International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 05 Issue: 08 | Aug - 2021 ISSN: 2582-3930

Automatic Garbage Collector Using Arduino

Krishna Samani[1], Aishwarya Sali[2], Shubham Chougule[3], Pranit Bhise[4], Aishwarya Shelke[5], Ajay P Dhawan[6]

[6], Asst. Professor, Dept. of Mechanical Engineering, Sanjay Ghodawat Institute, Kolhapur, India
[1-5], UG Students, Dept. of Mechanical Engineering, Sanjay Ghodawat Institute, Kolhapur

ABSTRACT: Considering current situation in India, we are a part of developing country. With the progress of industrialization, globalization & modern technology, we are facing a major problem which is affecting human as well as environment health that is garbage crisis. Poor administration of garbage leads to pollution. Hence there is urgent need of a smarter and effective ways of garbage collection.

This project presents the Garbage Collector Robot for footpaths, campus areas of school, colleges, offices etc. using Arduino microcontroller (Arduino is an open source hardware & software company, project and user community that designs and manufactures single board microcontrollers & kits for building digital devices). Conventional shock absorber simply dissipates this energy as heat. A conceptual regenerative braking and suspension system is designed and tested using a fabricated prototype.

Keywords - Arduino UNO microcontroller, atomization, globalization, industrialization, cleanliness, garbage collector.

a) INTRODUCTION:

In this world of industrialization, globalization and technological development we are facing major garbage crisis from the garbage collection to garbage management as the product of rapid economic growth, overcrowding, poor urban planning, corrosive corruption, and political dysfunction. This is mainly due to the rapid increase in population as well as physical resources especially in India. The status quo of the strategies of trash collection has been proved ineffective in both short term and long term basis. Hence there is an urgent need for a smarter and effective ways of garbage collection. This project presents the Garbage Collector robot for footpaths or campus areas of schools, colleges, or offices using Arduino microcontroller. The robot is built on a metallic base, which is powered by a battery of 12V. The robot is designed to collect Garbage from a

footpath, public places (parks, schools, and colleges), and mostly cemented paths. It also has a sensor in the dustbin that indicates when the dustbin is full. This robot cannot be used on muddy surfaces. The robot is built in such a way that, when it is powered ON, it will move on the path defined in the program. This project is based on mechatronics principles of the arduino microcontroller component.

1. LITERATURE REVIEW:

1.1 Arduino microcontroller

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs – light on a sensor, a finger on a button, or a Twitter message – and turn it into an output – activating a motor, turning on an LED, publishing something online. One can command the board what to do by sending a set of instructions to the microcontroller on the board.

1.2 Advantages of arduino

The main advantage of the Arduino technology is you can directly load the programs into the device without the need of a hardware programmer to burn the program. This is done because of the presence of the 0.5KB of boot loader that allows the program to be dumped into the circuit. The Arduino tool window contains a toolbar with a various buttons like new, open, verify, upload and serial monitor. And additionally it comprises of a text editor (employed to write the code), a message space (displays the feedback) like showing the errors, the text console, that displays the o/p & a series of menus just like the file, tool menu & edit.

1.3 Significance

- The project aims at providing automatic control to collect the garbage.
- It differentiates between static and dynamic obstacle and move accordingly as it programmed.
- To minimize the man power needed.
- To tackle the health issue of garbage collecting workers such as musculoskeletal, gastro intestinal and infectious diseases as well as injuries caused by work-related accidents.
- To minimize the cost required for procuring such systems by using recycled materials where ever possible.

2. NEED FOR ARDUINO CONTROLLED GARBAGE COLLECTOR:

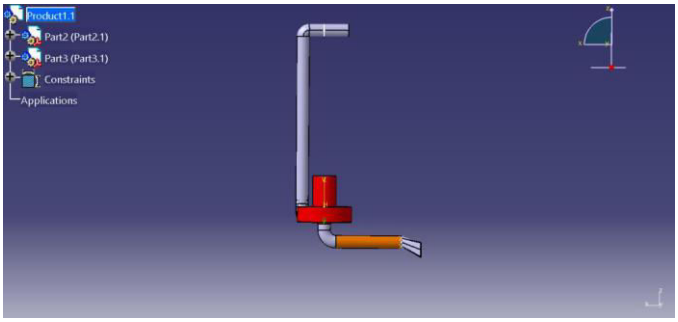
Garbage is the major problem not only in cities but also in rural areas of India. It is a major source of pollution. Indian cities alone generate more than 100 million tons of solid waste a year. In 2000, India's Supreme Court directed all Indian cities to implement a comprehensive waste-management program that would include household collection of segregated waste, recycling and composting. These directions have simply been ignored.

No major city runs a comprehensive program of the kind envisioned by the Supreme Court. It is not wrong to say that India is on verge of garbage crisis even though 9000, 00, 00,000 rupees are allotted for the Swachh Bharath Abhiyan.

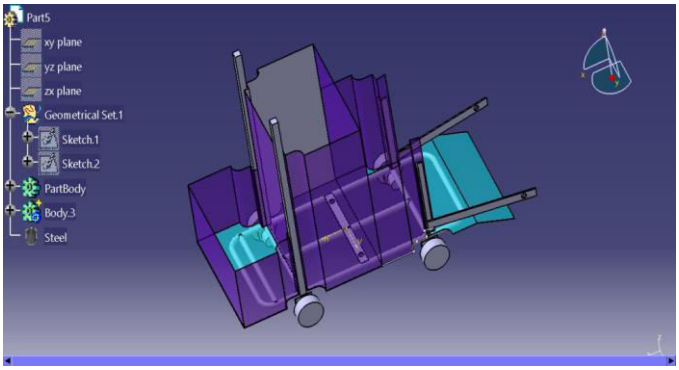
There are already different type of garbage collection robots like Robo-dumpster which mainly aims at collecting garbage from full cans and dispose it designated area and Dust cart which is designed to navigate through urban areas avoiding static and dynamic obstacle and waste door to door. These robots which are in use have various disadvantages like high implementation cost, not user friendly and aims at only collecting filled dustbins but not on collecting mechanism, etc.

3. DESIGN:

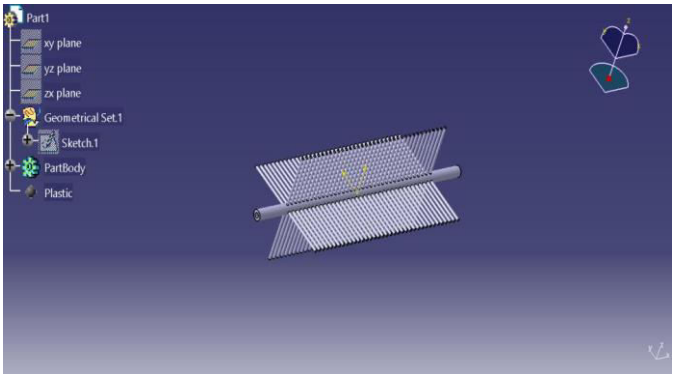
Blower:



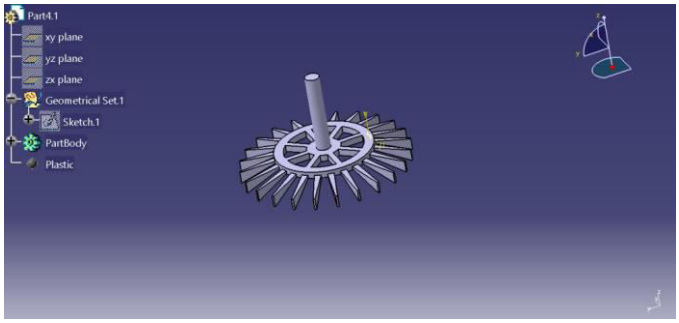
Steel frame:



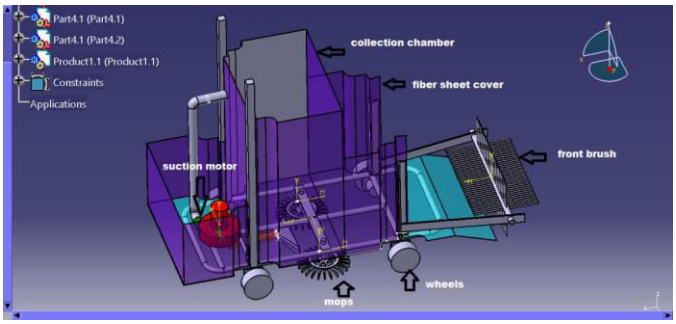
Rotating Blades:



Brushes:



Assembly:



4. COMPONENTS:

4.1 Base:

The platform on which other components will be mounted

4.2 Rotating brushes mounted on shaft:

Used for directing the dust and garbage like bottles, towards the collection compartment

4.3 Collection compartment:

Fibre sheets for light weight and strong design

4.4 Wheels:

Mounted on shaft and given the rotating motion by Motor powered by batteries.

4.5 Arduino microcontroller:

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online.

4.6 Battery and wirings:

The electricity generated is stored by using batteries. Two batteries of 6 V, 5 Amp connected in series which makes total capacity of 12 V and 5 Amp.

4.7 Motor of 30-100 rpm

5. METHODOLOGY:

In the present paper, the design of garbage collector robot uses engineering method. In sequence, the method is identification of the needs required. Then these needs are analyzed to get specific components. These components are later integrated to get the desired output.

Locomotion of the Robot

The robot can travel in the predetermined path by using a combination of motors, drivers, and sensors connected to the Arduino. This system consists of four geared motors of 30rpm each, motor drivers and three ultrasonic sensors. The ultrasonic sensors act as input to the Arduino. The motors are connected to the output of the Arduino through the drivers. The ultrasonic sensors detect the obstacles and the motors are made to rotate based on the pre-programmed instructions in the Arduino.

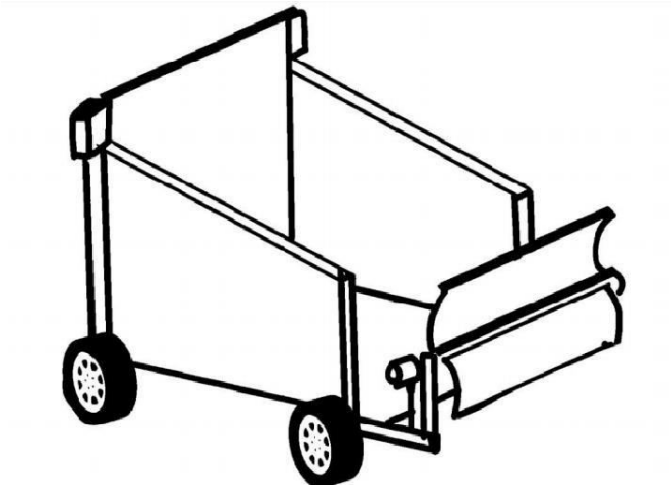
Garbage Collection

The robot Garbage collection system consists of a set of rotating blades mounted on a shaft connected to the motors. The mechanism will not operate for entirety of the vehicle operation and will rotate only for predetermined set of conditions. The rotating blades may be made of galvanized iron or stainless steel to suit outdoor applications as well as durability. Other auxiliary circuits are added as per the requirements. Arduino Uno is the controller that coordinates the functionalities of the three stages to meet the real-time requirements

5.1 Initial phase :

The in initial phase of the project we worked on understand the basic model of garbage collection robot powered by arduino mechanism which is a component of mechatronics where arduino programming would be to control the switch on and off of the device and along with the straight path which would be powered by 12v battery .The other devices which were supposed to run

on this battery was the rotary blades at the front of the garbage collector robot which is mounted on a shaft and also the 4 wheels . The wheels and the rotating blades will get its rotational motion from motor. As the device is switched on using the arduino system on smart phone the robot will start its forward motion and the rotating blades would push the garbage in the compartment provided.



5.2 Development:

Initiating with the basic idea of robotic autonomous garbage collection system powered with arduino mechatronics principle having a single compartment where the garbage would be collected as the rotating blades which would push the litter inside the Compartment. But in the later phase we tried to modify the basic structure into mire personalized manner for small to medium institutes and companies.

The development was made in the various aspects of design

- Number of compartments was made two, one for water bottles and other for the dust and dirt and small litter materials
- The introduction of suction device
- The rotating blades at the front for bottles to be collected along with two rotating brooms at the bottom

The above mentioned are few of the modification developments we ought to introduce in our model. The modified design called for more calculations to be made like the number of motors required, and making the compartment sizes accordingly to the weight of all the components together. Followed by various other questions like which materials to be used and the dimensions of the compartment and wheels and all other parts, the development also required us to focus on the materials to be used to make it light weight making it compatible with 12 V batteries. With the development we focused on making it more defined but yet made sure it is not complex to make it more portable.

6. CONCLUSION:

This mega project titled is primarily based on principle of Mechatronics. The AA arduino mechanism is used to power the commands of the garbage collector for its semi-automation which can also be customized into fully atomization. The garbage collector we are making is based for school, colleges, offices , or other campuses where cleanliness is must specially in the times of Covid and so is it necessary to minimize the human interaction with garbage. The project helps in eliminating manual interaction and in affordable way, as compared to other devices in market .It is designed to collect medium size objects like bottles and dust, dirt and litter around the campus in separate compartments, which can be further customized according to the needs. The project has wide scope of delivery of service and development in the field of waste collection and further facilitates waste segregation and waste management.

7. REFERENCES:

a) Mechatronics: Electronic Control Systems in Mechanical Engineering by W. Bolton.

b) Introduction To Mechatronics And Measurement Systems by David Alciatore

c) Automated Garbage Collector https://www.instructables.com/AutomatedGarbage-Collector/

d) Arduino Uno and Raspberry Pi for Autonomous Navigation https://doi.org/10.1016/j.promfg.2019.02.254

e) Smart garbage management system for a sustainable urban life: An IoT based application https://doi.org/10.1016/j.iot.2020.100255

f) Driverless vehicle for garbage collection https://doi.org/10.1016/j.matpr.2021.01.044

g) Internet of Things (IoT) based system development for robotic waste segregation management https://doi.org/10.1016/j.matpr.2021.02.473