

AUTOMATED FLOATING WASTE WATER REMOVER

Submitted in partial fulfillment of the requirements for
the award of
Bachelor of Engineering degree in Computer Science and Engineering

by

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SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

**Accredited with Grade "A" by NAAC
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APRIL - 2021



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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BONAFIDE CERTIFICATE

This is to certify that this project report is the bonafide work of **PRINCY JEAN P. (Reg. No. 37110597)** and **PRAGARTHI M. (Reg. No. 37110586)** who carried out the project entitled "**AUTOMATED FLOATING WASTE WATER REMOVER**" under my supervision from **August 2020** to **March 2021**.

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Head of the Department

Submitted for Viva voce Examination held on _____

Internal Examiner

External Examiner

DECLARATION

We **PRINCY JEAN P (Reg No. 37110597)** and **PRAGARTHI M. (Reg No.37110586)** hereby declare that the Project Report entitled “**AUTOMATED FLOATING WASTE WATER REMOVER**” is done by us under the guidance of **Mrs. M.D.Anto Praveena M.C.A.,M.E.,(Ph.D)**. Department of Computer Science and Engineering at Sathyabama Institute of Science and Technology is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in Computer Science and Engineering.

DATE:

PLACE: CHENNAI

SIGNATURE OF THE CANDIDATE

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ABSTRACT

In developing countries, accumulation of floating waste such as plastic scraps, foam scraps or tree leaves on city canals or ponds can block water drainage and also cause pollutions. Cleaning water surface is therefore an essential routine task. " In India water pollution is increasing day by day so this is becoming a serious problem for rivers, ponds etc. This mainly consist of impurities like waste water debris, plastics, garbage on floating water surface. These impurities mainly affect on health of human being and also affect on life of aquatic animals. This project focuses more on "Remote Operated and automatic ,Floating and stagnant water cleaning using sensors to detect the weight of waste materials obtained ,and to provide motion to the waste remover to indicate any kind of obstacles on its path of movement using an app to monitor." Wireless sensor networks represent a promising technology for water quality monitoring and management. The use of wireless sensor networks facilitates the improvement of current centralized systems and traditional manual methods, leading to decentralized smart water quality monitoring systems adaptable to the dynamic and heterogeneous water distribution infrastructure of cities. It helps to reduce the water pollution on floating and stagnant bodies .The Project aims to provide a non polluted water body which can be used for living purposes and a cleaner environment for aquatic animals . It is cost saving in the long run, environmental friendly and user-friendly with easy maintenance .

TABLE OF CONTENTS

CHAPTER No.	TITLE	PAGE No.
	ABSTRACT	v
	LIST OF	viii
	ABBREVIATIONS	ix
	LIST OF FIGURES	x
1	INTRODUCTION	
	1.1 Introduction	1
	1.2 Problem statement	2
2	LITERATURE SURVEY	3
3	AIM AND SCOPE OF THE PROJECT	5
	3.1 Aim of the project	5
	3.2 Scope of the project	5
4	SYSTEM MATERIALS AND METHODS	6
	4.1 Requirements of the system	6
	4.1.1 Hardware requirements	6
	4.1.1.1 Arduino Uno	6
	4.1.1.2 Bluetooth module HC-05	7
	4.1.1.3 Jumper Wire	8
	4.1.1.4 PIR sensor	9
	4.1.1.5 DC Motor	10
	4.1.1.6 Battery	11
	4.1.1.7 L298N motor driver	11
	4.1.2 Software Requirements	12
	4.1.2.1 Arduino ide	13
	4.1.2.2 Embedded C	13
	4.2 Connections	14
	4.2.1 Connection with Bluetooth module and Arduino	14 15
	4.2.2 Android App	16
5	SYSTEM METHODOLOGY	16
	5.1 SYSTEM ARCHITECTURE	16
	5.2 METHODOLOGY	16
	5.3 WORKING OF BLUETOOTH	

	CONNECTED WITH ANDROID APP	18
	5.4 SYSTEM TESTING	18
	5.4.1 TESTING	18
	APPROACH	18
	5.4.2 FEATURES TO BE TESTED	19
	5.4.3 TESTING TOOLS AND ENVIRONMENTS	19
	5.4.4 TEST CASES	19
	5.4.6 INPUTS	19
	5.4.7 EXPECTED OUTPUT	20
	5.4.8 TESTING PROCEDURE	20
6	RESULT AND DISCUSSION	22
	6.1 ANDROID APP CONNECTED WITH BLUETOOTH	23
	6.2 RESULT	23
7	SUMMARY AND CONCLUSION	24
	7.1 CONCLUSION	25
	7.2 FUTURE	25
	SCOPE	
	REFERENCE	
	APPENDIX	
	SOURCE CODE	

LIST OF ABBREVIATIONS

ABBREVIATIONS

IOT

AC

USB IDE

DC

IR

IORef

PIR

EXPANSIONS

Internet Of Things

Alternating Current

Universal Serial Bus

Integrated Development
Environment

Direct Current

Infra Red

Input Output Reference

PASSIVE INFRA RED

LIST OF FIGURES

FIG.NO	FIG NAME	PAGE NO
Fig 4.1	Arduino uno R3	7
Fig 4.2	Bluetooth HC-05 module	8
Fig 4.3	Jumper Wire	9
Fig 4.4	PIR Sensor	10
Fig 4.5	DC Motor	11
Fig 4.6	Battery	12
Fig 4.7	Motor Driver	13
Fig 4.8	Arduino IDE	14
Fig 4.9	Bluetooth connection	14
Fig 4.10	Circuit connection	14
Fig 5.1	Circuit architecture	16
Fig 5.2	App screenshot	17
Fig 5.3	App screenshot	17
Fig 5.4	App screenshot	17
Fig 5.5	App screenshot	17
Fig 6.1	Device top view	20
Fig 6.2	Device side view	21

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

The Internet of things, also called the Internet of objects, refers to a wireless network between objects. Usually, the network will be wireless and self- configuring, such as household appliances. Internet of things refers to concept that the Internet is no longer just a global network for the people to communicate with one another using computers, but it is also a platform for devices to communicate electronically with the world around them. The Internet of Things (IOT) is a network of the physical objects-device, vehicles, buildings and other items which are embedded with electronics, software, sensor and networks connectivity, which enables these objects to collect and exchange data. The Internet of things allows objects to be sensed and controlled remotely across existing networks infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems and resulting in improved efficiency, accuracy and economic benefit. The project aims in addressing the fundamental state of environmental crisis caused by water pollution that degrades the living standards of the entire ecosystem . It decreases the rate of existence of the aquatic life that indirectly affects the population of mankind in various ways . Today our water bodies are filled with plastic waste ,e-waste and other non biodegradable waste. These wastes have become a part of the marine environment lately .This contamination of different kinds of waste have lead in Contributing to one of the main reason for global hazards -water pollution, the contaminated waste not only makes the water impure but also affects the smallest living organism present in the water body and the process leads up to affecting every organism that is inter-dependent on it. This brings about the break where the marine ecosystem is affected and affects the existense of mankind. The project aims in bringing a detoxicated environment for both the aquatic and human kind .It also helps in providing a better ,cleaner and safer surrounding to live on.

1.2 PROBLEM STATEMENT

Nowadays we face a lot of environmental crisis such as dumping of garbage , waste, e-waste ,medical waste etc., in water bodies .This cruel act of human kind has brought great loss and damage to the aquatic ecosystem and to the basic necessity of man which is water .This act has not only created pollution of water but cause various disease to the people living around that particular locality . Most of this plastic pollution is attributed to an increase in tourism, shipping and fishing activities. But according to a recent study, a considerable portion of plastic garbage afloat in the open waters originates on land, and is drained into the seas by rivers. This project is not just about how we can rectify impact on environment and the wildlife that live underwater but also it is a small beginning to save and control from aquatic pollution to species, ecosystems, human health, coastal tourism, and contributes to climate change.This project aims to bring a cleaner and safer environment to live on through the help of Internet of Things, we have created a device which can remove waste that is floating on the water bodies, where the water body can either be a stagnant one or a floating water body. The device is created using IOT on a combination of using PIR sensors to indicate the level of garbage collected and to detect garbage floating on the water body. The proposed model “Automated Floating Water Waste Remover” is based on the new technologies which makes the whole process efficient. It is going to be very important and profitable for the whole society. Floating bottles, plastic bags and even toys have become a part of the marine environment in recent times.

CHAPTER 2

LITERATURE SURVEY

As a result of the destruction caused by mankind, different ways of segregation of waste is obtained by many authors. Different methods have been used in different fields and in the field of IOT to provide a risk free environment. Harshvardhan Baria, Mackwan Akash, Nirav Makwana, Raj Parmar, Mr. Sharad Chhantbar “Review Paper On Automated Drainage Cleaning System”[1], they have made a System which collects the floating waste from the drainage without any human assistance. They implemented a simple mechanism of motor, screw conveyor and sprocket, lifter in order to achieve an automated sewage wastewater treatment. This reduces human effort and during rainy season by increasing the motor speed, they can prevent the drain from getting block due to floating waste. Manoj Rathod, Vasant Pund, Rahul Pungle, Jiwan Rathod “Automatic Floating Waste Collector” [2], have prepared a machine to minimize the manual effort to clean the lakes and use automated system. They have merged all the systems of Mechanical, Electronic and Computer into one machine, which cleans floating wastes. This type of mechanism is simple in design also easy to use. Mahto Ravishankarkumar Ravindrabhai, Dehadrav Vaibhav, Kaka Smit, Prof. Ankur Joshi “Design And Fabrication Of River Waste Collector”[3], they modified the boat and converted it into a floating waste collector for rivers. This task is created dependent on contemplating distinctive writing and research on various papers so it can give adaptability in activity. The undertaking "River Waste Collector" is structured with the expectation that it is especially useful to waterway and River cleaning. Prof. N.G.Jogi, Akash Damhare, Kundan Golekar, Akshay Giri, Shubham Take “Efficient Lake Garbage Collector By Using Pedal Operated Boat”[4], they have made a pedal boat with a conveyor system on it which collects and dumps the floating waste into the tank. This task concentrated on demonstrating, structure and control of pedal worked pontoon, with accentuation on lightweight, compact apparatuses. The goal was effectively accomplished impressing task in the environmental purpose. Sheikh Md, Shahid Md Rafique, Dr. Akash Langde “Design and Fabrication of River Cleaning

Machine”[5], their project is been made looking after the situation of rivers which are filled with sewage and plastics wastes. Their project main aim is to reduce the labor and focus on automation. Government has implemented river cleaning projects like “Namami

Gange” & “Narmada Bachao” where huge money is invested. Their project is cheap and automated so it is easier to use. Their project has an 80W motor and 85W battery which provides a runtime of 1hr 15min on paper. Madhavi N. Wagh, Kashinath Munde “Design and Analysis of River Water Cleaning Machine”[6], their project focuses on improving the government efforts for cleaning the Lakes and River. Their project is automated which can be operated remotely. Without being on the machine their machine can clean the river with some commands to be given through a controller. Arduino board, Bluetooth Model, Battery's, Solar Panel, Blucontrol Android APP, DC Motors, Conveyor Belt. As it is powered by solar energy, they achieved their objective of automation for a small scale cleaning purpose.

CHAPTER 3

AIM AND SCOPE OF THE PROJECT

3.1 AIM OF PROJECT

The main aim of the project is to reduce the man power, time consumption for cleaning the river. To reduce the pollution in water bodies. Facility of removing waste particulate floating on water surface. To maintain the automation during working towards cleaning water bodies. To perform the fast & reliable operation during cleaning water bodies. Improve the water quality of a water bodies. To work for society for clean up a section of a stream or river .To record the amount

of garbage removed from the waterway & give solutions to local to provide better environment to aquatic animals and human life.

3.2 SCOPE OF THE PROJECT

- The main aim of the project is to reduce the man power, time consumption for cleaning the river.
- To reduce the pollution in water bodies. Facility of removing waste particulate floating on water surface.
- To maintain the automation during working towards cleaning water bodies.
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- To work for society for clean up a section of a stream or river .
- To record the amount of garbage removed from the waterway & give solutions to local to provide better environment to aquatic animals and human life.

CHAPTER 4

SYSTEM MATERIALS AND METHODS

4.1 REQUIREMENTS OF THE SYSTEM

The system needs two types of requirement they are

- Hardware requirements
- Software requirements

4.1.1 HARDWARE REUIREMENTS

I used following hardware's to accomplish my project

1. Arduino Uno R3
2. Bluetooth Module HC-05
3. Jumper wire
4. PIR sensor
5. DC motor
6. Bread Board
7. Battery
8. L298N Motor Driver

4.1.1.1 ARDUINO UNO R3

Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board. The Arduino platform has become quite popular with people just starting out with electronics, and for good reason. Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program. Finally, Arduino provides a standard form factor that breaks out the functions of the micro-controller into a more accessible package. The Arduino is a microcontroller board based on the ATmega8. It has 14 digital -input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, 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 a ACto-DC adapter or battery to get started "Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform.



Fig 4.1 Arduino uno R3

4.1.1.2 BLUETOOTH MODULE HC-05

- It is used for many applications like wireless headset, game controllers, wireless mouse, wireless keyboard and many more consumer applications.
- It has range up to <100m which depends upon transmitter and receiver, atmosphere, geographic & urban conditions.
- It is IEEE 802.15.1 standardized protocol, through which one can build wireless Personal Area Network (PAN). It uses frequency-hopping spread spectrum (FHSS) radio technology to send data over air.
- It uses serial communication to communicate with devices. It communicates with microcontroller using serial port (USART).
- HC-05 is a Bluetooth module which is designed for wireless communication. This module can be used in a master or slave configuration.

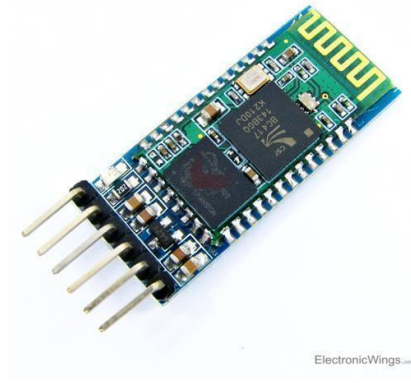


Fig 4.2 Bluetooth HC-05 module

Bluetooth serial modules allow all serial enabled devices to communicate with each other using Bluetooth.

It has 6 pins,

1. **Key/EN:** It is used to bring Bluetooth module in AT commands mode. If Key/EN pin is set to high, then this module will work in command mode. Otherwise by default it is in data mode. The default baud rate of HC-05 in command mode is 38400bps and 9600 in data mode.

HC-05 module has two modes,

Data mode: Exchange of data between devices.

Command mode: It uses AT commands which are used to change setting of HC-05. To send these commands to module serial (USART) port is used.

2. **VCC:** Connect 5 V or 3.3 V to this Pin.

3. **GND:** Ground Pin of module.

4. **TXD:** Transmit Serial data (wirelessly received data by Bluetooth module transmitted out serially on TXD pin)

5. **RXD:** Receive data serially (received data will be transmitted wirelessly by Bluetooth module).

6. **State:** It tells whether module is connected or not.

4.1.1.3 JUMPER WIRE

Jump wires (also called jumper wires) for solderless breadboarding can be obtained in ready-to-use jump wire sets or can be manually manufactured. The latter can become

tedious work for larger circuits. Ready-to-use jump wires come in different qualities, some even with tiny plugs attached to the wire ends. Jump wire material for ready-made or homemade wires should usually be 22 AWG (0.33 mm²) solid copper, tin-plated wire - assuming no tiny plugs are to be attached to the wire ends. The wire ends should be stripped $\frac{3}{16}$ to $\frac{5}{16}$ in (4.8 to 7.9 mm). Shorter stripped wires might result in bad contact with the board's spring clips (insulation being caught in the springs). Longer stripped wires increase the likelihood of short-circuits on the board. Needle-nose pliers and tweezers are helpful when inserting or removing wires, particularly on crowded boards.



Fig 4.3 Jumper Wire

4.1.1.4 PIR SENSOR

A passive infra red sensor (PIR Sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIR-based motion detectors. PIR sensors are commonly used in security alarms and automatic lighting applications. PIR sensors detect general movement, but do not give information on who or what moved. For that purpose, an imaging IR sensor is required. PIR sensors are commonly called simply "PIR", or sometimes "PID", for "passive infrared detector". The term *passive* refers to the fact that PIR devices do not radiate energy for detection purposes. They work entirely by detecting infrared radiation (radiant heat) emitted by or reflected from objects. A PIR sensor can detect changes in the amount of infrared radiation impinging upon it, which varies depending on the temperature and surface characteristics of the objects in front of the sensor. When an object, such as a person, passes in front of the background, such as a wall, the temperature at that point in the sensor's field of view will rise from room temperature to body temperature, and then back again. The sensor

converts the resulting change in the incoming infrared radiation into a change in the output voltage, and this triggers

the detection. Objects of similar temperature but different surface characteristics may also have a different infrared emission pattern, and thus moving them with respect to the background may trigger the detector as well.



Fig 4.4 PIR Sensor

4.1.1.5 DC MOTOR

A DC motor is any of a class of rotary electrical motors that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current in part of the motor. DC motors were the first form of motor widely used, as they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances.



**Fig 4.5 DC
Motor 10**

4.1.1.6 BATTERY

A battery is a device consisting of one or more electrochemical cells with external connections for powering electrical devices such as flashlights, mobile phones, and electric cars. When a battery is supplying electric power, its positive terminal is the cathode and its negative terminal is the anode. The terminal marked negative is the source of electrons that will flow through an external electric circuit to the positive terminal. When a battery is connected to an external electric load, a redox reaction converts high-energy reactants to lower-energy products, and the free-energy difference is delivered to the external circuit as electrical energy. Historically the term "battery" specifically referred to a device composed of multiple cells, however the usage has evolved to include devices composed of a single



cell.

Fig 4.6 Battery

4.1.1.7 L298N MOTOR DRIVER

The L298N is an integrated monolithic circuit in a 15- lead Multiwatt and PowerSO20 packages. It is a high voltage, high current dual full-bridge driver de-signed to accept standard TTL logic level sand drive inductive loads such as relays, solenoids, DC and stepping motors. Two enable inputs are provided to enable or disable the device independently of the in-put signals. The emitters of the lower transistors of each bridge are connected together rand the corresponding external terminal can be used for the connection of an external sensing resistor. An additional Supply input is provided so that the logic works at a lower voltage.

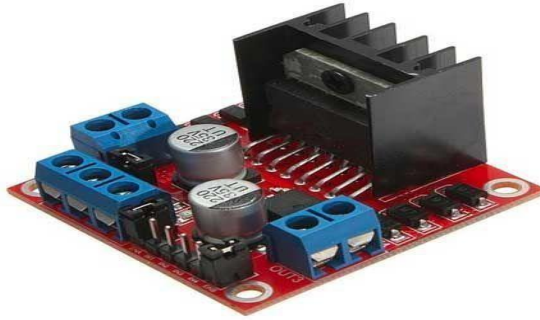


Fig 4.7 L298N Motor Driver

4.1.2 SOFTWARE REQUIREMENTS

The following softwares were used to accomplish this project:

- 1.Arduino IDE
- 2.Emmbedded C

4.1.2.1 ARDUINO IDE

Arduino software is used to put the instruction of whole functions of this system to the microcontroller. Here we use programming language 'C' for coding. The program for executing this project has been written in C language. The program is burnt in the microcontroller using burner software. The program is stored in the EEPROM of the microcontroller, which is present in the Arduino board. By this software we put the data and instruction for forward, backward, left, right operation of this system. In android application when we press a button, a corresponding signal is sent through the Bluetooth to Bluetooth module (HC-05) which is connected with the Arduino board. When signal data arrives the Arduino the pin which corresponds to the particular input is set to high. Now that pin gives the output to the motor driver section. Motor driver switches accordingly the data bit, if the data bit is low then the corresponding pin of the motor driver doesn't work else high bit then the corresponding pin of the motor driver is on. We have used Arduino IDE version 1.8.1 for writing program for Arduino. There are two steps of the programming. First set up section where we define all the variables. Second loop part where the program runs

continuously .

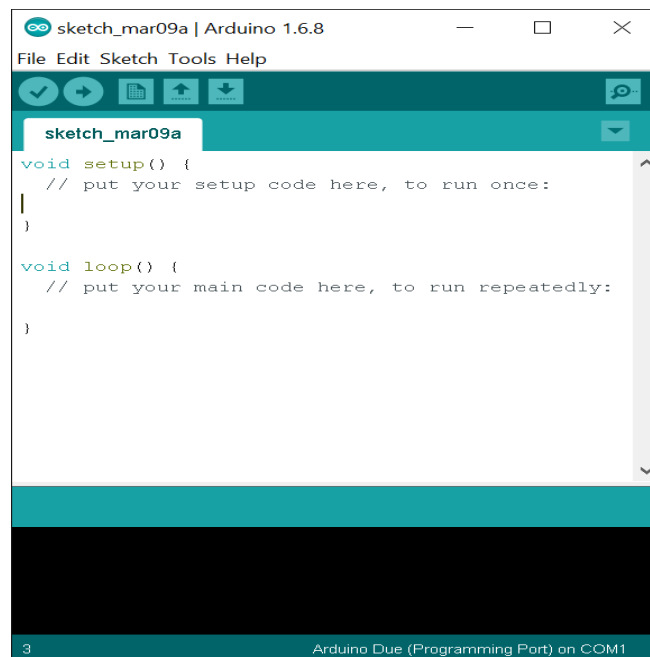


Fig 4.8 Arduino IDE

4.1.2.2 EMBEDDED C

Embedded C is a set of language extensions for the C programming language by the C Standards Committee to address commonality issues that exist between C extensions for different embedded systems.

Historically, embedded C programming requires nonstandard extensions to the C language in order to support exotic features such as fixed-point arithmetic, multiple distinct memory banks, and basic I/O operations. In 2008, the C Standards Committee extended the C language to address these issues by providing a common standard for all implementations to adhere to. It includes a number of features not available in normal C, such as fixed-point arithmetic, named address spaces and basic I/O hardware addressing. Embedded C uses most of the syntax and semantics of standard C, e.g., `main()` function, variable definition, datatype declaration, conditional statements (`if`, `switch case`), loops (`while`, `for`), functions, arrays and strings, structures and union, bit operations, macros, etc.

4.2 CONNECTIONS

4.2.1 CONNECTION WITH BLUETOOTH MODULE AND ARDIUNO

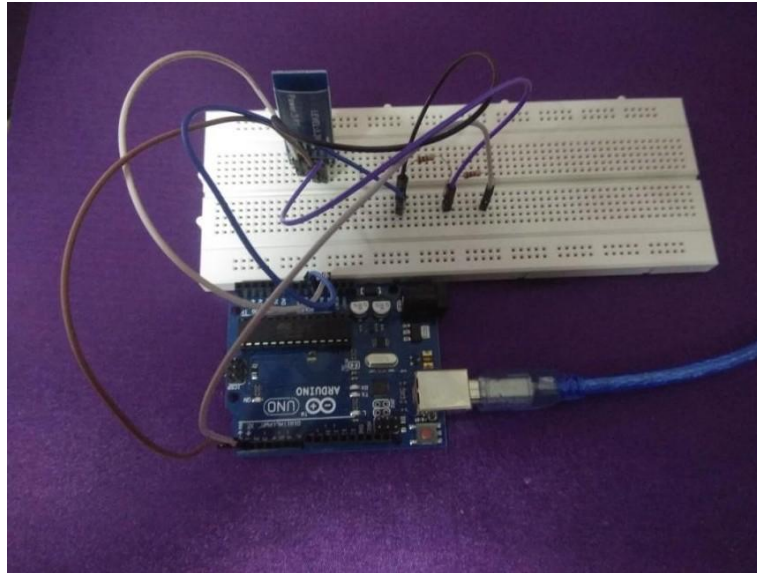


Fig 4.9 Bluetooth connection

To design the circuit the HC-05 BLUETOOTH MODULE is connected with the ARDUINO UNO R3 BOARD.

- The BLUETOOTH RX pin to TX pin of ARDUINO .
- The BLUETOOTH TX pin to RX pin of ARDUINO .
- The BLUETOOTH VCC pin to 3.3V of ARDUINO.
- The BLUETOOTH GND to GND of ARDUINO.

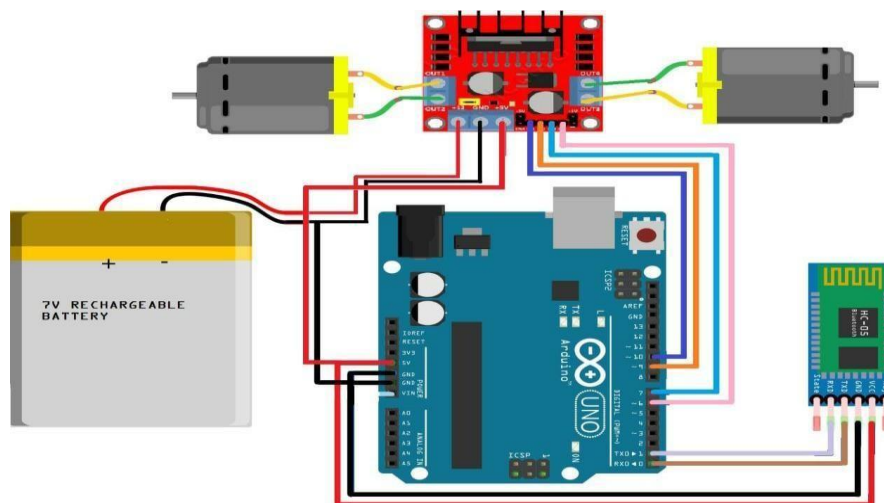


Fig 4.10 Circuit connection

4.2.2 ANDROID APP :

The HC-05 Bluetooth Module tutorial, I have used a simple app called Bluetooth Terminal HC-05, which is installed on an Android Phone to communicate with the Bluetooth Module. In this project, I have used the app with modifications in the data to be transmitted. The above given Arduino code is written to synchronize with the data configured in the Bluetooth Controller App.

CHAPTER 5

SYSTEM METHODOLOGY AND WORKING

5.1 SYSTEM ARCHITECTURE

The proposed system architecture aims to collect waste, garbage and other plastic trash items from running and stagnant water using this device. The device is connected using dc motors to an the Arduino Uno for locomotion using motor driver . Power supply Is connected to one end of the arduino and another end of the motor driver . Bluetooth connection is given and the sensors are given connection using the mobile app . The code is written in the arduino board for the functioning of the device.

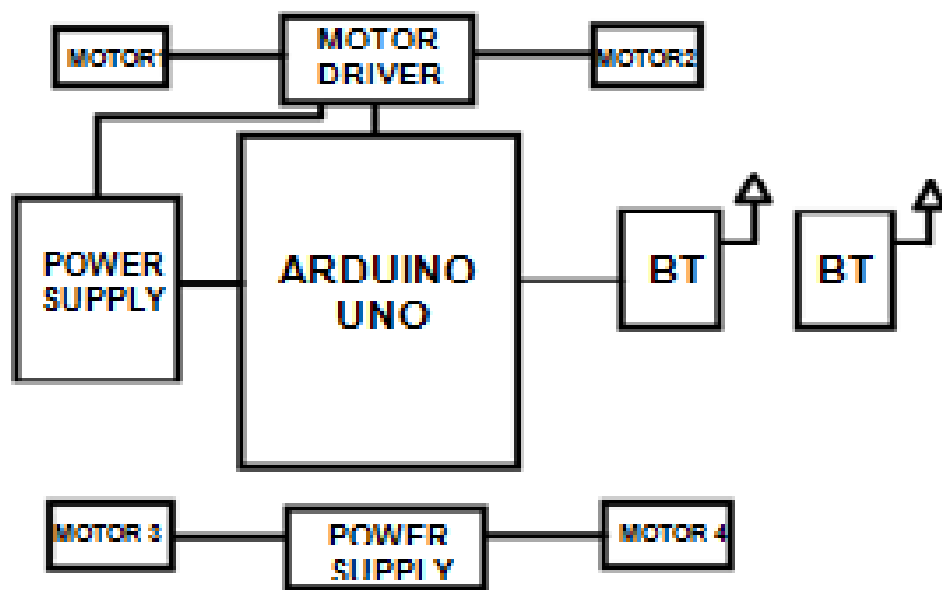


Fig 5.1 Circuit architecture

5.2 METHODOLOGY

The device is operated using an android mobile phone and a laptop. Two operating modes are available namely,

- 1.Manual mode
- 2.Automated mode

In manual mode the device locomotion and trash removing is operated using an android phone through blynk app. The device can be controlled from anywhere in the world by the use of WIFI module. The trash is picked up using conveyor belt made using 2 motors. The collected trash is transferred to a trash bin attached to the device platform.

Another motor attached behind the device that will rotate the water wheel so that the device move according to the direction where there is floating waste. In autonomous mode the device locomotion and waste pickup is done without human intervention. The device is placed at the centre of the water where floating waste is present .

Using this ultrasonic sensor configuration the device will be able to distinguish between big objects(walls). Big objects are considered as obstacles by the sensors and are avoided. Other objects are considered as trash and are picked up by the device. Ultrasonic sensor placed in the trash bin to monitor the level of the waste in the bin. If the bin is full it is notified to the operator.

5.3 WORKING OF BLUETOOTH CONNECTED WITH ANDROID APP

Assemble the circuit, make the necessary connections and upload the code to Arduino. Then understanding the Bluetooth Controlled project is very easy .First, in the Android App, I have used switches for ON and OFF purpose The corresponding data associated with each switch is as follows:

DEVICE 1 ON—1

DEVICE 1 OFF—a

DEVICE 2 ON—2

DEVICE 2 OFF—b

When the corresponding switch is pressed , the data is is transmitted to the Bluetooth Module from the Phone over Bluetooth Communication. The Arduino code, the Arduino UNO receives any of this data from the Bluetooth Module (as per the key pressed) and performs a simple switch case operation, where each case associated with appropriate instructions to the Motor Driver Input Pins. For example, if 'DEVICE 2 ON' switch is pressed in the Android Phone, then '2' is transmitted. Arduino will then make IN2 HIGH to ON the device. Similarly, other keys correspond to appropriate setting of INPUT.

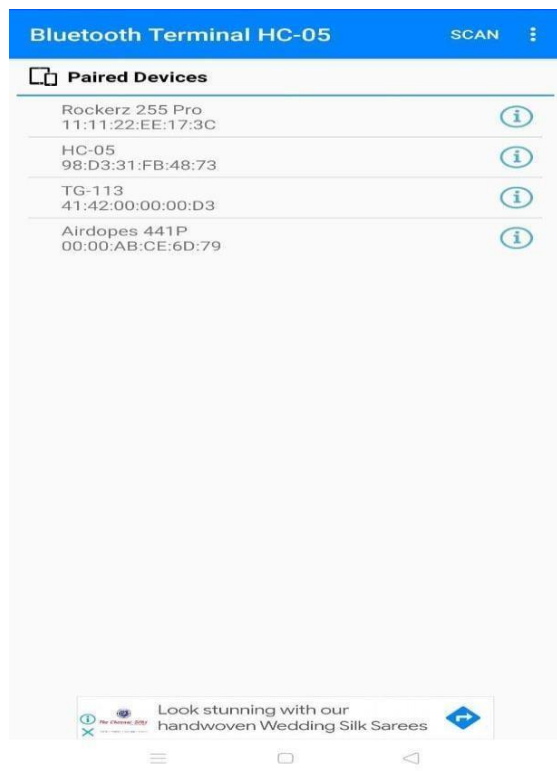


Fig 5.2 App screenshot

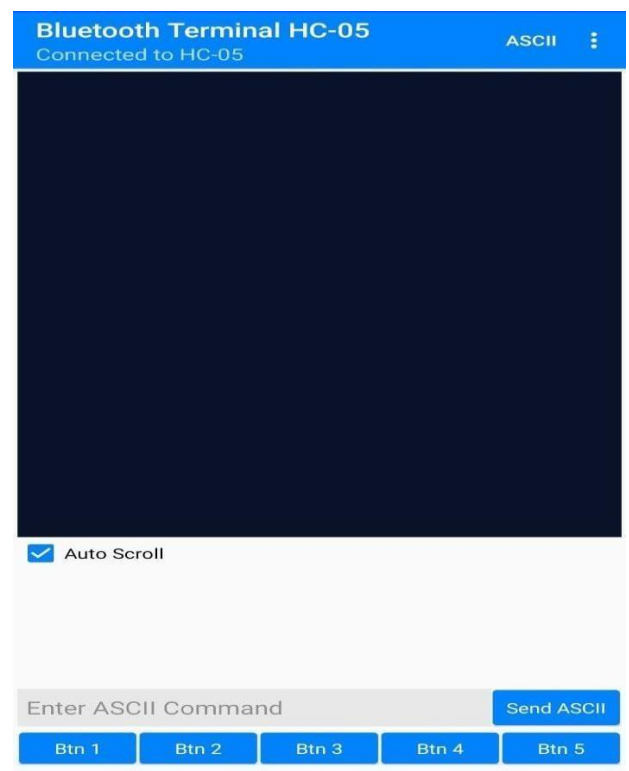


Fig 5.3 App screenshot

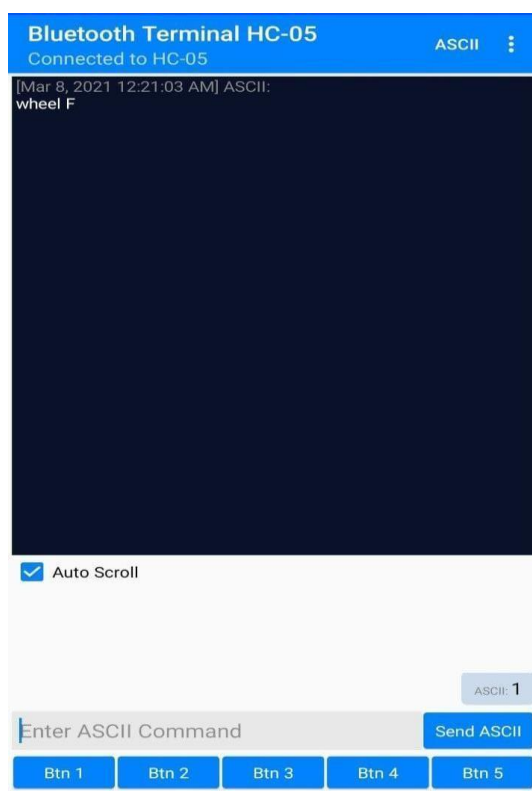


Fig 5.4 App screenshot

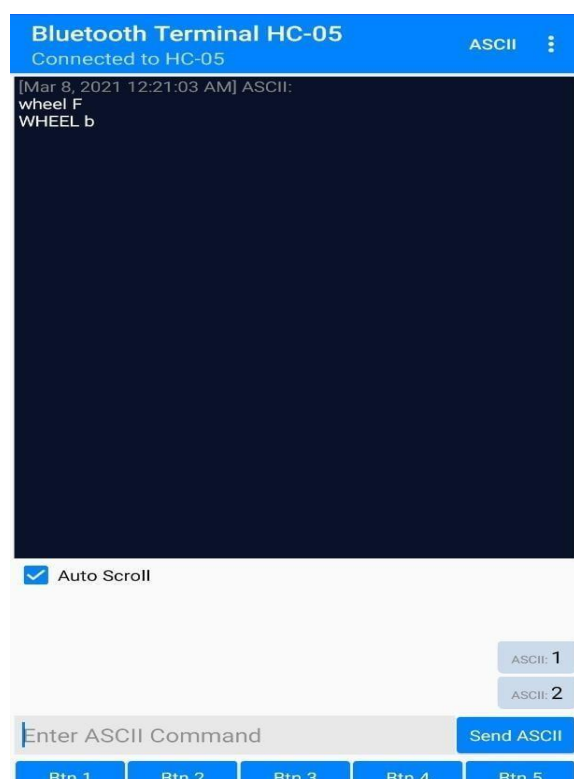


Fig 5.5 App screenshot

5.4 SYSTEM

TESTING

5.4.1 SYSTEM

TESTING

We will test the project in two stages: software and hardware. The software part is to be tested via the Arduino IDE, whereas the hardware part has to be tested physically. It is necessary to check whether the system is working properly or not to check whether the application is working we have to connect it with Bluetooth and run the application through the circuit.

5.4.2 FEATURES TO BE TESTED

After building the whole circuit we test it, testing procedure is given in below .This project should satisfy some features. Features to be tested as follows:

The arduino idk code should be running. To check whether the output is obtained we have to upload the code to the board and run it..

- The Bluetooth module should be connected with android app.By giving command in the app it should do the right job..
- The Android app should be checked.
- The functions should be done properly according to the inputs given in the app.

5.4.3 TESTING TOOLS AND ENVIRONMENTS

For testing of the project we require some tools, like to test Arduino program we require a Software called Arduino IDE. Using this we can check the program that program is working properly or not. For hardware checking we require power supply and proper working application. The Bluetooth Module should connect to the Android app and we have to press the buttons and check whether it is following the correct command and the appliances should work properly.

5.4.4 TEST CASES

In this section we discuss about the inputs, expected output, testing procedure.

5.4.6 INPUTS

This project requires three inputs:

1. Power supply: Power supply is the basic need of any electronic circuit. Here we use 5v dc battery to give power Arduino and sometimes we can give power directly from the computer and 3.3v battery for Bluetooth module which we change into 5v by voltage regulator.
2. The appliances should be plugged to the power supply of 1200V.

5.4.7 EXPECTED OUTPUT

The expected output of this project is it should operate properly according to the inputs given in the app. Also, it will be connected to Android app and controlled by the user. The output should also be seen on the serial monitor of the Arduino IDE. Also, the output should also be seen on the serial monitor and also on the Android app.

5.4.8 TESTING PROCEDURE

For testing first connect the circuit to the power supply is given to the Arduino using battery or the computer. In this way the whole testing circuit is built. Now we should connect the Bluetooth with the mobile app. Summary of testing procedure:-

- 1) Connect the circuit according to the diagram
- 2) Give power to the system.
- 3) Connect to Android app through Bluetooth.
- 4) Give command in the Android app to ON and OFF the corresponding devices.

CHAPTER-6

RESULT AND DISCUSSION, PERFORMANCE ANALYSIS

6.1 ANDROID APP CONNECTED WITH BLUETOOTH

Below is the screenshot of Android application which is used in this project to control the devices. This application has 6 buttons / commands. I have used 2 commands. Remaining Command are not used and are reserved for future scope. User can even rename these button text as Device 1, Device 2, etc using the Set Keys option . User needs to turn on the Bluetooth on his/her mobile and press scan button as shown below. Then connect to the Bluetooth receiver on the device. Once the connection is established then the application will show connected status as shown below.

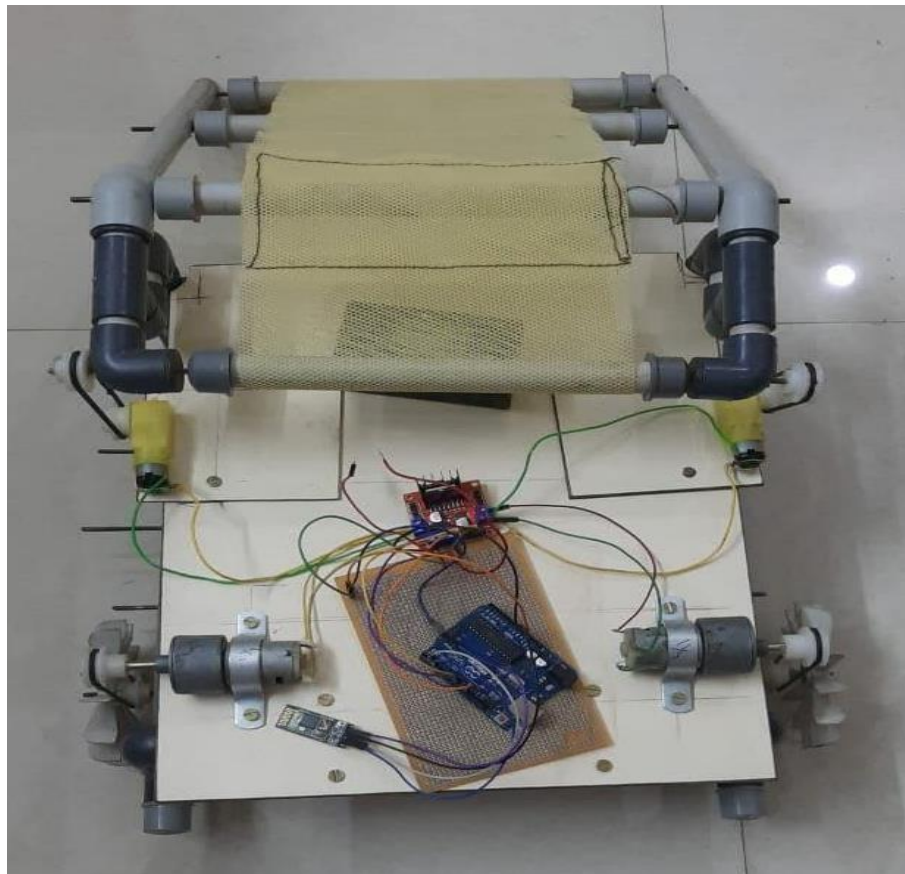


Fig 6.1 Device top view



Fig 6.2 Device side view

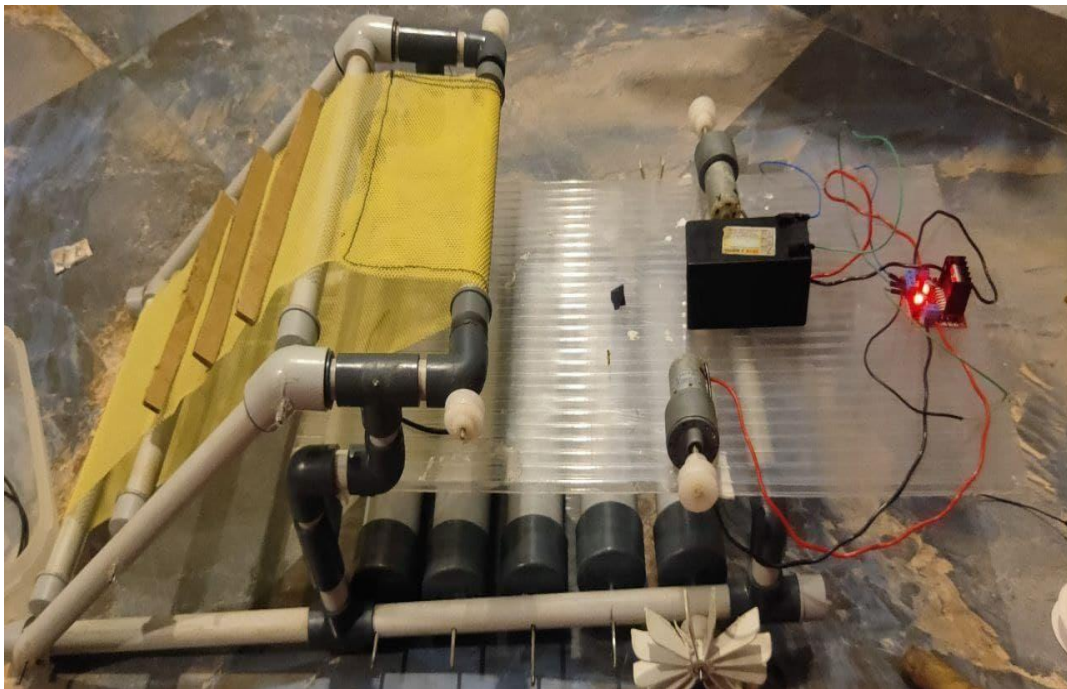


Fig 6.3 Device circuit

6.2 RESULT

The project detects waste objects such as plastic bags , plastic objects , and other floating

waste in water bodies. It provides a cleaner environment and helps in the

treatment of water purification. This device not only brings out a clean environment but also reduces the amount of man power needed to clean any water body . This project was implemented to provide a solution to irregular waste disposal to the water bodies. Using PIR sensor we can detect floating waste on water bodies and extent of pollution caused by unwanted toxic disposal from the waste which is floating on water. This device can later on be connected to solar panel or can generate power from moving water and can be explored more on the basis of conservation of the environment.

7.1 CONCLUSION

This device detects waste objects such as plastic bags , plastic objects , and other floating waste in water bodies. It provides a cleaner environment and helps In the treatment of water purification. It not only brings out a clean environment but also reduces the amount of man power needed to clean any water body. This project is implemented to provide a solution to irregular waste disposal to the water bodies. Using PIR sensor we can detect floating waste on water bodies and extent of pollution caused by unwanted toxic disposal from the waste which is floating on water.

7.2 FUTURE SCOPE

This device can later on be connected to solar panel and can generate power from moving water and can be explored more on the basis of conservation and protection of the Environment. The device can be further connected to water treatment analysis.

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APPENDIX

SOURCE CODE

```
#include<SoftwareSerial.h>

#define Txd 2

#define Rxd 3

SoftwareSerial bluetoothSerial(Txd,Rxd);

void setup()

{

  pinMode(LED_BUILTIN,OUTPUT);

  bluetoothSerial.begin(9600);

  pinMode(9, OUTPUT);

  pinMode(10, OUTPUT);

  pinMode(11, OUTPUT);

  pinMode(12, OUTPUT);

  Serial.begin(9600);

}

void loop()

{
```



```
Serial.read();

if(bluetoothSerial.available()>0)

{

    int c = bluetoothSerial.read();

    if(c == '1')

    {

        digitalWrite(9, HIGH);

        digitalWrite(10, LOW);

        bluetoothSerial.write("mot f");

    }

    else if(c == '2')

    {

        digitalWrite(9, LOW);

        digitalWrite(10, HIGH);

        bluetoothSerial.write("mot

        b");

    }

    else if(c == '3')

    {

        digitalWrite(11, HIGH);
```



```
    digitalWrite(12, LOW);

    bluetoothSerial.write("con

f");

}

else if(c == '4')

{

    digitalWrite(11, LOW);

    digitalWrite(12, HIGH);

    bluetoothSerial.write("con

b");

}

if(c == '5')

{

    digitalWrite(9, LOW);

    digitalWrite(10, LOW);

    digitalWrite(11, LOW);

    digitalWrite(12, LOW);

    bluetoothSerial.write("mot f");

}

}
```

}