

A Review On “Self-Sanitizing Robotic Wheelie Bin”

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Abstract: The year 2020 has witnessed unusual demands for COVID-19 preventions and appliances. As we can see generation of bio-medical waste during the treatment and diagnose of COVID-19 are in large proportion. The collection and disposal of bio-medical waste is the challenge during global pandemic across the world. In India, the biomedical waste is producing in large number of tones. The majority of today's systems, techniques, and technology, on the other hand, are ineffective for the current circumstances. We need to implement a system that includes latest technologies and applications to fulfil the need in the society. In order to do so, we have built a smart dustbin which is self-sanitizing and its robotic feature make a helping hand for Human. The proposed system aims to reduce health hazardous issues caused by decayed waste and minimizes infectious diseases to spread from person to person.

Keywords: COVID-19, self-sanitization, smart dustbin, robot

I. INTRODUCTION

We are in the era where population is the major concern for the society. Due to rise in rapid population world has to deal with several circumstances. One of major concern is rise in waste generation that leads to spreading of many infectious diseases. In most Indian cities, the fundamental issue with the current waste management system is the unsanitary state of the dustbins. We need a proper Waste Management system that manages garbage waste and segregate them in a smarter way. In India, the concept of smart city is being initiated so it becomes necessary to install a system that serves smart and highly efficient with respect to Waste Management.

In this pandemic circumstance, waste collection, handling, and management has become a dangerous responsibility for sanitation employees. We are taking every possible precaution to be safe but we have to work for the people who are trash collectors, cleaning personnel, and house-helpers. So, it is necessary to have a system that performs a task without human interference. The smart waste management system presented in this project attempts to cleanse the trash garbage in the bin. The sanitization process will eliminate the microorganisms and keep humans free from becoming affected [1]. In this paper, we have tried to overwhelmed the boundaries and upgrade the existing system with latest technologies.

II. LITERATURE SURVEY

The system consists of Arduino Mega 2560, Servo Motor MG995, an IR Proximity Sensor, GSM Module Sim 900A and 12V Lithium-ion rechargeable battery is demonstrated in [2]. The system is free from human involvement for carrying the process of segregation and collection of waste. The GSM technology is being used to inform the authorized person about dustbin full through SMS. The system needs some modification with the use of latest technology like AI, IOT etc., to make it more precise and efficient system.

The Researchers in [3] developed a system for monitoring the level of bins. When bins get filled completely, it will move automatically to the garbage disposal area, dispose the waste and come back to its place. The bin can move to particular areas for collecting garbage using 2-axis robot. Rain sensor is also used for closing the lid of bin, when rain is sensed. The system consists of various sensors and devices like IR sensor, Gas sensor, Arduino, WIFI Module, DC Gear Motor and so on.

The System comprises Ultrasonic sensor, Load cell HX11, Momentary switch, Node MCU. The mechanism prevents communal bins from overflowing by alerting the collection team when the bin is entirely full. The shortest path algorithm is used by the researchers in [4] to identify the shortest path between the bins that need to be gathered.

Arduino UNO, Raspberry pi, solar panel, a servo motors, ultrasonic sensor, RFID tags, an RFID reader, geared motor are all included in the system. For waste monitoring, the system makes use of a cloud-based technology. [5]. It checks the garbage level inside the bin and update the information on database. The RFID reader scans the tags and extracts information from them.

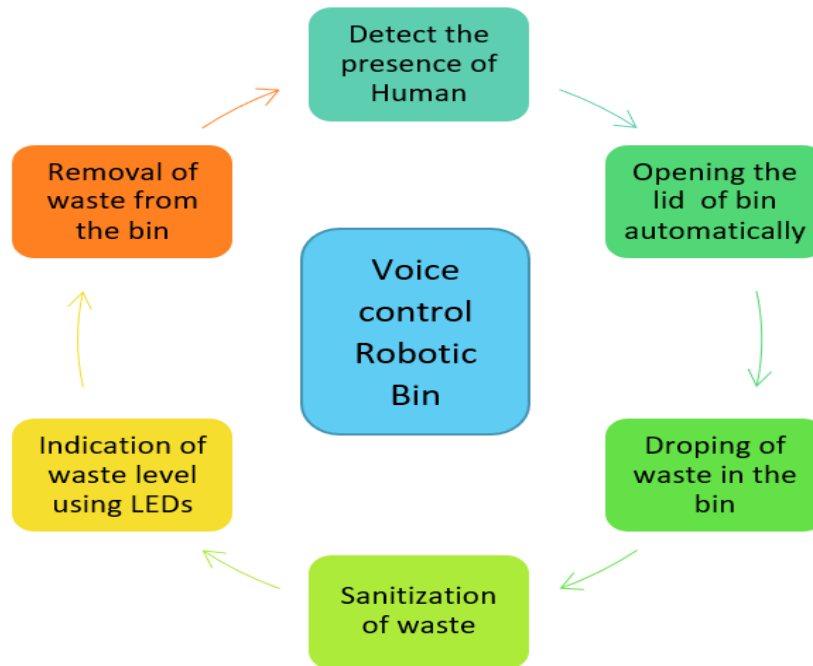
Researchers in [6] explained about the system that serves its purpose by getting a command by user's voice. The system is operated through a smart phone. The system comprises of Bluetooth device, Arduino-Uno, Motor drivers and DC motors. The other sections include LEDs and Ultrasonic sensor that are connected to the Micro-controller. The system needs proper connectivity and voice should be compatible to make robot work. The system is tough for old and a low pitch people too.

The System consists of ultrasonic sensor, relay, WIFI module, Arduino, GSM module, rainfall sensor, DTH 11. The Arduino interfaced with ultrasonic sensor to monitor level of waste present in the dustbin. The purpose of this document is to keep track of the waste in our surroundings and to monitor it. Through the GSM module, the dustbin alerts and sends a notification to the Municipal Corporation. As a result, these models require a lot of technology to manage and monitor the system, making them more expensive [7]. (Table -1) gives a quick overview of the systems discussed above

1. Literature Survey Table

Sr.no	Topic	Name of Authors	Observations
1.	Smart Bin-Automatic Waste Segregation and Collection [2].	Manisha Jayson et al., (2018)	The System performs the task without any Human intervention for segregation and collection of waste. The system includes Arduino, Servo motor, IR Sensor, GSM Module an many more.
2.	Smart Bin for Waste Management System [3].	Sreejith. S et al., (2019)	The bin can move to particular areas for collection of garbage.
3.	IOT based Smart Bin for Smart City Application [4].	Shashank Mithinti et al., (2019)	With the use of IOT technology, the system is capable to display the status of bin, if it is completely filled.
4.	Cloud Based Smart Dustbin System for Metro Station [5].	Ayush Tripathi et al., (2018)	For waste monitoring, the system employs a cloud-based monitoring system. It checks the level of waste and update the information on cloud-based platform.
5.	Voice controlled Automatic Dustbin with Garbage Level Sensing [6].	Abhishek Ayush et al., (2019)	It is a system in which dustbin is controlled by getting voice command from user and aims to help persons who are elderly or disabled.
6.	IOT based smart dustbin with tracking system using AT Mega 2560 Microcontroller [7].	Hussain M. et al., (2019)	The system monitor and tracks the level of garbage present in our surrounding. It is a GSM based system which uses a lots of Hardware component.

Table 1- Comparison of different technologies and techniques used in given system

**Fig -1:** Working process of the proposed system

III. METHODOLOGY

(Fig-1) shows the complete working process of proposed system. The Self-Sanitizing Robotic Wheelie Bin procedure is divided into three stages. They are as follows: -

A. Automatic sanitization process

A container will be used for disposing of waste. Firstly, with the help of PIR Sensor, the system will detect the presence of Human and calculate the distance between the person and the bin. After calculation, the lid of the bin will open automatically. When the waste is thrown inside the bin, the Proximity sensor will detect the waste within the bin and the sanitization process will take place immediately.

B. Waste Level Monitoring

The Ultra Sonic sensor is placed at the top of the bin facing downward to detect the level of waste present in the bin. As the waste is thrown inside the bin, the level of waste is monitored by ultrasonic sensor and indicated with the help of LEDs. There are three LEDs (i.e., Red, Blue and Green) which will glow as per the waste inside the bin increases accordingly.

C. Changing the position of bin using android app

The system also includes the robotic section that provides movement to the system from one place to another. This portion comprises of Bluetooth device, dc motors, Arduino UNO, motor driver. By downloading the Android software "BT Voice Control for Arduino" from the Google Play store, the system may be readily connected through Bluetooth. After the installation of app, we search for nearby robot and interconnect them, after which we can send voice command for the movement of the bin. The basic commands are right, left, forward, backward and stop.

IV. CONCLUSION

We are in the World where every individual are cautions about their health and hygiene. As we have seen in recent time, unpredictable hazardous infectious disease spread all over the global drastically. The speed of disease is due to the improper waste management system, lack of resources in the society. The existing system are not fulfilling the present need like self-sanitizing, smarter handling process and many more. To overcome the limitations, we have built a system that removes all the barriers that hamper the progress of the nation. The proposed system is a smart, automatic which will help people to keep their surrounding clean effortlessly and safely. The aim of these system is to fulfil the present requirements arises after covid pandemic across globe. The system is self-sanitizing, preventing infectious illnesses from

spreading among individuals. The technology can also monitor the amount of garbage in the bin. The Robotic Wheelie Bin provides dynamic mobility feature that will reduce the human efforts to collect garbage at different positions. The system aims to get a safe and clean environment for wildlife and mankind.

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