GARBAGE CONTAINER WITH AUTOMATIC OPENING/CLOSING AND MOVEMENT TOWARDS THE SUBJECT BY RESPONDING ELECTRONIC SIGNAL.

Mini Project report submitted

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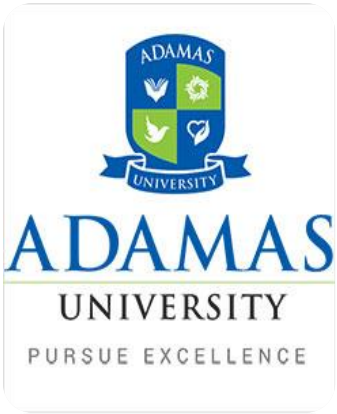

Adamas University, Kolkata

School of Engineering & Technology

Department of Mechanical Engineering

(May-2019)

UNDERTAKING

I declare that the work presented in the Mini Project entitled "***garbage container with automatic opening/closing and movement towards the subject by responding electronic signal.***", submitted to the Department of Mechanical Engineering, School of Engineering & Technology, Adamas University, Kolkata is my original work. I have not plagiarized or submitted the same work anywhere else. In case this undertaking is found incorrect, I accept that my project may be unconditionally cancelled.

Serial No.	Name of student	University Roll No.	Signature of Student
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CERTIFICATE

*Certified that the work contained in the Project entitled "**garbage container with automatic opening/closing and movement towards the subject by responding electronic signal**", by,*

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ABSTRACT

An improved garbage container with automatic opening and closing functions, in particular an improvement directed to large or medium size garbage container, including an electric-controlled sensing device i.e. ultra-sonic sensor will be fitted in front of the bin.

The main purpose of this project is to provide electronic circuit that will be used to control dustbin door that will open automatically when somebody comes near it and will close automatically when somebody gets away from it. I have found that the existing dustbins commonly used have to be opened manually so they do not give good environment to use for those disabled people who lost one of their hands or feet. This is going to be a solution for this problem.

Key words- *Smart Dustbin, Automatic movable dustbin, Robodust.*

Contents

INTRODUCTION

The main idea behind it is a programmable robotic vehicle having blue tooth control app-based system. In any commercial place like airport, shopping mall, or in multiplexes the stored dustbin used to place in a long distance. Therefore, if anyone in a hurry to put his/her garbage they have to move near about 100m to put it.

In that scenario this bot will help them much.

All they need to just to turned on their Bluetooth via mobile and then they can control it by their own.

Or if in any multiplexes or any in any big houses if we put this type of smart dustbin, we can reduce the number of labour's we used to take in before. Because now they can take care of all the dustbin at a time by just having a smart phone.

In addition to that to make the Dustbin more users' friendly there is QR code stacked in front and back side of the bin. So, for that users don't need to search for the app in play store or iOS market to download it. They will simply scan the code and the pre-defined application will be downloaded automatically with the permission of user.

Last but not the least feature of the bot is its alarming system, whenever it will be full it will continuously alarm its owner to clean the bot.

MOTIVATION

This project has been inspired by Swachh Bharat Abhiyan (SBA) or Swachh Bharat Mission (SBM) is a nation-wide campaign in INDIA for the period 2014 to 2019 that aims to clean up the streets, roads and infrastructure of India's cities, towns, and rural areas. The campaign's official name is in Hindi and translates to "Clean India Mission" in English.

The objectives of Swachh Bharat include eliminating open defecation through the construction of household-owned and community-owned toilets and establishing an accountable mechanism of monitoring toilet use.

Meanwhile we are looking heavily to implement this occasion into commercial level as well as in smart cities as the name suggest this smart dustbin bot will heavily use in multiplexes, shopping mall and in airport.

Problem Statement

To implement a smart bin built on a microcontroller-based platform Arduino Uno board which is interfaced with Ultrasonic sensor which can gives the status of the waste present in the dustbin to the owner or the waste management team for commercial areas i.e. shopping malls, multiplexes, airports etc.

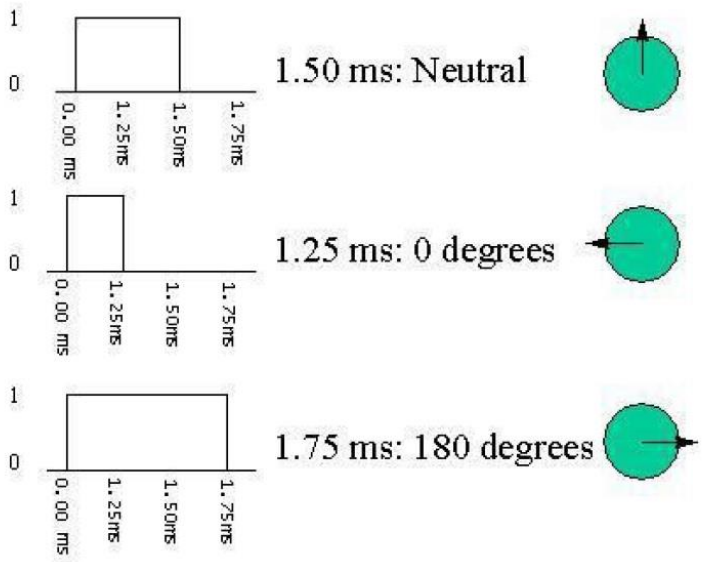
System Design

For communication purpose Bluetooth technology can also be used in the transmitter section. Bluetooth is a wireless networking standard that is aimed at remote control and sensor applications which is suitable for operation in harsh radio environments and in isolated locations.

The operation is not affected by sunlight or black material, although acoustically, soft materials like cloth can be difficult to detect. It comes complete with ultrasonic transmitter and receiver module.

How Do You Communicate the Angle at Which the Servo Should Turn?

The control wire is used to communicate the angle. The angle is determined by the duration of a pulse that is applied to the control wire. This is called **Pulse Coded Modulation**. The servo expects to see a pulse every 20 milliseconds (.02 seconds). The length of the pulse will determine how far the motor turns. A 1.5 millisecond pulse, for example, will make the motor turn to the 90-degree position (often called as the neutral position). If the pulse is shorter than 1.5 milliseconds, then the motor will turn the shaft closer to 0 degrees. If the pulse is longer than 1.5 milliseconds, the shaft turns closer to 180 degrees.



Literature survey

The authors Alexey Medvedev, S.S. Navghane have made a quantitative analysis between existing dustbins and their serving population. The study first analyses the spatial distribution of dustbins in some areas of Dhaka city using average nearest neighbor functions of GIS. Remarkably, the spatial circulation of the current dustbins has appeared to be dominatingly in clustered pattern. Next, an optimal number of additional dustbins were calculated. It is shown that the number of existing dustbins is insufficient in the study area. The extent of pollution caused by the existing dustbins was calculated using spatial analyst functions of GIS. It is found that all the dustbins are burnt with wastes and causing pollution to the environment.

The results thus obtained would help to understand the present situation of the waste management of Research Article Volume 6 Issue No. 6 International Journal of Engineering Science and Computing, June 2016 7114 http://ijesc.org/ Dhaka city and to optimally place the required number of dustbins to prevent further pollution to environment.

The authors Dr. K R Nataraja have equipped the smart bins with ultrasonic sensors which measure the level of dustbin being filled up. The container is divided into three levels of garbage being collected in it. Every time the garbage crosses a level the sensors receives the data of the filled level. This data is further sent to the garbage analyzer as instant message using GSM module. Placing three ultrasonic sensors at three different levels of the container may be a disadvantage as the cost of the dustbin increases due to the sensors and also the sensors can be damaged due to the rough action by the users. An IoT-based smart garbage system (SGS) is proposed to reduce the amount of food waste.

The author Vishesh Kumar Kurrel. In an SGS, battery-based smart garbage bins (SGBs) exchange information with each other using wireless mesh networks, and a router and server collect and analyze the information for service provisioning. Furthermore, the SGS includes various IoT skills considering user convenience and increases the battery lifetime through two types of energy-efficient operations of the SGBs: stand-alone operation and cooperation-based operation. The proposed SGS had been functioned as a pilot project in Gangnam district, Seoul, Republic of Korea, for a one-year period. The test demonstrated that the normal measure of food waste could be decreased by 33%.

The authors Nikitha Rao, has built a framework in which a Camera will be set at each garbage collection point alongside load cell sensor at base of the trash can. The camera will take continuous snapshots of the garbage can. A threshold level is set which compares the output of camera and load sensor. The comparison is done with help of microcontroller. After analyzing the image an idea about level of garbage in the can and from the load cell sensor, weight of garbage can be known. Accordingly, information is processed that is controller checks if the threshold level is exceeded or not. This is convenient to use but economically not reliable.

Requirement Specification

Smart bin is built on Arduino board platform. It is interfaced and equipped with Ultrasonic sensor (HC-SR04).

Components Used

- Arduino
- Ultrasonic Sensor
- 300 RPM BO Motors
- Wheels
- L293D Motor Driver
- 2300 MAH LIPO Battery
- Buzzer Module
- Servo Motors
- HC06 Bluetooth Module
- Connecting wires

Description of Major Used Components

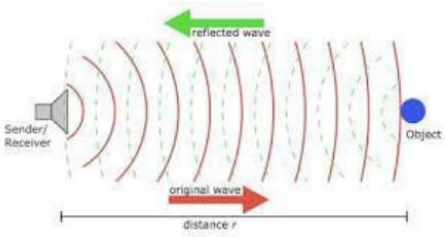
○ Arduino

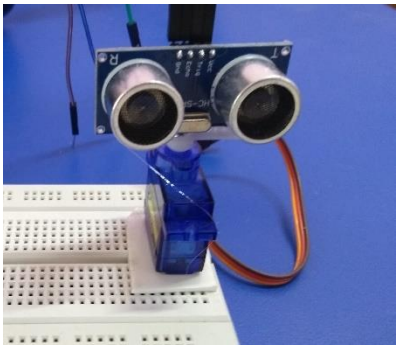
Arduino is an open source, computer hardware and software company, project, and user community that designs and manufactures microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world. The project's products are distributed as open-source hardware and software, which are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL), permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form, or as do-it-yourself kits. Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (*shields*) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers.

Arduino/Genuine Uno is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again. "Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards.

o ULTRASONIC SENSOR

HC-SR04 ultrasonic sensor uses SONAR to determine the distance of an object just like the bats do. It offers excellent non-contact range detection with high accuracy and stable readings in an easy-to-use package from 2 cm to 400 cm or 1” to 13 feet. The operation is not affected by sunlight or black material, although acoustically, soft materials like cloth can be difficult to detect. It comes complete with ultrasonic transmitter and receiver module.





○ Servo Motor

A Servo Motor is a small device that has an output shaft. This shaft can be positioned to specific angular positions by sending the servo a coded signal. As long as the coded
signal exists on the input line; the servo will maintain the angular position of the shaft. If the coded signal changes, the angular position of the shaft changes. [8] In practice, servos are used in radio-controlled airplanes to position control surfaces like the elevators and rudders. They are also used in radio-controlled cars, puppets, and of course, robots.

Servos are extremely useful in robotics. The motors are small, have built-in control circuitry, and are extremely powerful for their size. A standard servo such as the Futaba S-148 has 42 oz/inches of torque, which is strong for its size. It also draws power proportional to the mechanical load. A lightly loaded servo, therefore, does not consume much energy. The guts of a servo motor are shown in the following picture. You can see the control circuitry, the motor, a set of gears, and the case. You can also see the 3 wires that connect to the outside world. One is for power (+5volts), ground, and the white wire is the control wire.

Working of a Servo Motor

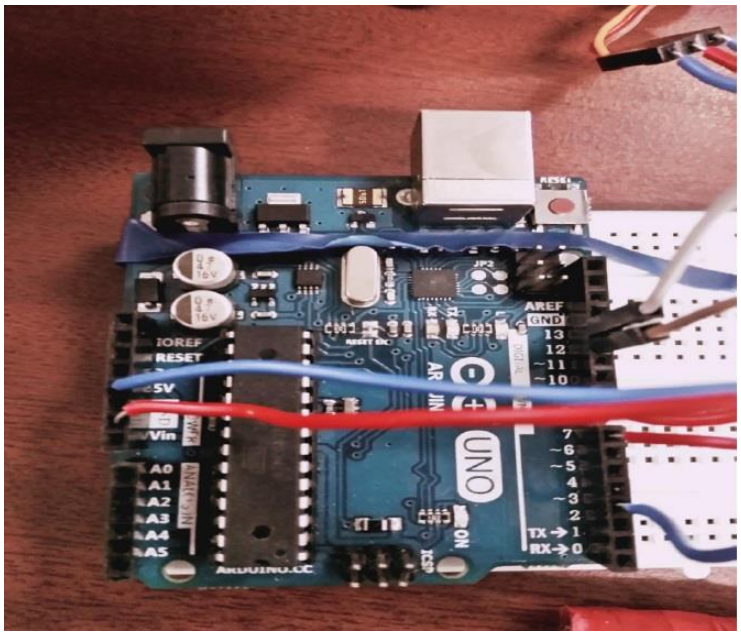
The servo motor has some control circuits and a potentiometer (a variable resistor, aka pot) connected to the output shaft. In the picture above, the pot can be seen on the right side of the circuit board. This pot allows the control circuitry to monitor the current angle of the servo motor.
If the shaft is at the correct angle, then the motor shuts off. If the circuit finds that the angle is not correct, it will turn the motor until it is at a desired angle.
The output shaft of the servo is capable of traveling somewhere around 180 degrees. Usually, it is somewhere in the 210-degree range, however, it varies depending on the manufacturer.
A normal servo is used to control an angular motion of 0 to 180 degrees. It is mechanically not capable of turning any farther due to a mechanical stop built on to the main output gear.
The power applied to the motor is proportional to the distance it needs to travel. So, if the shaft needs to turn a large distance, the motor will run at full speed. If it needs to turn only a small amount, the motor will run at a slower speed. This is called **proportional control**.

Test Result

The dustbin is able to open the lid with the help of servo motor whenever it detects motion. The ultrasonic sensor is giving the details about the waste present in the dustbin. The status of the waste is transferred to the owner or waste management team whenever it is exceeding the thrash hold value.

Bar Code is fully working for provide the particular application for controlling the movement of the bin.

HC06 Bluetooth module is responding to connect the controller application.



Future Enhancement

Automatic Garbage Fill Alerting system helps us to reduce the pollution. Many times, garbage dustbin is overflow and many animals like dog or cow enters inside or near the dustbin. Also, some birds are also trying to take out garbage from dustbin. This project can avoid such situations. Apart from this, differentiation can be made between dry trash bin and wet trash bin collecting plastic dry waste and biodegradable waste respectively.
To implement this methane and smell sensors can be used. This helps in distinguishing the waste at the source and hence reducing the requirement of manpower. To enhance it further, an automated system can be developed which is able to pick up waste in and around the bin, segregate them and put them in respective bins.

Conclusion

This project work is the implementation of Automatic Garbage Fill Alerting system using Ultrasonic sensor, Arduino Uno, Buzzer and Wi-Fi module. This system assures the cleaning of dustbins soon when the garbage level reaches its maximum. It will take power supply with the help of Piezoelectric Device. If the dustbin is not cleaned in specific time, then the record is sent to the Sweeper or higher authority who can take appropriate action against the concerned contractor. This system also helps to monitor the fake reports and hence can reduce the corruption in the overall management system. This reduces the total number of trips of garbage collection vehicle and hence reduces the overall expenditure associated with the garbage collection. It ultimately helps to keep cleanliness in the society. Therefore, the Automatic Garbage Fill Alerting system makes the garbage collection more efficient.

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