASTRUCTURE
- DISASTER AND ENVIRONMENT MANAGEMENT
- SMARTER CITIES AND URBAN PLANNIN

Thimsportsote da-tanching

Our IoT Smart Garbage Manufacturing system introduces a new methodology to automatically manage waste, helping cities stay clean, healthy, and sustainable. By leveraging the power of IoT, everyday tasks and systems are seamlessly connected, creating more efﬁcient workfbws and enabling rapid execution of jobs. This innovation empowers communities to make a direct impact on their surroundings—whether at home or across entire cities—bringing us closer to a better way of living. Building such an IoT architecture is complex due to the vast variety of devices, technologies, and services involved, yet it represents a bold step into a new technological era where smart solutions transform waste management into a cleaner, smarter future

Formation of Hypothesis

T b problem is that, we don't know the actual level of garbage in every trashcan. So we need a real time indication of the garbage level in the trashcan at any given time. Using that data we can then optimize waste collection routes and ultimately reduce fuel consumption. It allows trash collectors to plan their daily/weekly pick up schedule.
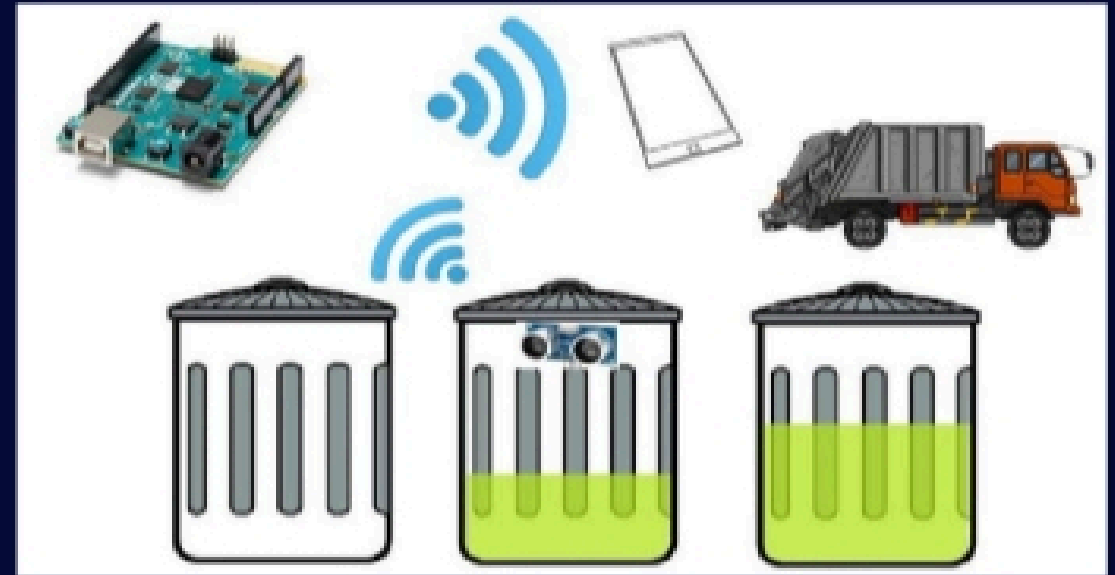
Components and Working

- Our IoT Smart Garbage Management System is built using essential electronic components such as Arduino 101, Arduino WiFi Shield 101, Ultrasonic sensor, IR sensor, 9V Battery with clip, jumper wires, slide switch, hot glue gun, plastic box, and a hand driller

- An Infrared sensor is placed inside the lid, facing the solid waste. As trash accumulates, the distance between the IR sensor and the waste decreases. T is live data is captured and sent to the Arduino 101 microcontroller, which processes the information and transmits it via Wi-Fi to a connected database or mobile app.

- T hough the app, users can visually monitor the trash levels in real time, represented with simple animations, ensuring efficient waste management and smarter community living

Construction of the Model

It's the time to construct our very own system to minimize the negative impacts of non-proper garbage management. It can be dine in two ways as follows:

- **Small Scale**: Using the usage of Blynk, we can create an app to a small level. It can be used up for a household garbage disposal or for an apartment or even for a small network of houses.

- **Large Scale**: By creating a database in the cloud, we can make an intranet connection between certain boundaries. Using Python/SQL/MYSQL we can create a database in the cloud to form a network of Trash bins
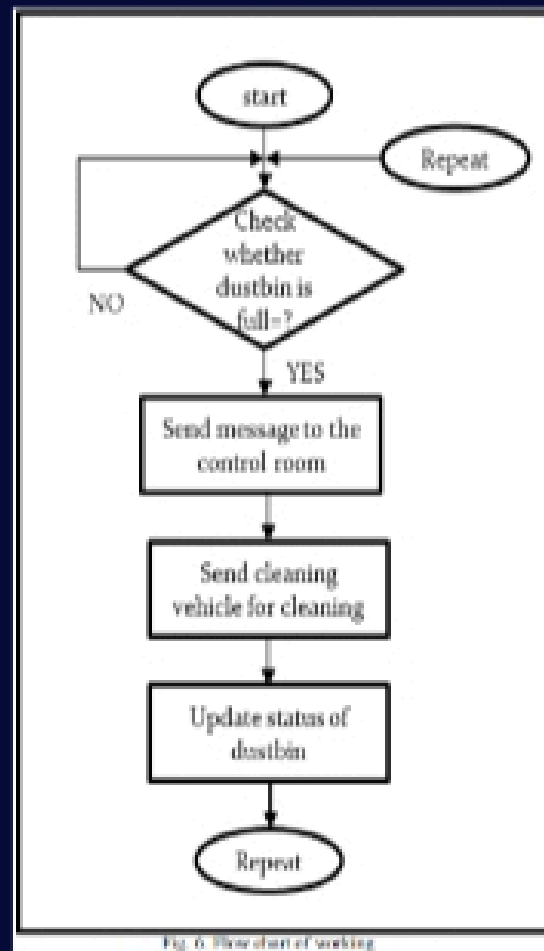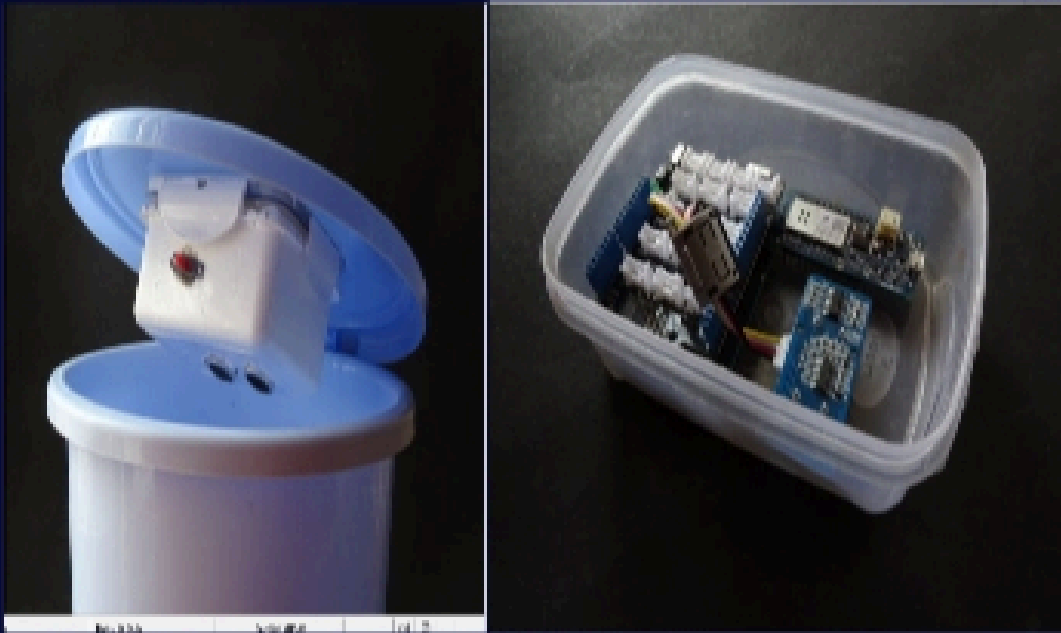

Fig. 6 Flow chart of working

Making a Small Scale Monitoring System

01 Mark and drill holes on a plastic container for the ultrasonic sensor

02 Mount the ultrasonic sensor carefully to ensure accurate readings

03 Connect the sensor to Arduino 101 using a Base Shield and add a slide switch

04 Upload the program and integrate the system with a sample bin

05 Connect to Blynk and test the prototype

Conclusion for Small Scale

T h small-scale waste monitoring system was successfully designed and implemented using Arduino 101 and the Blynk platform. T h system enables real-time monitoring of trash levels through a smartphone or laptop, providing clear visual indications for ef fctive waste management. It is cost-effective and suitable for household or small-area applications; however, it is not ef cient for large-scale deployment, highlighting the need for further scalability improvements.

Large-Scale Monitoring System – Overview & Setup

01 Overview

- Designed for municipal or government-level waste management
- Two approaches:
  - Common street bins: Large bins per street (e.g., 40 bins for 10 streets) with segregation for polythene, food, glass, and metals
  - Distributed bins: Encourage shops and households to adopt smart bins, generating revenue

02 Steps to Be Concerned

- Module similar to small-scale system
- Use Infrared (IR) Sensors for more accurate readings in noisy environments
- No need to repeat small-scale instlation steps

Data Handling & Results

Handling Big Data

- Store sensor data in a database using Python/SQL/MySQL
- Connect the database to the cloud for centralized monitoring
- Enables government authorities to track garbage levels from multiple locations

Results Calculation

- Arduino sends data to the database at regular intervals
- Analyze trends to identify high-accumulation areas
- Helps plan efficient garbage collection schedules
- Supports long-term surveillance and optimization

Google Maps
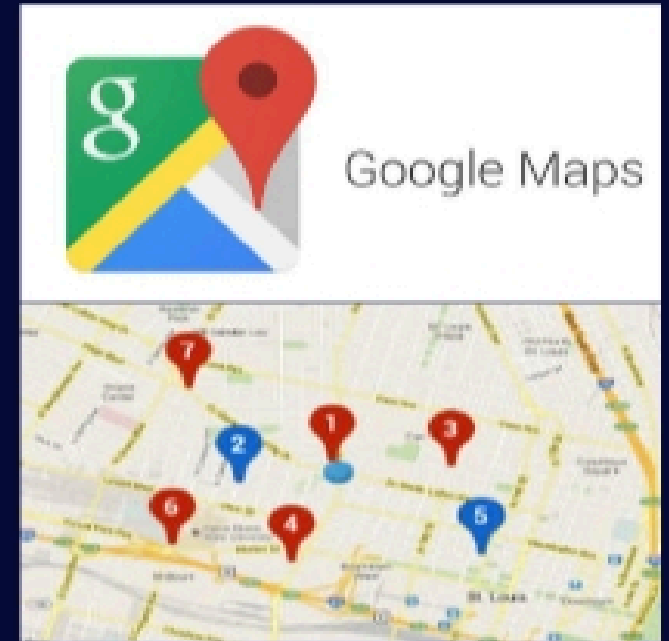
Conclusion

Using the data received from the database , the government will be able to create a wide network to collect trashes . So that it will be leading to –

- Minimal usage of fuel.
- Minimal usage of Human Resources.
- Efficient usage of time.

So our project of smart garbage management is almost finished now. So let's try to keep our surrounding clean and healthy. Make a happy time :)

Google Developer Group
On Campus

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Leveraging the power of AI

Thank you!

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