Research Proposal

Skill Development Project I - ICT 1108

Bachelor of Information and Communication Technology (BICT)

Degree Programme

Department of Information and Communication Technology

Faculty of Technology

Rajarata University of Sri Lanka

Mihintale

Details of the Project

Project Title : Automated Garbage Bin Powered by Arduino
Group Number : 13
Group Name : ECODUINO
Submission Date : 02/10/2023
Group Members : 6

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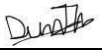
H.H.D.L. Hewarathna	1664	
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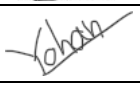
N.Y.R. De silva	1739	
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1. Introduction

World population is growing rapidly because of this situation viruses, environmental pollution and other problems are increasing too. As we all know past few years world severely affected by a virus called COVID. We lost many lives and it led our country into an economic crisis. Waste management is one of the main issues that COVID virus spread rapidly around our country.

And also, by observing we discover that most of the people are lazy and not disposing waste correctly into the garbage bin. So, we came with an idea to create an Automated Lid Opening Garbage Bin that works without any manual interference.

In anyplace like Universities, Business places and other similar places one of a main issue is waste management and also everywhere we can see garbage bins that need to interference manually. These garbage bins not only unhygienic but also very inefficient. Without any problem these issues can handle easily by our Automated lid opening garbage bin that powered by Arduino. By our creation people will enjoy disposing their waste.

Arduino is an open – source platform that anyone can make different and new innovation. In that case we use Arduino board to not only control the lid opening mechanism but also people can see a red light when there's no space to put garbage. This will provide an efficient way to solve waste management problems and also compare to other solutions in waste management our solution is cost efficient way and also it brings lots of benefits like improve hygiene, simplicity of accessibility and increase of efficiency after implementing.

Because we use Arduino technology it is very simple to add improve our automated lid opening garbage bin in future. For example, we hope to add weight sensors to measure weight, motions sensors and by adding wheels we can make it move automatically.

We hope by developing our creation we can successfully fight viruses like COVID in future and reduce environment issues and make people love to dispose their garbage correctly and protect environment for our future.

2. Problem Statement

2.1 Health Issues

When people use manual garbage bins, they might touch them, which could spread the germs on the bin to themselves. Even if it is opened manually by their legs, germs can still spread through their shoes. This can lead to a serious health issue.

2.2 Inconvenience

It's hard to put garbage in garbage bins when people have to carry so many bags, and if someone has dirty hands and still needs to put garbage in the bin, it's hard to avoid touching the can so that the person puts his dirty hands on it. Therefore, using manual bins are so inconvenience.

2.3 Unhygienic

Garbage bins you see in parks and other public placers are full of garbage and it’s hard to use because they are not clean so people don’t like to use them.

2.4 Inefficient

It will take a lot of time to people to dispose garbage into garbage bin manually because of this people do not dispose garbage correctly.

2.5 Environmental Unsustainability

Because of improper waste disposal natural resources will be damaged and it will cause to environmental unsustainability.

3. Aim

The Aim of this design is to make the user's experience better and keep them as far away from the trash as possible, which will help not to spread germs and encourage good hygiene and to facilitate the tasks in people's daily life and safely dispose of garbage in case of threat to people's health.

4. Objectives

- To decrease spread microorganisms by trash receptacles witch we can effectively battle dangerous infections like Coronavirus in future and save life of thousands of individuals and make people's life simple when pandemics.

- To control the bad conditions caused by the improper disposal of garbage due to the fear of contracting such diseases due to touch.

- To improve hygiene, which means preventing the spread of germs and promoting a cleaner, more hygienic environment by limiting manual contact with trash.

- To enhancing the appearance of public spaces with a modern and sleek design and promoting inclusivity and accessibility by making waste disposal easier for individuals with mobility or dexterity issues.

- To prevent destroy natural resources like rivers, plantation, forests, soil etc. and maintain environmental sustainability.

- To access easy and convenient for dispose garbage and give a great waste managing experience for people.

- To save people’s time and energy by make it easy to manage garbage.

5. Scope

Automated lid opening garbage bin our project has 2 phrases as indoor creation and outdoor phrases. Each creation is unique and different from each other.

Phrase 1: Providing users to dispose their garbage inside the University classrooms and the machine battery will charge by plugging into a socket.

phrase 2: Providing users to dispose their garbage outside university classrooms that located near parks inside university premises and the machine will be protected by climate and charge using solar power

Automated lid opening garbage bin will provide Students. Lectures and other people follow,

- Allow users to dispose garbage without touching the garbage bin.
- Allow users to easy and safe method to dispose garbage.
- Allow users to dispose garbage without fear when a pandemic.
- Allow users to see if garbage bin is full by seen the red light.
- Allow users to not smell disgusting garbage when they use it.

For garbage collectors it is easy to identify when the garbage bin in full because of the red light that emit when garbage reach for a certain level and also, they need to put a garbage bag every time inside the bin to protect the circuit from water.

6. Methodology / Technical Approach

This project makes use of Arduino programming and technology. The Arduino Uno board serves as the project's brain. All of the subparts connect to the Arduino board. The main part of our project is a HC-SR04 ultrasonic sensor, which can detect anything between 2 cm and 400 cm and we can always adjust that measurement. One ultrasonic sensor detects the person at the front of the garbage bin and the other sensor detect the level of garbage inside the bin. when the garbage reaches a certain height the red LED bulb will emit. The person is detected by the front-mounted ultrasonic sensor, which sends a signal to the Arduino board. The signal then travels to the metal servo motor or TowerPro SG90 which is the component we use to open and close the lid. Solar panels or plugging in can both be used to charge the machine.

Following are the Components and a brief explanation of what we are going to use in our project.

- A dustbin with hinged lid
- Arduino UNO
- HC-SR04 Ultrasonic Sensor Module
- TowerPro SG90 Servo Motor
- Connecting Wires
- 5V Power Supply
- Solar panel

6.1 Arduino UNO

Arduino does the main logical operation, takes data from the ultrasonic senor and switches on Servo Motor according to our Algorithm, and distributes the electricity required to other devices.

Figure 1 A picture of an Arduino UNO

6.2 HC-SR04 Ultrasonic Sensor Module

The Ultrasonic sensor is placed on top of the dustbin's lid and when the sensor detects any objects like a human hand, it will send data to Arduino board. When a person reaches the dustbin to dump the litter, this is notified to the Arduino via an Electrical signal.

Figure 2 A picture of an HC-SR04 Ultrasonic Sensor

6.3 TowerPro SG90 Servo Motor

The Servo Motor Works as an arm of the dustbin's lid and opens and closes the dustbin's lid according to the signals of the Arduino.

Figure 3 A picture of a servo motor

6.4 5V Power Supply

This helps to produce the electricity required for the other components and connecting wires helps to deliver the electricity power supply made for each component.

Figure 4 A picture of a battery

7. Time Work Plan

ID	Task Name	Start	Finish	Duration (Days)	2023
					January: 2 w, 3 w, 4 w; February: 1 w, 2 w, 3 w, 4 w; March: 1 w, 2 w, 3 w, 4 w; April: 1 w, 2 w, 3 w, 4 w; May: 1 w, 2 w, 3 w, 4 w; June: 1 w, 2 w, 3 w
1	Group Registration	2023/01/14	2023/01/19	5	
2	Requirement Analysis	2023/01/20	2023/02/24	4	
3	Planning	2023/01/25	2023/01/28	3	
4	Project Proposal	2023/01/29	2023/02/10	12	
5	Design the Project	2023/02/11	2023/02/26	15	
6	Project Presentation	2023/02/27	2023/03/10	11	
7	Develop the Project phrase 1	2023/03/11	2023/03/28	17	
8	Progress Presentation	2023/03/29	2023/04/05	7	
9	Develop the project phrase 2	2023/04/06	2023/05/07	31	
10	Implementing and test the Project	2023/05/08	2023/05/28	20	
11	Finish Report	2023/05/29	2023/06/14	16	

Table 1 Gantt Chart for the Work Plan

8. Conclusion

People and the environment will be greatly affected by our trash bin with an automatic lid opening. We can see results like better waste management, less impact on the environment, more user convenience, and better hygiene. The most important and valuable conclusion is that we can stop germs from spreading through garbage bins with this machine, which gives us hope that we can successfully fight viruses like COVID in future. We hope to add improvements like automatic moving and our creation will change the state of waste management in Sri Lanka.

"Save environment and Save the world"

9. References

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