SMART BOT WITH AUTOMATIC GARBAGE COLLECTING SYSTEM

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Abstract -: *The present day waste management techniques, from collection to dumping and disruption has become a challenging and arduous chore for municipal corporations, all around the globe. To make this monotonous job effortless, a new concept of Smart Garbage Collection System has been taken into consideration for Smart buildings, hospitals, schools and railway stations. The Smart garbage collector idea is an advancement of conventional garbage collector by upgrading it to become smart by instilling sensors and forms of logic. This smart garbage collector is a pioneering idea of application of line following garbage car and pole fixed garbage part on premeditated locomotive path. The fixed bin makes use of ultrasonic sensors for garbage level indication and updates the volume level of the bin to the garbage car, using RF Module. Hence, this device is fully automated system, making compact contribution towards the concern of Clean India Green India.*

Keywords: Garbage Collecting Robot, IR Sensor, Ultrasonic Sensor, Arduino, RF Module

1. INTRODUCTION

In present day era, countries developing at a rapid rate have a lot of unwanted waste being generated like electronics, plastics and many biodegradable products. Waste management being the topmost declined factors in developing countries creates an urgency to address this problem. In metropolitan cities, the clearance of waste management has been a laborious task for the majority of the country, all over the world. The need for a well-organized waste clearance system is obligatory for maintaining green environment. Currently are many prowess mechanisms available for handling as well as managing waste. But, the deficiency for collecting garbage is a major challenging task. This struggle will unsettle the quick nationwide rate of growth in heaped urban areas as well as its growing demand for the citywide ecological and environmental protection. This is a major confrontation in waste management system to create a prototype because of the scarcity of planning and systematization among government, people and local authority for shipping and processing waste. The current waste management process is conventional which requires lot of labor and is time engulfing process.

The main direction of this research is to design a highly cost effective and utilitarian waste management system which shall make regulation and picking up of the garbage as easy and convenient as possible. In the following sections, the methodology of the system will be elaborated along with the description of the hardware used. The design of the system, the algorithm, and the flowchart will follow the hardware description.

2. LITERATURE SURVEY

In Earlier times a Smart Dustbin was presented, based on IoT that contained the smart bin which was being made on a platform, based on Arduino Uno board that had been linked with ultrasonic sensor and a GSM modem. Many researchers made a conclusion that numerous issues like durability, perpetuation and affordability were seen during the designing of these bins.

The scientists also suggested the technique for management and disposal of garbage, in which the garbage bin had been made to interface and connect with a system which was based on microcontroller and also had IR systems along with a main system that clearly displayed the current weight and level of the waste in the bin. A unique ID had been given to each bin so as to detect and analyze that which among the all bins has been filled and is ready to be dumped or emptied.

3. PRESENT STUDY

In Earlier times a Smart Dustbin was presented, based on IoT that contained the smart bin which was being made on a platform, based on Arduino Uno board that had been linked with ultrasonic sensor and a GSM modem. Many researchers made a conclusion that numerous issues like durability, perpetuation and affordability were seen during the designing of these bins.

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3.1 Proposed system methodology
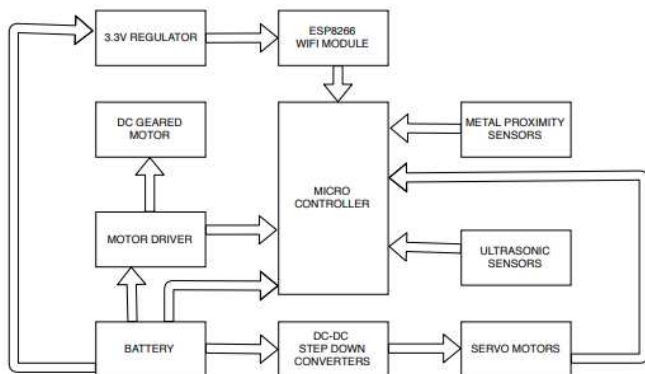
Fig- 1 Block diagram of proposed system

Microcontroller is mainly used so as to interface the ultrasonic sensor with the RF module. This is a fully automated system in which the garbage car moves automatically when it gets a signal via RF Module from the Garbage bin, when it gets completely filled. The ultrasonic sensors are also used to detect obstacles, which is then commanded by the microcontroller.

3.2 System Architecture

1. Arduino Mega 2560

Fig-2 Arduino Mega 2560

It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.

2. DC Motor

Fig-3 DC Motor

HC -05 Bluetooth module. D.C. motor is controlled by DC voltages and moves in forward, backward, left and right, direction according to the polarity of voltage applied.

3. Ultrasonic Sensor (HC-SR04)

Fig– 4 Ultrasonic sensor

This sensor is being placed in the fixed pole part of garbage bin, so as to intimate about the garbage level of the fixed garbage part. These are also used to indicate trashes and obstacles.

4. RF Module (433MHz)

Fig– 5 RF module

RF Module is basically used for conveyance purpose over ranges, mainly to indicate the garbage car about the level of the fixed dustbin. If the dustbin is completely filled it will send a signal to the garbage car part, and the garbage car will come and empty the dustbin instantly.

5. STEPPER MOTOR

Fig– 6 Stepper motor

A stepper motor, also known as step motor or stepping motor, is a brushless DC electric motor that divides a full rotation into a number of equal steps. It is used to control the rotation of the robot arms and the rotation of the trash bin.
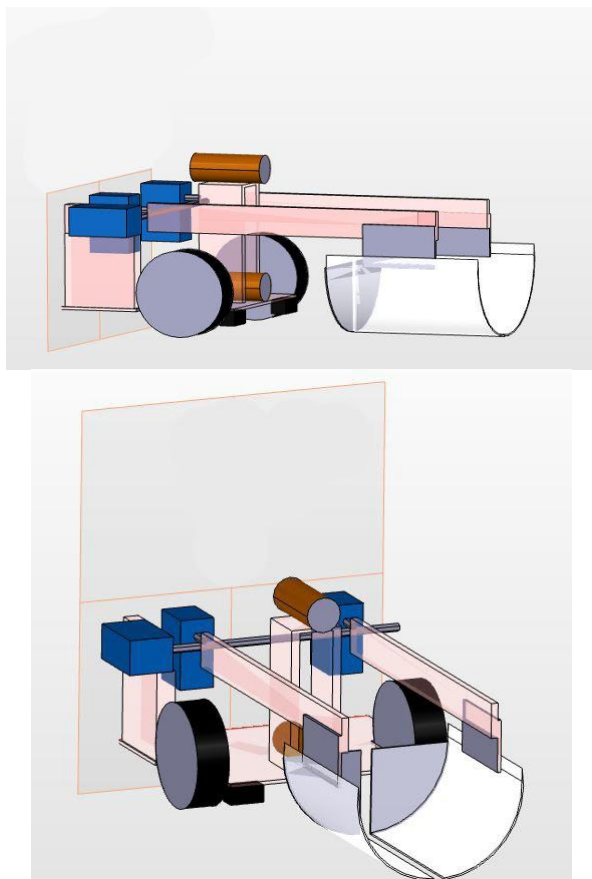
6. METAL SENSOR

Fig- 7 METAL SENSOR

Used to detect the metal trash to be picked. They are attached to the robot arms.

## 3.3 Mechanical Model

ROBOTIC ARM

- The movement of the arm is made possible using 3 servos(35kg-cm,2x15kg-cm)

Fig- 8 Chassis Design

- This approach might appear easy, but it is not always efficient with all kinds of 4wheel chassis.
- In this design when the robot takes a zero-radius 360 degree turn (pivot turning), the front wheel gives almost negligible resistance to the overall

circular motion generated by the rear wheels. Hence the torque applied by motors on each wheel gets properly harnessed, resulting In better performance without any drag or wheel slip while taking turn.
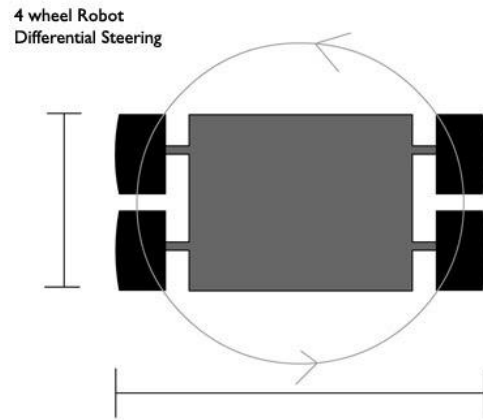
4. CONCLUSION

This proposed project is conceived to exhibit the task of garbage collection from various places and then segregated based on garbage type and dump it at a point from where the garbage is conveniently taken for the action of reusing and recycling. By earlier intimation of level of garbage filled in the fixed dustbin to the garbage car, we can optimize the number of trips of the garbage collecting vehicle, thus saving power and money. Also by introducing the RF Module on the fixed dustbin part, we are making this system fully autonomous and automated making the need for human involvement obsolete. This leads to the protection of the health of workers as well as efficiency of work undertaken. Thus, by implementing this project in synchronal framework we can realize of the dream of CLEAN INDIA GREEN INDIA

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