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DESIGN AND IMPLEMENTATION OF A REMOTE CONTROLLED WATER WASTE COLLECTOR WITH FISH FEEDER

by

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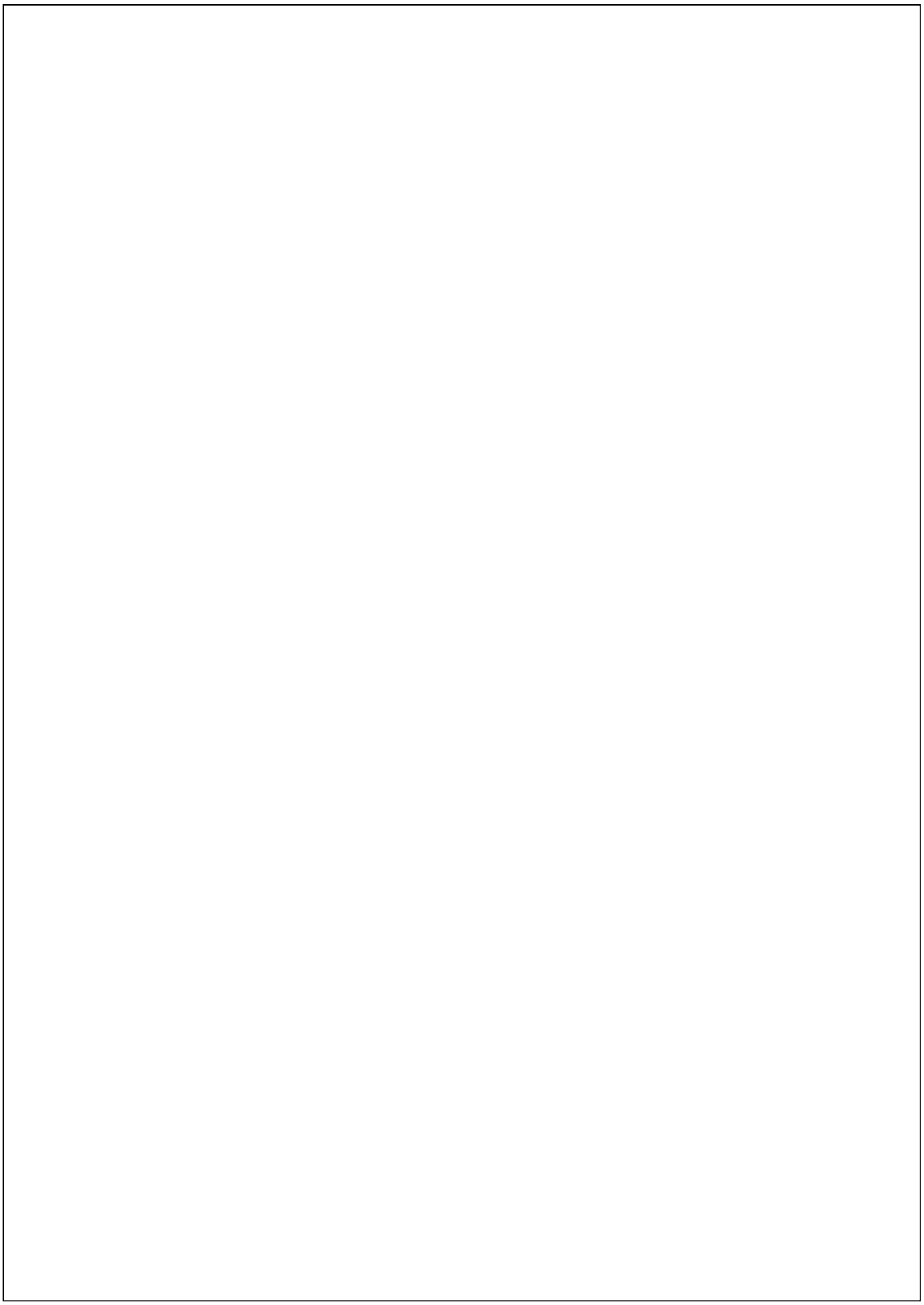
Department of Electrical and Electronic Engineering
INTERNATIONAL ISLAMIC UNIVERSITY CHITTAGONG

DECEMBER 2021



DESIGN AND IMPLEMENTATION OF A REMOTE CONTROLLED WATER WASTE COLLECTOR WITH FISH FEEDER

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A project

submitted as partial fulfillment of the requirement for the degree of

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DECEMBER 2021

CERTIFICATE OF APPROVAL

The project entitled "**Design and Implementation of a Remote Controlled Water Waste Collector With Fish Feeder**" submitted by **Ayesha Akter,** bearing Matric ID: **ET 171209** and **Shalaha Akter Jarin,** bearing Matric ID: **ET 171219** of session **Spring 2017**, to the Department of Electrical and Electronic Engineering, International Islamic University Chittagong, has been accepted as satisfactory in partial fulfillment of the requirements for the degree of Bachelor of Science in Engineering and approved for the examination held on **24th December 2021.**

_____

Supervisor
Engr. Md. Jalal Uddin
Assistant Professor
Department of Electrical and Electronics Engineering International Islamic University Chittagong.

DECLARATION

It is hereby declared that this work has been done by us and no portion of the work contained in this project has been submitted elsewhere for the award of any degree or diploma.

_____

Ayesha Akter

_____

Shalaha Akter Jarin

ACKNOWLEDGEMENT

In the name of Allah (SWT), the most gracious and the most merciful. First of all, we are grateful to Almighty Allah for giving us strength and wisdom throughout all our life. We thank our family for their love, the moral and financial support they had given us. This helped us a lot We would like to give our gratitude to our honourable supervisor Engr Md. Jalal Uddin, Assistant professor of EEE department, International Islamic University Chittagong. who has given us significant suggestions and inspections during the whole process of the work. His invaluable help of constructive comments and suggestions throughout the experiment and project work has contributed to the success of this project.

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Authors

ABSTRACT

This project emphasizes on design and development of a solar-powered floating waste collector machine. The work has been done looking at the current situation of our national rivers which are dumped with core litters of sewage and loaded with pollutants, toxic materials, debris, etc. The government of Bangladesh has taken charge to clean rivers and invest huge capital in many river cleaning projects like "Karnafuli", ''Halda'' and many major and medium projects in various cities like Chittagong, etc. By considering this, this machine has been designed to clean the river water surface. Nowadays almost all the manufacturing process is being atomized to deliver the products at a faster rate. Automation plays an important role in mass production. In this project, we have fabricated the remote-operated and solar-powered river waste collector machine. The main aim of the project is to reduce manpower, time consumption for cleaning the river. In this project, we have automated the operation of river cleaning with the help of three motors and chain/belt conveyor drive arrangements. Some needs of automation are described below. Here using the RF transmitter and receiver are to control the cleaning or waste collector machine. Automation can be achieved through computers, hydraulics, pneumatics, robotics, etc., of these sources, pneumatics form an attractive medium for low-cost automation.

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LIST OF ABBREVIATIONS

RF	Radio Frequency
DOL	Direct On Line
PCB	Printed Circuit Board
NO	Normally Opened
NC	Normally Closed
LED	Light Emitting Diode

CHAPTER 1
INTRODUCTION

1.1 Introduction

Water spans well over a couple of the Planet's surface, whereas solid only makes up around a third. As the global population grows, people are placing greater demand on the earth's natural water supply. Human activities, in a way, are "squeezing" our seas, lakes, and other waterways, reducing their quality. Poor water quality leads to water contamination. Skimmer boats, also known as workboats, are used to collect and dispose of floating waste management wastes in ponds, lakes, rivers, and waterways. The innovation is tailored more specifically to multi-purpose watercraft having devices for scooping up floating garbage, storing it aboard the vessel, and releasing it to a storage location, which might be ashore or on another cargo ship, such as a tanker. Many labor boats and barges have been suggested for the collecting of floating solid waste and other debris. Typically, these are designed as a catamaran hull with two propellers or sponsors, or as a monohull with a paddle wheel or screwdriver operation and an operator station. A common garbage skimmer design includes one or many hydraulically operated open mesh conveyors.

Floods and climate change have grown out of control as a result of current environmental developments. It has become a matter of great concern for the whole globe, especially developing nations. Water traveling through a drainage system transports waste items, the majority of which are non-biodegradable, causing flooding Nonpoint and point sources of floating trash rubbish and debris can both reach the sea. Overflow of a water drainage system occurs when an end of the drainage system is blocked, forcing the water to find its way somewhere other than the mapped-out drainage system. As a result, the water supply spills over the horizontal height of the drainage network, spreading to regions alongside the drainage network, causing problems such as fences being pushed down, waterlogging of farmlands and residential houses, and so on. Water impurities can be dangerous and cause sickness. In terms of the draining body, the main drainage system's role is to collect, convey, and dispose of liquid through an outfall or outlet. In drainage water, you can find bottles and cans, polythene bags, documents, papers, foods among other things.

Floating trash and debris may enter streams from both nonpoint and point sources. During and after a storm, for example, stormwater runoff can sweep trash and plastics down drainage systems that run to aquatic bodies. When water bodies aren't adequately maintained, each fresh rainstorm might poison them more. It's a functional prototype of a solar-powered water cleaning system that can collect floating trash and waste products from the water's surface as well as deposit them in a floating bin. It may be remotely controlled and programmed, as well as scaled to any size. In addressing the problem of water cleaning, this method is unique and successful. Water contamination by debris is seen in **Figure 1.1.**

Figure 1.1: Water pollution by debris.

1.2 Background

The remote-control garbage collector's mission is to gather the rubbish from the river. Solar energy or AC currents are used to power the system. We will investigate ways to gather the rubbish from contaminated water in this project. The project's major focus is on collecting dust from the conveyor. The dust from the water will be dragged over by the conveyor. The conveyor is operated by a touch-sensitive remote.

1.3 Problem Statement

When it comes to water resources, Bangladesh is a fortunate country, with several river sand lakes to choose from. Water contamination comes from a variety of sources. For example, we pour household garbage into rivers, which contributes to pollution levels. As the population expands, so does the scale of towns and cities. As a result, the quantity of domestic garbage we discharge into rivers grows. We noticed a considerable quantity of junk in Bangladesh's most sacred river, the Buriganga, as well as small and large lakes closer to settlements, in which we found a large amount of waste, preventing us from using the water for our everyday necessities. Waterlogging caused by a plastic, thermocouple, and metal encourages the spread of pests and illnesses such as malaria and typhoid. Because this is dangerous to human life, the concept for this research arose. The proposed project's goal is to build and create remote-controlled equipment for cleaning river water to avoid humans from contracting illnesses caused by infectious bacteria present in sewage when cleaning manually. The goal of this suggested system is to reduce or eliminate the problems that arise when utilizing man-operated equipment, as well as the increased trash disposal rate.

Figure 1.2: Debris on the river water.

1.4 Objectives

- To design and build a floating garbage collector that can be controlled remotely.
- To remove waste off the water's surface and place it in the tray.

1.5 Motivation

- To lessen the number of pollutants in the water.
- To avoid ecological imbalances in the river or sea ecosystems.
- To preserve marine biodiversity.

1.6 Report Outlines

Six chapters have been covered in the course of the design and development of this project. The chapters and their contents are as follows:

- Chapter 1 is the introductory chapter that gives the overview, motivation, and objective of the project.
- Chapter 2 is the literature review. The previous work-related of this project has been discussed in this chapter.
- Chapter 3 is a hardware description. In this chapter, all the components used in this project have been described elaborately.
- Chapter 4 deals with the system design of the project. In this chapter Block Diagram, Circuit diagram Flow Chart, and programming of the project has discussed.
- Chapter 5 deals with the system implementation and results, Objectives in verification, and system specification.
- Finally, the summary of this project has discussed in detail in chapter 6. The limitation of the project, advantage, and future development has been discussed on this topic.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Water is vital to our survival. Water can be used in a variety of ways. Watering plants is also vital since water can provide sustenance to them. However, many irrigation systems use water that contains a variety of polymers, solids, and other contaminants. A lot of water has been contaminated as a result of this. As a result of this technology, we can gather the rubbish from the water.

2.2 Review of Previous Work

2.2.1 Designing and Modeling of Automatic Garbage collector

Garbage and recycling collection is a physically hard job that exposes workers to a variety of hazards. This project is planned to gather the rubbish from various locations and then dispose of it at a single location, from which the garbage will be collected for disposal or recycling. To create an autonomous trash robot that detects and collects waste using an Arduino microcontroller. Second, the project was effectively implemented with the help of a very advanced microcontroller and expanding technologies. In **Figure 2.1**, which depicts the design and modeling of an automatic trash collector, it has been concluded that by applying these technologies, we can clean up our environment.

Figure 2.1 Designing and Modeling of Automatic Garbage collector.

2.2.2 Automatic System to Fish Feeder and Water Turbidity Detector

This tool system operates automatically, feeding the fish and detecting water turbidity. The fish being fed and the water detected are both in an aquarium or a pond. RTC (real-time clock), turbidity sensor, and on/off button are the tool's inputs. The on/off button is used to start or stop the tool; the RTC component is used to feed the fish automatically, and the turbidity sensor is used to measure water turbidity. An LCD (liquid crystal display) screen, a buzzer, a servo motor, and an LED (light-emitting diode) component are all included in the tool's output. The LCD is used to display information in a writing format, the buzzer is used to sound information in a sound format, the servo motor is used to move the waterways and foodways doors, and the LED component is used to indicate the tool is active and processing. Arduino Mega 2560 is the key component in this tool that controls all of the components and programs. C programming language for Arduino is used to create a tool software that will be installed in the Arduino Mega. Using this technology, feeding the fish and detecting turbidity in the water will be more effective, efficient, and simple than manually. **Figure 2.2** shows the automatic fish feeder and water turbidity detector.

Figure 2.2 Automatic System to Fish Feeder and Water Turbidity Detector.

2.2.3 Unmanned Floating Waste Collecting Robot

Plastic pollution of aquatic bodies is a serious problem on a local and worldwide scale. The prototype presented here provides a low-cost, safe, and effective method of floating trash disposal with low maintenance costs, as well as an easy-to-control and monitor system, making it a viable solution to the problem of plastic pollution in water bodies. Several prototypes for cleaning floating garbage from bodies of water exist. Some of them have also been used commercially. The majority of the available devices are manned, requiring more manpower and posing a risk to the operator. Again, the majority of the proposed designs rely on oil-based fuels, which run the risk of leaking into the water and further polluting it. So far, the battery-powered gadgets in use lack scalability. The prototype's scalability and versatility make it stand out. It can be scaled for usage in vast bodies of water with simple modifications, solar panels can be installed to make it self-sustaining, long-distance control can be set up via Wi-Fi connectivity, and sensors to monitor water quality can be attached onboard. The safe use of fuels in aquatic robotics is a major challenge. Oil as a fuel may result in oil spills in the event of an accident, contaminating water bodies and posing a hazard to aquatic animals' life. Our proposed design is more advantageous and safe thanks to the usage of a battery, and it also allows us to employ sustainable solar energy. The circuitry is tightly sealed and segregated to keep electronic components safe from water while also preventing contamination of the water. **Figure 2.3** illustrates the autonomous floating garbage collection robot, which presents a unique, scalable, and long-term solution to the burning issue of aquatic plastic.

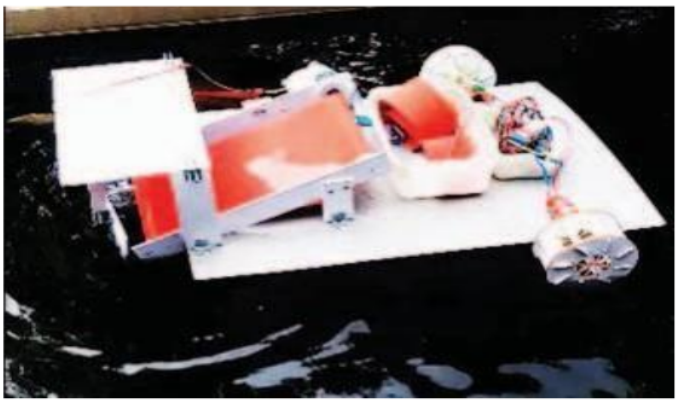

Figure 2.3 Unmanned Floating Waste Collecting Robot.

2.2.4 Summary of Literature Review

Table 1.1 shows the summary of the literature of the Review.

Title	Publication	Author	Year
Designing and Modeling of Automatic Garbage Collector.	International Journal of Scientific Research in Science and Technology (www.ijsrst.com)	Gourav, Sandeep Singh, Amandeep Singh, Bhagwan Singh, Jagdish Singh, Harpreet Kaur Channi.	2017
Automatic System to Fish Feeder and Water Turbidity Detector.	International Conference Computer Science and Engineering	H Hendri, S Enggari, Mardison, M R Putra, L N Rani	2019
Unmanned Floating Waste Collecting Robot.	2019 IEEE Region 10 Conference (TENCON 2019)	Abir Akib Faiza Tasnim Disa Biswas Maeeshsa Binte Hashem Kirsti Rahman Arnob Bharttacharjee Shaikh Arnob Fattah	2019

CHAPTER 3
HARDWARE DESCRIPTION

3.1 Introduction

We'll go over the hardware that was used in this project in this chapter. The function of the selected sections will also be discussed. By the end of this chapter, you'll have a better understanding of why the components utilized in this project were chosen and what they do.

3.2 List of Components

This chapter will go through the hardware that was used in this project. We'll also go through the functions of the parts we've picked. By the end of this chapter, you will have a better understanding of why the components utilized in this project were chosen.

1. Arduino Uno
2. Arduino nano
3. 4 channel relay module
4. 1 channel relay module
5. Yellow DC motor
6. RF module
7. PVC Board
8. Servo Motor
9. Battery
10. Vero Board
11. Joystick
12. Push Button
13. Solar

3.3 Arduino Uno

The Arduino Uno is a Microchip ATmega328P-based open-source microcontroller board created by Arduino. cc. The board has microprocessors and controllers (I/O) pins that can be used to connect to different expansion modules (shields) and other circuits. The board includes 14 digital pins and 6 analog pins, and it can be programmed using the Arduino IDE (Integrated Development Environment) using a USB type B connector. It can be powered by a USB cable or an external 9-volt battery, and it can handle voltages ranging from 7 to 20 volts. The Arduino Uno is the first in a series of Hardware Arduino boards, and it and version 2 are the most popular. The original STK500 protocol is used by Uno, It is distinguished from all previous boards by the absence of the FTDI USB-to-serial driver chip. Instead, it employs a USB-to-serial converter based on the Atmega16U2 (Atmega8U2 through to version R2) [22]. The Arduino Uno is a microcontroller-based board with 14 digital input and output pins (6 of which can be used as PWM outputs), 6 analog input pins, a USB connection, a power port, and an ICSP heard, as well as a reset button. All of these are needed to support a microcontroller, allowing it to be readily programmed with a USB cable and afterward used by powering this with an AC or DC supply. The structure of the Arduino Uno is depicted in **Figure 3.1.**

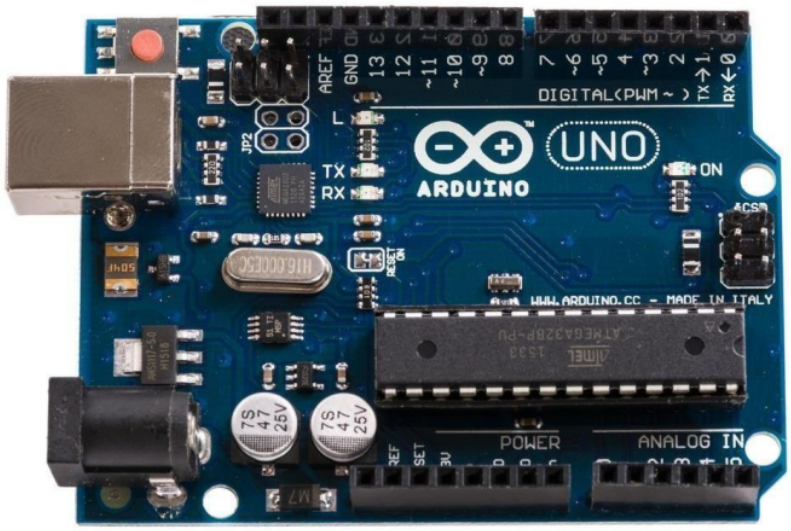

Figure 3.1: Arduino Uno.

3.3.1 Arduino Uno Specification

Flash Memory: 32 KB (ATmega328) of which 0.5 KB is used by the boot loader. SRAM 2 KB (ATmega328) EEPROM 1 KB (ATmega328).

Digital I/O Pins: 14 (of which 6 provide PWM output).

Input Voltage (recommended): 7-12V. DC Current for 3.3V Pin: 50mA.

Figure 3.2 shows the Arduino Uno specification.

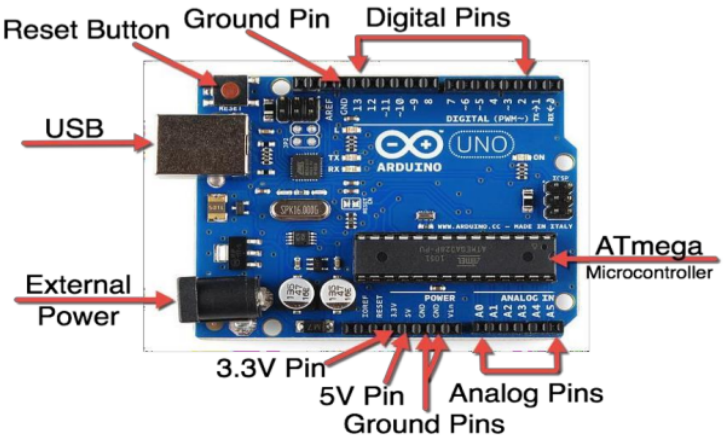

Figure 3.2: Arduino Uno Specification.

3.2 Arduino Nano

Based on the Atmel ATMega328 (Microcontroller Nano 3.0) or Atmel ATMega168, the Arduino Nano is a compact, comprehensive, and breadboard-friendly board (Arduino Nano 2. x). It offers a lot of the same features as the Arduino Circuitry, but it comes in different packaging. It just has a DC power connector and uses a Small USB cable rather than a conventional one. Gravitech is the company that invented and manufactures the Nano. The Arduino micro is seen in **Figure 3.3.**

Figure 3.3. Arduino Nano

3.2.1-Arduino Nano Specification

Figure 3.4 shows the Arduino Nano specification.

Name	Arduino Nano
MCU	Atmega328p/Atmega 168.
Power	5V
Input Voltage	7 -12 V
Maximum Current Rating	40mA
Clock Frequency	16MHz
Flash Memory	16KB/32KB
USB	Mini
USART	Yes
SRAM	1KB/2KB
PWM	6 out of 14 digital pins
GPIO	14
Analog Pins	8
EEPROM	512bytes/1KB

Figure 3.4. Arduino Nano specification.

3.3 Channel Relay Module

It's a 4 channel 5V 10A isolated relay module. It may be controlled by a variety of microcontrollers, including Arduino, AVR, PIC, ARM, and others. It can also manage a wide range of appliances and other high-current devices. The maximum contact on the relay is AC250V 10A & DC5V 10A. It may be immediately connected to a microcontroller with a standard interface. The safe usage of red functioning status indicator lights is encouraged. It may be used for a variety of purposes, including MCU control, industrial control, PLC control, and smart home control. You're all set to turn on your Microprocessor! This clever relay module has four 5V relays, each rated as 10A/250V. With the aid of a microprocessor, it can switch up to four current flow (10A) or high voltage (250V) loads. Each relay may be turned on or off separately using a range of traits digital input that can be connected directly to a controller output pin. It just needs about 1.0V to turn on the inputs, but it can tolerate input signals which range up to 5V. The four-channel relay is shown in **Figure 3.5.**

Figure 3.5. 4 Channel Relay Module [12].

3.3.1 Specification

- Channel number: 4
- Operating Voltage of the Relay: 3.3V to 5V
- Increased relay coil with triode drive
- Pin with a high impedance controller
- Pull-down circuit to prevent malfunctions
- Control indicator lamp and power supply indication lamp
- Power source and relay instructions are illuminated, but the disconnect is turned off
- Connect the input signal, the signal, the common terminal, and begin conducting
- Can be used to regulate appliances
- You may manage the 220v load using a DC or AC signal
- One contact is generally open, and the other is normally closed

3.4 Single Channel Relay Module

The One Channel Device is a handy board for controlling high-voltage, high-current loads such as motors, solenoid valves, lights, and AC loads. It's made to work with microcontrollers like Arduino, PIC, and other similar devices. Screw terminals are used to bring the relays' terminals (COM, NO, and NC) out. It also has an LED that shows the relay status. A single cable relay module is shown in **Figure 3.6.**

Figure 3.6. Single Channel Relay Module [11].

3.4.1 Specification

- Adjustable digital output
- Arduino and other 5V microcontrollers are compatible
- Rated via: 10A (NO) 5A (NC)
- Control signal: TTL level
- Maximum switching voltage 250VAC/30VDC
- Switching current maximum of 10A
- Dimensions: 43mm x 17mm x 17mm

3.5 Yellow DC Motor

The ability to adapt This gear engine wheel is ideal for any robotics project. This gearbox is suitable for a robotic automobile or a robot that follows a line. The DC gear wheel is approximately 2.5 inches long, 0.85 inches wide, and 0.7 inches thick, with a bright yellow plastic structure. The Gearmotor operates well among 4V and 7V and the wheel may be put on either side (recommended 6 Volts). You can get a lot of power at 5 Volts with a 1:48 ratio. The yellow dc motor is seen in **Figure 3.7.**

Figure 3.7: Yellow DC Motor [12].

3.5.1 Specification

* 3V – 6V DC operating voltage (recommended 5V)
* Torque maximum: 800g.cm
* Ratio Reduction: 1:48
* No Load current: 190mA(max.250)
* 1A stall current
* Without load, the speed is 90-10rpm.
* This motor's strong anti-interference keeps it clean around microcontrollers

3.6 RF Module

In general, the wireless transmission designer must work under two constraints: it must function over a particular distance and send a certain quantity of data at a specific pace. The RF modules are tiny and also have a wide range of operating voltage ranges, ranging from 3 to 12 volts. RF modules are 433 MHz RF transmit and receive modules. When sending logic zero while completely suppressing the carrier frequency, the transmitter draws no power, consuming much less power in battery operation. With a 3volt power source, the carrier is completely on to roughly 4.5mA when logic one would be communicated. The RF-module is seen in **Figure 3.8.**

Figure 3.8. RF Module [13].

3.7 PVC Board

RFL UPVC Sheet is a long-lasting, water-resistant building material that has replaced particle board, plain board, melamine board, and wood in the manufacture of furniture, kitchen cabinets, and false ceilings across the world. The PVC board is seen in **Figure 3.9.**

Figure 3.9. PVC Board [14].

3.8 Servo Motor

Plastic gears are used on the SG91. The case weighs 9 grams and is blue. For helicopters, 3D-flyers, and F3A, this is the Tower Pro Micro Servo. It is light. As a result, we're employing it to draw up or down the toll plaza entryway gate. It includes a 3-wire power and influence cable as well as mounting hardware. The servo motor is seen in **Figure 3.10.**

Figure 3.10. Servo Motor [15].

3.9 Battery

Batteries are made up of one or so more cells that produce an electron flow in a circuit through chemical processes. An anode (the '-' side), a cathode (the '+' side), and some sort of electrolyte are the three fundamental components of all batteries (a substance that chemically reacts with the anode and cathode). The battery is seen in **figure 3.11.**

Figure 3.11 Battery [16].

3.10 Vero Board

Veroboard is a trademark of stripboard, a pre-formed electronic circuit material consisting of iron strips on an insulating bonded paper board that was created in the early 1960s. It was created as a public material for use in the construction of electronic circuits, differentiating from the intent printed circuit (PCBs) in that a standard wire board may be used to manufacture a range of electronic circuits. The Vero board is seen in **Figure 3.12.**

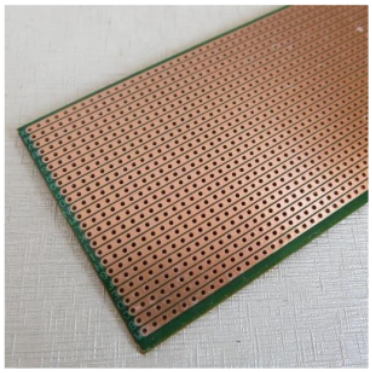

Figure 3.12. Vero Board [17].

3.11 Joystick

In a computer program, a joystick is an inputting device that controls a character or machine, such as a plane in a simulation model. They resemble the control mechanism seen on gameplay, although they almost usually include extra keys for further functionality. The image of a joystick is shown in **Figure 3.13.**

Figure 3.13. Joystick [17].

3.12 Push Button

A touching switch is a switch that can only be activated by an item touching it. It may be found in a variety of metal-clad lights and wall switches, as well as public computer terminals. On a display, a touchscreen consists of any number of touch switches. The most basic form of the tactile sensor is a touch switch. The push-button is seen in **Figure 3.14.**

Figure 3.14: Push Button [18].

3.13 Soler Cell

Solar panels are semi-conductor devices that generate energy from sunshine. They're made and processed in the same way that computer memory chips are. The photons released by the sun's beams are absorbed by solar cells, which are largely comprised of silicon. The method was first identified in 1839. The electrical connectors that connect one solar cell to the next are installed on silicon wafers that have been doped. Anti-reflective coating is applied to the resultant silicon disks. This layer prevents the loss of sunlight. After that, the solar panels are encased and mounted on an aluminum frame. To achieve quality control throughout time, the process must be continuously monitored. Following the production procedure. When it's finished, they're put through a final test to see how effective they are in regular situations. The solar cell is seen in **Figure 3.15.**

Figure 3.15. Soler Cell [18].

CHAPTER 4

SYSTEM DESIGN

4.1 Introduction

This project has been done by using a DC Motor, Relay Module and conveyer, and Arduino nano, Arduino Uno, Solar Cell, etc. The overall system design of this system has described below by using a proper circuit diagram, block diagram, flow chart.

4.2 Block Diagram

The charge control circuit can charge in two ways. one is a solar panel and another is by battery. At first, the Arduino Uno connected with the remote which consist of the RF, the joystick, and the push button. The main purpose of the RF is to receive the data from RF. And by the joystick, we can move the water vehicle in our desired direction. And the push button is for giving a command to the fish feeder and the conveyor system. The right part is about the body of our project which consists of the conveyor system, servo motor, and relay. The conveyor system is for collecting the garbage from the selected area the servo motor is for testing the fish feeder storage from 0 to 90 degrees & the last relay is for connecting the garbage system and the fish feeder system. **Figure 4.1** shows the Block Diagram of the system.

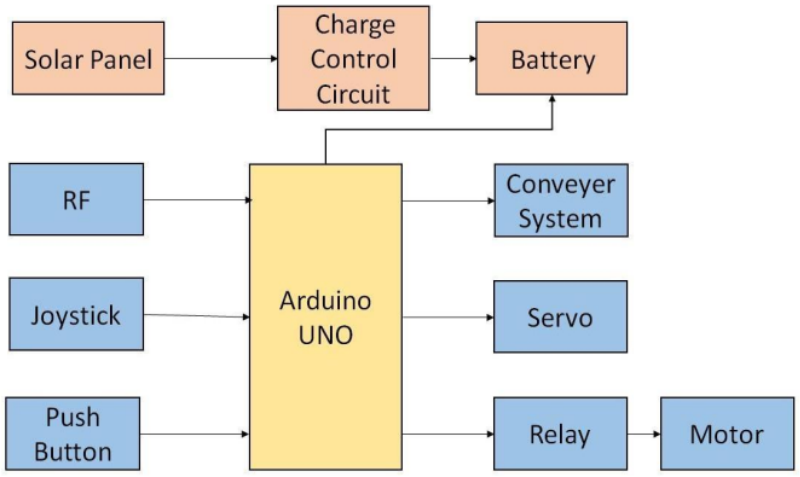

Figure 4.1: Block diagram of the main circuit.

4.3 Flow Chart of RF Boat Control

Initializing all compounds. Then turn on the joystick. Data of analog signal input will be transferred through the RF transmitter of the microcontroller. RF receiver will receive the data. The data will go to the motor drive through the microcontroller. If joystick value Y>0 it moves forward. If joystick value Y<0 then it moves backward. If joystick X>0 then it moves right. If joystick value x<0 then it moves left. **Figure 4.2** shows the flow chart of RF boat control.

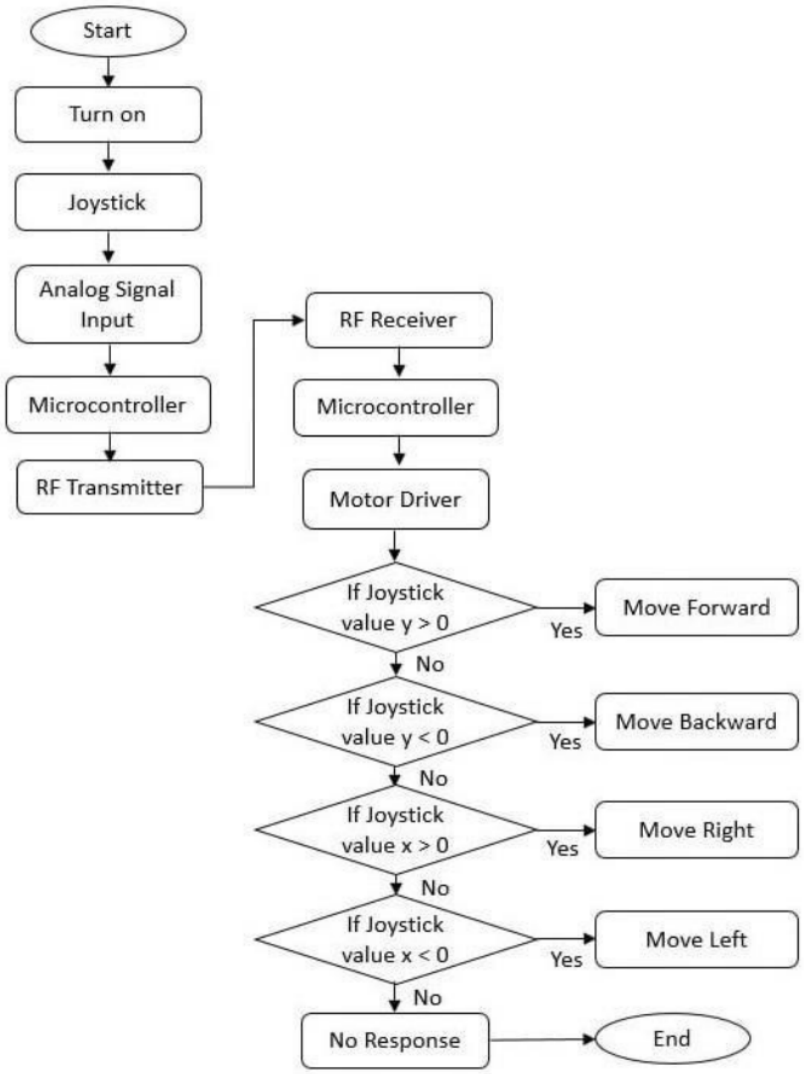

Figure 4.2: Flow Chart of RF Boat Control.

4.4 Flow Chart of Fish Feeding System

Initializing all compounds. Give commands to move forward check for garbage. If garbage is detected then the conveyor will become active. Collect the garbage. If the container is full it stops the garbage detection. If the container does not full then it will be checked for garbage again. The operation is ended. **Figure 4.3** shows the Flow chart of the Garbage Collection System.

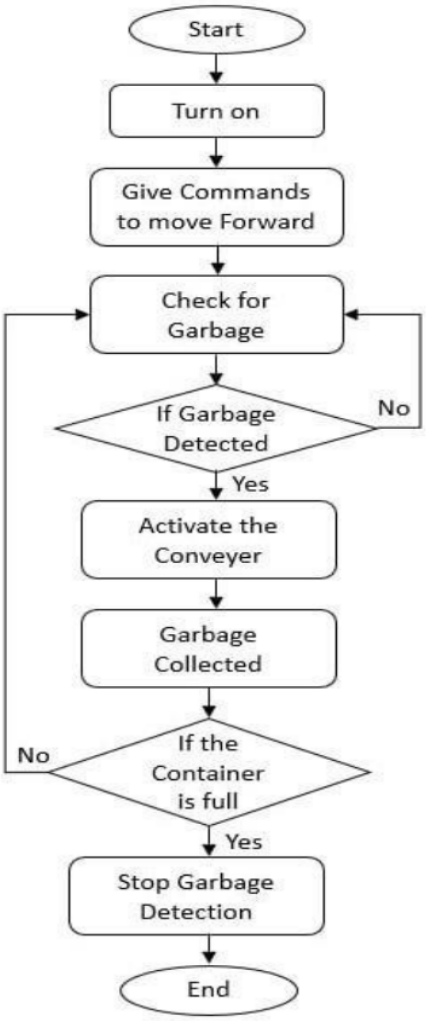

Figure 4.3: Flow chart of Garbage Collection System.

4.5 Flow Chart of Fish Feeding System

Initializing all compounds. Active the servo motor. Then food will release in 60 seconds. After stopping releasing food. End the operation of the fish feeding system. **Figure 4.4** shows the Flow chart of the Fish Feeding system.

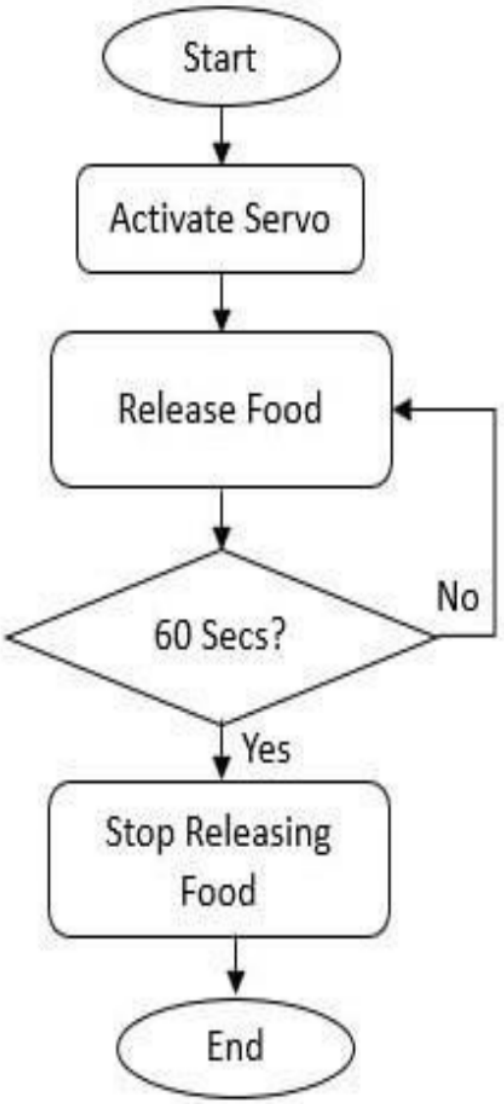

Figure 4.4: Flow chart of the Fish Feeding system.

4.6 Circuit Diagram (Body)

Here we have an RF receiver output pin that is connected with the Arduino D7 pin. We have used Relay and yellow motor. A wire of the motor will be connected to the common pin of the relay. The ground pin of the relay has to connect. Same as the 5v pin of the relay have to connect all. In this stage, Arduino connects with the coil pin of the relay. The relay RL_1, RL_2, RL_3, RL_4 are connected to the D_6, D_5, D_4, D_3 pins of the Arduino. We used the RL_5 relay for the dust collector & it connected with the D10 pin of the Arduino. here also used the servo motor for the fish food feeder area. Here the outside pin of the servo motor is connected to the D9 pin of the Arduino. **Figure 4.5** shows the circuit diagram of the body.

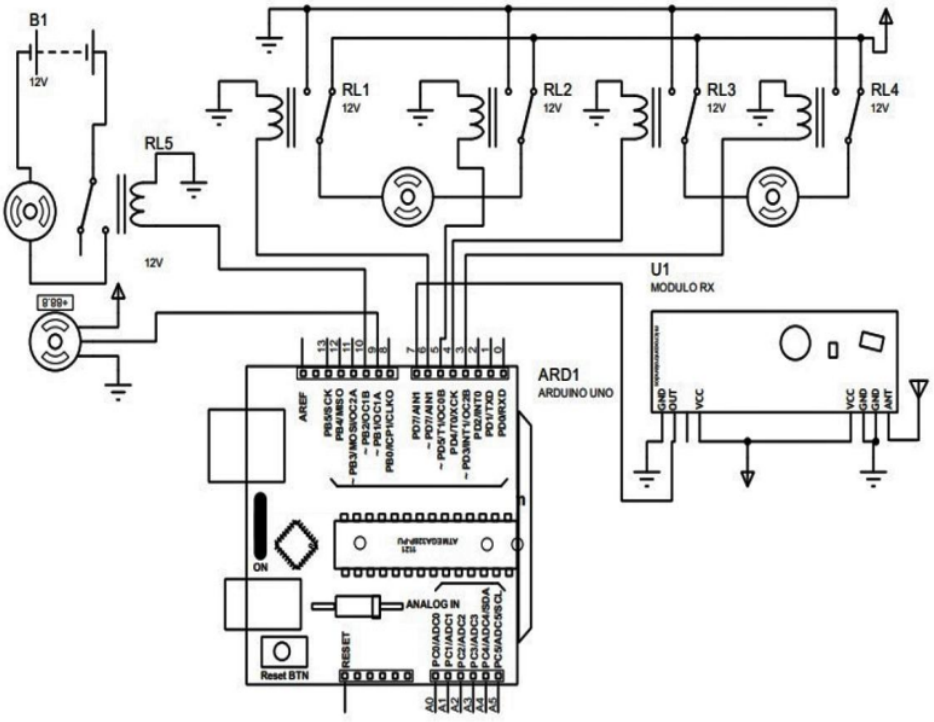

Figure 4.5: Circuit diagram of the body.

4.7 Circuit Diagram (Remote)

In this circuit diagram, the pin of the joystick X&Y axis is connected with Arduino's A_1 & A_3 pin. The transmitter is connected with Arduino's D_{11} pin. Here we have used two push switches of feeder & cleaner are connected to the D_5 and D_2 pins of the Arduino. We also have used an indicator light and the indicator light of the feeder & cleaner are connected to the D_8 and D_3 pins of the Arduino. **Figure 4.6** shows the circuit diagram of the remote.

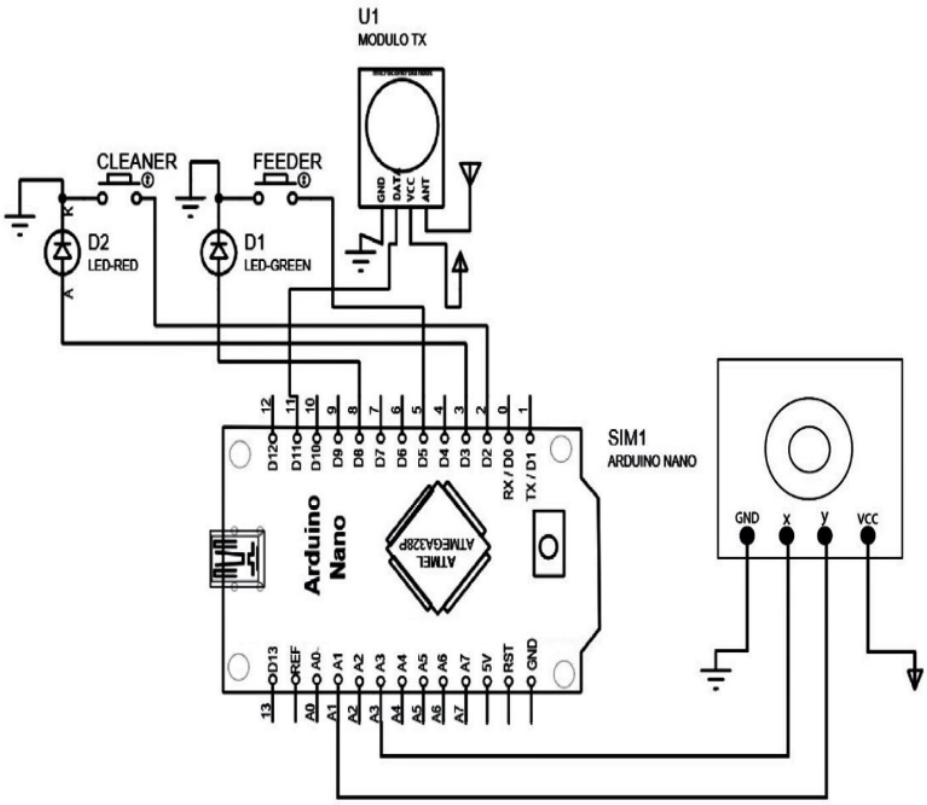

Figure 4.6: Circuit diagram of the remote

CHAPTER 5

SYSTEM IMPLEMENTATION AND RESULT

5.1 Introduction

In this chapter, the total output and results of this project are discussed. After completing the entire system, our project has worked perfectly during the experiment. We have done some experiments to determine the working capacity and efficiency of the project.

5.2 Project Overview

5.2.1 Project full setup

This project aims to collect dust or trash from the waster by the conveyer. The system is can be driven by solar energy or AC. It also measures the distance by the sonar sensor. **Fig 5.1** indicates the full setup of this project.

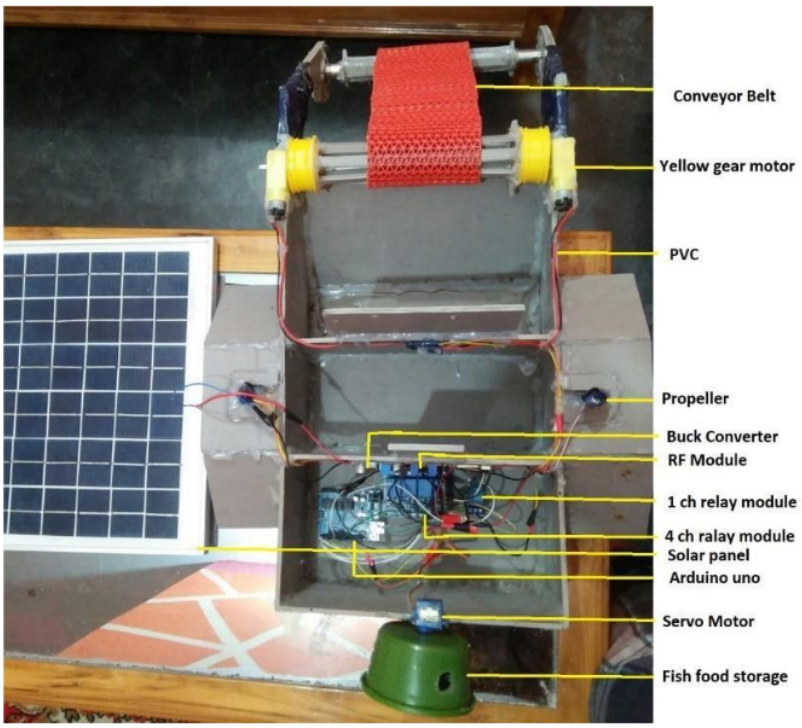

Figure 5.1: Project Full Setup.

5.2.1 Remote Performance

Here we can see the setup of the remote part where the remote was contributed with an antenna which worked for transferring and receiving the signal, the TX module which worked for transfer data, the LEDs are for giving the signal to cleaner and feeder**.** Red light is the main light which indicates the remote is on and it is working. Whenever the red light is off, the remote is not working. When press the yellow light push button, Then yellow light is on which indicates the working procedure of the conveyer belt. It means the conveyer belt is on and it collects the waster in water. Similarly, when pressing the green light push button, then the green light is on which indicates the working procedure of the fish feeder system. It means servo motor is working and it pure on the fish food in the water. **Figure 5.2** shows the remote performance of the project.

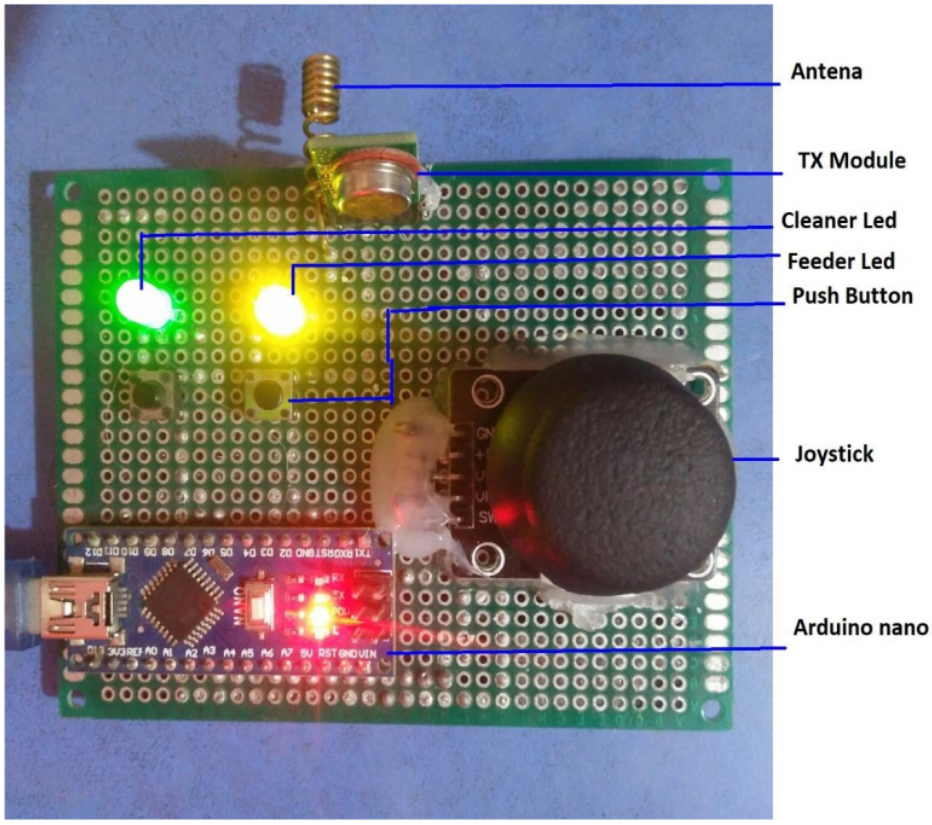

Figure 5.2: Remote Performance

5.2.3 Objective justification

In general terms, the present invention relates to a stationary, Solid waste Screening or skimming vessel for collecting waste from flowing waterways using a conveyor belt. The belt is fixed by two rollers and connected with a motor. Waste is collected by the conveyor belt into a vessel/basket After fulfilling the basket/vessel by collecting waste then derbies are transferred to the land or a specific area. The motor of the belt conveyor is powered by a battery of 12 volts. This waste collector boat can operate by a remote control system from a long distance. Besides it also provide food to the fishes in the selected area. When it is needed to supply the foods the food storage is twisted to supply the food. And then when it's completed to supply the food it's closed by the push button of the remote. **Figure 5.3** shows the remote performance of the project

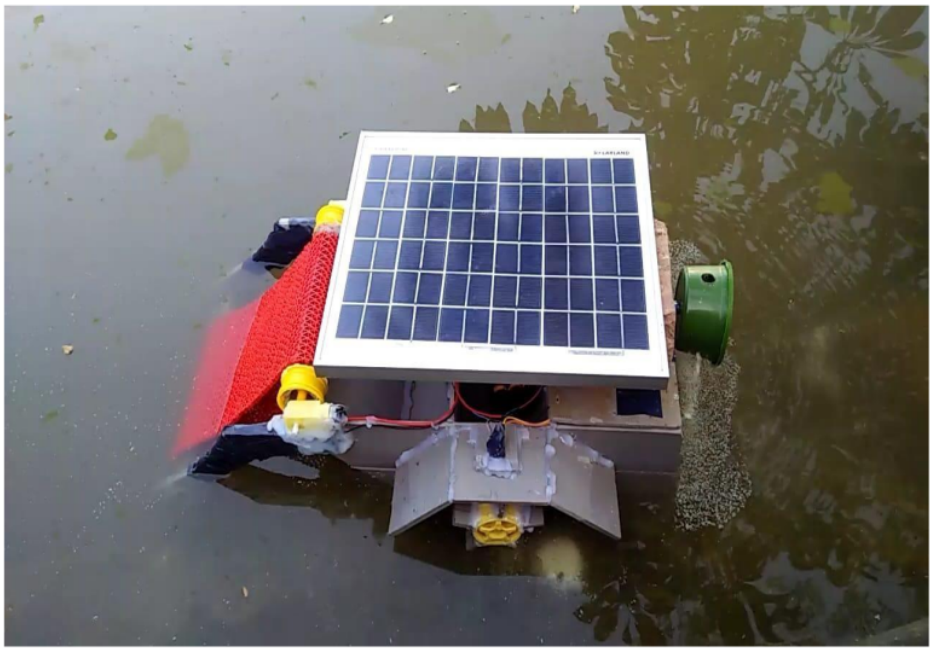

Figure 5.3: Water waste collector with fish feeder.

5.3 Cost Analysis

Our project is very costly as it is normally used for industrial purposes. This project has cost more than 10,000 takas, If we want to reduce the cost, then we need to reduce or replace some equipment. But it will bring down the performance of the project. Since this is the basic idea of water waste collectors for industrial purposes, it is

important to use good and long-lasting equipment. The total cost of this project is shown in **table 5.1**.

Table 5.1: Cost analysis of this project.

Sl. No.	Particular	Quantity	Price (BDT)
01	Arduino Uno	1	540.00
02	Arduino Nano	1	350.00
03	4 channel relay module	1	250.00
04	1 channel relay module	1	80.00
05	Yellow Dc motor	4	320.00
06	RF module	1	250.00
07	Conveyer Belt	1	200.00
08	Servo motor	1	215.00
09	Battery	1	900.00
10	Vero board	1	80.00
11	Joystick	1	120.00
12	Push-button	1	4.00
13	PVC Board	1	900.00
14	Solar panel	1	640.00
15	LED	2	36.00
	Total		4,849.00

5.4 Cost Comparison

As per our research, when compared to related projects published in renowned journals and articles, we conclude that this article is ‘Development of water trash collector [3] the approximate cost of this project is around BDT25,000. The main key feature of this project is designing the high stability of the Water Trash Collector (WTC) model and fabricating this vehicle with the high stainless-steel material. The catamaran model is the suitable hull-type to collect a load of garbage on the water surface. Besides, the objective for the electrical part is to develop the remotely WTC by using the Skyfly controller and battery as the main power source. 3D Catamaran model is sketched in Siemen NX10 software based on USV element information gathered. Trash Bin collector and waterwheel are added in the design for collecting purposes and movement respectively. Then another journal ‘Design & Construction of River Cleaning Mechanism [4] the approximate cost of this project is around BDT12,000. reduce water pollution by cleaning water resources, thereby helping the environment. In addition to that one of its secondary aims include remotely controlling the system a reducing the human interaction with the polluted water thereby reducing the diseases which can affect them. The working principle of our system viz. using conveyors, chain drive, coupling & motors for cleaning & collecting the river waste is by far the most ‘Effective’ method. Also, the use of the remote controller to control the entire system further increases the effectiveness.

After analyzing possible journals and papers and comparing them to our project, we have concluded that the projects included both fish feeders and trash collectors. It can be used for the double task. In our project, we can charge it with a solar panel which is an unlimited source. That is why the cost behind our project is less than the other project.

CHAPTER 6

CONCLUSION

6.1 Introduction

This is the final chapter of this project report. In this chapter, we will discuss the conclusion of the project. We will also discuss the limitations, future improvements, applications, and advantages of this project.

6.2 Conclusion

This project emphasizes providing flexibility in operation. This is easy to operate and the cost of maintenance is low. Hence this project "Remote Operated Floating River Cleaning Machine" is mostly designed to make the system very much economical and helpful to remove water impurities like plastics, trashes, water debris which is floating on river and pond surface. This is mainly very useful in maintaining human health and for increasing the life of aquatic animals. This project design and analysis of river water waste collector and fish feeder are fabricated based on literature and research on different journals and paper relevantly available and fabricated in accordance so it can provide flexibility in operation. This innovation is easy and less costly and has a lot of room to grow more economically. This project "River water Waste Collector and fish feeder" is designed with the hope that it is very much economical and helpful to river and lake cleaning. From this project, we not only clean the river but we can ensure the food of the selected area. We operated it by a solar panel. Based on its design and estimating cost and availability it is very cheap and very useful for society.

6.3 Advantages

1) Initial & maintenance cost is less.

2) It is very useful for small as well as big lakes, rivers where garbage is present in the large amount.

3) Easy replacement and installation of various parts

4) Skill workers are not required to drive the system self-propel.

5) Environment-friendly system.

6.4 Disadvantages

6) The waste collecting capacity of the machine is limited at a time.

7) This machine can collect the waste which is only floating at water level.

6.5 Future Improvement

1) The machine can be designed for deep cleaning.

2) Solar panels used for providing power to the machine and engine can be used.

3) Remote controlling can be done.

4) At the place of fixed Pins, we can use movable fins.

5) This cleaning system is easy to operate and flexible.

6) This system is Eco-friendly.

7) This requires less manpower.

8) Waste collecting capacity is limited.

9) Only useful to collect waste which is floating on the river surface.

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APPENDIX

Receiver code

```
This #include <VirtualWire.h>
#include <Bounce2.h>
#define feederPin 8
#define feederLed 5
#define cleanerPin 2
#define cleanerLed 3
Bounce feeder = Bounce(feederPin, 10);
Bounce cleaner = Bounce(cleanerPin, 10);
byte feederState = 0;
byte cleanerState = 0;
char data[2];

 void setup()
{
    vw_set_tx_pin(11);
    vw_setup(2000);
    Serial.begin(9600);
    pinMode(A1, INPUT);
    pinMode(A3, INPUT);
    pinMode(feederPin, INPUT_PULLUP);
    pinMode(cleanerPin, INPUT_PULLUP);
    pinMode(feederLed, OUTPUT);
    pinMode(cleanerLed, OUTPUT);
    digitalWrite(feederLed, LOW);
    digitalWrite(cleanerLed, LOW);
 }
    void loop()
{
    String val;
    command(val);
```

```
      Serial.println(val);
      val.toCharArray(data,2);
      vw_send((uint8_t *)data, strlen(data));
      vw_wait_tx();
      delay(10);
 }
  void command(String &value)
{
    int x = analogRead(A1);
   int y = analogRead(A3);
   feeder.update();
   cleaner.update();
   if (y <= 400) {
        value = "F"; // F = FORWARD
}
   to     else if (y >= 600) {
  value = "B"; // B = BACKWARD
}
  else if (x >= 600) {
  value = "R"; // R = RIGHT
}
  else if (x <= 400) {
  value = "L"; // L = LEFT
}
  provide}
  else if (feeder.fallingEdge() && (feederState == 0)){
  digitalWrite(feederLed, HIGH);
  value = "a"; // a = feeder on
 feederState = 1;
}
 else if (feeder.fallingEdge() && (feederState == 1)){
digitalWrite(feederLed, LOW);
value = "b"; // b = feeder off
feederState = 0;
```

```
}
   else if (cleaner.fallingEdge() && (cleanerState == 0)){
   digitalWrite(cleanerLed, HIGH);
   value = "c"; // c = cleaner on
   cleanerState = 1;
}
   else if (cleaner.fallingEdge() && (cleanerState == 1)){
   digitalWrite(cleanerLed, LOW);
   value = "d"; // d = cleaner off
   cleanerState = 0;
}

   else if (x >= 600) {
   value = "R"; // R = RIGHT
}

    else if (x <= 400) {
    value = "L"; // L = LEFT
}
   else if (feeder.fallingEdge() && (feederState == 0)){
   digitalWrite(feederLed, HIGH);
   value = "a"; // a = feeder on
   feederState = 1;
}
   else if (feeder.fallingEdge() && (feederState == 1)){
   digitalWrite(feederLed, LOW);
   value = "b"; // b = feeder off
   feederState = 0;
 }
    else if (cleaner.fallingEdge() && (cleanerState == 0)){
    digitalWrite(cleanerLed, HIGH);
    value = "c"; // c = cleaner on
    cleanerState = 1;
 }
    else if (cleaner.fallingEdge() && (cleanerState == 1)){
    digitalWrite(cleanerLed, LOW);
```

```
    value = "d"; // d = cleaner off
    cleanerState = 0;
  }
}
```

Remote code

```
#include <VirtualWire.h>
#include <ServoTimer2.h>
#define feederPin 9
#define cleanerPin 10
#define MR1 4
#define MR2 3
#define ML1 6
#define ML2 5
int feederPos;
boolean feederState = false;
boolean State = false;
unsigned long previousTime;
ServoTimer2 feeder;
void setup()
{
   Serial.begin(9600);
   pinMode(cleanerPin, OUTPUT);
   pinMode(MR1, OUTPUT);
   pinMode(MR2, OUTPUT);
   pinMode(ML1, OUTPUT);
   pinMode(ML2, OUTPUT);
   vw_set_rx_pin(7);
   vw_setup(2000);
   vw_rx_start();
```

```
    feeder.attach(feederPin);
    feeder.write(750);
    digitalWrite(cleanerPin, HIGH);
    digitalWrite(MR1, HIGH);
    digitalWrite(MR2, HIGH);
    digitalWrite(ML1, HIGH);
     digitalWrite(ML2, HIGH);
  }
     void loop()
  {
    uint8_t message[VW_MAX_MESSAGE_LEN];
    uint8_t messageLen = VW_MAX_MESSAGE_LEN;
    feederOpener(feederState);
    if (vw_get_message(message, &messageLen)){
    if ( message[0] == 's' ){
    Serial.println("STOP");
    digitalWrite(MR1, HIGH);
    digitalWrite(MR2, HIGH);
    digitalWrite(ML1, HIGH);
    digitalWrite(ML2, HIGH);
  }
    else if ( message[0] == 'F'){
   Serial.println("F");
   digitalWrite(MR1, HIGH);
   digitalWrite(MR2, LOW);
   digitalWrite(ML1, HIGH);
   digitalWrite(ML2, LOW);
}
    else if ( message[0] == 'B'){
```

```
    Serial.println("B");
   digitalWrite(MR1, LOW);
   digitalWrite(MR2, HIGH);
   digitalWrite(ML1, LOW);
   digitalWrite(ML2, HIGH);
}
    else if ( message[0] == 'R'){
   Serial.println("R");
   digitalWrite(MR1, LOW);
   digitalWrite(MR2, HIGH);
   digitalWrite(ML1, HIGH);
   digitalWrite(ML2, LOW);
}
    else if ( message[0] == 'L'){
    Serial.println("L");
    digitalWrite(MR1, HIGH);
    digitalWrite(MR2, LOW);
    digitalWrite(ML1, LOW);
    digitalWrite(ML2, HIGH);
}
     else if ( message[0] == 'a'){
     Serial.println("Feeder ON");
     feederState = true;
}
     else if ( message[0] == 'b'){
     Serial.println("Feeder OFF");
     feederState = false;
     feeder.write(750);
}
```

```
        else if ( message[0] == 'c'){
        Serial.println("Cleaner ON");
        digitalWrite(cleanerPin, LOW);
    }
        else if ( message[0] == 'd'){
        Serial.println("Cleaner OFF");
        digitalWrite(cleanerPin, HIGH);
    }
        else if ( message[0] == 's' ){
        Serial.println("STOP");
        digitalWrite(MR1, HIGH);
        digitalWrite(MR2, HIGH);
        digitalWrite(ML1, HIGH);
        digitalWrite(ML2, HIGH);
    }
  }
}
        void feederOpener(boolean i)
  {
        if (i == true){
        unsigned long currentTime = millis();
        if (currentTime - previousTime >= 300){
        if(State == true){
        State =! State;
        feeder.write(1500);
    }
        else {
        State =! State;
        feeder.write(750);
     }
```

```
        previousTi
        me =
        currentTim
        e;

      }

    }
```

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