

Construction of a Water Body Washing System

Shreya Suresh Dhamake¹, Aryan Thakur²

HOD¹, Research Scholar²

Department of Mechanical Engineering

IET Bhaddal, Ropar

Corresponding Author's Email id: gthakuraryanme@gmail.com

Abstract

The focus of this project is on the design and manufacture of a water body cleaning equipment. As we all know, water bodies are becoming increasingly polluted. As a result, aquatic species may mistakenly ingest surface waste particles as food, resulting in animal mortality as well as skin illnesses and respiratory ailments in humans. The water body cleaning machine is utilised in areas where waste particles has to be cleaned from the body. An operator in charge of the equipment approaches and cleans the area of waste or debris first. It is cost effective and incredibly valuable for society due to its design. It also alleviates the challenges we have in keeping our water bodies clean. India is known for its rivers, however they are becoming increasingly polluted these days. Water pollution is a big issue in water bodies; as a result of increased water pollution in the form of waste material, human, animal, and marine life are suffering. We built the water body cleaning equipment after seeing the existing state of our country's river.

Keywords: Rx-Transmitter, Tx-Receiver, food chain

INTRODUCTION

Water covers more than two-thirds of the Earth's surface, whereas land occupies less than a third. People are placing ever-increasing strain on the planet's water supplies as the world's population

continues to grow. Logic dictates that human actions have "squeezed" our seas, rivers, and other inland waterways, lowering their quality. B. Kambuaya, Minister of Environment, said that garbage generation in 33 cities throughout India in

2007 was 132,192 cubic metres per day, according to Central Bureau of Statistics figures. Not all trash is disposed of and taken to landfills; for example, a lot of trash that is not picked up properly is burnt and thrown into rivers. This phenomena has negative consequences for the environment. Rivers become household garbage dumps. Domestic garbage has contaminated 80 percent of India's rivers. The Ganga and Godavari River ecosystems are more vulnerable to pollution than those of other rivers. This river flows between Allahabad and Nasik, passing through a number of villages with poor sanitary conditions. During the rainy season, this river regularly overflows, causing flooding. The Uttar Pradesh government is working to reduce garbage contamination in waterways. One of them is to create a regulation prohibiting dumping into rivers in these states.

The main objective of this machine in this project is to lift waste particles from the water surface and deposit it in the storage tank. This machine is made up of a water wheel-driven conveyor system that collects and removes waste, rubbish, and plastic waste from bodies of water. This also lessens the problems we have when collecting waste. The waste particles will be lifted off the surface of the water bodies

by a machine[1]. This will eventually result in less water contamination and, as a result, fewer aquatic animal deaths as a result of these issues. It is powered by a belt drive system that pulls trash from the water. This initiative will be used to maintain rivers, ponds, lakes, and other bodies of water clean. Similarly, there is a lot of water pollution in the Godavari River in Nasik, which has an impact on the river's acoustics, human life, and aesthetics.

The water pollution along the Godavari River in Nasik is depicted in few images. Waste water is described as the flow of spent water from residences, businesses, commercial activities, and educational institutions that is transported to treatment facilities via a well designed and built network of pipes. Cleaning chemical wastes has a significant impact on respiratory ailments, making it a difficult issue for municipal officials to address. There are three forms of polluted water when it comes to water damage. Uncontaminated water, grey water, and black water are the three types. A broken water stream line or a leaking faucet is the source of uncontaminated water. Depending on the amount of time, temperature, and interaction with nearby pollutants, this water can transform into

black water or grey water if not treated immediately [1]. A drainage ditch is a small canal excavated along the side of a road or on the ground to convey water away. Even while automation plays an increasingly essential part in all industrialised applications, the proper disposal of sewage from industry and sewage purification remains a difficult problem. Drainage pipes are utilised to dispose of sewage, and unfortunately, sometimes human life is lost when clearing clogs in the drainage duct. The only responsibility of the municipality staff is to guarantee that the sewage is clean or not. Although they clean the ditches along the sides of buildings, they are unable to clean in large sewage systems. To clean the vast sewage, municipal personnel must descend into the sewage sludge. It has a negative impact on their health and promotes skin allergies.

PROBLEM STATEMENT

1. The statement of the project is “Design & Fabrication of River Cleaning System” to remove the waste debris, plastic waste & garbage from River. This causes harm to acoustic & human life.
2. To achieve clean water body for reduction of river pollution & to achieve the beauty of River by clean water bodies.

3. To reduce the difficulties which we are facing right now and it also remove the chemical wastages from the waterbody.

Effects of Pollution in WaterBody

Effects of water pollution

Water contamination has a wide range of impacts, depending on what pollutants are discharged. Many water bodies in the vicinity of metropolitan areas (cities and towns) are highly polluted. This is the consequence of both waste dropped by individuals and dangerous substances discharged by industrialised companies, health institutions, schools, and marketplaces, both legally and illegally.

Death of aquatic animal

The most serious problem caused by water pollution is that it kills the species that live in these bodies of water. Dead fish, crabs, birds especially sea gulls, dolphins, and a variety of other live creatures regularly wash up on beaches, having been contaminated by toxins in their environment (living environment).

Interruption of food chain

Pollution also disrupts the normal food cycle. Contaminants like lead and cadmium are consumed by small animals. These creatures are eventually consumed

by fish and shellfish, and the food chain is disrupted at all levels.

Diseases

In the end, this process has an impact on humans. People can get infections like hepatitis from polluted seafood. Cholera and other infections are frequently outbreaks in many poor countries as a result of poor drinking water treatment from dirty water. **See Figure 1**

CONSTRUCTION AND OPERATION OF WATER BODY CLEANING MACHINE

The gadget for cleansing the body with water 12V DC Motor(one for conveyor mechanism 160 rpm, 10kg of Torque & two for locomotion waterwheels 160 rpm, 10kg of Torque), chain, conveyor belt, propeller, and Arduino To power the concept, the proposal includes a motorised water wheel. It is made up of a DC motor.

The mechanism that runs the project by chain drive has a collecting plate attached between the chains. The project comprises of two primary shafts that balance and raise the chain drive sprocket. The elements sit atop a frame that serves as the project's main body. The pressure head generated by the PVC pipe with pressurised air is used to run the project on the water surface. The waste is stored in the manufactured storage tank, which serves the scheme's objective. The motor rotates the collecting plate and conveyor chain mechanism drivers continually, and the motor derives its power from the battery. The collecting plate is connected to the two chain drives and is used to collect garbage from the water body. With the aid of a conveyer, the collected waste is put into the collecting tank. PVC tubing is used in our project to float the machine over the water.



Fig.1: Effects of Pollution by Debris and Garbage in Water Body.

The machine cannot be sunk because of the PVC pipe. The propeller propels the machine through the water. The DC motor is used to propel the propeller (12 V). Arduino controls the entire electrical apparatus, and a Bluetooth module is utilised to control the machine from a mobile device. Our machine is supported by a base frame. PVC pipe is attached to the bottom of the base frame to prevent the machine from sinking into the water body. When the battery gives power to the motor, the conveyor belt mechanism begins to operate. The locomotive motor, which propels the machine, is powered by the same battery. To gather garbage from a water body, a collecting plate is put on a conveyor belt.

OPERATION

The primary goal of this machine in this project is to lift discarded material from the water surface and deposit it in the tray. It consists of a conveyor system that is

supported by a shaft and bearings; the shaft is joined to the podium bearing, and the bearing is attached to the M.S angle frame; the frame is linked and shaped like a slope in front of the machine portion. Waterwheels revolve, and this power is transferred to the conveyer system through belt drives. The conveyer gathers water debris, thrown-away waste, and plastics from water bodies as it moves. Because the machine is submerged in water, the undesired detritus in the water is elevated and travels upward. The waste particles will fall into the tray once it reaches the highest extreme position. As a result, the water surface will be cleaned and waste material will be collected in an environmentally friendly manner. After the waste debris is collected, the second conveyer will transport it out of the river. The River Cleanup Machine employs long floating barriers that trap plastic at an angle, allowing for mechanical extraction.



Fig. 2: 3D Model of Water Body Cleaning Machine.

A Bluetooth module is used to control the machine. There are two motor drivers in use, and both obtain their power from the battery. The UNO is linked to the Bluetooth module and the propeller's motor driver. The DC Motor is attached to one Motor driver, and the DC Motor is paired with the Roller, which is where the conveyor belt mechanism runs. For propulsion, another motor driver is linked to a DC motor. Conveyor belt mechanism begins to operate when Battery feeds electricity to Motor through Motor driver[3]. The DC Motor in the Propeller receives a charge from the Battery and

then begins to drive the machine. PVC tubing is used in our project to float the machine over the water. The machine cannot be sunk because of the PVC pipe. The main goal of this project is to use a conveyor belt and chain system to remove waste, plastic, and garbage and put it in a storage tank. The project's goal is to decrease manpower requirements by implementing a semi-automated water body cleaning system using a motor and chain drive configuration. The major benefit is that it can clean chemical wastes while reducing the risk of respiratory sickness and protecting the environment.

FUNDAMENTAL OF BLOCK DIAGAM

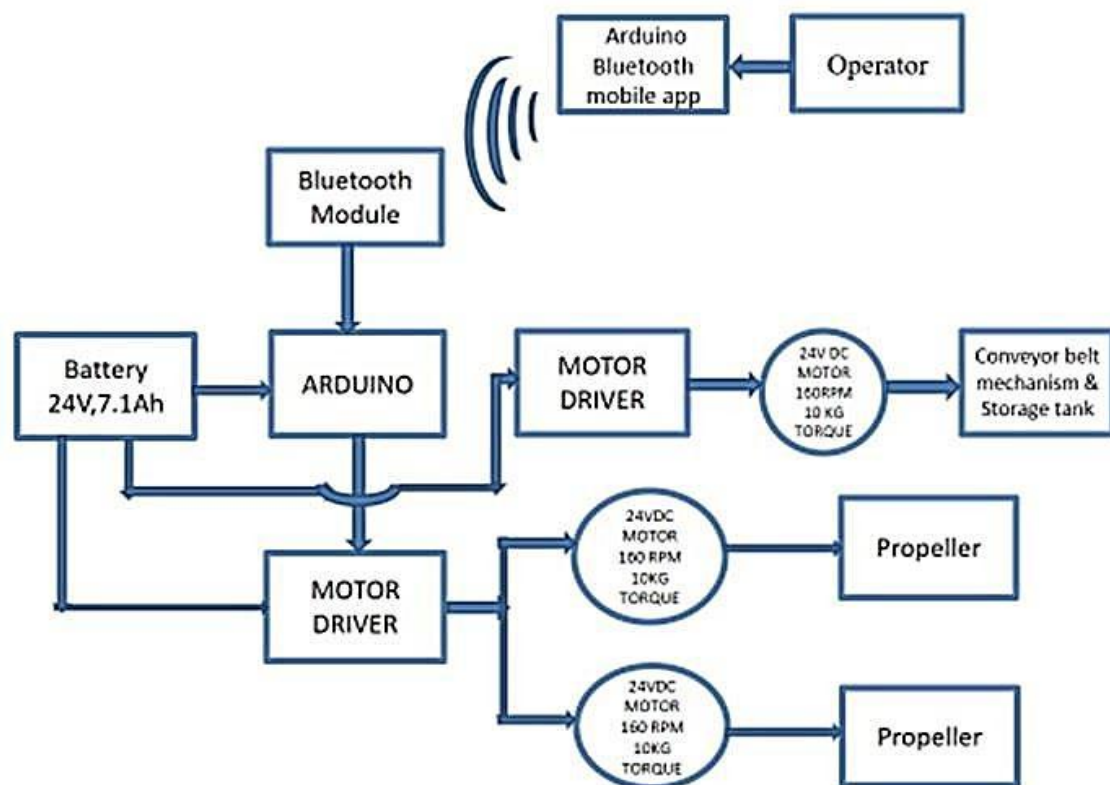


Fig. 3:Block Diagram of Water Body Cleaning

Block Diagram Explanation

A Bluetooth module is used to control the machine. There are two motor drivers in use, and both obtain their power from the battery. The UNO is linked to the Bluetooth module and the propeller's motor driver.

The DC Motor is attached to one Motor driver, and the DC Motor is paired with the Roller, which is where the conveyor belt mechanism runs. For propulsion, another motor driver is linked to a DC motor. Conveyor belt mechanism begins to operate when Battery feeds current to Motor through Motor driver. The DC Motor in the Propeller receives a charge from the Battery and then begins to drive the machine.

Model of Water Body Cleaning Machine

The ply board is used to manufacture the water body cleaning equipment. The ply board is attached to the roller stands[3]. Both sides of the roller rod have a ball bearing installed. The roller stand is equipped with a ball bearing. The roller rod is welded to the chain sprockets, and the chain is then connected between the chain sprockets. Between the chain sprockets on the roller rod is a conveyor belt. Wastages from the water body are kept in the storage tank, which is located behind the roller stand. On the conveyor belt, a collecting plate is being placed. PVC pipe is attached to the bottom of the ply board to allow the machine to float over the water. The machine is propelled by its propellers.

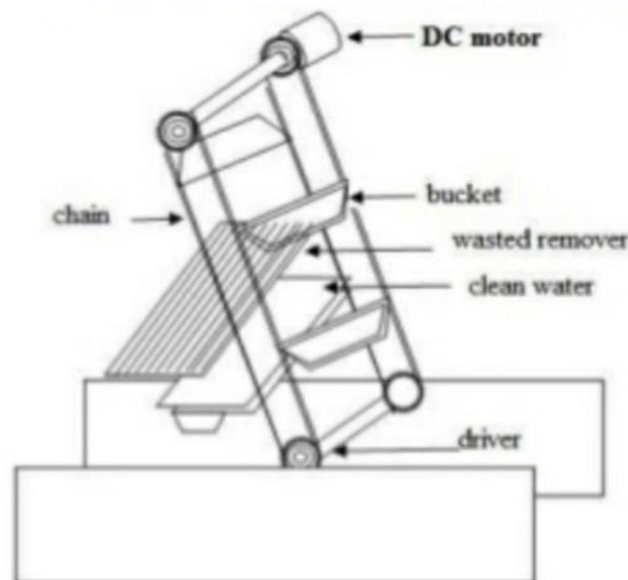


Fig. 4: Model of Water Body Cleaning Machine.

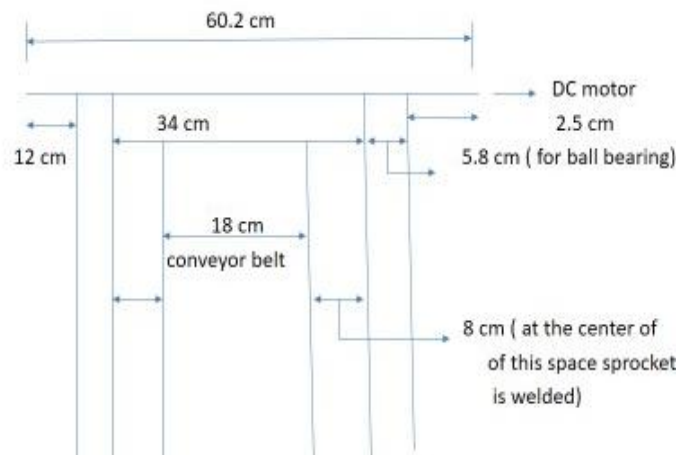


Fig. 5: Roller Rod Arrangement



Fig. 6: Model Picture of Our Machine.

WORKING OF WATER BODY CLEANING MACHINE

The "Water body cleanup machine" is utilised in areas where there is debris in the water body that has to be cleaned up. This equipment consists of a waterwheel-driven conveyer system that collects and removes garbage, trash, and plastic waste from bodies of water. This also helps to

alleviate the problems we have when collecting debris. A machine will remove waste surface material from water bodies, resulting in a reduction in water pollution and the loss of marine animals as a result of these challenges. It has a belt drive system that accelerates the removal of particles from the water. This project will be used to clean surface water debris from

bodies such as rivers, ponds, lakes, and other bodies of water. Similarly, there are several issues with water contamination under the Godavari River.

Some photographs demonstrate the water contamination near Godavari River Nasik, which affects the sound, vitality, and beauty of the river. Waste water is described as the flow of spent water from homes, businesses, commercial activities, and educational institutions to treatment facilities via a carefully constructed and engineered network of pipes. Cleaning chemical wastes has a significant impact on respiratory difficulties, and it is a motivating concern for municipal officials. There are three forms of dirty water when it comes to water damage. Clean water, grey water, and black water are the three types of water. A leaking faucet or a broken water supply line provide clean water. If not pickled promptly, this water will turn black or grey, depending on the length of time, temperature, and interaction with contaminants in the environment. A drainage ditch is a narrow canal dug into the side of a road or into the ground to convey water away. Despite the fact that automation plays an important part in all industrial applications, efficient waste disposal and sewage cleansing remains a difficult process. Drainage pipes

are used to remove sewage, and when they are handled improperly, human life may be endangered when clearing clogs in the drainage pipes. The only responsibility of the municipality staff is to guarantee that the sewage is clean or not. They can clean the ditches along the sides of buildings, but they can't clear extremely large sewages. To clean the vast sewage, municipal personnel must descend into the sewage sludge. It has a negative impact on their health and promotes skin allergies.

The plan is powered by a water wheel that is turned by a motor. It features four 12V DC motors. The project is being run using a chain drive paired with a collecting plate mechanism. The project comprises of two primary shafts that balance and raise the chain drive sprocket. The scheme's main body is made up of machines that are mounted on a frame. The pressure head generated by the steel pipe with pressurised air is used to run the project on the water surface. The leftovers are stored in the built storage tank, achieving the project's goal. We're making the remote-controlled water body cleansing machine right now. The motor spins the collecting plate and chain drives constantly. To collect waste materials from the river, the collecting plate is connected between the two chain drives. With the aid of a

conveyer, the collected waste is put into the collecting tank. The propeller in our project is utilised to push the machine down the river. The equipment is floatated above the water using PVC pipe. Two DC motors are used to propel the propeller. The Bluetooth module controls the entire electrical gadget, and the Bluetooth module is connected to the Arduino, which is used to control the machine remotely.

Machine Assembly Procedure

To endure the model and its method, the basic phase is to join the plan's base frame utilising a hand cutting machine and an electric fusing machine. M.S. angle is used for the base frame.

With the help of an L-section and a nut and bolt, the hollow tube is pulled together at the base frame. It's manufactured out of tin sheet that's been rolled and tapped. The goal of this pipe is to float on water while bearing the project's weight. Compressed air is situated in the pipe, creating a differential pressure head, which causes the machine to float.

With the help of nut and bolt, the L-section is attached in the base frame, which is utilised to hold the hollow pipe. To protect the bearing and shaft, the inclined portion is attached to the base frame.

Welding connects the T-section to the base frame. With the help of bearings and shafts, it supports the larger chain drive.

The torque is transferred from the motor to the chain drive through a shaft. In the machine, there are two shafts. With the use of inclined section and T-section, shaft 1 is installed on the machine's front chain drive, while shaft 2 is put on the machine's rear chain drive.

An electric motor with a voltage of 12 volts and a current of 7.6 amps is utilised to power the gear train, water wheel, and collecting mechanism in our project. We utilised four motors in this project. With the help of a gear train and chain drive mechanism, one motor is attached to the garbage collector, two motors are attached to the left and right water wheels, and four motors are coupled to the carrying belt.

With the help of a connecting link and a T-section, the gear drive is fused to the shaft. Gear drive is a power transmission drive that transfers power from a motor to a chain drive in order to carry a load and meet the project's goals. In the mission, an 8-sprocket wheel is employed, with 1,2,3,4 of the same dimension linked to the shaft of the carrying belt with the help of a chain. The remaining 5,6,7,8 are utilised to

power the water wheel, which floats the appliance in water.

The method of transmitting mechanical power from one location to another is known as chain drive. It is occasionally used to transmit power to the wheels of a vehicle, primarily bicycles and motorcycles. It's also found in a wide range of machinery other than automobiles. A roller chain, referred to as the drive chain, transmits power transiently over a sprocket gear, with the teeth of the gear meshing with the holes in the chain links. The gear is turned, and the chain is pulled, exerting mechanical force.

Our solution employs a Gathering Mechanism to address a real-time issue where garbage collection is difficult owing to water stress. It spins at a certain angle to gather rubbish for the model, thanks to its four-bar system. It features two windows that open and close as the handler desires, with the mechanism being turned on and off by a remote control.

The water wheel is secured to the base frame's shaft. The primary function of a water wheel is to propel a machine forward or backward through water. The water wheel is rotated by a motor with the help of a chain drive mechanism.

EXPLANATION

AND

PROGRAMMING OF SOFTWARE

The machine is controlled by a Bluetooth module that is linked to an Arduino. All of this is wirelessly linked to an Arduino Bluetooth RC vehicle. To accept commands from an Android phone, a Bluetooth module is employed, and an Arduino UNO is used to operate the entire system. The Bluetooth-controlled automobile moves when a button on the Android Bluetooth smartphone app is pressed. Any Bluetooth app that supports or can transfer data can be used. A Bluetooth module accepts commands from an Android phone, and an Arduino UNO controls the entire system. The Bluetooth-controlled automobile moves when a button on the Android Bluetooth smartphone app is pressed. To get started, go to the Google Play Store and download the Bluetooth app. Any Bluetooth app that supports or can conduct data can be used. Here are some app names that could be useful.

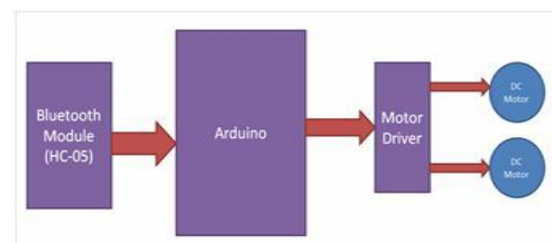


Fig. 7: Connection of Electronics Media.

After installing the app, you must launch it and then search for and pick your favourite Bluetooth device. After that, make keys. We utilised a Bluetooth controller app in this plan.

1. Get Bluetooth Controller and install it.
2. Enabled Bluetooth on the phone.
3. Now launch the Bluetooth controller application.
4. Select Scan.
5. Choose a Bluetooth device.
6. Now, press the set buttons on the screen to configure the keys, and then press OK.

When we press the forward button on the Bluetooth controller app, the machine begins to move ahead and continues to go forward until the next order is received.

When we press the backward button on the Bluetooth controller app, the machine begins to move in the other direction and continues to do so until the next order is received.

When we press the left button on the Bluetooth regulator app, the instrument begins to move to the left and continues to do so until the next order is received. In this case, the front side motor rotates the front wheels to the left, while the rear motor travels ahead.

When we press the appropriate button on the Bluetooth regulator app, the machine begins to move in the right direction and continues to do so until the next order is received. In this case, the front side motor rotates the front wheels in the right direction while the rear motor moves forward. We may stop the machine by pressing the stop button.

DISCUSSION AND RESULTS

To operate the automobile, Arduino is connected to a motor driver. Input pins 2, 7, 10, and 15 of the motor driver are linked to Arduino digital pins 12, 11, 10, and 9. We have connected two DC motors to the driver vehicle, one to the output pins of the motor driver 3 and 6, and the other to the output pins of the motor driver 11 and 14. A 6 volt battery is also utilised to power the motor driver, which is used to operate motors. The RX and TX pins of the Bluetooth module are directly linked to the RX and TX pins of the Arduino. The Bluetooth module's vcc and ground pins are connected to the Arduino's +5 volt and gnd. At the Arduino Vin pin, a 9-volt battery is utilised to power the circuit.

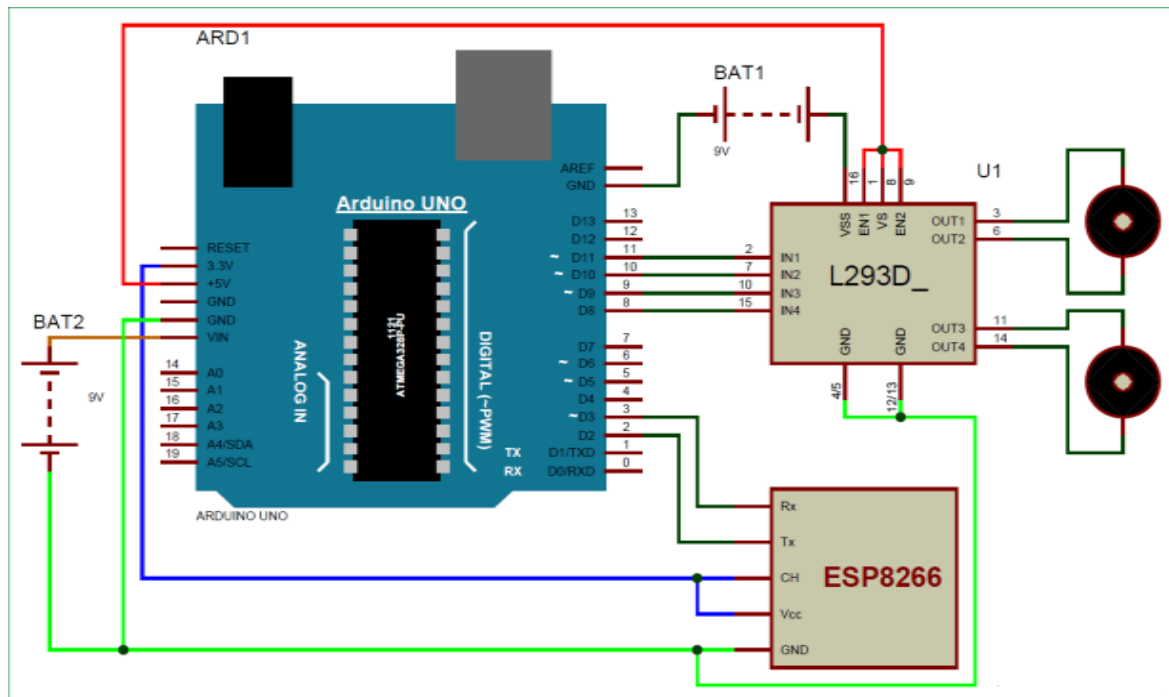


Fig. 8: Circuit Diagram of Electronics Media.

Then it has created functions for different directions of machine. There are five conditions for this Bluetooth controlled machine which are used to give the directions:

Touched button in Bluetooth controller app.	Output for front side motor to give direction		Output for rear side motor to move forward or reverse direction		
Button	M11	M12	M21	M22	Direction
Stop	0	0	0	0	Stop
Forward	0	0	0	1	Forward
Backward	0	0	1	0	Backward
Right	1	0	0	1	Right
Left	0	1	0	1	Left

CONCLUSION

This project is based on literature and research from several publications and papers that are relevantly available, and it is manufactured appropriately. It has the

ability to give operational flexibility. This concept is simple and inexpensive, with plenty of possibilities for improvement. The Water Body Cleaning Machine was created in the hopes of serving the aim of

water body cleaning with the least amount of illness risk and maximum efficiency. It is cost effective and incredibly valuable for society due to its design. It also lessens the challenges we have in keeping our water bodies clean. A pollutant-free water body may be maintained by utilising this equipment.

During the design and construction of the water body cleaning equipment, we were able to obtain useful insights. We will benefit from these valuable learning and critical thinking abilities throughout our lives.

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