Project Report

On

SOLAR POWERED WATER TRASH COLLECTOR

Submitted in partial fulfillment of the

Requirements for the award of the degree

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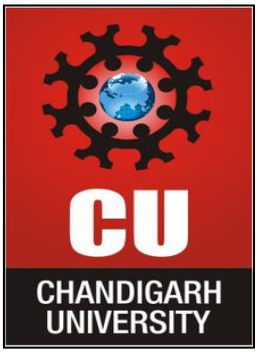

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INTRODUCTION

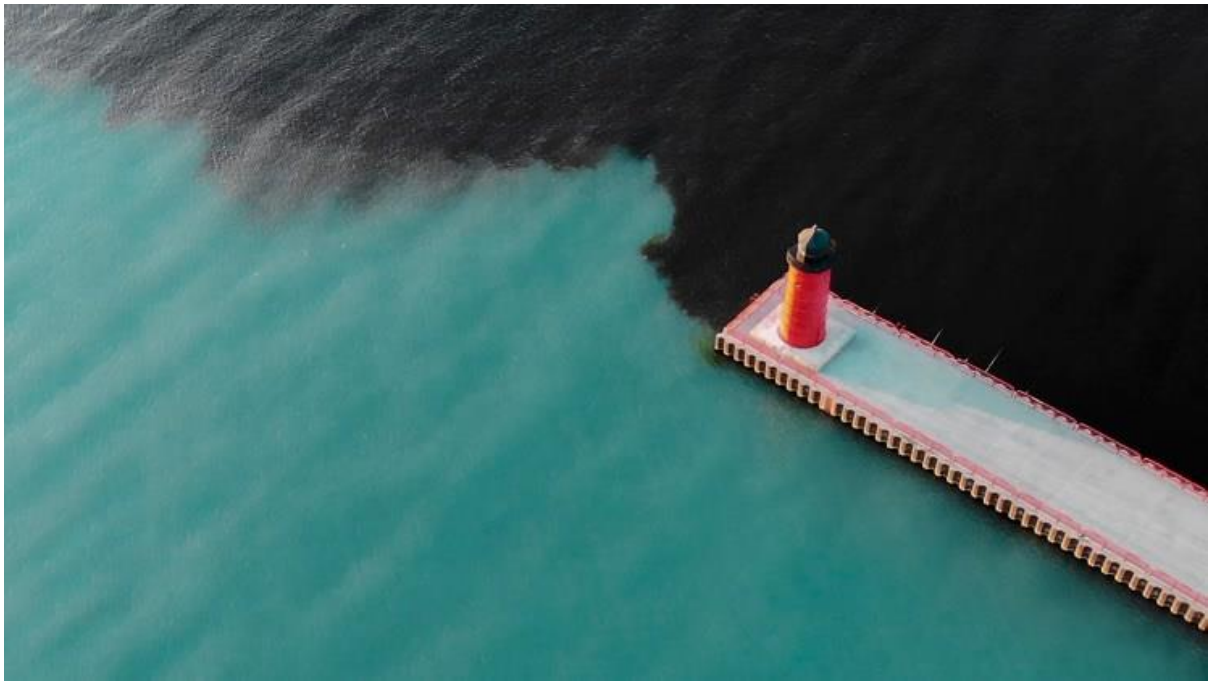
Water is most important resource for human and all living beings. So the cleaniness of water is necessary but the water bodies like ponds, rivers, lakes is get polluted by humans. Due to this, the impurities present in water can cause hazardous disease. There is penalty of water on earth in liquid form of our country is converted to being unfit for consumption. There are lot of trash in the oceans, rivers and other water bodies does not disappear, and this is becoming a big problem for our environment. Biodegradable materials like papers and food easily decompose, degrade and are eaten by microorganism in the ocean. However, material such as plastics, metals and glass do not degrade as well but we know that glass and metals tend to be heavy enough that they sink to the bottom of ocean. While, most plastic objects float on the surface of ocean. After some time, water sweep these floating trash into big patches of garbage in the middle of the ocean. The “Great pacific garbage patch” is one of the biggest garbage patch across the globe which lies in the northern pacific ocean. This trash is harmful for aquatic animals or marine life and it can even reach humans through food chain. Floating debris or marine debris is the waste produced by human that has deliberately or accidentally been released in a sea or ocean.

Fig 1. Floating debris.

There are many methods and innovation which are currently use by different countries to clean the marine environment. We can prevent the problem of river trash at small scale with the help of these method and innovations. We have to make every possible way to overcome this situation. Our project tries to get overcome this water pollution and clean the water which can be very useful for our planet Earth. The boat is totally work on solar power which get energy from sun rays, and stored the energy in battery. We can use this project at anywhere and at any time. This project will work on the principle of wireless controlling of arduino using mobile application. It consists of a conveyor belt which is constantly running, electronics component, bluetooth connectivity and mobile application controlling of whole setp. A trash collector is installed below the conveyor belt and for stability of whole project in water, air filled tube is installed below it. The mobile application is used to control the movement of boat and manipulation of direction of boat. The project has a potential to become great socio-economic advantage. This project does not require any external supply of energy, as we are using solar plate to acquire energy therefore it is economic in energy usage.

What is water pollution, causes and prevention:

The planet keeps nudging us with increasingly extreme droughts, reminding us that water is life. It is an essential resource upon which all living beings depend and it is crucial to all social and economic development, as well as energy production and adaptation to climate change. Nevertheless, we are now facing a gigantic challenge. How do we stop contaminating our rivers, seas, oceans, canals, lakes and reservoirs?



The waters of the River Ganges flow clear and clean through the Indian city of Rishikesh at the gateway to the Himalayas. In these mountains, nobody would guess that this water will be transformed into one of the most heavily polluted rivers in the world, with faecal bacteria levels up to 31 million per 100 millilitres. This is according to reports from Sankat Mochan Foundation, an organisation struggling to restore the Ganges to its former glory. These levels mean that the sacred river has become **synonymous with water pollution, a worldwide problem affecting one in every three people on the planet,** according to the United Nations (UN).

The World Health Organisation (WHO) says that polluted water is water whose composition has been changed to the extent that it is unusable. In other

words, it is toxic water that cannot be drunk or used for essential purposes like agriculture, and which also causes diseases like diarrhoea, cholera, dysentery, typhoid and poliomyelitis that kill more than 500,000 people worldwide every year.

The main water pollutants include bacteria, viruses, parasites, fertilisers, pesticides, pharmaceutical products, nitrates, phosphates, plastics**, faecal waste and even radioactive substances.** These substances do not always change the colour of the water, meaning that they are often invisible pollutants. That's why small amounts of water and aquatic organisms are tested to determine water quality.

MAIN CAUSES OF WATER POLLUTION

It is sometimes caused by nature, such as when mercury filters from the Earth's crust, polluting oceans, rivers, lakes, canals and reservoirs. However, **the most common cause of poor quality water is human activity** and its consequences, which we will now go on to explain:

Global warming

Rising global temperatures caused by CO_2 emissions heat the water, reducing its oxygen content.

Deforestation

Felling forests can exhaust water resources and generate organic residue which becomes a breeding ground for harmful bacteria.

Industry, agriculture and livestock farming

Chemical dumping from these sectors is one of the main causes of eutrophication of water.

Rubbish and faecal water dumping

The UN says that more than 80% of the world's sewage finds its way into seas and rivers untreated.

Maritime traffic

Much of the plastic pollution in the ocean comes from fishing boats, tankers and cargo shipping.

Fuel spillages

The transportation and storage of oil and its derivatives is subject to leakage that pollutes our water resources.

EFFECTS OF WATER POLLUTION

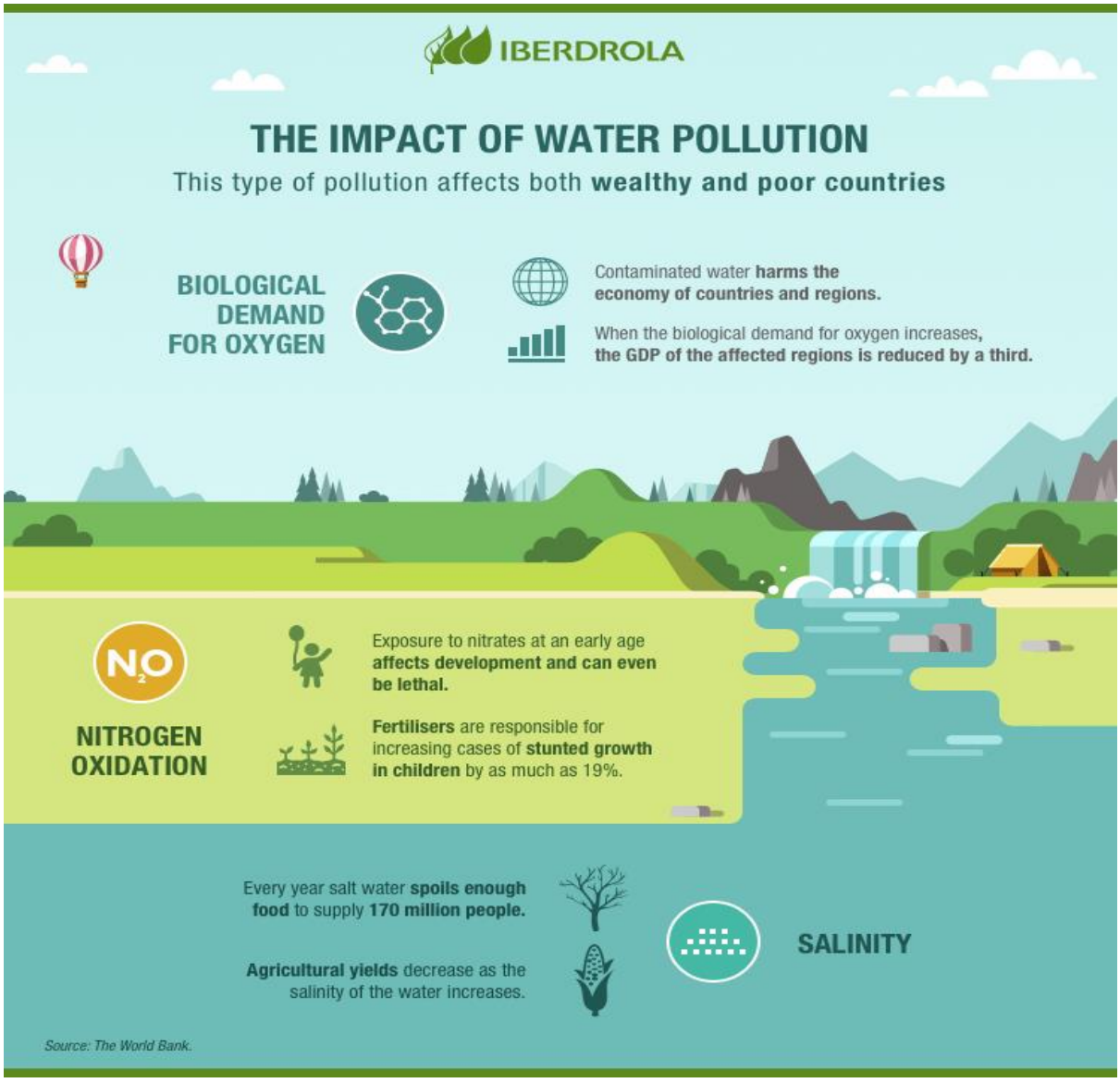
Deteriorating water quality is damaging the environment, health conditions and the global economy. The president of the World Bank, David Malpass, warns of the economic impact: "Deteriorating water quality is stalling economic growth and exacerbating poverty in many countries". The explanation is that, when **biological oxygen demand** — the indicator that measures the organic pollution found in water — exceeds a certain threshold, the growth in the Gross Domestic Product (GDP) of the regions within the associated water basins falls by a third. In addition, here are some of the other consequences:

- **Destruction of biodiversity.** Water pollution depletes aquatic ecosystems and triggers unbridled proliferation of phytoplankton in lakes — eutrophication —.
- **Contamination of the food chain.** Fishing in polluted waters and the use of waste water for livestock farming and agriculture can introduce toxins into foods which are harmful to our health when eaten.

- **Lack of potable water.** The UN says that billions of people around the world have no access to clean water to drink or sanitation, particularly in rural areas.

- **Disease.** The WHO estimates that about 2 billion people have no option but to drink water contaminated by excrement, exposing them to diseases such as cholera, hepatitis A and dysentery.

- **Infant mortality.** According to the UN, diarrhoeal diseases linked to lack of hygiene cause the death of about 1,000 children a day worldwide.



Half of the world's inhabitants will live in water-scarce areas by 2025, so every drop of polluted water today is an irreparable loss for tomorrow. That's why we must prevent water pollution with measures like the following:

- Reduce CO_2 emissions to prevent global warming and acidification of the oceans.
- Reduce the use of chemical pesticides and nutrients on crops.
- Reduce and safely treat waste water so that, as well as not polluting, it can be reused for irrigation and energy production.
- Restrict the use of single-use plastics that end up floating in rivers, lakes and oceans, many as microplastics.
- Encourage sustainable fishing to ensure the survival of species and avoid depletion of the seas.

LITERATURE SURVEY

There are many types of ideas proposed till now for the solar powered water trash collector. Some of the ideas are listed below: M Mohamed Idris et.al. [2] Has proposed a semi-automated sewage clean system which helps in cleaning the sewage automatically and helps in decreasing the spread of diseases due to direct human intervention into sewage. This system is easy to operate and cheap to fix the drainage problems. In this project battery is the main source of power for entire electrical circuit design. For effective working of the circuit relays and switches are used and to remote controlling operation Rf transmitter and receiver are used. This design or system can be used in all type of drainages like large, small and medium. It is efficient way to control the disposal of sewage with regular filtration of wastes.

N Kiran Kumar et.al. [3] The Bluetooth based garbage collection robot using Arduino microcontroller. In this design they have utilized to control the cleaning machine. The electronic setup is operated through mobile on Bluetooth. Different sensors and scanners are used to identify natural and artificial waste. In this project after identifying the waste, the natural waste can be recycled for organic waste for cultivation. On the other hand, synthetic waste can be recycling for reuse.

Ketan H Pakhmode et.al. [4] The solar powered water surface garbage collecting boat. In this paper they proposed a system which works by using solar energy and for movement of boat, Bluetooth module is used. An ultrasonic sensor is also used for object detection using transmitting and receiving signal which send the signal to Arduino. A conveyor belt is used for loading garbage from water surfaces and container installed on this boat will collect the garbage. Ultrasonic sensors are also attached to the container which can sense the level of garbage. As the garbage increased beyond the level, it will give signals to Arduino. Then, motors get command from Arduino to stop collecting the garbage by conveyor belt.

Sirichaiwatanasophon et.al. [5] The garbage collection robot on the beach using wireless communication. This paper presents a robot which is built on caterpillar wheels, size 52*74*17 cm. Power is supplied from 12v 30Ah battery which is connected to 40w solar cells. The robot can move with average speed of 0.5 meter per sec, on the sand via wireless communication and collect the big garbage with side 12.5*49 cm.

Apoorva S. Chaithanya et.al. [6] The autonomous garbage collector robot. This article presents the garbage collector robot for footpath using Arduino controller. The size of robot is 50*40cm and built on a metallic base which is powered by battery of 12v, 7.5Ah. This system is design to collect garbage at footpath, public places like school and colleges. This system cannot be used on muddy surface but it can use on mostly cemented and on the beach. The

robot is built in such a way that when it is started it will move on path defined in the program. When it encounters the obstacles, then the motion will proceed according to the applied program.

So, in the above-mentioned papers mostly they have shown how we can design a garbage collector in rivers. Some of these papers used battery for power and there are also many papers who use solar energy as the power source for controlling the boat. They have installed a conveyor belt which helps in the collection of trash from the water surfaces.

When the idea of such device is come into our mind, we searched for the counter measures that can be implemented to limit the water pollution due to floating waste. As the issue is related to the environment and pollution has been responsible for very drastic changes in the environment we started searching for various environment related journals to find any relevant information. 1. Garbage collection robot on the beach using wireless communication: This article presents the garbage collection robot on the beach using wireless communication. The robot is built on caterpillar wheels, size 52x74x17 cm and power is supplied from 12 v 30Ah battery which is connected to 40 W solar cells. The user can control a robot via a program developed from visual basic 2005 application based on windows XP. The command from user sent via Bluetooth to PIC18F4550 for processing. In addition, it is also equipped with an IP camera with added pan/ tilt capability which relays feedback information to the human operator. The result of robot performance where found that the robot can move with the average speed of 0.5meter per sec. on the sand via wireless communication and collect the big garbage with side 12.5x49 cm. 2. Autonomous garbage collector robot This paper presents the garbage collector robot for footpath using arduino microcontroller. The robot is built on a metallic base of size 50x40 cm. which is powered by battery of 12v, 7.5Ah. The robot moment is controlled by programming the arduino. The robot is design to collect garbage at footpath, public places (parks, school, and colleges), mostly cemented path and beach. The robot cannot be used

on muddy surface. The robot is built in such a way that, when it is started it will move on the path defined in the program. When it encounters the obstacle, depending on condition applied in the program the bot proceeds with further motion and then robot peaks up the garbage.

“They worked looking at the current situation of national sacred rivers which are dump with thousands liters of waste and loaded with pollutants, toxic chemicals, debris etc. which are multiplying water pollution in the form of waste debris and putting the life of aquatic animal in danger. They worked on a machine which will lift the waste surface debris from the lakes and water reservoirs, whose final result will be in fall of water pollution and fall of aquatic animal’s death. Their other aim was to reduce the man power and time consumption for cleaning the river. In their project (Design and Fabrication of River Cleaning Machine) they have stored the energy in the battery and used the energy for river cleaning with the help of a motor and chain drive arrangement.”

“The motive of their project “Design and fabrication of sewage cleaning machine” was to automate the sewage cleaning process in drainage, to reduce the spreading of diseases to human. They proposed the system where they made machine which was operated by the remote control to clean the sewage from the water bodies. Hence their system reduces the impacts from the sewage waste and its harmful chemicals and gases. They had used wiper motor that starts working as soon as the setup is switched on. They attached two power window motors to the wheel and driven them with the help of remote control system. They used arm to lift the sewage and made a dustbin bucket arrangement for collecting the sewage. They proposed that their machine is also capable of lifting the wastage which floats on the water surface. Their system has limited human contacts and interference in the process of cleaning and this in turn reduces spreading of diseases to humans.”

“These research emphases the lake garbage collector by using Pedal powered boat that uses a flexible shaft to drive a propeller. For seating arrangement they placed

a seat lower in the vessel which is doing function of increasing stability. It eliminates the pedal with their sweeping circular motion and replaces them with a pair of foot pegs and a ratcheted straight driver. This straight drive not only increases the efficiency of the power, it also converts the rotary action of the pedals to a liner motion that reduces the amount of space required to operate the unit. Thus, the driver unit can be placed under a seat so that it does not excessively intrude into the space of the boat.

"They explained Cleaning the wastes by utilizing manual procedures would be insufficient as it regularly covers large territory of activities and attachedwith plausibility to getting affected by different sicknesses from the different type of microorganisms present in the sewage while cleaning with human contact. Their project (Design and Development of River Cleaning Robot Using IOT Technology) features a proposed plan of garbage gathering system important and effective for tidying up waste from rivers, channels and lakes. Their trash gathering system is nicely coordinated to application for getting up a wide differentiation of debris, including gliding water litter, trash logs, disposed tires, plastics and others. For this integrated system they used IOT technology (Internet of Things) that has the ability to monitor and control the total process.

"In this project they have explained about the present scenario of the national rivers; and the major resources which are responsible for these situation or water pollution. With this they have also explained the need of automation for reducing manual work as it may cause so many diseases. And taking this as inspiration they worked on project called "Design of Automatic Aquatic Weed Cleaning System" and given efficient solution for cleaning of water bodies which are loaded with so many different type of water floating garbage, sewages, plants weeds, etc. For making project fully efficient and effective they have specifically used Radio Frequency model i.e. (RF model) for controlling and operating the operation of weed cleaning machine. Also they tried their best for providing best

design. With this they also full filled their main objective of reducing man power and human intervention with better automation."

"They specified there main aim as reducing the consumption of time and the man power required for the manual work of cleaning process. In this project they have used the motor, battery and chain drive arrangement for automation; with this they also used special purpose harvesting cutter for cutting the aquatic weed. They have given proper design and calculations for every component of the machine with the material specification and selection procedure. The main components they have used in the project are as follows: cutter, cutter shaft, chain, chain drive, conveyer, conveyor shaft and base frame. With all this they have suggested proper economical approach for implementation of project in urban areas."

"The use of mechanical drainage cleaner system is the replacement of manual drainage cleaning system. To overcome this problem, they implemental mechanical semiautomatic drainage water cleaner and so the water flow is efficient because of regular filtration of wastage with the help of that project. The method followed these days is proving to be the very much hazardous for the health of workers undergoing the process of cleaning the blockage in the drainage pipes; along with the drainage water some solid water travels through the drainage line and chock at the junction points of drainage system. This solid waste remains over time and thus causes blockage to the system. This creates the needs of cleaning drainage lines time to time. So this system will help to resolve the problem and will thus help in ensuring the cleaning of the system time to time by separating the solid waste."

"They explained efficient and practical disposal of garbage is very necessary with respect to the health of the surrounding nature. The current methods of garbage collection have been proven inefficient for the use. For that they proposed the system, which is the great way of reducing the garbage collection and disposal problem. Their paper (Design and Implementation of Solar Powered Automated

Garbage Monitoring System) presents the Garbage Collector robot using ARM7 (ARM processer for microcontroller use) technology. They constructed a robot on a base of size 50 x 40 cm, which is powered by a rechargeable battery of 12 V, 7.5 Ah from the solar panel. The robot movement is operated by a program in an Android Phone or tablet. The robot is constructed to collect wet and dry Garbage from every lakes and water bodies, by making use of solar energy as a source.

In this paper they described India as one of largest population country in the world. And India is also known for its cultural and traditional festivals. During this festival people discharge large amount of garbage into the rivers which remain there for long time and get contaminated. And if this contaminated water is get used for residential activities, then it causes the different type of diseases like epidermal, gastrointestinal, neurological disorder, etc. and affects the life of humans as well as other living beings. Mostly this water pollution affects the aquatic animal. The conventional machines which are available in market are of high price having costly maintenance. So they come up with the project which is totally economical and efficient for the cleaning of rivers. In their project they specifically used remote control devices for controlling the functions of conveyer and motor.

"They explained the present situation/scenario of our environment and the effects of the increased pollution over mankind. After that they highlighted the recent problem of water pollution in rivers and lakes and also explained the major resources which are responsible for the water pollution: like biological, commercial, industrial, institutional, residential, etc. Further they added cleaning this polluted rivers and water bodies with traditional or manual methods effectively are impossible and takes so much time and man power with risk of getting diseases. And for overcoming this problem they proposed the trash collecting system design which is effective for cleaning of trash from the river."

They explained the fresh and clean water is the important basic need for all mankind and living beings, without water the survival of living being is impossible. Industry waste, garbage waste, sewage waste are the main resources of water pollution in the rivers and lakes. With increased water pollution the various diseases are also increasing so it is important to increase the level of hygiene and cleanliness. They considered this issue of water pollution very seriously and acted in the direction of it. For that they incorporated the technology for the efficient and effective cleaning of rivers and lakes. The main specification of their project is that, it is semi-automatic whose operating is controlled by Radio Frequency (RF) model. The RF model is the model having transmitter and receiver placed at two different ends, which are capable of transmitting and receiving signals. Further they added monitoring the pH of water body is very important as it indicates the level of pollution, for fulfilling this purpose they added pH sensors in their project."

There model consists of a cage arrangement which they partially submerge it into the water while collecting the water floating garbage. They move their model around this floating debris and trap them into it. They have attached level sensors to their model for identifying the level of garbage filled into the cage. They have also added turbidity and pH sensors to determine the level of pollution in water bodies and used odor sensors for sensing odor and harmful smell of water. They have used RF transmitters and receivers for controlling all the functions of a model. This way they have worked on achieving eco-friendly and less human intervention efficient technology.

"They explained rising water pollution is destroying the life of aquatic animal and causing danger to their life. And sometimes the aquatic animals eat surface waste considering it as a readymade food; which lastly takes the life of aquatic animals. Due to the polluted water so many skin problems has been seen in population. So to reduce the solid waste pollution from the river they proposed the system "River cleanup machine'. A machine which involves the removing and disposing of

waste debris from the water body. Their river cleanup machine works on hydropower to clean waste water debris, plastics & garbage from Godavari River. They used hydropower energy for rotating the waterwheels, which converts the kinetic energy (K.E.)into the mechanical energy from the drive shaft to the conveyer."

"They analyzed and explained, from the last two decades, most of the urban water bodies in India are suffering because of increased pollution of local sewages and solid waste debris. Further they added that those water bodies get turned into landfills and get wasted. By taking this things into consideration, they proposed the project "Solar Operated Water Trash Collector" for removing garbage, solid waste debris from water bodies for making it clean. The main aim of their concept is to reduce time consumption and man power for cleaning the river and to use of nonconventional energy source (solar) for running the garbage collection equipment. The Solar based water trash collector is eco-friendly in nature and it is safe for the user. In this system Photovoltaic (PV) cells generate electricity by absorbing sunlight and using that light energy to create electricity current."

MAIN OBJECTIVES OF PROJECT

After studying different literature reviews and analyzing the different products which are working presently we found a wide gap between the technologies. So, we had decided to work on the main objectives of the problem which are written below.

- Remotely controlled boat type structure.
- Use of conveyor belt to collect the trash effectively.
- Withstand up to 10kg load of trash at a single time.

- Android application is used for movement of boat structure and to establish connectivity between Bluetooth and application.
- Cheaper in case of smaller ponds and water bodies as it can be handled with ease by anyone.

METHODOLOGY

This system method includes the implementation of proto-type device work robotically and controlled through the mobile application. For the prototype format drawing up the timeline and reading related works will be step one. After looking into benefits and downsides of previous studies in the subject of a Solar powered water trash collector, we can start using the plan to implement layout and automation method for run. The steps can will be in the following process chart:

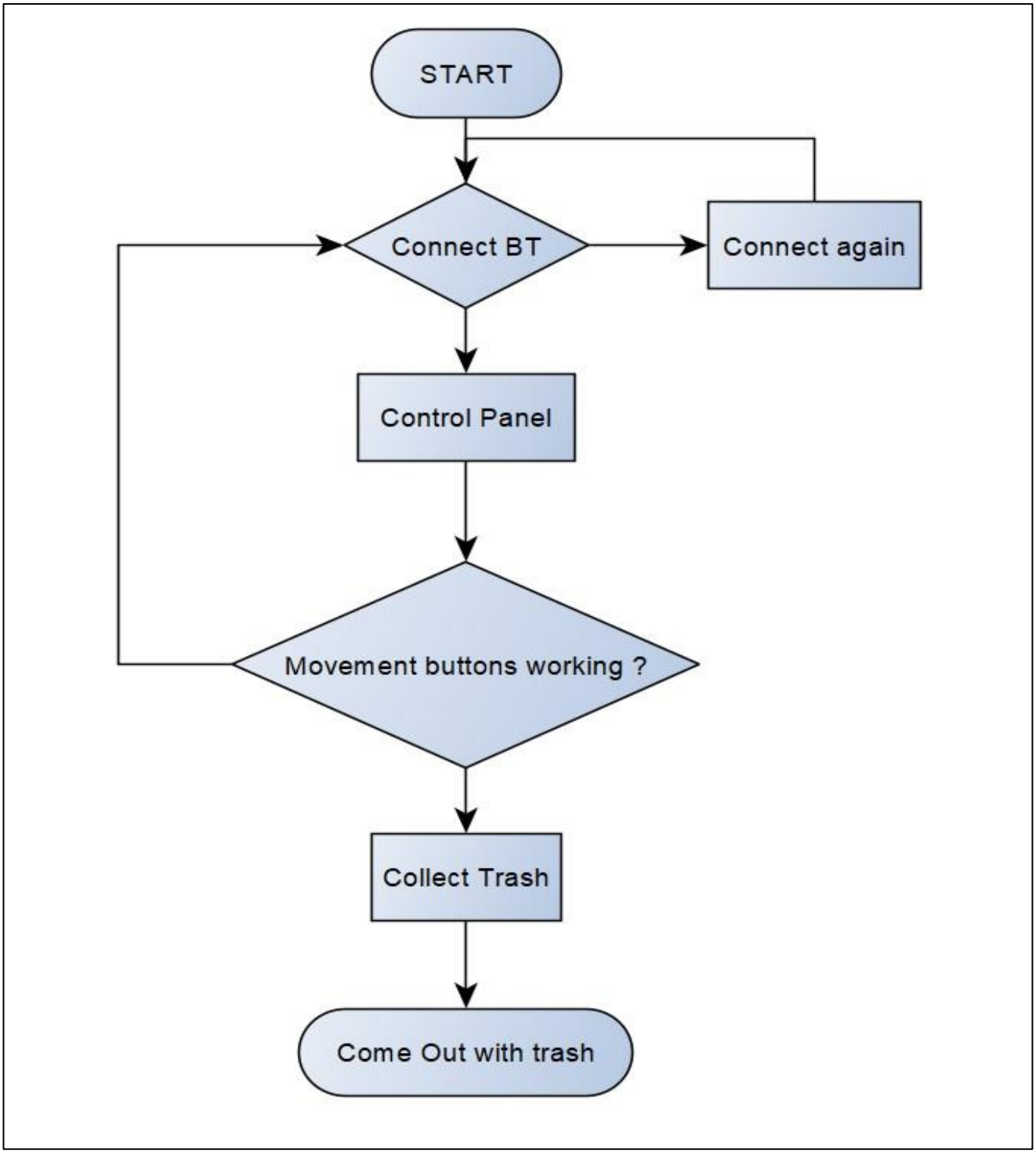


Fig. Machines used presently

Fig2. Flowchart

MATERIAL UTILIZED

1. Arduino Uno
2. Bluetooth module
3. 100rpm motors *2
4. Solar plate
5. Battery
6. Conveyor belt
7. Motor driver L298N

WORK DONE

Following are the steps that were to be taken for the proper functioning of the supposed model:

We are using solar panel for energy source and it is used to convert light energy into electrical energy. This acquired energy is stored into the battery and this power energy is used for all electronic and electrical devices. Microcontroller Arduino is used and it is programmed that will give command to change the motion of the boat, movement of conveyor belt etc. No external power supply is required in this project except solar energy. We are using the Bluetooth module which are connected to Arduino and which can be operated by using mobile app. The app we are using named as new boat. The motor will operate as it receives the command from Arduino. After then conveyor will start continuously and start collecting the garbage through water. The conveyor belt will transfer the garbage to garbage container. The capacity of container is 10kg, it can withstand up to 10kg load of trash at single time.

ARDUINO UNO

The Arduino Uno R3 is an open source microcontroller board based on the ATmega328 chip. This Board has 14 digital input/output pins, 6 analog input pins, On-board 16 MHz ceramic resonator, Port for USB connection, On-board DC power jack, An ICSP header and a microcontroller reset button. It contains everything needed to support the microcontroller. Using the board is also very easy, simply connect it to a computer with a USB cable or power it with DC adapter or battery to get started.

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2Atmega8U2 up to version R2) programmed as a USB-to-serial converter. While the Arduino UNO can be powered via the USB connection or with an external power supply, the power source is selected automatically.

External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm centre-positive plug into the board's power jack. Also leads from a battery can be inserted in the Gnd and Vin pin headers of the Power connector. The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 5v to 12v for Arduino Uno.

Features:-

- Microcontroller: ATmega328P.
- Operating Voltage: 5V.
- Input Voltage: 7-12V.
- Digital I/O Pins: 14 (of which 6 provide PWM output).
- Analog Input Pins: 6.
- DC Current: 40mA.
- Flash Memory: 32 KB.
- SRAM: 2 KB.
- EEPROM: 1 KB.
- Clock Speed: 16 MHz

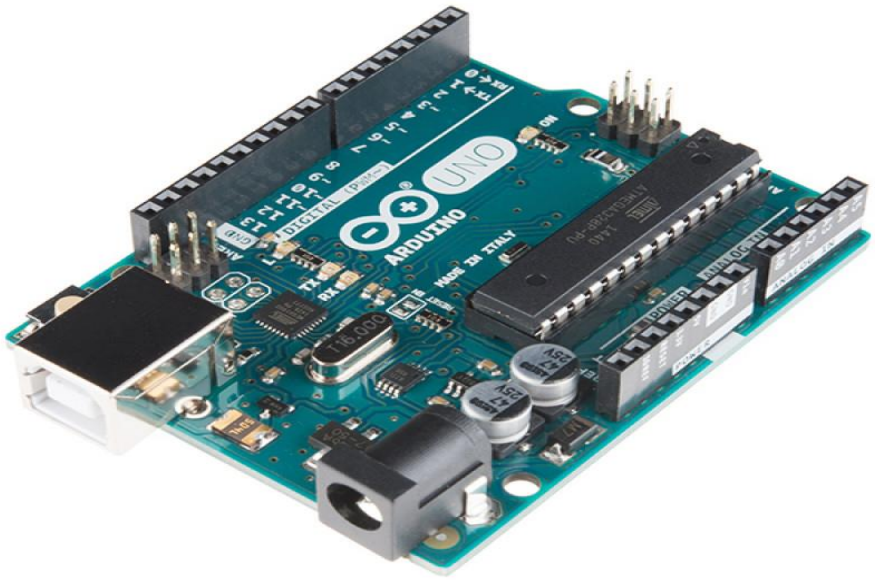


Fig. Arduino UNO

Applications:-

- DIY project prototyping.
- Developing varied varieties of projects that require a code based control.
- Automation System development.
- Learning AVR programming.
- Entry level circuit designing.

BLUETOOTH MODULE-HC05

HC-05 6 Pin Wireless Serial Bluetooth Module is a Bluetooth module for use with any microcontroller. It uses the UART protocol to make it easy to send and receive data wirelessly.

The HC-06 module is a slave only device. This means that it can connect to most phones and computers with Bluetooth but it cannot connect to another slave-only device such as keyboards and other HC-06 modules. To connect with other slave devices a master module would be necessary such as the HC-05 version which can do both master and slave.

Applications:

1. Embedded Projects.
2. Industrial Applications.
3. Computer and Portable Devices.
4. GPS receiver.

Features:

1. Working current: matching for 30 mA, matching the communication for 8 mA.
2. Dormancy current: no dormancy.
3. Used for a GPS navigation system, water, and electricity gas meter reading system.
4. With the computer and Bluetooth adapter, PDA, seamless connection equipment.
5. Bluetooth module HC-08 Master and slave Two in one module.
6. Use the CSR mainstream Bluetooth chip, Bluetooth V2.0 protocol standards.
7. Potter default rate of 9600, the user can be set up.
8. Bluetooth protocol: Bluetooth Specification v2.0+EDR
9. Speed: Asynchronous: 2.1Mbps (Max) / 160 kbps, Synchronous: 1Mbps/1Mbps.
10. Security: Authentication and encryption.
11. Profiles: Bluetooth serial port.

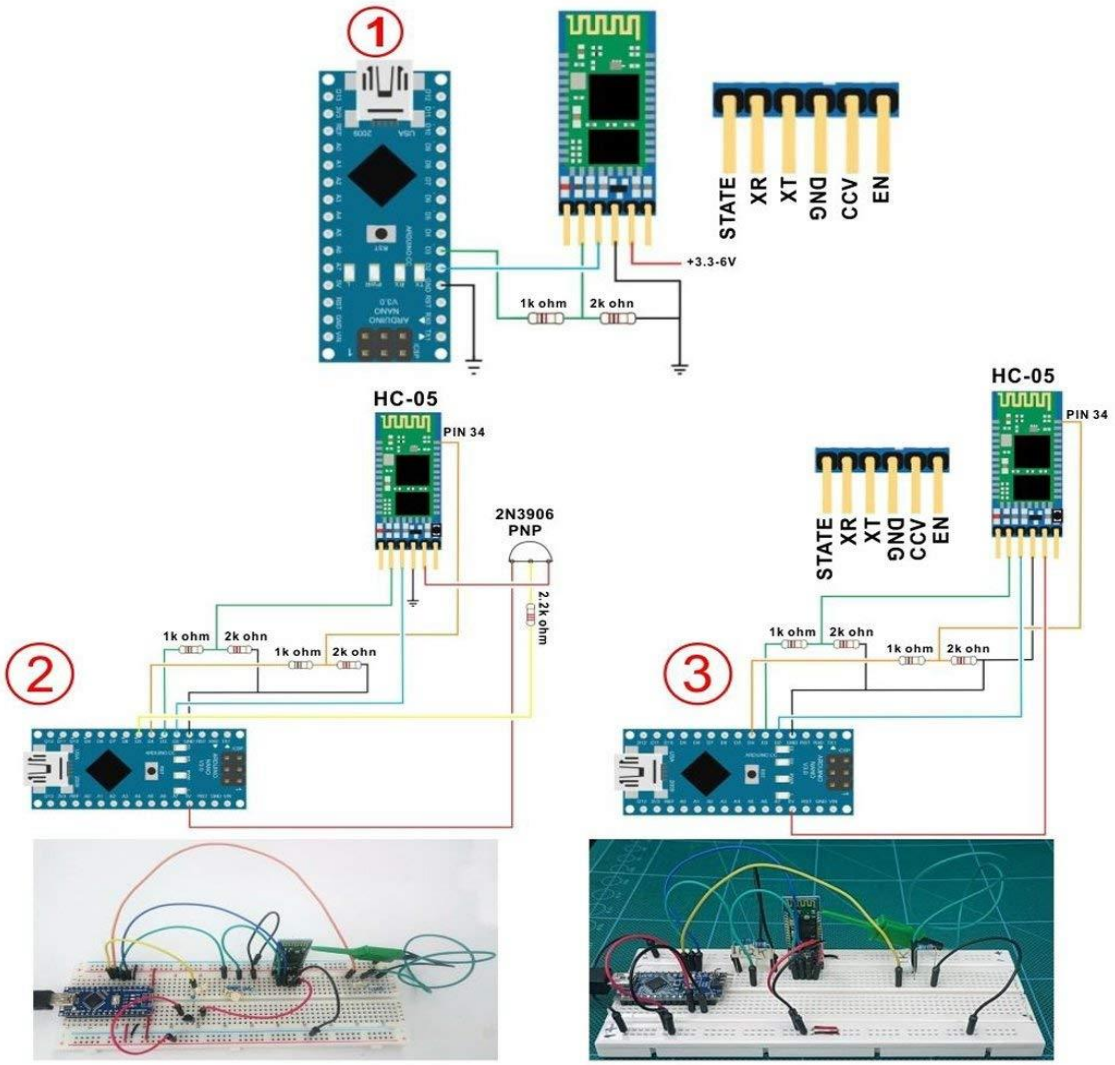


Fig. Bluetooth Module with different connections

100 RPM DC MOTORS

DC Motor – 100RPM – 12Volts geared motors are generally a simple DC motor with a gearbox attached to it. This can be used in all-terrain robots and variety of robotic applications. These motors have a 3 mm threaded drill hole in the middle of the shaft thus making it simple to connect it to the wheels or any other mechanical assembly.

100 RPM 12V DC geared motors widely used for robotics applications. Very easy to use and available in standard size. Also, you don't have to spend a lot of money to control motors with an Arduino or compatible board. The most popular L298N H-bridge module with on-board voltage regulator motor driver can be used with this motor that has a voltage of between 5 and 35V DC or you can choose the most precise motor diver module from the wide range available in our Motor driver category as per your specific requirements.

Nut and threads on the shaft to easily connect and internally threaded shaft for easily connecting it to the wheel.DC Geared motors with robust metal gearbox for heavy-duty applications, available in the wide RPM range and ideally suited for robotics and industrial applications. Very easy to use and available in standard size. Nut and threads on the shaft to easily connect and internally threaded shaft for easily connecting it to the wheel.

Specifications and Features:-

1. RPM: 100.
2. Operating Voltage: 12V DC
3. Gearbox: Attached Plastic (spur)Gearbox
4. Shaft diameter: 6mm with internal hole
5. Torque: 2 kg-cm

6. No-load current = 60 mA(Max)
7. Load current = 300 mA (Max).

Fig.100 RPM DC Motor

MOTOR DRIVER L298N

This L298 Based Motor Driver Module is a high power motor driver perfect for driving DC Motors and Stepper Motors. It uses the popular L298 motor driver IC and has the on-board 5V regulator which it can supply to an external circuit. It can control up to 4 DC motors, or 2 DC motors with directional and speed control

This motor driver is perfect for robotics and mechatronics projects and perfect for controlling motors from microcontrollers, switches, relays, etc. Perfect for driving DC and Stepper motors for micro mouse, line following robots, robot arms, etc.

An H-Bridge is a circuit that can drive a current in either polarity and be controlled by Pulse Width Modulation (PWM).

Pulse Width Modulation is a means of controlling the duration of an electronic pulse. In motors try to imagine the brush as a water wheel and electrons as the flowing droplets of water. The voltage would be the water flowing over the wheel at a constant rate, the more water flowing the higher the voltage. Motors are rated at certain voltages and can be damaged if the voltage is applied to heavily or if it is dropped quickly to slow the motor down. Thus PWM. Take the water wheel analogy and think of the water hitting it in pulses but at a constant flow. The longer the pulses the faster the wheel will turn, the shorter the pulses, the slower the water wheel will turn. Motors will last much longer and be more reliable if controlled through PWM.

Features:-

- Driver chip: L298 dual H-bridge driver chip.

- Operates up to 35V DC
- Drive part of the peak current Io: 2A / Bridge
- Logical part of the terminal power supply range Vss :4.5V-5.5V
- Logical part of the operating current range: 0 ~ 36mA
- Maximum power consumption: 20W

Pins:-

- Out 1: Motor A lead out
- Out 2: Motor A lead out
- Out 3: Motor B lead out
- Out 4: Mo (Can actually be from 5v-35v, just marked as 12v)
- GND: Ground
- 5v: 5v input (unnecessary if your power source is 7v-35v, if the power source is 7v-35v then it can act as a 5v out)
- EnA: Enables PWM signal for Motor A (Please see the “Arduino Sketch Considerations” section)
- In1: Enable Motor A

- In2: Enable Motor A
- In3: Enable Motor B
- In4: Enable Motor B
- EnB: Enables PWM signal for Motor B

Usage:-

H-bridges are typically used in controlling motors speed and direction but can be used for other projects such as driving the brightness of certain lighting projects such as high powered LED arrays.

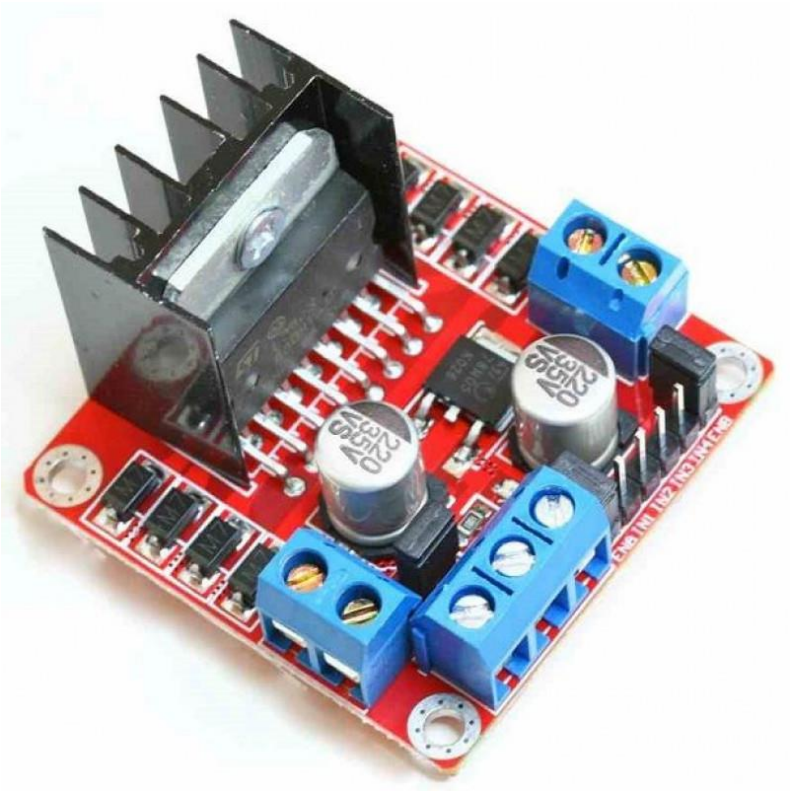


Fig. Motor Driver L298N

SPECIFICATIONS OF SOLAR PANEL

SKU: SO.PO.1624863

Type of Product: Polycrystalline Solar Panel

Rated Power Range: 1-30 W

Watt: 10 W

Voltage at Pmax (V): 17.3 V

Module Voltage: 12 V

Number of Cells: 36

Module Dimension (L x W x T): 410 x 245 x 15 mm

Cell Efficiency: 0.176

Junction Box: Normal Junction Box with Diode

Warranty Period: 25 Years of warranty

Tolerance (%): 0.01

Applications: Industrial and commercial sectors

Features: TUV / MNRE Certified, Glass Type- 3.2 mm for smaller panels and 4 mm for bigger panels, high transmission low iron, tempered.

Model No: SSI10W

Short Circuit Current: 0.61 A

Open Circuit Voltage: 21.6 V

Price per Watt: 57

Solar panel is use for charging the battery. Sunrays incident on the panel and it gets converted into electricity in this process the light energy is change into electrical energy. The dimensions of solar panel are 220*360*20mm.The voltage rating of solar panel is 12v.solar panel is used because it is harmless Or environment and it reduces fuel cost. No external supply of electricity is required.

WORK DONE ARDUINO IDE

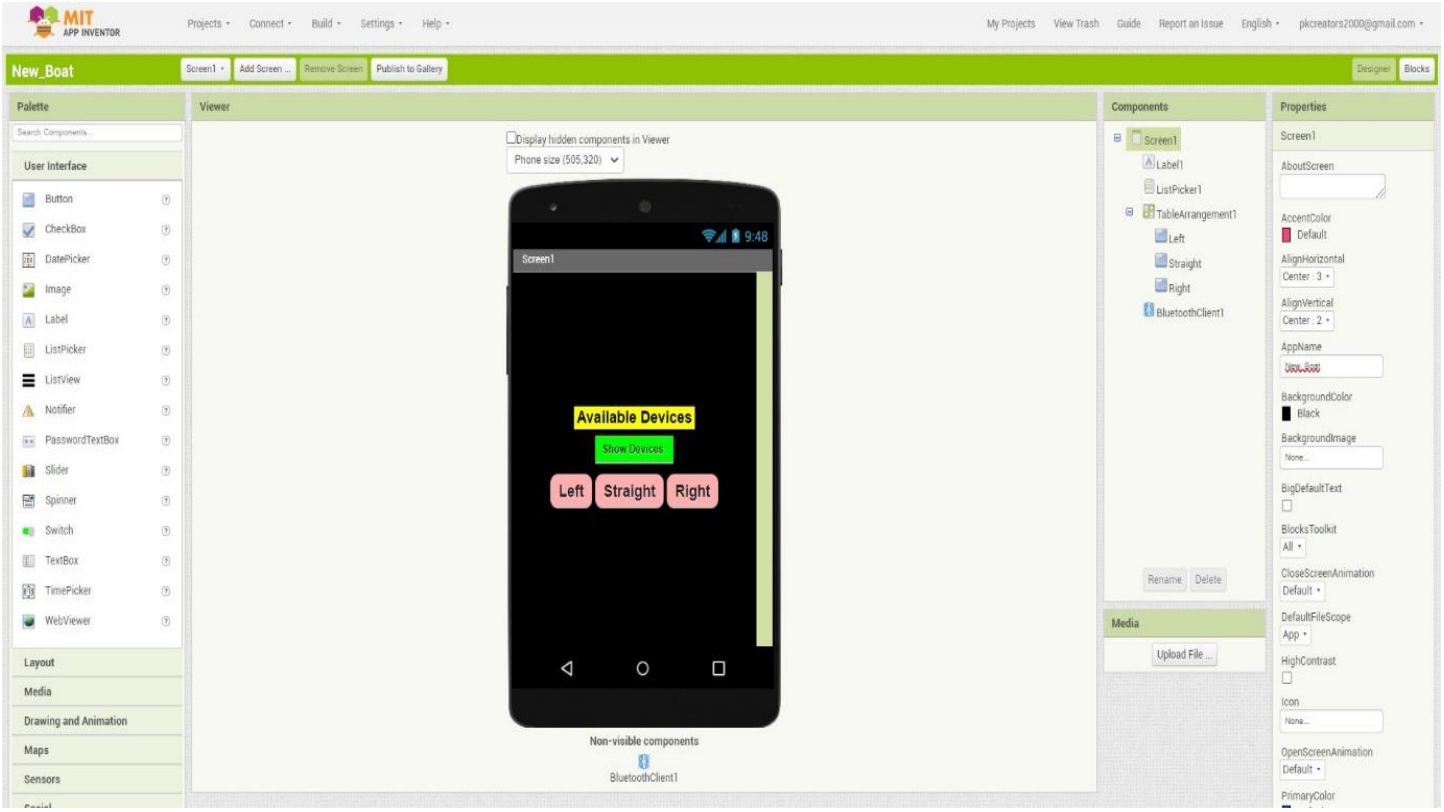
Boat_default | Arduino 1.8.12

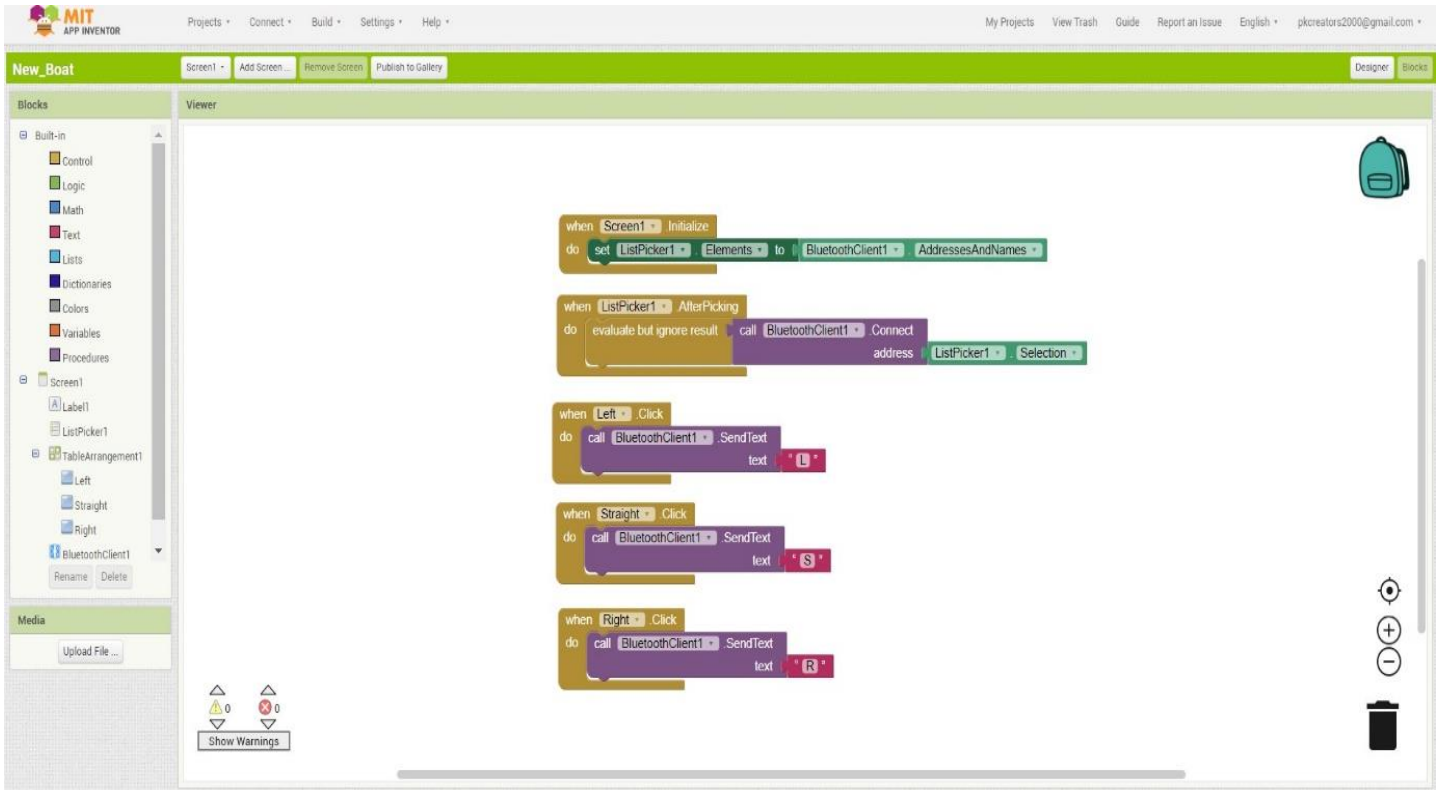
File Edit Sketch Tools Help

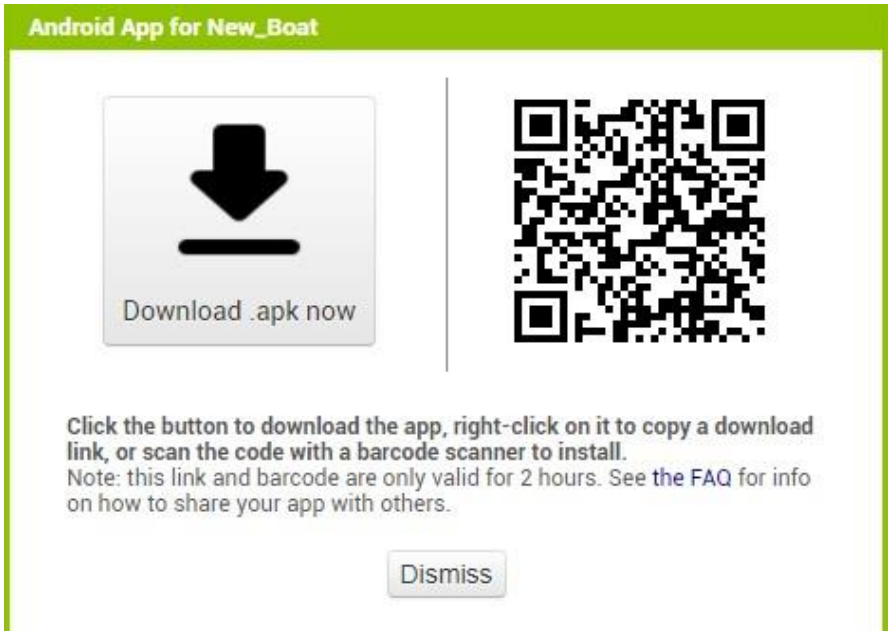
Boat_default

```
int LMP = 7;
int RMP = 8;
void setup() {
  // put your setup code here, to run once:
pinMode(LMP,OUTPUT);
pinMode(RMP,OUTPUT);
Serial.begin(9600);
}

void loop() {
  // put your main code here, to run repeatedly:
if(Serial.available())
{
  String Direction =Serial.readString();
  if(Direction == "S")
  {
    Serial.println("Straight command Given");
    digitalWrite(LMP,HIGH);
    digitalWrite(RMP,HIGH);
    }
  else if(Direction == "L")
  {
    Serial.println("Left command Given");
    digitalWrite(LMP,LOW);
    digitalWrite(RMP,HIGH);
    }

  else if(Direction == "R")
  {
    Serial.println("Right command Given");
    digitalWrite(LMP,HIGH);
    digitalWrite(RMP,LOW);
    }
  }
}
```

WORK DONE ON MIT APP INVENTOR







CAD MODEL VIEW

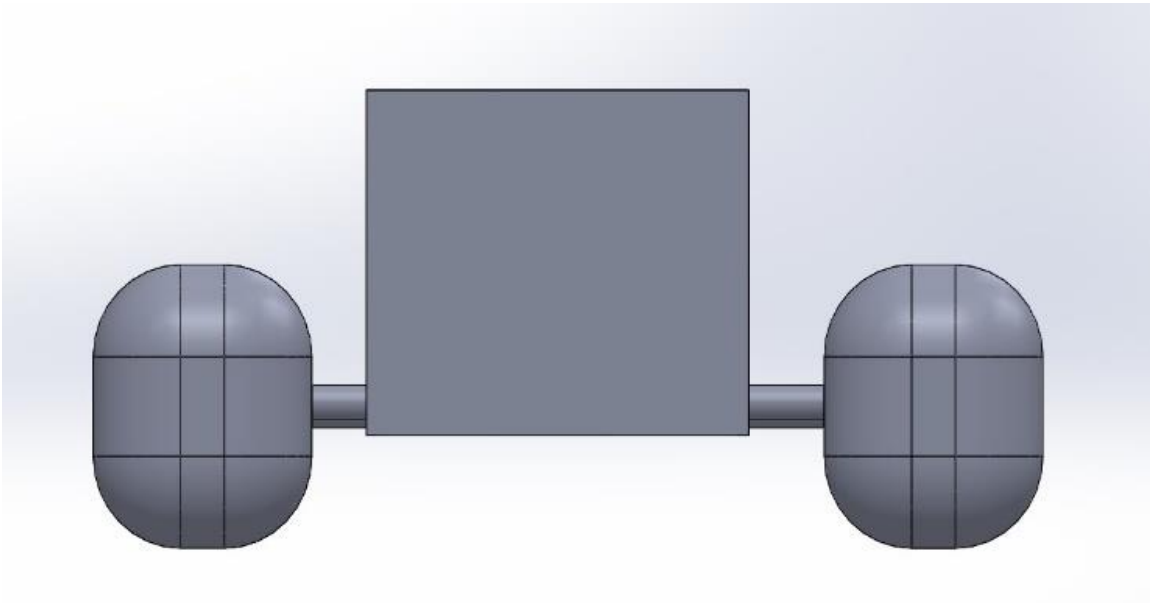


Fig. Back view

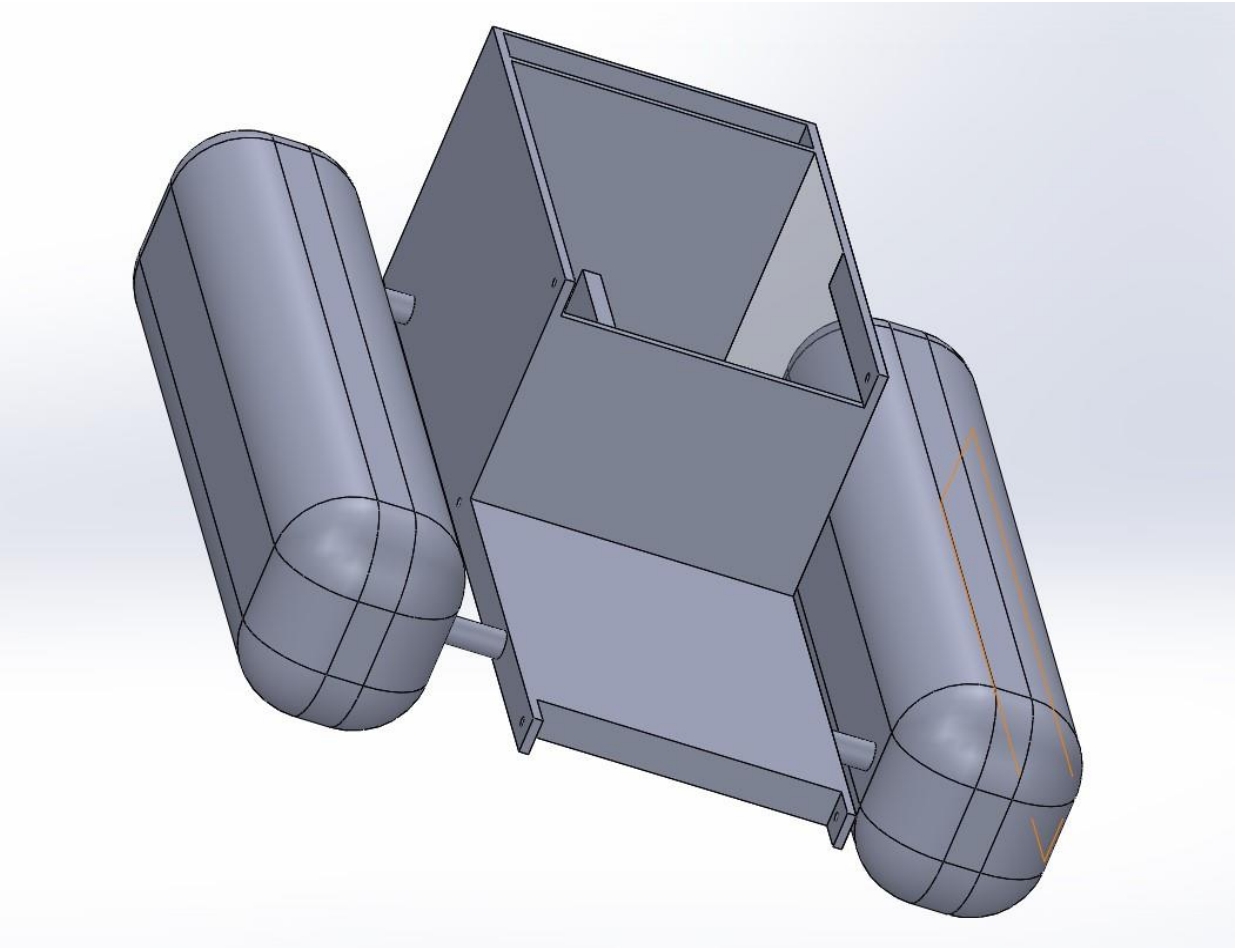


Fig. Front Isometric view

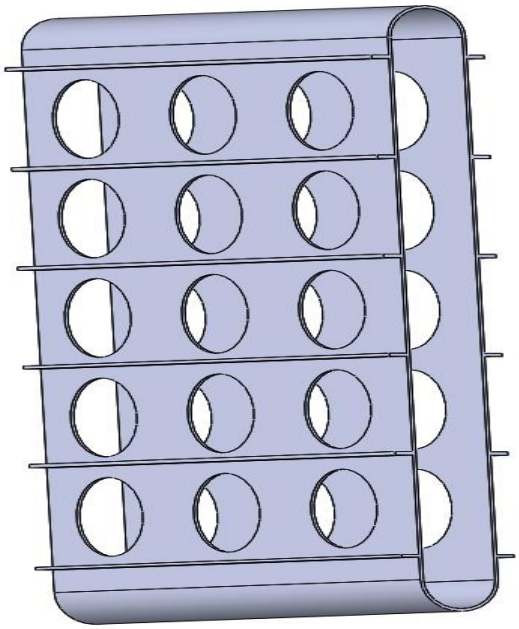


Fig. Planned design for conveyor belt

APPROXIMATE COST

S No.	Components	No. of units	Cost in Rs
1	ARDUINO UNO	01	330
2	HC-05 Bluetooth module	01	140
3	100rpm motors	02	240
4	Battery	01	570
5	Solar plate	01	550
6	Motor Driver L298N	01	90
7	150 rpm motors	01	100
8	Acrylic sheets (white and red)	1.5m*1.5m	200

Approx. Total Cost – Rs. 3,000

WORK PLACE

1. IDE Arduino
2. MIT App developer
3. All the work is done at home with the help of local things.
4. Some of the electrical connection is done in Home.

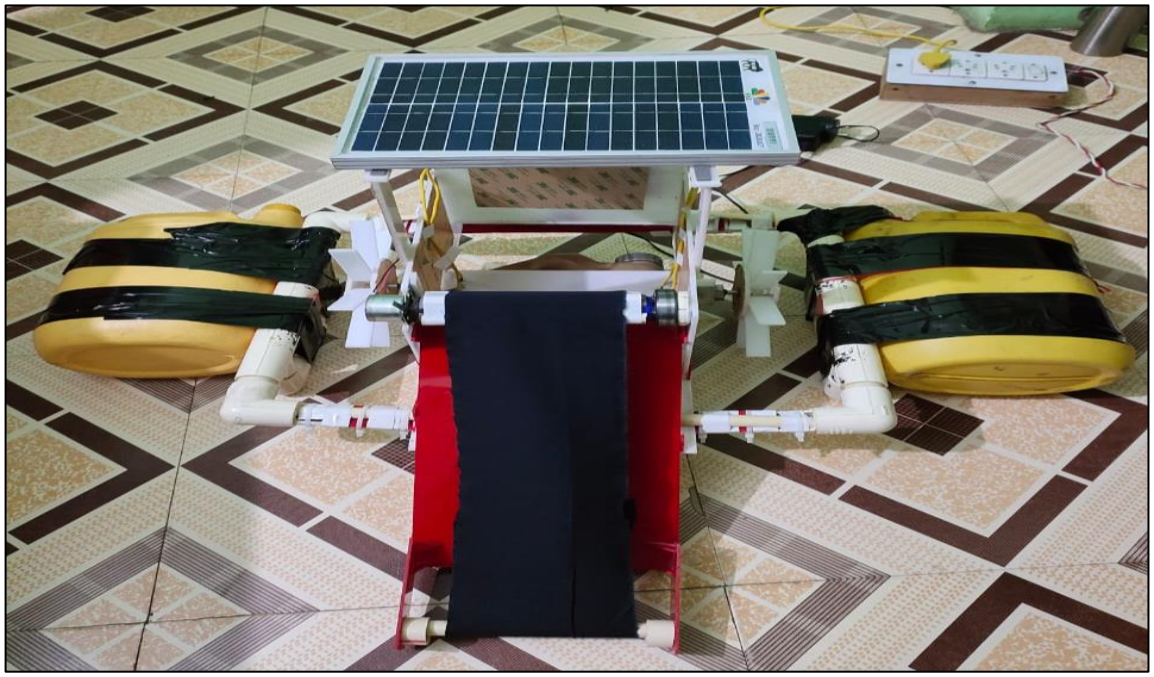
WORK PLAN

Work Plan	Time span
Selection of project based on real life problem	**1-09-2021 to 7-09-2021**
Selection of components and purchasing	**01-10-2021 to 20-10-2021**
Learning required modules	**7-09-2021 to 20-09-2021**
Deploying of code on system and testing working of prototype	**25-10-2021 to 30-10-2021**
Troubleshooting and report writing	**1-11-2021 to 17-11-2021**

OUTPUT OF PROJECT

In this paper, solar powered water trash collector has designed which is very economical, easy to operate and helpful for water cleaning and it can be modified with more cleaning and loading capacity and efficiency. It is very useful for society by cleaning nearby rivers and lakes. Hence, by using this trash collector system we are cleaning the water surface and maintaining the water without trash and waste materials. An Arduino is used for controlling all part of systems by using an android mobile with WIFI and Bluetooth. The solar panel acquired the

energy from sun ray and these energies is stored by battery. From power of this battery the Arduino and all electrical and electronic system will be controlled. We have made an android app i.e. New_boat from MIT app developer by controlling from Bluetooth. By using this application, we can control the movement of system.



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