

**DEVELOPMENT OF A FLOATING GARBAGE CLEANING ROBOT FOR
WATER BODY**

BY

**FARHANA BINTE ISLAM
ID: 161-15-7129**

This Report Presented in Partial Fulfillment of the Requirements for the Degree of
Bachelor of Science in Computer Science and Engineering.

Supervised By:

Fahad Faisal

Senior Lecturer A

Assistant Professor
Department of CSE
Daffodil International University

Co-Supervised By

Saiful Islam

Lecturer (Senior Scale)
Department of CSE
Daffodil International University



**DAFFODIL INTERNATIONAL UNIVERSITY
DHAKA, BANGLADESH**

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APPROVAL

This Project/internship titled **Development of a Floating Garbage Cleaning Robot for Waterbody**, submitted by Farhana Binte Islam, ID No: 161-15-7129 to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 05 December 2019.

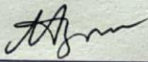
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Daffodil International University

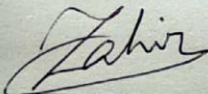
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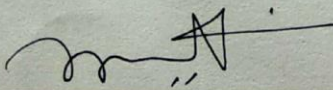
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Assistant Professor

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Faculty of Science & Information Technology
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Internal Examiner



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Professor

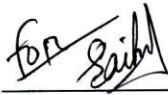
Department of Computer Science and Engineering
Jahangirnagar University

External Examiner

DECLARATION

I hereby declare that, this project has been done by me under the supervision of **Fahad Faisal**, **Assistant Professor**, Department of **CSE** Daffodil International University. I also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

Supervised by:



Fahad Faisal

Assistant Professor
Department of CSE
Daffodil International University

Co-Supervised by:



Saiful Islam

Lecturer (Senior Scale)
Department of CSE
Daffodil International University

Submitted by:



Farhana Binte Islam

ID: 161-15-7129
Department of CSE
Daffodil International University

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ABSTRACT

“DEVELOPMENT OF A FLOATING GARBAGE CLEANING ROBOT FOR WATER BODY”: This is an embedded system project. Embedded system is a part of machine learning. Our nature is rapidly polluted by human. This embedded project will help to clean garbage and dirt from the places. Water shrouds about 70% of the Earth’s surface among that only 3% of that is pure water. Water gets polluted by many reasons like industry waste, sewage waste, garbage waste etc. Hence it is essential to maintain cleanliness and hygiene of water. I thought this water pollution as a serious issue and start to work on this project. I decided to incorporate technology to get the work done successfully and efficiently. This project helps us to reduce man power, time consumption for cleaning the river. This project design is in such a way that it collects the waste which floats on water. I tried my level best to make this system easy and simple as it can be possible. This project is very user friendly and effective. I would like to develop a water cleaning robot. The water cleaning robot will be consisting one part. This project clean floating things in water such as water bottles, papers, polythene etc.

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CHAPTER 1

INTRODUCTION

1.1 Motivation

The global warming is real and this effect will show first to our country. We should concern about our environment cleaning. Our country has a lot of rivers but maximum rivers are no polluted highly. We should clean and come forward how to clean environment using digital tools so that our time and energy will save. From that I decided to make a robot which will clean water sector garbage and clean environment. My project is embedded based project. This project is intended for developing a remote controlled environment cleaning system.

1.2 Objective

This is an embedded based project. Its water cleaning robot.

1. Time saving
2. Compatible with existing system.
3. User friendly
4. Fully con
5. Controlled by remote.

1.3 Description

This project motto is clean environment. It's cleaning robot. I used some hardware to build this project. Those hardware will help to clean environment garbage. This project is very useful for small as well as big lakes, rivers where garbage is present in large amount .This project "Remote Operated watercourse cleansing Machine" is intended with the hope that it's pretty much economical and useful to watercourse and pool cleansing. Talent employee don't seem to be needed to drive the system. Atmosphere friendly system. Style of the system is created straightforward. On the premise of it style and estimating price and handiness its rock bottom and really helpful for the society. This a dummy robot and it work properly.

1.4 Expected Outcome

This project is embedded project. It's an water cleaning robot. It clean garbage from water.

- Fully controlled by remote
- Good efficiency
- Long time work capability.
- Environment Friendly device.

1.5 Report Layout

Chapter 1: In this chapter, I have discussed the motivation, objectives and the expected outcome Of the project.

Chapter 2: I discuss the background circumstances and hardware details of our project. I also talk About the related work, comparative studies, scope of the problem and challenges of the project.

Chapter 3: This chapter is all about the requirements like the use case model of the project and Their description, and the design requirements.

Chapter 4: In this chapter, I discussed the experimental results and discussion.

Chapter 5: This chapter contain implication for future work and the summary of my project

CHAPTER 2

BACKGROUND AND HARDWARE'S

2.1 Introduction

In developing countries, accumulation of floating waste like plastic scraps, foam scraps or tree leaves on town willows or ponds can block water evacuation and conjointly cause pollutions. Improvement water surface is so a vital routine task. The “water improvement robot” employed in that places wherever there's waste dust within the water body that square measure to be removed. This problem is consists of waterwheel driven conveyer mechanism that collect & take away the wastage, garbage & plastic wastages from water bodies. This conjointly cut back the difficulties that I face once assortment of dust happen. To eliminate the drawbacks of the higher than mentioned ways the remote controlled water improvement machine was designed that helps in improvement the water surface expeditiously and friendly , this may ultimately end in reduction of pollution and in conclusion the aquatic animal's death to those issues are reduced. It consists of Belt drive mechanism that lifts the dust from the water. The employment of this project are created in rivers, ponds, lakes and alternative water bodies for to wash the surface water dust from bodies. In our country the water bodies square measure principally impure by industrial liquid waste .The some picture graphs square measure shows the pollution close to Buriganga watercourse [2]



Figure 2.1.1: Polluted Burigonga River [9].

2.2 Comparative Studies

I searched to find related work I found some of work but not similar of my project. All those just used hardware and not good handling. Just on the switch then off the switch it will stop work. I have studies each and every requirement and system process of that site to work our system in an efficient and proper way. My project can control by android phone. I used Bluetooth module so that person can use control this device by phone.

2.3 Scope of the problem

I wanted to build an environment cleaning robot. And it's embedded based project. So I used some hardware to build this. From those hardware some will scope of the problem. Motor, Battery will scope of the problem.

- If battery dies then the project will not working
- If Bluetooth module signal is missing I can't control this device properly.
- If motor don't get too much energy from battery device will not clean garbage's.

2.4 Challenges

As I am student, my main challenge is maintaining time at our daily basis. This is embedded based project so building this project I bought some hardware which challenges to buy. Following are the challenges of this project:

- Wire connection properly in arduino.
- Bluetooth module working properly or not.
- Android phone to control the device with Bluetooth module.
- Making the project beautiful and user friendly.

2.5 Hardware Requirement

Here I added the detail about the hardware's which is needed to implement our project.

2.5.1 Arduino Uno



Figure 2.5.1: Arduino Uno

The Arduino is really just an AVR 8-bit microcontroller with some extra hardware to make it faster to get up and running. That extra hardware includes:

A USB-to-serial board so that you can easily program the microcontroller, as well as monitor the serial port from your computer.

Power management - for most Arduino that means stepping 6+ volts down to 5v to power the microcontroller and anything connected to it, although there are some 3.3v versions also.

A (usually) 16mhz crystal - most 8-bit microcontrollers from AVR have an internal clock that runs up to 8mhz, but requires an external crystal to run faster than that.

Some convenient headers to easily connect external hardware to the microcontroller's pins.

Other than hardware, the Arduino also comes with a custom "bootloader" loaded onto the AVR to make loading "sketches" easier. The Arduino IDE also provides a whole bunch of software libraries, so that you don't have to write so much low-level code to turn registers on and off. None of this is required though. It just makes prototyping a lot easier. If your project reaches a point where you're satisfied with it, you can buy a bare AVR chip and program it directly, and do away with the extra bit quite happily [1].

2.5.2 Motor Driver

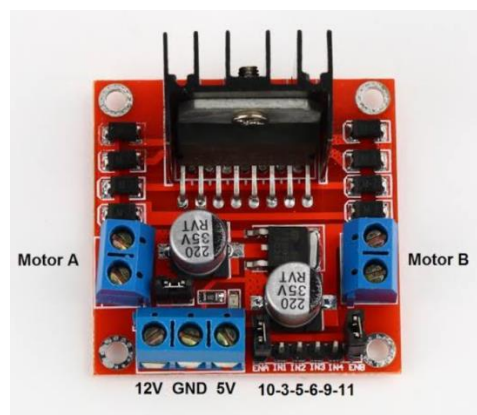


Figure 2.5.2 : Motor Driver

The L298N could be a double H-Bridge motor driver which allows rate and means regulator of 2 DC motors at constant time. The module will drive DC motors that have voltages amongst five and 35V, with peak current up to 2A.

This is dependent on the voltage used at the motors VCC. The module has associate aboard 5V regulator that is either allowed or disabled employing a jumper. If the motor quantity voltage is up to 12V I will alter the 5V regulator and therefore the 5V pin is often used as an output, as an example for running our Arduino board. however, if the motor voltage is larger than 12V I need to disconnect the participant as a result of those voltages that can cause hurt to the aboard 5V regulator. During this instance, the 5V pin is used as input as I would like to connect it to a 5V power supply so as the IC to effort properly.

2.5.3 LED

LEDs (that's "ell-ee-dees") are a particular type of diode that convert electrical energy into light. In fact, LED stands for "Light Emitting Diode." (It does what it says on the tin!) And this is reflected in the similarity between the diode and LED schematic symbols:

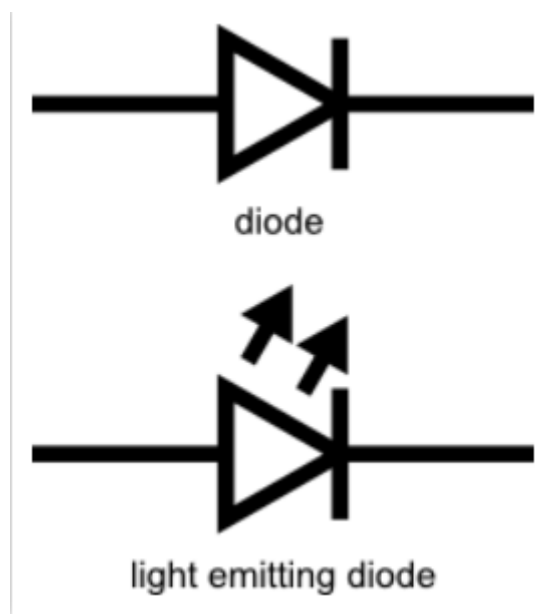


Figure 2.5.3 : LED [9].

In squat, LEDs area unit like miniature light bulbs. Though, LEDs necessitate loads flows power to illuminate in contrast. They're conjointly a lot of energy active so that they don't tend

to induce hot like typical light bulbs do (unless you're very pushing pour into them). This makes them ideal for mobile devices and alternative low-power submissions. Don't count them out of the high-power game, though. High-intensity LEDs have found their approach into inflection illumination, focuses and even automotive headlights!

2.5.4 Wheels

A waterwheel is an unassuming turbine a device with lots, sculls or edges that is rotated by poignant water, adapting the kinetic get-up-and-go of water into power-driven movement. Hydroelectric influence plants use enormous and more compound turbines to produce electricity.

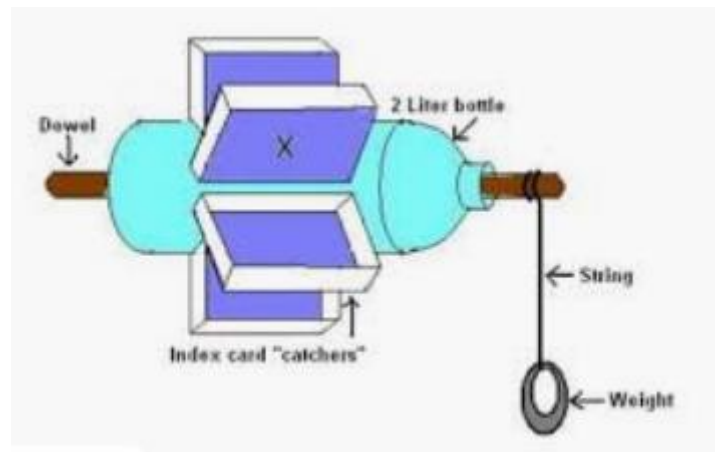


Figure 2.5.4: Water wheels [9].

2.5.5 Bluetooth Module



Figure 2.5.5 : Bluetooth Module [9].

Bluetooth may be a technology for wireless communication. It's designed to interchange cable connections. It uses serial communication to speak with devices. It communicates with microcontroller victimization port (USART). Usually, it connects tiny devices like mobile phones, PDAs and TVs employing a short-range wireless affiliation to exchange documents. It uses the two.45GHz band. The affiliation is point-to-point or multi-point wherever the utmost vary is ten meters. The transfer rate of the information is 1Mbps.

HC-05 Bluetooth module provides shift mode between master and slave mode which implies it able to use neither receiving nor transmittal information.

Comparing it to the HC-06 module, which may solely be set as a Slave, the HC-05 is set as Master moreover that permits creating a communication between 2 separate Arduino Boards.

2.5.6 Battery



Figure 2.5.6: Battery [9].

2.5.7 DC Motor



Figure 2.5.7: DC motor [9].

2.5.8 Table Mat

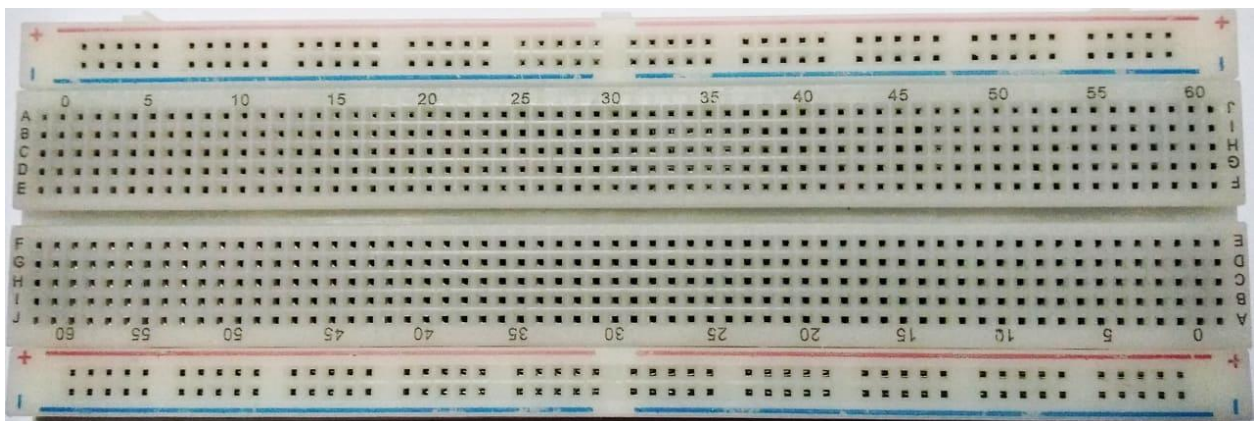


Figure 2.5.8: Table mat [9].

2.5.9 Bread Board

Breadboard is a plastic board for holding wires and electronic segments such as transistors and resistors.

A breadboard is utilized to assemble and test circuits rapidly before finishing any circuit design. The breadboard has numerous gaps into which circuit segments like ICs and resistors can be



embedded. A run of the mill breadboard is demonstrated as follows:

Figure 2.5.9: Bread Board [9].

The breadboard has segments of metal underneath the board and interface the openings on the highest point of the board. The metal strips are spread out as demonstrated as follows.

Note that the top and base lines of gaps are associated evenly and split in the center while the rest of the openings are associated vertically.

2.5.10 PVC

The PVC foam board, otherwise referred to as Chevron board or Andy board is wide used for each indoor and outside applications. It contains the chemical composition, Poly Vinyl Chloride, that is employed in piece of furniture, building, and advertising industries. Made of light-light and foamed PVC, this PVC foam board is It and corrosion resistant. the thickness of the fabric can vary from half dozen metric linear unit to 45mm.it's possible to engrave, emboss, paint, print, laminate and mill the surface of the froth board consistent with your needs.one in all the foremost light options of this foam board is that they're going to not decay with time and also the color remains within the same vogue.



Figure 2.5.10: PVC board [9]

In my project I used PVC board for design and work best in the water.

CHAPTER 3

REQUIRMENT SPECIFICATION

3.1 Introduction

This is an embedded based project “**Development of a Floating Garbage Cleaning Robot for water body**”. To build a project must need some requirement so that it can build properly. This project also need some requirement. My project needs some hardware and software resource and support to run efficiently. So in this chapter of our report, I will go to discuss the requirement specification for our project

3.2 General system requirement for this project

There are some minimum requirements for both hardware and software to build our project. These requirements have to fulfill in order to run our project. A general list of hardware and software component is given below to get an idea of what I used to build our project-

Hardware:

- Arduino Uno
- Battery
- Breed Board
- Jumper wire
- Bluetooth module
- Motor Driver (L298N)
- Switch
- Wheels, PVC and table mat.

Software:

- Windows operating system.
- Arduino IDE.
- Built in android Bluetooth connection app.

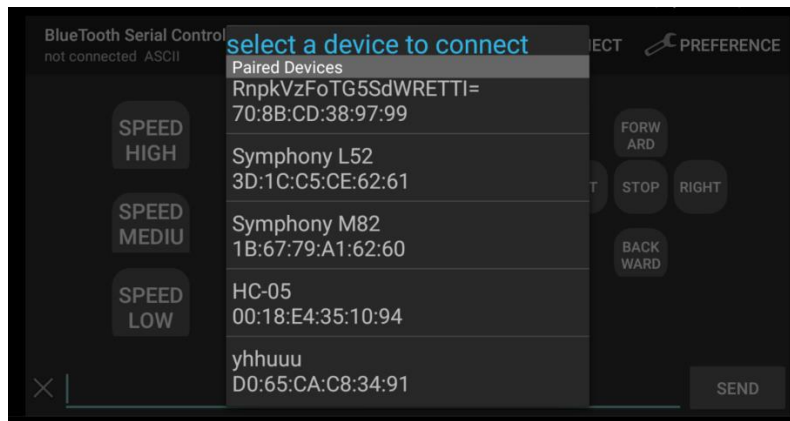


Figure 3.2.1: Built in android Bluetooth connection app.

3.3 Flow chart and implementation process

By a flow chart I will know how a system a working. Following flow chart is for my project.

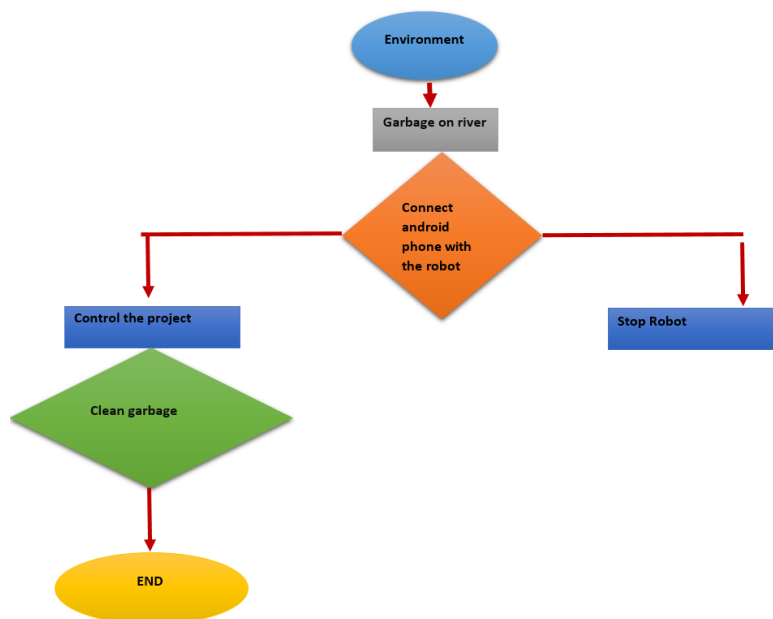


Figure 3.3.1: Flow chart

My project can be controlled by android device. It has a Bluetooth module which helps to connect with android device. By device I can control the robot and where ever see garbage on the river I can clean that garbage. This flow chart explain that.

3.4 Use case model and description

The environment is getting increasingly dirtied step by step because of urbanization and industrialization. If this can be decreased or illuminated in a natural way then it'll be beneficial for both the environment and people living in it. Also the river is polluted increasing which so harmful for our environment.

A use case model explain the project properly. Here is my project use case model

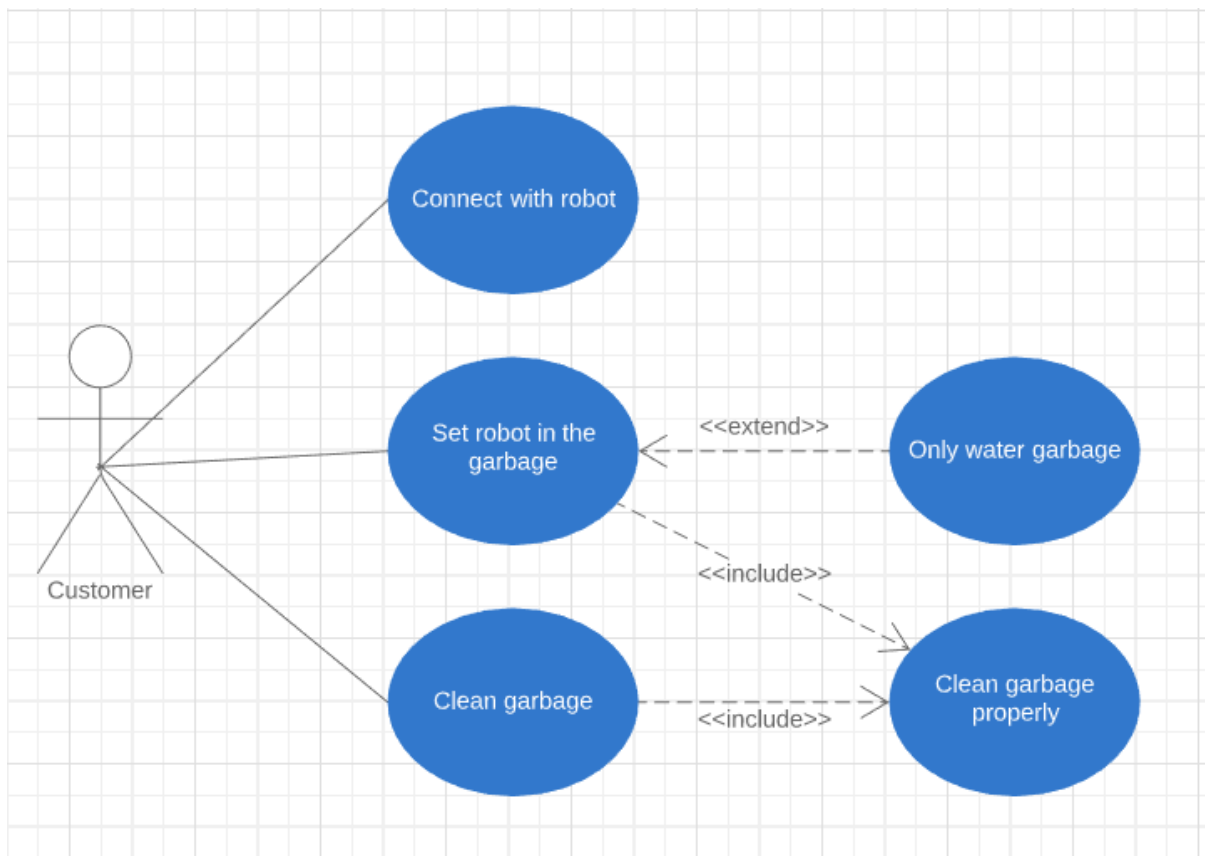


Figure 3.4.1: Use case

Description

This project can control by android device. It's a cleaning robot. I built this by using embedded system. Used Arduino to handle all the components which I used. The main components is Bluetooth module and motor. This components handling by Arduino. Arduino makes easy to handle those components. By using jumper wire I connected all components in Arduino. After connecting all those, I set up and declare all components as variable in Arduino IDE. After coding this device work properly [10].

```
sketch_oct31a
const int in1 = 3;
const int in2 = 5;
const int in3 = 6;
const int in4 = 9;
const int led = 10;
int ledBrightness = 200;
int motorSpeed = 155;
int control;

void setup() {
  Serial.begin(9600);
  pinMode(led, OUTPUT);
  pinMode(in1, OUTPUT);
  pinMode(in2, OUTPUT);
  pinMode(in3, OUTPUT);
  pinMode(in4, OUTPUT);
}
```

Figure 3.4.2: arduino code



Figure 3.4.3: Completed project.

3.5 Design Requirement

This is environment cleaning robot project. It clean the water garbage. For the best efficient work I have to design properly this project. For my project design requirement are:

- PVC board
- Mat
- Marker pan with connected motor
- DC motor

I used PVC board because it float on the water. Mat with marker pan helps to clean garbage. In android has built application which helps to connect embedded Bluetooth device. After connecting this device I can control the device by android phone. So, I don't have to build android device for connecting my robot [6].

CHAPTER 4

EXPERIMENTAL RESULT AND DISCUSSION

4.1 Introduction

This chapter will cover, how does clean environment helps us to live peacefully? One of the significant advantages of cleaning environment is the cultivated inclination of accomplishing something useful for the environment. I most likely definitely realize that clean environment work in the earth comparably to how lungs work in the body. Filthy environment is bad for our health. Also the ecology system harm for this. The water pollution is the main problem right now. For this pollution the eco system of water harm so much. So this project aim is clean water garbage.

4.2 Homepage

Built in Bluetooth connector android app homepage is given.

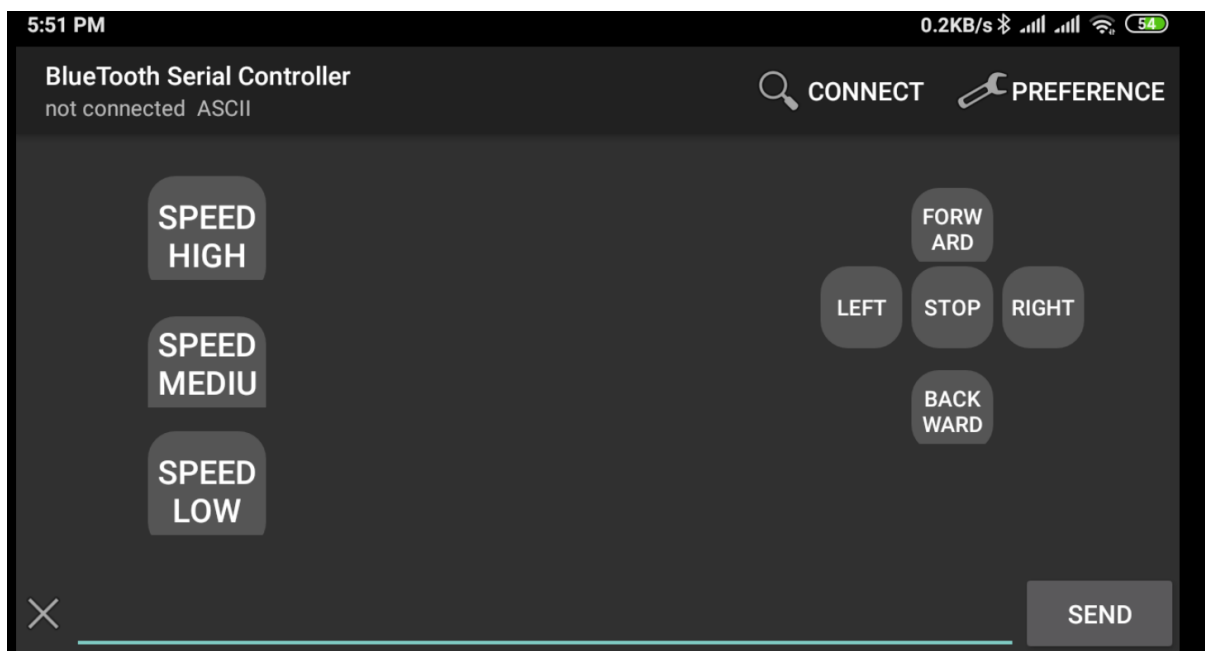


Figure 4.2.1: homepage

By this app I can control my project. So the work system will easy and easy to clean garbage. My Bluetooth module is high range module so that it can connect easily with the app.

4.3 Back End design

As I know this the embedded based project the back end design of this project is arduino code. Arduino code is the back end code. In this section I connected the all my components with the arduino and declare this components into arduino. I am given the back end design code of my project.

```
sketch_oct31a
const int in1 = 3;
const int in2 = 5;
const int in3 = 6;
const int in4 = 9;
const int led = 10;
int ledBrightness = 200;
int motorSpeed = 155;
int control;

void setup() {
  Serial.begin(9600);
  pinMode(led, OUTPUT);
  pinMode(in1, OUTPUT);
  pinMode(in2, OUTPUT);
  pinMode(in3, OUTPUT);
  pinMode(in4, OUTPUT);
}
```

Figure 4.3.1: Back end 1

```
sketch_oct31a
void back()
{
  analogWrite(led, ledBrightness);
  analogWrite(in1, 0);
  analogWrite(in3, 0);
  analogWrite(in2, motorSpeed);
  analogWrite(in4, motorSpeed);
}

void left()
{
  analogWrite(led, ledBrightness);
  analogWrite(in1, 0);
  analogWrite(in3, motorSpeed);
  analogWrite(in2, 0);
  analogWrite(in4, 0);
}

void right()
{
  analogWrite(led, ledBrightness);
  analogWrite(in1, motorSpeed);
  analogWrite(in3, 0);
  analogWrite(in2, 0);
}
```

Figure 4.3.2: Back end 2

4.4 Experimental Result

In this experiment I used the motor and Bluetooth module to control the device. I designed the motor as like it can clean the garbage on water. I connect the motor with two marker pen wrap with mat so that it can properly clean the garbage. Here is my project picture:

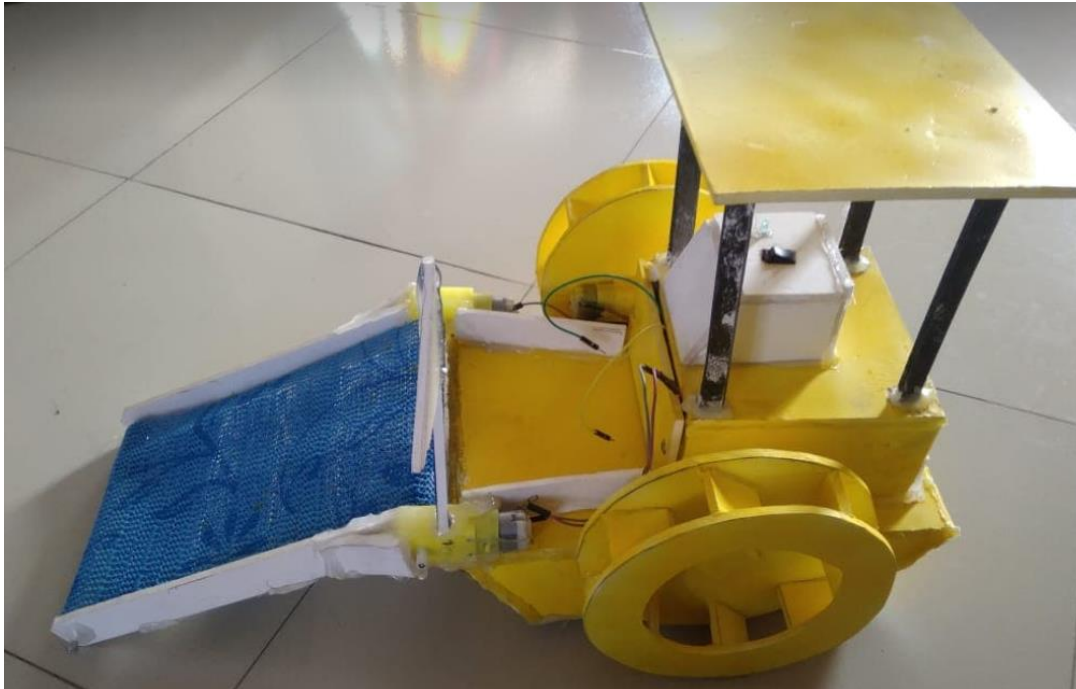


Figure 4.4.1: Project 1

Our country river is vastly polluted now. The river eco system almost died in some river. I have to come forward and try to solve the problem. Behind reason of that pollution is density of people and mills. Mills wastage are mix with water and make water dirty. Also some careless people throw garbage into the river. That's why river are polluted now. Here is picture of present condition of river.



Figure 4.4.2: Polluted river [9].

So, my aim is clean the garbage on the river. Using those components I build this project for cleaning the garbage. And it work properly. I tried many times every time it clean properly and save time of us. It is automated so that it work efficiency is good [7].



Figure 4.4.3: cleaning garbage.

4.5 Descriptive analysis

My project is embedded based project. I designed it on Arduino. For that I need some components. After I connected all into Arduino and did coding to build the project.

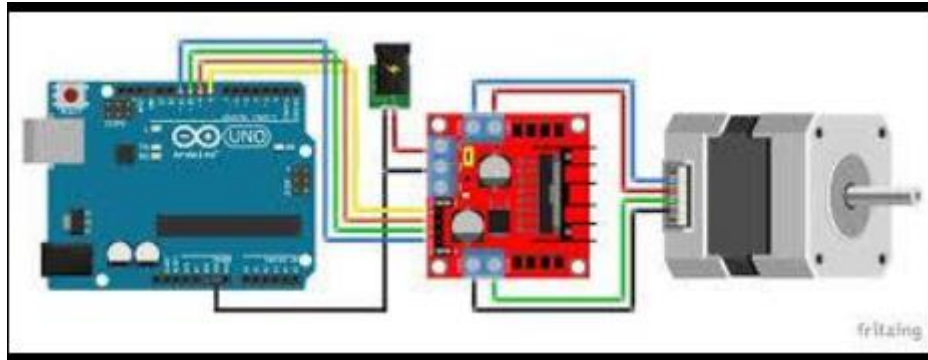


Figure 4.5.1: Design of motor driver

This is the design of connecting motor driver with motor and with arduino. I used here L298N motor driver. A motor driver just divided the voltage to a motor and control the motions of motor. It's very important for my project. This motor driver control my all motor [8].

Now, this is my circuit diagram:

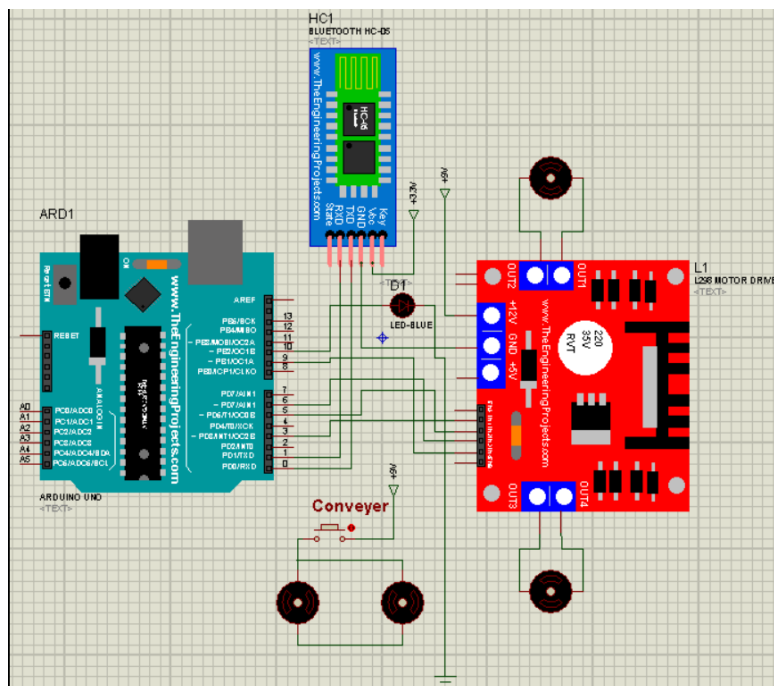


Figure 4.5.2: Circuit diagram.

For the project control I used a Bluetooth module. By this Bluetooth module I can connect with android phone. By android phone I can control my device. This diagram showing which Bluetooth module I used. HC1 Bluetooth module used. It's a good range Bluetooth module. It's output also good.

I used some motors for cleaning garbage. Those motor can controlled by android device. So where I see garbage in the river I can send the robot for cleaning garbage. Those motor connected with motor driver. And also connected with mat. The mat collects the garbage and store it [8].



Figure 4.5.3: Cleaning robot

4.6 Workflow Diagram

A workflow diagram may be a visual illustration of a business method (or workflow), typically done through a flow sheet. It uses standardized symbols to explain the precise steps required to finish a method, likewise as noting people accountable for every step.

In my workflow the whole project of mine is given specifically. Which components I used how to connect arduino this are given in workflow diagram properly.

Here is my workflow diagram:

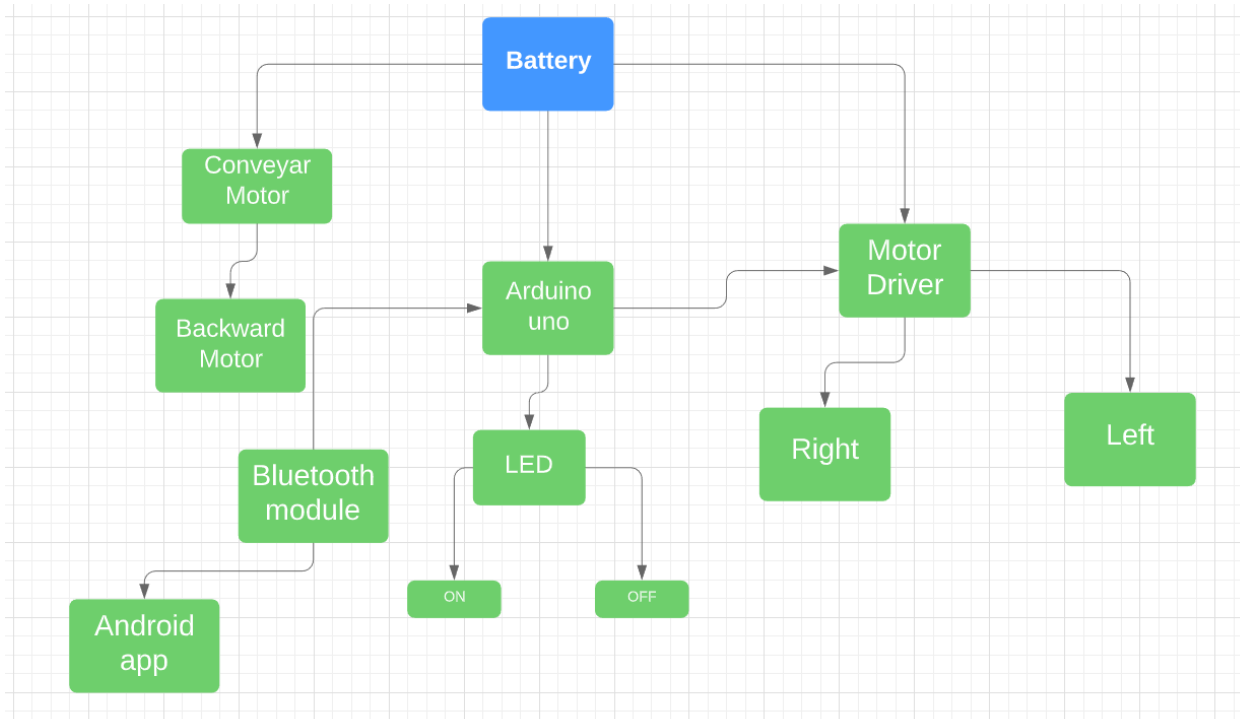


Figure 4.6.1: Workflow diagram

CHAPTER 5

CONCLUSION AND IMPLICATION FOR FUTURE WORK

5.1 Introduction

In this chapter I will discuss the findings of the results, conclusion, recommendation of and implication for future research of the study, first it will be discussed the major findings of each study as confirmed in the research objectives, second the conclusion from the findings of the study, lastly the research will suggest recommendation of the study and areas future research.

5.2 Summary of the project

Clean environment motivated to build this project. It's embedded based project. The embedded system helping to our life easier and efficient.

'Development of a Floating Garbage Cleaning Robot for water body' this robot is built for cleaning the river garbage. I tried to make this project best. I tested this project and its work properly. The easiest system of this I can control this robot by the android phone so I can clean anywhere garbage. A Bluetooth module is help to connect the device with android.

5.3 Conclusion

The aim of the study was to embedded based clean environment. The study also aims to know whether the human sees clean environment as a solution to fresh and good life. Based on the findings of this study, the following conclusions are drawn:

Embedded based clean environment can be a major solution to solving water pollution problem. Because, clean environment give us fresh air, good life and a good eco system. So, the aim of the project is clean environment.

Finally I can say that to clean environment, I need to plant more trees, more careful with environment.

5.4 Future work

This project is done as a demo of a big project. It cleans garbage but amount is less. Due to less budget and capability of components it could not built in big shape. My future plan with this work is:

- Make this project large
- Convert into soil surface
- More working efficiency
- Garbage detection.
- Automated.
- Clean both side water and floor.

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