**SMART CITY CLEANING AND COMPLAINT MONITORING APP**

**Introduction :**

With increasing population in our country, urbanization has increased which has led to the generation of waste. Tons of trash are generated every year. Ten million tons of garbage is generated in the cities. This leads to deterioration of public health, environmental pollution, impact on quality of life of the citizens. Thus, waste management has been a crucial issue. The previous research in the area of technology related to Smart Garbage Management involves the use of Zigbee and GSM technology for connectivity. Earlier technology include RFID technology to identify tags attached to objects. A combination of above technologies have been used for connectivity purpose. There is short fall in research to efficiently alert the authoritiesinan optimized way to maintain clean environment. The system introduces more advanced wireless technology and handy applications for further improvements. The garbage full condition is automatically detected with the help of threshold value set and the information is transmitted to the concerned authorities to initiate the cleaning operations. To locate the bin helps in minimizing the time required for performing the cleaning process.

**Literature Survey :**

The previous research in the area of technology related to Smart Garbage Management involves the use of Zigbee and GSM technology for connectivity. Some also include RFID technology to identify tags attached to objects. While some others have used combination of the above technologies for connectivity purpose. Decision Support

Systems (DSS) integrated with geographical information system (GIS) to optimize collection are used as Smart Trash System embodies an electronic device known as Smart Trash Bin, which consists of Sensors (Load sensor and IR proximity sensor) and a Radio Frequency (RF) transmitter. The sensors sense the waste status being collected by the Smart Trash Bin.

An automated GSM module, Load sensor, Microcontroller, DC motor, LCD, Web Camera and Power supply are the essentials for collection, monitoring and management of garbage. Implementation of this project helps in avoiding overflow of garbage from the container in residential area which is previously either loaded manually or with the help of loaders in traditional trucks. It reduces the productivity of the vehicles and manpower deployed and thereby helps in minimizing threat to the health of the sanitation workers as the waste is highly contaminated.

A combined integrated system of Zigbee and Global System for Mobile Communication (GSM) is introduced. It helps in minimizing the usage of route, reduces the fuel cost, maintains clean environment. The objective is to design a System Based on Arm 7 for collecting the garbage from a particular area – the area whose public Garbage Bins are overflowing with prior concern. In this system, truck database has been developed in the way that information of truck ID, driver ID, date and time of waste collection, etc. are compiled and stored for monitoring and management activities. This system is able to monitor the solid waste collection process and management of the overall collection process. It provides on time solid waste collection.

The paper concentrates on eradicating the issue of ignorance of cleanliness which is spoiling our environment and then reduce it. The smart trash consists of two sensors namely IR and gas sensors. The IR sensor placed inside the trash sense the level of trash and gas sensor will sense the toxic gases. Once the trash is filled, alarm rings. The RFID placed inside the trash will intimate about the overflowing of trash to the corporation office. The RFID placed at the corporation office is serial interfaced with PC.

The paper proposes a smart bin application based on RFID system without requiring the support of an external information system and a method to improve the quality of selective sorting. This approach is based on local interactions to track the waste flow of a city. Each waste is detected by information properties stored in a RFID tag associated to it. At each step where wastes are to be processed the RFID tags are read in order to provide the relevant information. This process improves the sorting quality of recyclable products. As organic wastes products are not recycled and hence RFID tags are not attached to it. In this way, undesirable wastes for a given container are either rejected or tracked, depending on the chosen policy for handling undesirable wastes.

The concept of integrated analytics and electronics is used in order to create optimal changes in the conventional methodology of waste collection with the large amount of data that is being produced by the smart bin networks which is further analyzed and visualized at real time to gain insights about the status of waste around the city. The product which is designed to make every dustbin smart is very handy using GSM integrated model, sensors and microcontroller. This product will not only help to stop overflow of dustbins along roadsides and localities ,but the cleaning time of smart bin will also be reduced using the prediction and route algorithm in a Real-Time monitor system which will smartly find the shortest route thus reducing the workforce.

An automatic garbage level detecting system informing the concerned authorities timely and also classification among the wastes aiding efficient waste management. GSM is used in the project as a communication backbone for the whole system for various reasons like low cost, easy to implement and less signal deterioration. It is an automatic dust bin monitoring system in order to detect the full condition of the garbage bins. This provides the authorized users timely updates of the status of the garbage bins and thus eliminates the need of periodic manual checks and overflowing garbage bins.

There is shortfall in research related to these papers to efficiently alert the authorities in an optimized way to maintain clean environment. This research uses more advanced wireless technology and handy applications for further improvements.

**Materials and methods :**

**Data Collection and Sensors:** Utilize various sensors and IoT devices to collect data on traffic flow, air quality, energy usage, waste management, etc. This data forms the foundation for making informed decisions.

**Data Analytics and AI:** Analyze the collected data using advanced analytics techniques and artificial intelligence to derive insights, identify patterns, and predict trends. Machine learning algorithms can optimize various processes and improve efficiency.

**Internet Connectivity:** Establish a robust internet infrastructure including high-speed broadband and wireless networks to enable communication between devices and systems.

**Smart Infrastructure:** Upgrade infrastructure components such as roads, buildings, streetlights, and utilities with smart technologies to enhance efficiency, reduce resource consumption, and improve overall quality of life.

**Urban Mobility Solutions:** Implement intelligent transportation systems (ITS) to manage traffic flow, optimize public transportation routes, and encourage the use of alternative modes of transportation such as cycling and walking.

**Energy Management:** Integrate renewable energy sources, smart grids, and energy-efficient systems to reduce carbon emissions, improve energy efficiency, and ensure reliable power supply.

**Waste Management:** Deploy smart waste bins equipped with sensors to optimize waste collection routes, reduce overflowing bins, and promote recycling and waste reduction initiatives.

**Public Safety and Security:** Utilize surveillance cameras, IoT devices, and predictive analytics to enhance public safety, respond quickly to emergencies, and prevent crime.

**Citizen Engagement:** Develop digital platforms and mobile applications to facilitate citizen participation, gather feedback, and promote transparency in decision-making processes.

Cross-Sector Collaboration: Foster partnerships between government agencies, private sector organizations, academic institutions, and community stakeholders to share resources, expertise, and best practices in implementing smart city initiatives.

**Policy and Regulation:** Establish supportive policies and regulations to govern data privacy, cyber security, and interoperability standards while ensuring ethical use of technology.

**Testing and Piloting:** Conduct small-scale pilot projects to test new technologies and approaches before scaling them up city-wide. This helps identify potential challenges and refine implementation strategies.

**Continuous Evaluation and Improvement:** Monitor the performance of smart city systems and services through key performance indicators (KPIs) and feedback mechanisms, and make adjustments as needed to optimize outcomes.

**Existing System :**

In existing system, cleaning service sector in corporation work allotment to the employees through the oral communication and the cleaning work in an area are allotted to the employee in monthly wise. For a month, an employee in the corporation have to work in the allotted particular area. In next month, that particular area is allotted to another employee in the cleaning section of corporation. For every month, that particular area work allotment is transferred to the various employees in the cleaning service section of the corporation.

## Drawbacks of the existing system can be concluded as follows:

* + - The existing process is time consuming and not very user friendly.
    - In existing process, there is record maintenance about the daily work allotment and work status details.

**Proposed System :**

The main aim of this system is to manipulating the cleaning section in corporation systematically. Now I can develop this product as an app which we can use in the android mobiles. By this proposed system, introduce advancement in the cleaning service section of corporation sector. In this system, admin can allocate the daily works to the employees and intimation the allocated works to the employees too through the short message service (sms) in mobile phones. We choose short message service for the quick intimation of allotted work to the employees. As per the allotment, employees have to complete the work.

## Advantages of the proposed system

* + - Quick and efficient way of communication between the admin and the employee.
    - Systematic record maintenance of the allotted work and work maintenance.
    - I can implement this product as an app in android mobile phones.
    - It provides the gateway to the customer to complaint about the improper works.
    - Proposed system is less time consuming and user friendly.

**Implementation :**

Implementation is used here to mean the process of converting a new or revised system design into operational one; conversion is one aspect of implementation. the other aspect is post implementation review and software and maintenance

There are three type of implementation:

* Implementation of a computer system
* Implementation of new computer system
* Implementation of a modified application

**Implementation of the computer system**

It’s should be replace a manual system the problems encountered are converting files, training users creating accurate files, and verifying printouts for integrity

**Implementation of new computer system**

It’s should be replace an existing one this is usually a difficult conversion. if not properly planned there can be many problems. Some large computer system have taken even years to convert

**Implementation of a modified application**

It’s should be replace an existing one using the same computer. This type of conversion is relativity easy to handle, provided there are no major changes to the file

**Results :**

**Improvements in Infrastructure:**

Detail the enhancements made to various aspects of urban infrastructure, such as transportation, energy, waste management, and public facilities. Provide quantitative data on key performance indicators (KPIs) like reduced traffic congestion, energy savings, increased recycling rates, etc.

**Enhanced Services and Quality of Life:**

Discuss how smart city technologies have led to improvements in public services, citizen satisfaction, and overall quality of life. Present survey results or qualitative feedback from residents highlighting their experiences and perceptions.

**Efficiency Gains and Cost Savings:**

Quantify the efficiency gains achieved through the implementation of smart solutions, such as reduced energy consumption, optimized resource allocation, and streamlined processes.

Provide cost-benefit analyses comparing the initial investment in smart technologies with the long-term savings and benefits accrued.

**Data-Driven Decision Making:**

Highlight the use of data analytics and AI in informing decision-making processes and improving governance. Showcase examples of how data insights have been utilized to address urban challenges and optimize city operations.

**Discussion :**

**Success Factors:**

Identify the key factors that contributed to the success of the smart city project, such as strong leadership, stakeholder engagement, technological innovation, and effective collaboration.

Discuss specific strategies or interventions that proved particularly effective in achieving project goals.

**Challenges and Limitations:**

Acknowledge the challenges encountered during the implementation of smart city initiatives, such as technical issues, data privacy concerns, regulatory barriers, and financial constraints.

Reflect on any limitations or unintended consequences of the deployed solutions and lessons learned for future projects.

**Sustainability and Scalability:**

Evaluate the sustainability of the implemented solutions in terms of their long-term viability, scalability to larger populations or geographic areas, and potential for replication in other cities.

Discuss strategies for maintaining and updating smart city infrastructure to keep pace with technological advancements and evolving urban needs.

**Equity and Inclusivity:**

Consider the social and equity implications of smart city technologies, including issues related to digital divide, accessibility, and the potential for exacerbating inequalities. Propose measures to ensure that smart city benefits are equitably distributed across diverse communities and demographic groups.

**Future Directions and Recommendations:**

Outline future directions for the smart city project, including areas for further innovation, expansion of services, and integration with emerging technologies. Provide recommendations for policymakers, urban planners, and stakeholders on how to sustain momentum and continue advancing toward the vision of a smarter, more inclusive city.

**Conclusion :**

This paper proposes a system that makes sure that cleaning of garbage bins is done when level of garbage reaches its threshold value. The system uses IR Sensor, Microcontroller and Wi-Fi module. This further reduces operational time by alerting the concerned authorities via an Android application. This system also makes use of GPS technology in the Android application to alert the nearest employee and hence reducing the time for the dustbin cleaning process.