IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 7, May 2022
Impact Factor: 6.252

IoT Based Water Pollution Monitoring RC Boat

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Abstract: *Nowadays there is an ever increasing strain regarding the provision of clean, consumable water. This problem especially arises in rural areas due to the ineffectiveness of the governments and the increasing population in the country. Therefore, this particular project aims to detect and display real-time physicochemical quality of the water in a much more cost effective manner, as opposed to the current methods which involve sampling and laboratory methods, through its wireless, multi-sensor network. It takes into consideration multiple factors and presents this real-time quality through the display of its electrical conductivity, pH, total dissolved solids TDS, turbidity, as well as temperature of water that is being tested. Additionally, this remote control system is specially designed for lakes, reservoirs, rivers etc. where we cannot monitor water quality in such complicated scale water environments by just using a stationary system because water parameters vary at every single location. To avoid this, we manufactured a boat which can float and move on the water simply by user controller. This structure is designed as a hull shape which minimizes the resistivity of water flow and this shape also maintains the stability of water. This water quality monitoring boat includes an embedded global positioning system GPS which gives the location of the point wherever water quality is varying and radio frequency module for wireless communication. All the results are generated and displayed with their readings and their graphical analogue meters through the graphical user interface GUI technique, along with water's impurities limitation points and its hazardous level notification. It is proven through various tests conducted in reservoirs, lakes and personal water storage tanks that this project is successfully capable of demonstrating these physicochemical parameters as well as displaying these readings effectively*

Keywords: Remote Control.

I. INTRODUCTION

Water quality plays a very important part in the health of animals and human beings. Lakes and reservoirs, canals are one of the major sources of drinking water. The first step towards water pollution control is to be able to monitor the actual level of water pollution. The problem with water pollution monitoring is the manual effort of taking a boat through a lake or reservoir each time to monitor pollution throughout the water body.

So we here design a solution for easy water quality checking of vast water bodies with ease. This RC water pollution monitor boat allows for recording as well as transmitting water quality data to an IOT server online. This will further help us to maintain the water clean. This project is remote-operated and controlled by an RC remote using which it can be maneuverer accordingly, a motorized propeller system to provide the forward propulsion and servo motor arrangement to provide with the steering using a rudder.

We have two sensors to determine water quality, we include PH sensors as well as turbidity sensor and a dissolved oxygen sensor. These sensors will detect the presence of suspended particles in the water. We also have a GPS module and micro SD card, which will log the data from sensors as well as GPS locations as well as transmit the same online over IOT at particular intervals.

Thus the water quality monitoring rc boat can be used for water quality monitoring on lakes and reservoirs with ease.

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II. LITERATURE REVIEW

WATER QUALITY MONITORING SYSTEM USING IOT

By:Dr. Nageswara Rao Moparti Associate Professor in Dept. of CSE. Velagapudi Ramakrishna Siddhartha Engineering College, Vijayawada, Andhra Pradesh, India
Ch. Mukesh Assistant Professor in Dept. of CSE.
Velagapudi Ramakrishna Siddhartha Engineering College, Vijayawada, Andhra Pradesh, India
Dr. P. Vidya Sagar Associate Professor Dept. of Information Techno.
Velagapudi Ramakrishna Siddhartha Engineering College, Vijayawada, Andhra Pradesh, India
Review: Using an arduino board for finding ph value and fsm module for message technique.

Real Time Water Quality Monitoring Boat

By, Moez ul Hassan ,Sanjay Kumar ,Hitesh Kumar , Kabir Kumar , Sarmad Hameed and Kiran Fatima.
Presented at Environment, Green Technology and Engineering International Conference (EGTEIC 2018), Caceres, Spain, 18–20 June 2018.
Review: The implemented system has conductivity, TDS, pH, temperature, turbidity sensors from first principle standards.

Water Pollution Monitoring Boat Based on IOT (NODE MCU)

BY: V. VENKATESH, K. ROJA SHANKAR NAIDU, M. PAVAN KUMAR, S. RAMARAO, B. GANESH.
Final Year B. Tech Students, Department of Mechanical Engineering, Sankethika Engineering College.
Review : They are using two sensors, namely PH and turbidity sensors which will detect the presence of suspended particles and PH range of the water. The values are viewed on our mobile through Blynk application through mobile hotspot. Thus, the water pollution monitoring boat using IOT can be used for water quality monitoring on lakes and rivers with ease.

Online Monitoring Of Water Quality Using Raspberry Pi3 Model

B M. B. KALPANA M.
Tech Student Department of Electronics & Communication Engineering (Embedded Systems) CVR College of Engineering, Ranga Reddy Dist,Hyderabad
Review: This can monitor the ph and turbidity levels.

Automated Water Quality Monitoring IOT System for Small-scale Aquaculture Farms

By, Aishwarya Girish Menon, and Prabhakar Menon ,Department of Computing and Information Technology, REVA University, Bangalore, India.
Review : This proposed IoT System uses Arduino development board with sensors for cost effectiveness and provides a real time monitoring environment whereby data is collected from certain specified areas of the pond every few hours and sent as an SMS via the GSM module to the farmer's mobile along with a warning in case any of the parameters.

Water Quality Monitoring System Based on IOT

By: Vaishnavi V. Daigavane and Dr. M.A Gaikwad Department Electronics & Telecommunication Engineering, Mtech(VLSI), Bapurao Deshmukh College of Engineering, Sevagram, wardha_442102(M.S.).
Review: The parameters such as temperature, PH, turbidity, flow sensor of the water can be measured.The measured values from the sensors can be processed by the core controller.

IoT-based Automated Pond Water Quality Monitoring System for Aquaculture Farms

By, A. Menon, M. Prabhakar at 2021 8th International Conference on Computing for Sustainable Global Development (INDIACom)
Review : The proposed Internet of Things (IoT) based System in this paper works on Arduino development board and its sensors for obtaining a real-time cost-effective monitoring system.

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Water Quality Monitoring System using RC Boat with Wireless Sensor Network

By: Mr. Aakash Pramod Adake , Dr. Manasi Dixit M.Tech in Electronics and Telecommunication Engineering, Professor in Department of Electronics Engineering,Department of Electronics Engineering, Kit's College of Engineering (Autonomous), Kolhapur Maharashtra, India

Review: The aim of this project is to implement the RC boat and get the real time water quality using different wireless sensors such as Ph sensor, Turbidity sensor, water temperature sensor and air temperature and humidity sensor etc. This paper presents the different sensors interfaced to the controller (raspberry pi 3) and uploads the data to the cloud based server (thingspeak). The proposed system contains a camera which shows the visual output to find the location of the boat.

Smart Water Quality Monitoring System

By: A.N.Prasad, K. A. Mamun, F. R. Islam, H. Haqva School of Engineering and Physics University of the South Pacific Laucala, Fiji Islands

Review: This paper presents a smart water quality monitoring system for Fiji, using IoT and remote sensing technology.

Intelligent IoT Based Water Quality Monitoring System

By: Soundarya Pappu, Prathyusha Vudatha, Niharika.A.V, Karthick.T and Suresh Sankaranarayanan Department of Information Technology, SRM University, Kattankaluthur Campus, Chennai, India.

Review: The system here employs a PH sensor and TDS meter for measuring the water quality parameters pertaining to hydrogen ion and total dissolved solvents. In addition, machine learning algorithm K-Means clustering has been employed for predicting the quality of water based on trained data sets from different water samples.

SMART WATER-QUALITY MONITORING SYSTEM BASED ON ENABLED REAL-TIME INTERNET OF THINGS

By: ALI J. RAMADHAN Department of Computer Techniques Engineering, College of Technical Engineering, University of AlKafeel, Najaf 31001, Iraq

Review: The system affords remote- and smart-monitoring capabilities to determine water pH level; temperature; nitrate, chloride, and dissolved oxygen concentration; turbidity; oxidation-reduction potential (ORP); conductivity or total dissolved solids (TDS) and sodium content.

Internet of things enabled real time water quality monitoring system.

By: S. Geetha* and S. Gouthami Department of Electrical and Electronics Engineering,Coimbatore Institute of Technology, Coimbatore 641014, India.

Review: The model developed is used for testing water samples and the data uploaded over the Internet are analyzed. The system also provides an alert to a remote user, when there is a deviation of water quality parameters from the pre-defined set of standard values.

Real-Time Water Quality Monitoring System

By: Yashwanth Gowda K.N, Vishali C, Sumalatha S.J and Spoorth G.B 8 th semester, CSE student, Guide: N Ganeshan, Asst. prof Viswesvaraya Technological University, Belagavi, Karnataka, India

Review: In this system, three sensors are used to measure the essential water parameters. The most essential water parameters needed to be monitored by the average users are water pH level, water turbidity (cloudiness) and water temperature which is a measurement of the amount of the water in a container.

IoT based smart water quality monitoring system

By, Varsha Lakshmikantha, Anjitha Hiriyannagowda, Aksh Manjunath, Aruna Patted, Jagadeesh Basavaiah , Audre Arlene Anthony a Dept. of Electronics and Communication Engineering, Vidyavardhaka College of Engineering, Mysuru, India

Review : In this paper, a detailed review of the latest works that were implemented in the arena of smart water pollution monitoring systems presented. The paper proposes a cost effective and efficient IoT based smart water quality monitoring

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system which monitors the quality.

Smart water quality monitoring system with cost-effective using IoT
By: Sathish Pasika , Sai Teja Gandla Department of Electronics and Communication Engineering Chaitanya Bharathi Institute of Technology, Hyderabad (TS), India.
Review: In this paper, the proposed system consists of several sensors to measure various parameters such as pH value, the turbidity in the water, level of water in the tank, temperature and humidity of the surrounding atmosphere.The obtained data is sent to the cloud by using IoT based Think Speak application to monitor the quality of the water.

Water Quality Monitoring System Using Wireless Sensor Network
By, Shruti Sridharan, International Journal of Advanced Research in Electronics and Communication Engineering (IJARECE) Volume 3, Issue 4, April 2014
Review: The application of wireless sensor network (WSN) for water quality monitoring is composed of a number of sensor nodes with networking capability. Such monitoring systems can be set up emphasizing on the aspects of low cost, easy ad hoc installation, easy handling and maintenance.

Smart water quality monitoring system with cost-effective using IoT
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Review: In this paper, the proposed system consists of several sensors to measure various parameters such as pH value, the turbidity in the water, level of water in the tank, temperature and humidity of the surrounding atmosphere.The obtained data is sent to the cloud by IOT.

Water Quality Monitoring System Using Wireless Sensor Network
By, Shruti Sridharan, International Journal of Advanced Research in Electronics and Communication Engineering (IJARECE) Volume 3, Issue 4, April 2014
Review: The application of wireless sensor network (WSN) for water quality monitoring is composed of a number of sensor nodes with networking capability. Such monitoring systems can be set up emphasizing on the aspects of low cost, easy ad hoc installation, easy handling and maintenance.

IOT Based Water Quality Monitoring System
By: Mourvika Shirode, Monika Adaling, Jyoti Biradar, Trupti Mate
International Journal of Scientific Research in Computer Science, Engineering and Information Technology
Review: This method is time consuming, wastage of manpower, and not economical. The water quality measuring system that we have implemented checks the quality of water in real time through various sensors (one for each parameter: pH, conductivity, temperature, turbidity) to measure the quality of water. As a variation in the value of this parameter points towards the presence of pollutants. This system can keep a strict check on the pollution of the water resources and be able to provide an environment for safe drinking water.

IOT BASED WATER AND SOIL QUALITY MONITORING SYSTEM
By: R.Siva Kumar Research Scholar, Shri JJT University, Jhunjhunu, Rajasthan, India.
International Journal of Mechanical Engineering and Technology
Review: This system continuously monitors the contamination of the water assets, soil quality.

III. EXISTING SYSTEM

The existing system is used to measure the PH and turbidity level of water samples and further maintain the water clean. Existing system is controlled by the Arduino Mega, a propeller system to provide the forward propulsion and servo motor arrangement to control the boat by moving left or right using a remote controller. A 12V DC motor is used to rotate the

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propeller through a flexible bearing and shaft. Now we have used the steer to control as per controller instructions. Additionally, we have two sensors, namely PH and turbidity sensors which will detect the presence of suspended particles and PH range of the water. The values are viewed on the lcd display. Thus, the water pollution monitoring boat can be used for water quality monitoring on lakes and rivers with ease.

In the existing system they are using two sensors namely, turbidity sensor and pH sensor which are used to collect the information from the required water. These sensors are connected to the Arduino Mega. The water parameters data are sensed by the sensors and processed data is sent to the connected lcd display. The output is viewed on the lcd display through the microcontroller, through which information about water parameters is displayed. The sensor values are collected from the different solutions and conclude that they are safe for drinking water by means of PH range and turbidity values. They are using a joystick module on the transmitter to send data to the receiver over radio using the NRF24l01. The receiver receives the data and uses the digital pins as output to send the received data as a control signal.

3.1 BLOCK DIAGRAM

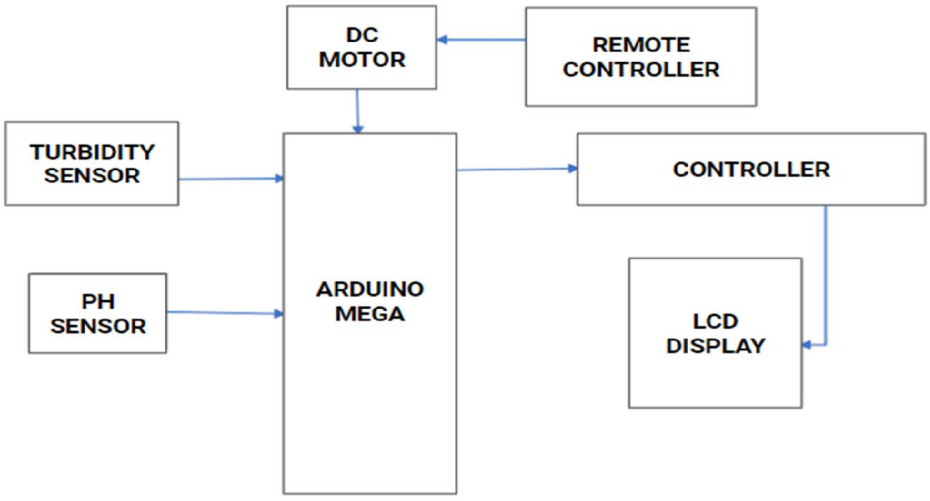

Fig 3.1 Block diagram of existing system model

3.2 EXISTING SYSTEM MODEL

Fig 3.2 Existing system model

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3.3 LIMITATIONS:

- They are not very efficient.
- Limited sensors are only used.
- Low range operation (about 100m only).
- Limited operating time.

IV. PROPOSED SYSTEM

So our proposed system designs a solution for easy water quality checking of vast water bodies with ease. This RC water pollution monitor boat allows for recording as well as transmitting water quality data to an IOT server online. This will further help us to maintain the water clean. This project is remote-operated and controlled by an RC remote using which it can be maneuverer accordingly, a motorized propeller system to provide the forward propulsion and servo motor arrangement to provide with the steering using a rudder. As per the commands received by the rc receiver the controller operates the DC motor which rotates the propeller through a flexible bearing and shaft. Now we have 2x direction control rudders attached to a servo motor used to steer the boat as per controller signals received.

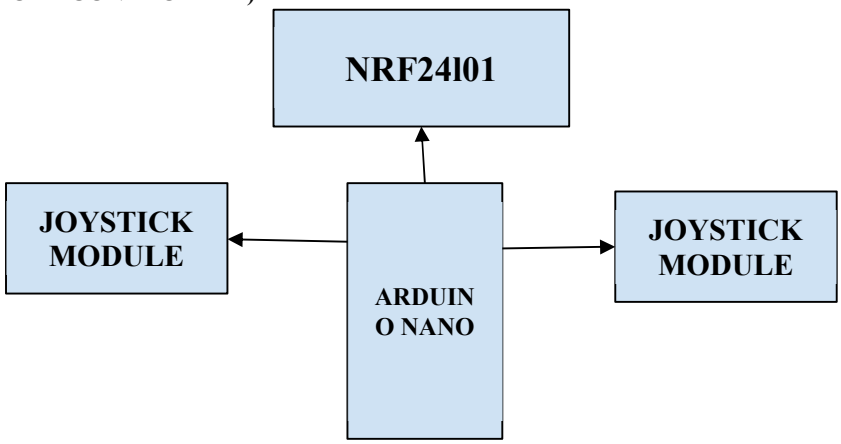
In this proposed system we are using two sensors to determine water quality, we include PH sensors as well as turbidity sensor and a temperature sensor. These sensors will detect the presence of suspended particles in the water. We also have a GPS module and micro SD card, which will log the data from sensors as well as GPS locations as well as transmit the same online over IOT at particular intervals.Thus the water quality monitoring rc boat can be used for water quality monitoring on lakes and reservoirs with ease.

Our Water pollution monitor boat provides the following advantages:

- Ph & Turbidity Sensing
- Temperature Sensing
- Long Range Remote Controlled Operation
- Data Logging as well as IOT Online Transmission
- Efficient Propeller Driven Navigation system
- Easy to operate

4.1 BLOCK DIAGRAM

MODULE 1 (REMOTE CONTROLLER)



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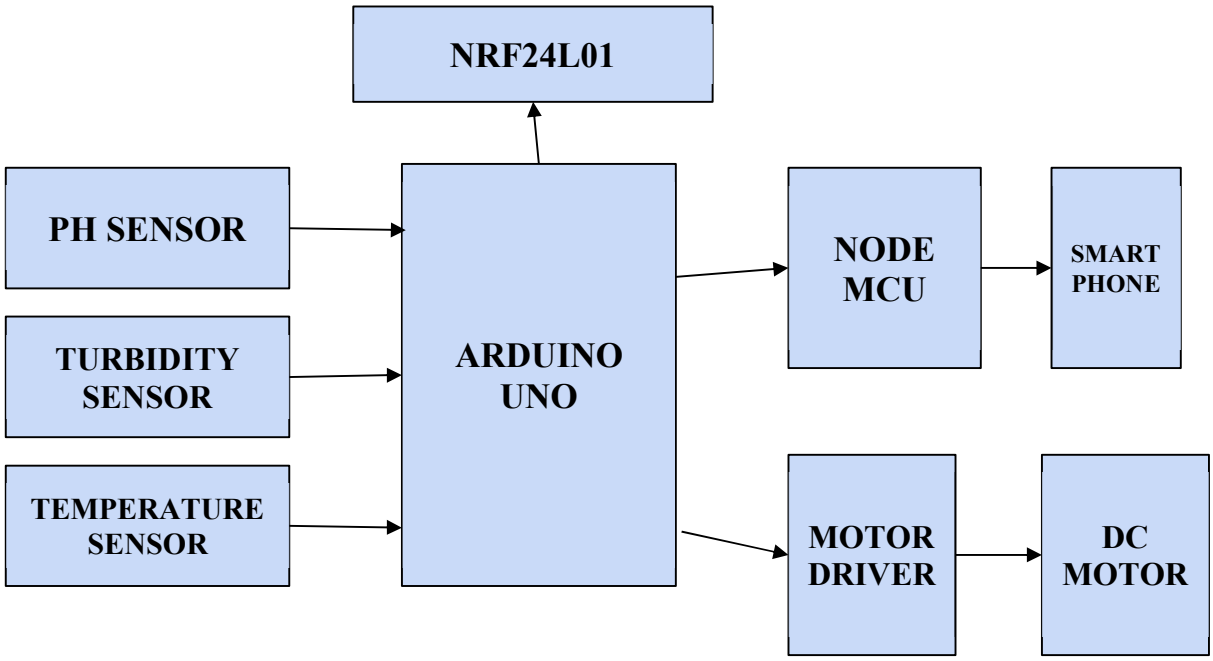
MODULE 2 (RC BOAT)



V. SOFTWARE EXPLANATION

5.1 ARDUINO IDE

The Arduino Integrated Development Environment (IDE) is a cross platform application (for Windows, macOS, Linux) that is written in functions from C and C++. It is used to write and upload programs to Arduino compatible boards, but also, with the help of third-party cores, other vendor development boards. The source code for the IDE is released under the GNU General Public License, version 2. The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures. User Written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub main () into an executable cyclic executive program with the GNU toolchain, also included with the IDE distribution. The Arduino IDE employs the program avrdude to convert the executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware. By default, avrdude is used as the uploading tool to flash the user code onto official Arduino boards. 7 Arduino IDE is a derivative of the Processing IDE, however as of version 2.0, the Processing IDE will be replaced with the Visual Studio Code-based Eclipse Theia IDE framework. With the rising popularity of Arduino as a software platform, other vendors started to implement custom open source compilers and tools (cores) that can build and upload sketches to other microcontrollers that are not supported by Arduino's official line of microcontrollers.

5.2 INTERNET OF THINGS

In the past decade, all humans' life changed because of the internet. The internet of things has been heralded as one of the major development to be realized throughout the internet portfolio of technologies. The Internet of Things (IOT) is concerned with interconnecting communicating objects that are installed at different locations that are possibly distant from each other. Internet of Things represents a concept in which, network devices have the ability to collect and sense data from the world, and then share that data across the internet where that data can be utilized and processed for various purposes. The internet of things describes a vision where objects become part of the internet: where every object is uniquely identified and access to the network. IOT communication is quite different from the traditional human to human communication, bringing a large challenge to existing telecommunication and infrastructure. Furthermore, IOT provides immediate

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information regarding access to physical objects with high efficiency. The concept of Internet of Things is very much helpful to achieve real time monitoring of sensor data. Internet of Things (IoT) is a kind of network technology, which is based on information sensing equipments such as RFID, infrared sensors, GPS,laser scanners, gas sensors and so on, can make anything join the Internet to exchange information, according to the protocol, which gives intelligent identification, location and tracking, monitoring and management. In proposing the system we introduce cloud computing techniques for monitoring sensor values on the internet. Cloud computing provides the access of applications as utilities,over the internet. The cloud computing characteristic and development approaches are explained. Cloud Computing is a large scale processing unit which processes in run time and it is also a very low cost technology based on the IP. The application area of IoT includes building and home automation, smart city projects, etc.

5.3 BLYNK IOT PLATFORM

Blynk is a new platform that allows you to quickly build interfaces for controlling and monitoring your hardware projects from your iOS and Android device. After downloading the Blynk app, you can create a project dashboard and arrange buttons, sliders, graphs, and other widgets onto the screen. Using the widgets, you can turn pins on and off or display data from sensors.

Whatever your project is, there are likely hundreds of tutorials that make the hardware part pretty easy, but building the software interface is still difficult. With Blynk, though, the software side is even easier than the hardware. Blynk is perfect for interfacing with simple projects like monitoring the temperature of your fish tank or turning lights on and off remotely.

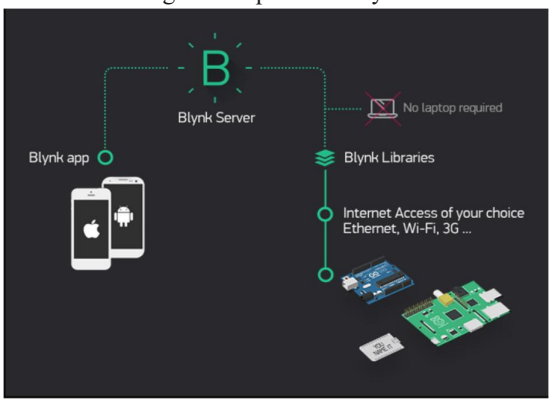

Fig 5.1 Blynk Iot Platform

VI. HARDWARE IMPLEMENTATION

6.1 CIRCUIT DIAGRAM

6.1.1 MODULE 1 (REMOTE CONTROLLER)

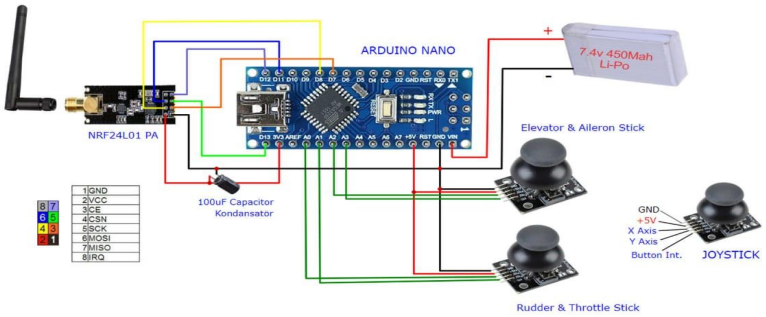

Fig 6.1 Circuit Diagram of Remote Controller

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6.1.2 MODULE 2 (RC BOAT)

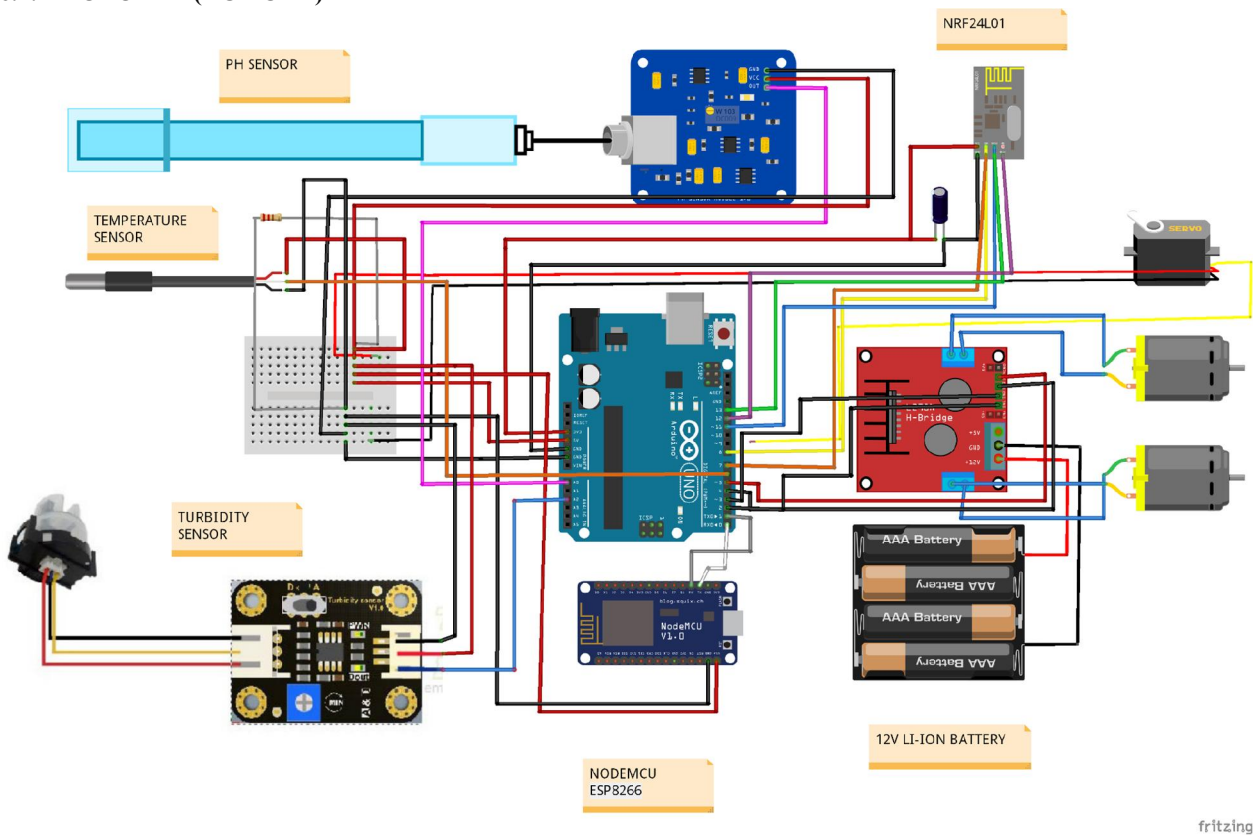

Fig 6.2 Circuit diagram of Rc Boat

6.2 LIST OF COMPONENTS

- Arduino Uno
- Arduino Nano
- Ph sensor
- Turbidity sensor
- Temperature sensor
- GPS module
- NRF24lo1 Transceiver
- Joystick module
- 12V DC Motor
- L298N Motor Driver
- MG90S Servo Motor
- Propeller
- Rudder
- Battery
- Capacitors
- Jumper Wires
- PCB and Breadboards

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6.2.1 Arduino Uno

Fig 6.3 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, Onboard 16 MHz ceramic resonator, Port for USB connection, Onboard DC power jack, An ICSP header and a microcontroller reset button. It contains everything needed to support the microcontroller.
The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 Atmega8U2 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.

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.

6.2.2 Arduino Nano

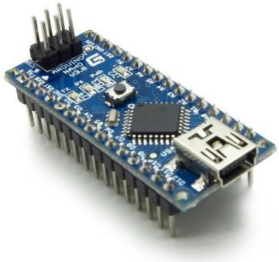

Fig 6.4 Arduino Nano

Arduino NANO Version 3 is the open source smallest Embedded Development board launched by Arduino based on Atmega328 SMD Package Microcontroller. It is a Surface mount Breadboard Friendly board integrated with Mini USB Port. DC Power Jack is not available on this Board, so power can be given through Mini USB Cable. It automatically senses and switches to the higher potential source of power, there is no need for the power select jumper.

Specifications:

- Microcontroller Atmel ATmega328 SMD Package
- Operating Voltage (logic level) 5 V
- Input Voltage (recommended) 7-12 V

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- Input Voltage (limits) 6-20 V
- Digital I/O Pins 14 (of which 6 provide PWM output)
- Analog Input Pins 8
- DC Current per I/O Pin 40 mA
- Flash Memory 32 KB
- SRAM 2 KB
- EEPROM 1 KB

6.2.3 PH Sensor

Fig 6.5 Ph Sensor

This pH sensor is commonly used to test the pH of a liquid as it measures the hydrogen-ion activity in water-based solutions. Wherever acidity and alkalinity testing is required, it is frequently employed in the chemical businesses, pharmaceutical industry, dye industry, and scientific research. This kit's drive board works with both 9V systems. It's also very easy to work with Arduino and Raspberry Pi thanks to the standard BNC probe interface and Grove connection. A Power Indicator LED, a BNC connector, and a PH2.0 sensor interface are all included.

To use it, simply connect the pH sensor to the BND connection and plug the PH2.0 interface into any Arduino controller's analog input port. If pre-programmed, you will get the pH value easily. Comes in a compact plastic box with foams for better mobile storage. The pH stands for the power of hydrogen, which is a measurement of the hydrogen ion concentration in the body. The human body has a standard pH level of 7.4, which is essential for the body to run effectively. If the composition of the body ever becomes too acidic or overly alkaline, it will look to return to the neutral state.

6.2.4 Turbidity Sensor

Fig 6.6 Turbidity Sensor

The turbidity of water refers to the degree of turbidity caused by suspended substances such as silt, clay, organic matter, plankton and microorganisms contained in the water. Industrial-grade turbidity sensors or turbidity meters are expensive, and the cost is too high in the design of electronic products. The sensor uses optical principles to comprehensively judge the turbidity through the light transmittance and scattering rate in the solution. Inside the sensor is an infrared tube. When light passes through a certain amount of water, the amount of light transmission depends on the degree of dirtiness of the water. The dirtier the water, the less light it transmits.

The receiving end converts the intensity of the transmitted light to the corresponding current size. The transmitted light is more and the current is larger. On the contrary, the transmitted light is less and the current is smaller.

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The turbidity sensor module converts the current signal output by the sensor into a voltage signal and performs AD conversion data processing through the single-chip microcomputer. The re-modelling module has analogue and digital output interfaces. The analogue quantity can be sampled and processed by the single-chip A/D converter to know the current water pollution.

6.2.5 Temperature Sensor -DS18B20

Fig 6.7 DS18B20 Sensor

This is a 1 Meter Long Waterproof, sealed and pre-wired digital temperature sensor probe based on the DS18B20 sensor. It is very handy for when you need to measure something far away, or in wet conditions. Because they are digital, you don't get any signal degradation even over long distances.

These 1-wire digital temperature sensors are fairly precise (±0.5°C over much of the range) and can give up to 12 bits of precision from the onboard digital-to-analog converter. They work great with any microcontroller using a single digital pin, and you can even connect multiple ones to the same pin, each one has a unique 64-bit ID burned in at the factory to differentiate them. Usable with 3.0-5.0V systems.

DS18B20 Sensor Technical specs:-

- Usable temperature range: -55 to 125°C (-67°F to +257°F)
- 9 to 12 bit selectable resolution
- Uses 1-Wire interface- requires only one digital pin for communication
- ±0.5°C Accuracy from -10°C to +85°C
- Temperature-limit alarm system
- Query time is less than 750ms
- Usable with 3.0V to 5.5V power/data

6.2.6 GPS Module

Fig 6.8 GPS Module

This is a complete GPS module that is based on the NEO-6M. This unit uses the latest technology to give the best possible positioning information and includes a larger built-in 25 x 25mm active GPS antenna with a UART TTL socket. A battery is also included so that you can obtain a GPS lock faster. This is an updated GPS module that can be used with ardupilot mega v2. This GPS module gives the best possible position information, allowing for better performance with your Ardupilot or other Multirotor control platform. The GPS module has serial TTL output, it has four pins: TX, RX, VCC, and GND.

Features NEO-6M GPS Module:-

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- 5Hz position update rate
- Operating temperature range: -40 TO 85°CUART TTL socket
- EEPROM to save configuration settings
- Rechargeable battery for Backup
- The cold start time of 38 s and Hot start time of 1 s
- Supply voltage: 3.3 V
- Configurable from 4800 Baud to 115200 Baud rates. (default 9600)
- Separated 18X18mm GPS antenna

6.2.7 NRF24lO1 Transceiver

Fig 6.9 NRF24l01 Transceiver

The NRF24L01 module is the latest in RF modules. This module uses the 2.4GHz transceiver from Nordic Semiconductor, the NRF24L01+. This transceiver IC operates in the 2.4GHz band and has many new features. This board features a reverse polarized SMA connector for maximum RF range. And there is PA and LNA circuit on board, with the external antenna it can reach a longer distance than the one without these parts.

This module comes with the 2.4G antenna (2DB), with 250Kbps transmission rate on open air it can reach the 800-1K meters communication distance.

Features :-

- It uses 2.4GHz global open ISM band, with license free.
- Transmit power is greater than +20 dBm.
- Support six-channel data reception.
- 2Mbit/s speed makes high-quality VoIP possible
- Multi-frequency points: 125 frequency points meet the needs of multi-point communications and frequency hopping.
- Low cost: integrated with high-speed signal processing parts associated with RF protocol, such as: automatically resend lost packets and generate acknowledge signal.

6.2.8 Joystick Module

Fig 6.10 Joystick Module

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International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
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This is a dual axis high quality JoyStick Module . It can be used to sense movements in 2 directions(axes). It also has an inbuilt switch which can be activated by pressing the stick.Directional movements are simply two potentiometers - one for each axis. Pots are ~10k each.

With the help of this Joystick Module, you can measure position coordinates on the X and Y axis by moving the "hat". It also contains a switch that is press-able by pushing the "hat".It also contains a switch that is press-able by pushing the "hat" down. Similar to the XBOX controller.

Specifications and Features:-

- Dimensions: 40 x 27 x 15 (LxWxH) mm
- Weight: 10gm (without Hat).
- 2.54mm pin interface leads
- Operating Voltage: 5V.
- Long service life and stable performance
- Standard interface and electronic building blocks
- Widely use in Arduino DIY projects
- Cross rocker as a two-way 10K resistor, with the rocker in a different direction

6.2.9 12V DC Motor (1000rpm)

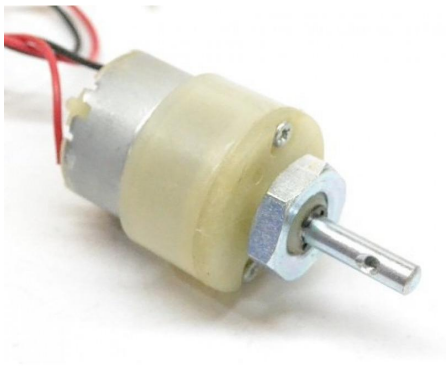

Fig 6.11 12v DC Motor

DC Motor – 1000 RPM – 12 Volts geared motors are generally a simple DC motor with a gearbox attached to it. This can be used in all-terrain robots and a 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.

The most popular L298N H-bridge module with onboard 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 driver module from the wide range available in our Motor divers category as per your specific requirements.

Specifications and Features:-

- RPM: 1000.
- Operating Voltage: 12V DC
- Gearbox: Attached Plastic (spur)Gearbox
- Shaft diameter: 6mm with internal hole
- Torque: 0.5 kg-cm
- No-load current = 60 mA(Max)
- Load current = 300 mA(Max).

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6.2.10 L298N Motor Driver

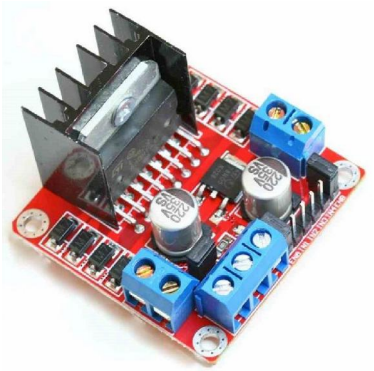

Fig 6.12 L298N Motor Driver

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 onboard 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).

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

6.2.11 MG90S Servo Motor

Fig 6.13 MG90S Servo Motor

The Tower pro MG90S Mini Digital Servo is 180° rotation servo. It is a Digital Servo Motor which receives and processes PWM signals faster and better. It equips sophisticated internal circuitry that provides good torque, holding power, and faster updates in response to external forces.The good optimized performance and reliability of our servos have made them the favorite choice of many RC hobbyists.

They are packed within a tight sturdy plastic case which makes them water and dust resistant which is a very useful feature in RC planes, Boats, and RC Monster Trucks etc. It has a 3-wire JR servo plug which is compatible with Futaba connectors too.

Specification :-

- Modulation: Analog
- Torque: 6.0V: 2.50 kg-cm
- Speed: 6.0V: 0.10 sec/60°
- Weight: 0.49 oz (14.0 g)

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
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- Dimensions: Length:0.91 in (23.1 mm), Width: 0.48 in (12.2 mm), Height: 1.14 in (29.0 mm)
- Gear Type: Metal
- Rotation/Support: Dual Bearings
- Rotational Range: 180°

6.2.12 Propeller

Fig 6.14 Propeller

A propeller (colloquially often called a screw if on a ship or an airscrew if on an aircraft), is a device with a rotating hub and radiating blades that are set at a pitch to form a helical spiral, that, when rotated, exerts linear thrust upon a working fluid, such as water or air. Propellers are used to pump fluid through a pipe or duct, or to create thrust to propel a boat through water or an aircraft through air. The blades are specially shaped so that their rotational motion through the fluid causes a pressure difference between the two surfaces of the blade by Bernoulli's principle which exerts force on the fluid. Most marine propellers are screw propellers with helical blades rotating on a propeller shaft with an approximately horizontal axis.

6.2.13 Rudder

Fig 6.15 Rudder

A rudder is a primary control surface used to steer a ship, boat, submarine, hovercraft, aircraft, or other conveyance that moves through a fluid medium (generally air or water). On an aircraft the rudder is used primarily to counter adverse yaw and p-factor and is not the primary control used to turn the airplane. A rudder operates by redirecting the fluid past the hull (watercraft) or fuselage, thus imparting a turning or yawing motion to the craft. In basic form, a rudder is a flat plane or sheet of material attached with hinges to the craft's stern, tail, or after end.

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6.2.14 Battery

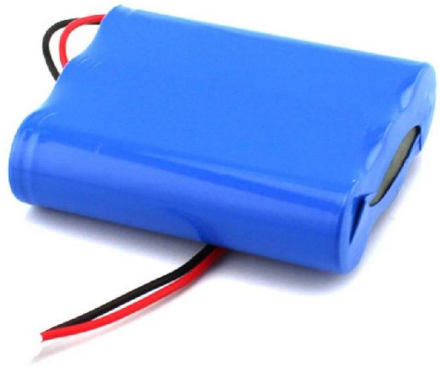

Fig 6.16 Battery

An electric battery is a source of electric power consisting of one or more electrochemical cells with external connections for powering electrical devices.

When a battery is supplying power, its positive terminal is the cathode and its negative terminal is the anode. The terminal marked negative is the source of electrons that will flow through an external electric circuit to the positive terminal. When a battery is connected to an external electric load, a redox reaction converts high-energy reactants to lower-energy products, and the free-energy difference is delivered to the external circuit as electrical energy. Historically the term "battery" specifically referred to a device composed of multiple cells; however, the usage has evolved to include devices composed of a single cell.

Batteries come in many shapes and sizes, from miniature cells used to power hearing aids and wristwatches to, at the largest extreme, huge battery banks the size of rooms that provide standby or emergency power for telephone exchanges and computer data centers.

Here we are using a 12V and a 9V battery.

6.2.15 Jumper Wire

FIg 6.17 Jumper Wire

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A jump wire (also known as jumper, jumper wire, DuPont wire) is an electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.
Individual jump wires are fitted by inserting their "end connectors" into the slots provided in a breadboard, the header connector of a circuit board, or a piece of test equipment.

6.2.16 Printed Dotted Board

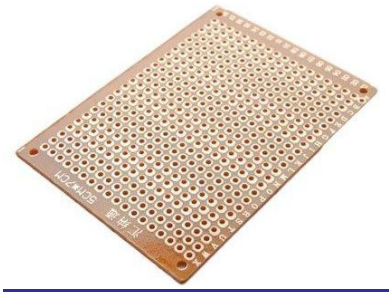

Fig 6.18 Printed Dotted Board

Perfboard is a material for prototyping electronic circuits (also called DOT PCB). It is a thin, rigid sheet with holes pre-drilled at standard intervals across a grid, usually a square grid of 0.1 inches (2.54 mm) spacing. These holes are ringed by round or square copper pads, though bare boards are also available.

6.2.17 Breadboard

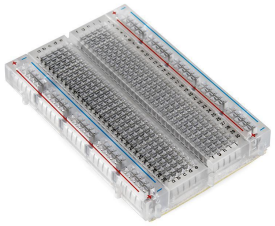

Fig 6.19 Breadboard

Breadboards are one of the most fundamental pieces when learning how to build circuits. In this tutorial, you will learn a little bit about what breadboards are, why they are called breadboards, and how to use one. Once you are done you should have a basic understanding of how breadboards work and be able to build a basic circuit on a breadboard.

VII. WORKING

In this project we are having two modules, the first module is a remote controller. This remote controller is used to control module 2. Module 1 has an Arduino Nano, NRF24L01, and two joystick modules. Arduino Nano is used as a microcontroller for controlling all the components used. The next component is a transceiver module called NRF24L01 is used to transmit and receive signals from the Module 2 and we are using two joysticks for controlling the movement of the rc boat.
Module 2 is the main part of this project. It's a RC Boat which has all the main components we are using for finding the quality of water. The RC Boat has components like Ph sensor, Turbidity Sensor, Temperature sensor, NodeMcu, Motordriver, 12V DC Motor, etc. Ph Sensor ,Turbidity sensor, and temperature sensor is used for checking the quality of water. These sensors are connected to the Arduino Uno and then collected datas are transmitted to a NodeMcu controller. NodeMcu is an open source IOT platform which can connect objects and let data transfer using the Wi-Fi protocol. So the datas can be viewed in any smart device using an application called Blynk IOT.

IJARSCT
ISSN (Online) 2581-9429
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For the easy travel of RC Boat through water bodies we are using two 12V DC Motor of 1000rpm each. These Dc motor are controlled using a motor driver called L298N. We are using these motors for the forward movement of this boat. For turning to the left and right direction we are using a stepper motor which is connected to the rudder of this boat.

This RC water pollution monitor boat allows for recording as well as transmitting water quality data to an IOT server online. This will further help us to maintain the water clean. This project is remote-operated and controlled by an RC remote using which it can be maneuverer accordingly, a motorized propeller system to provide the forward propulsion and servo motor arrangement to provide with the steering using a rudder.

As per the commands received by the rc receiver the controller operates the DC motor which rotates the propeller through a flexible bearing and shaft. Now we have 2x direction control rudders attached to a servo motor used to steer the boat as per controller signals received.

Additionally, we have two sensors to determine water quality, we include PH sensors as well as turbidity sensor and a temperature sensor. These sensors will detect the presence of suspended particles in the water. We also have a GPS module and micro SD card, which will log the data from sensors as well as GPS locations as well as transmit the same online over IOT at particular intervals. This IOT system provides wi-fi hotspot to collect the information about the level of liquid for the users by viewing the data in their mobile and prevent it from the overflow. BLYNK app is installed in the android version to see the output. When the system get started dc current given to the kit and arduino and WIFI gets on. The app went provided with hotspot gives the exact values collected . Thus like this when the kit is located on any specific water body and WIFI is provided we can observe its real time value on our android phone anywhere at any time.

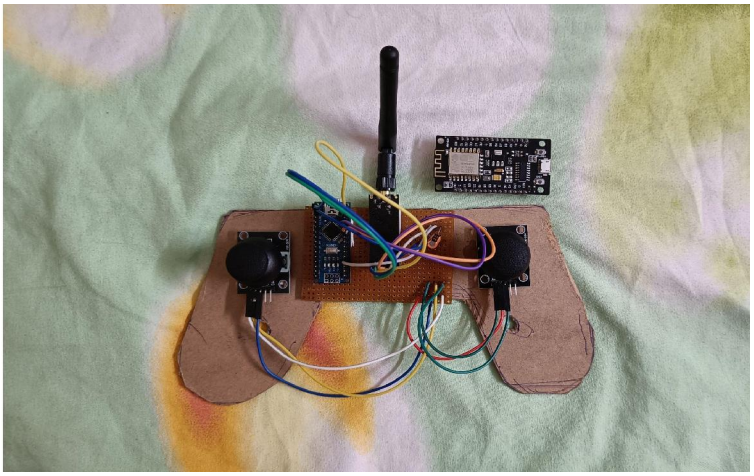
Thus the water quality monitoring rc boat can be used for water quality monitoring on lakes and reservoirs with ease.

VIII. RESULT

To check the quality of water, the current method is to take the water sample manually. These samples were sent to the laboratories to test the quality which takes extra human effort, cost and time. In our proposed system, it will give the properties of water automatically on screen without any extra human effort. With the help of these properties we could figure out the quality.

Monitoring of Turbidity, pH & conductivity of Water used corresponding sensors. The system can monitor water quality automatically, and it updates to servers' websites with low cost and does not require people on duty. So the water quality testing has to be more economical, convenient and fast. The system has good flexibility by replacing the corresponding sensors and changing the relevant python programs. This system can be used to monitor other water quality parameters. The operation is simple. The system can be expanded to monitor hydrologic, air pollution, industrial and agricultural production and so on. It has widespread application and extension value.

MODULE 1 (REMOTE CONTROLLER)



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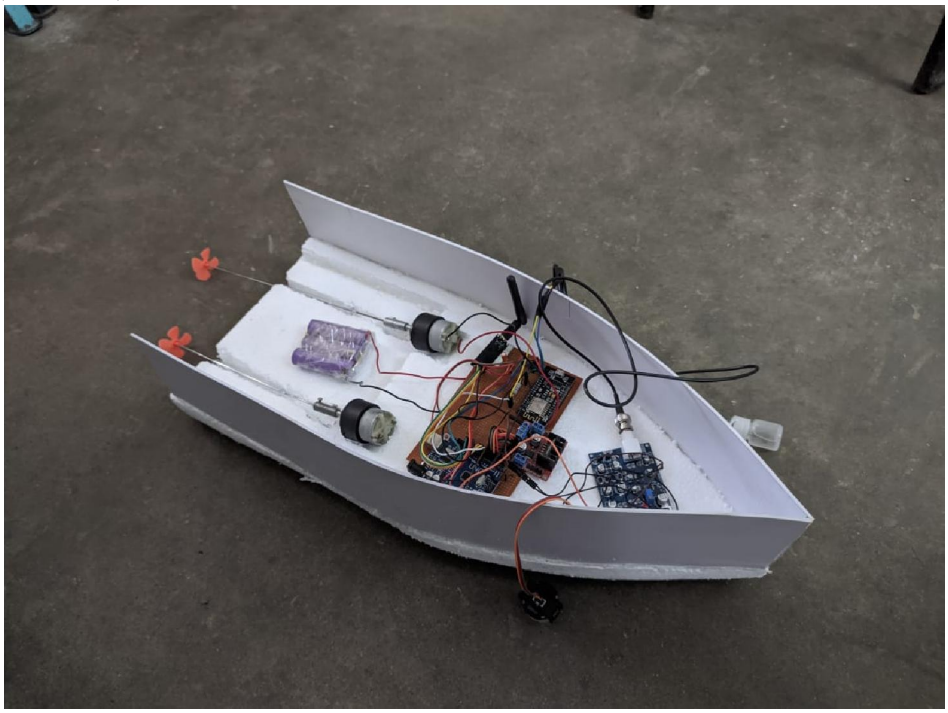
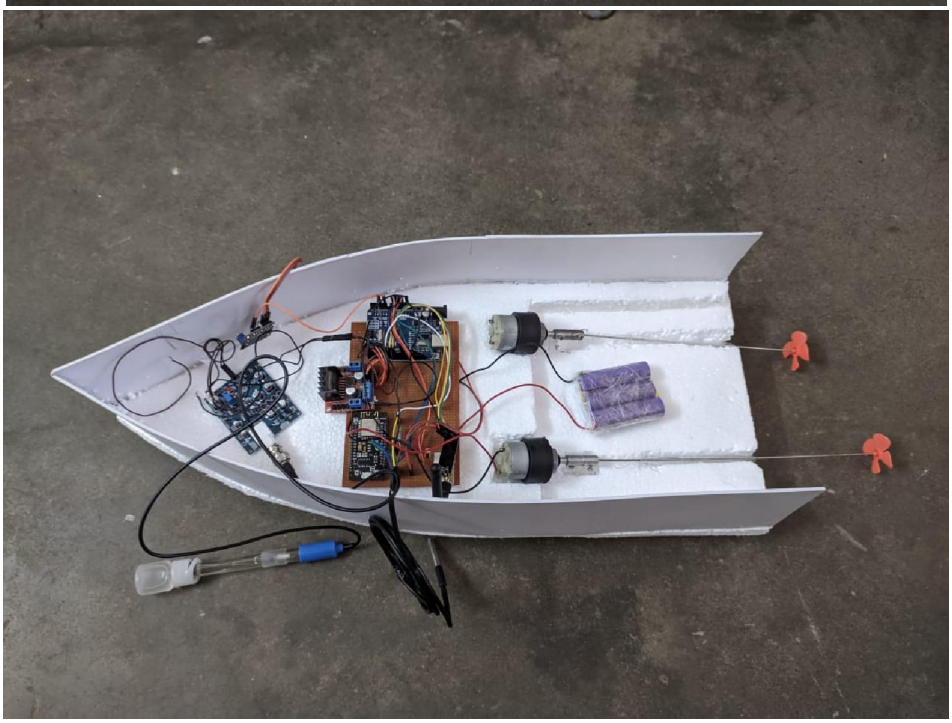
MODULE 2 (RC BOAT)





IX. CONCLUSION

To check the quality of water, the current method is to sample the water manually. These samples were sent to the laboratories to test the quality which takes extra human effort, cost and time.

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In our proposed system it will give the properties of the water automatically on the screen without any extra effort. With the help of these properties monitoring of Turbidity, PH & Temperature of Water makes use of a water detection sensor with unique advantage and existing GSM network. The system can monitor water quality automatically, and it is low in cost and does not require people on duty. So the water quality testing is likely to be more economical, convenient and fast. The system has good flexibility. Only by replacing the corresponding sensors and changing the relevant software programs, this system can be used to monitor other water quality parameters. The operation is simple.

The system can be expanded to monitor hydrologic, air pollution, industrial and agricultural production and so on. It has widespread application and extension value. By keeping the embedded devices in the environment for monitoring enables self protection (i.e., smart environment) to the environment. To implement this, we need to deploy the sensor devices in the environment for collecting the data and analysis. By deploying sensor devices in the environment, we can bring the environment into real life i.e. it can interact with other objects through the network. Then the collected data and analysis results will be available to the end user through the Wi-Fi.

X. FUTURE SCOPE

- In the future we will be using modern technologies.
- Detecting the more parameters for the most secure purpose.
- Increase the parameters by addition of multiple sensors.
- By interfacing the relay we control the supply of water.

REFERENCES

1. https://www.sciencedirect.com/science/article/pii/S2666285X2100090X
2. https://www.ripublication.com/awmc17/awmcv10n5_24.pdf
3. https://www.researchgate.net/publication/353853205_IoT_based_Smart_Water_Quality_Monitoring_System
4. https://www.ijert.org/research/iot-based-water-monitoring-system-IJERTCONV5IS01114.pdf
5. https://ieeexplore.ieee.org/document/9641630
6. https://nevonprojects.com/iot-water-pollution-monitor-rc-boat/
7.https://www.researchgate.net/publication/335682486_Water_Quality_Monitoring_System_using_RC_Boat_with_Wireless_Sensor_Network