IoT Enabled Floatable Boat For Robot With Waterbody Quality Monitoring And Chemical Neutralization System

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Abstract- *The conventional method of testing water quality involves collecting samples of water manually and then using laboratory methods to test and analyse the collected samples. But this method is time consuming, involves wastage of man power, and uneconomical. The water quality measuring system that we have implemented checks the quality of water in real time through various sensors. The microcontroller transfers the data collected by the sensors to the smart phone/PC using Wi-Fi connection. This system can keep a strict check on the pollution of the water resources and thus ensures to provide safe drinking water.The current developments in the field of sensor networks are critical for environmental applications. Internet of Things (IOT) allows connections among various devices with the ability to exchange and gather data. IoT also extends its capability to environmental issues in addition to automation industry by using industry 4.0. As water is one of the basic needs of human survival, it is required to incorporate some mechanism to monitor water quality time to time. Around 40% of deaths are caused due to contaminated water in the world.*

Hence, there is a necessity to ensure supply of purified drinking water for the people both in cities and villages. Water Quality Monitoring (WQM) is a cost-effective and efficient system designed to monitor drinking water quality which makes use of Internet of Things (IoT) technology. 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. And also, the Microcontroller Unit (MCU) interfaced with these sensors and further processing is performed at Personal Computer (PC). The obtained data is sent to the cloud by using IoT based Think Speak application to monitor the quality of the water.

Keywords- Arduino, Turbidity Sensors, PH Sensor, Luminance Sensors, Battery.

I. INTRODUCTION

Water is essential for life on earth. Yet, numerous countries are facing shortages of freshwater. This alarming issue strongly motivated them to utilize other available resources instead. For example, Gulf countries are acquiring freshwater from the sea through a tedious desalination process. Increased costal industrialization and resulting water pollution, however, is making this process even more challenging. Other countries are processing rainwater to obtain freshwater. However, lately climate change is affecting rainfalls, which is putting into jeopardy this option. Countries where freshwater is more accessible are unfortunately not safe from water related issues. Water pollution has been reported for years as a growing concern. For example, the America Clean Water Foundation established the water monitoring day (called the Earth Echo Water Challenge). Its main agenda is to spread public awareness regarding water pollution. Both the United States Environmental Protection Agency (USEPA) and World Health Organization (WHO) are constantly providing updates and recommendations on how to cope with the newly detected water contaminants and diseases. On the top of pollution and studies pointing out to global-warming's impact on water resources, the World Water Council (WWC) is predicting a global population increase by 40% to 50% over the next 50 years. This significant growth, in conjunction with urbanization and industrialization, may greatly increase the overall water demand. All aforementioned pointers are indicating a potential global water crisis coming. In the eve of such a water crisis, freshwater is commonly turning into an industrial product. Under the municipality control in urban areas, it is often stored in over-head/underground tanks, sometimes for extended period prior to consumption. Continuous monitoring of water quality is thus necessary, to classify water for its suitable application and prevent waste. For example, water that is not good for drinking can be used for cleaning purposes.

EXISTING SYSTEM

The design phase is a vital aspect of the developed system because it's the objective and scope are justified through the conceptual design while the interface design enables better vision for the system development based on the logical and physical design. The design of this prototype was done using the Solid works software, a modeling computer-aided design program that runs primarily on Microsoft Windows. This software has a rich feature that can be used for engineering design ranging from machinery design and its mechanics, electrical system, and has a friendly development environment.

PROPOSED SYSTEM

We have fabricated the IOT enabled Pond cleaning machine. The main aim of the project is to reduce the man power, time consumption for cleaning the Pond. We have automated the operation of Pond cleaning with help of a motor and chain drive arrangement. Water wheel is bolted on shaft which is placed on base frame. The purpose of water wheel is to move the machine forward or backward on water. Motor is used to rotate the water wheel with the help of chain drive mechanism. This motor also powers the waste collecting conveyor. Finally, the floating waste are collected by the bin which is placed inside the boat. In this projects we also have a quality monitoring, in case of any quality is reduces in water the buffer solution is mixed with water to improve the quality.

II. RELATEDWORKS

The development and implementation of a portable, mobile, cost-efficient and reliable water level control system. Here the authors used two transceivers of radio frequency (RF) and a transmitter mounted on the tank and sump at the place where they wanted to check the quality of water. The RF transceivers used for wireless communication to the internet server. With the help of a microcontroller, the system is fully programmed of the user unless the water the bottle is drained or overflowed. The sensor array is used to measure various parameters such as dissolved Oxygen, Tumble, pH, Temperature, etc. Sensor array. Costs of installation are reduced because of the wireless system. The smart Water Quality Monitoring (WQM) device for Fiji using IoT and remote sensing technologies is shown in this article. The Pacific Islands of Fiji require regular collection and analysis of collected data for the water quality monitoring and uploading this data into the server. In order to monitor water quality, the authors have used IoT and remote sensing technologies. The current measurements can be enhanced by remote sensing. During the entire test period, the system has been proved worth by delivering accurate and consistent data using IoT for water monitoring in real-time. The system proposed by these authors also used a GSM module to forward the data to the mobile user via SMS.Omar Faruq et al. A water quality monitoring system based on microcontrollers for people living in Bangladesh's outskirts, where safe drinking water is not available, is provided in this paper. The device has been designed with a high degree of accuracy and is sensitive to several water parameters such as temperature, turbidity and hydrogen potential. (pH) displayed on the LCD monitor. Finally, in this paper, each of the parameter values is compared with the predefined equipment, and sensor values and error are calculated.

III. SYSTEM DESIGN

We have fabricated the IOT enabled Pond cleaning machine. The main aim of the project is to reduce the man power, time consumption for cleaning the Pond. We have automated the operation of Pond cleaning with help of a motor and chain drive arrangement. Water wheel is bolted on shaft which is placed on base frame. The purpose of water wheel is to move the machine forward or backward on water. Motor is used to rotate the water wheel with the help of chain drive mechanism. This motor also powers the waste collecting conveyor. Finally, the floating waste are collected by the bin which is placed inside the boat. In this projects we also have a quality monitoring, in case of any quality is reduces in water the buffer solution is mixed with water to improve the quality.

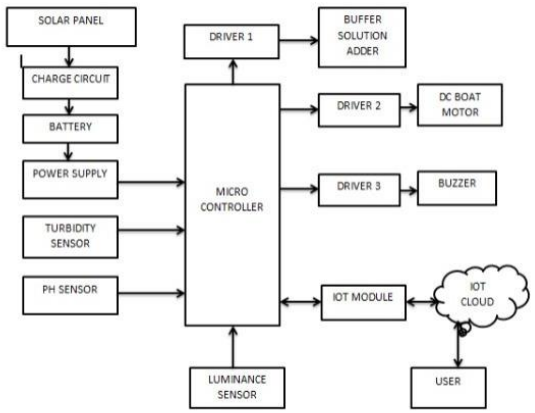

Figure 1 Block Diagram

In this project we have fabricated the remote operated Pond cleaning machine. In this project we have automated the operation of Pond cleaning with help of a motor and chain drive arrangement. Water wheel is bolted on shaft which is placed on base frame. The purpose of water wheel is to move the machine forward or backward on water. Motor is used to rotate the water wheel with the help of chain drive mechanism. This motor also powers the waste collecting conveyor. Finally the floating waste are collected by the bin which is placed

inside the boat. In this projects we also have a quality monitoring, in case of any quality is reduces in water the buffer solution is mixed with water to improve the quality.

IV. RESULT

The system proposed in this paper is an efficient, inexpensive IOT solution for real-time water quality monitoring. The developed system having Arduino mega and node MCU target boards are interfaced with several sensors successfully as Shown in Figure 9. An efficient PH value ranges from 6.5 to 7.5 for Hyderabad metropolitan city supply water and 7 to 8.5 for groundwater. The measured value of turbidity ranges from 600 to 2000 NTU for both Hyderabad metropolitan city supply water and ground water.

A web-based application i.e., thing speak is used to monitor the parameters as PH value, the turbidity of the water, level of water in the tank, temperature and humidity of the surrounding atmosphere through the web server. Further, these measured parameters also monitored in thing speak mobile application. Also this work needs to be carried out to analysis several other parameters like electrical conductivity, free residual, nitrates, and dissolved oxygen in the water.

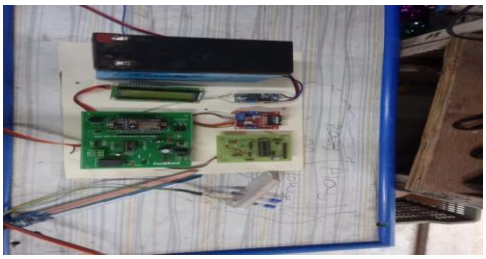

Figure.9 Hardware kit

V. CONCLUSION

This innovation is easy and less costly and has lot of room to grow more economical. This project "IOT ENABLED FLOATABLE BOAT FOR POND CLEANING ROBOT WITH WATER BODY QUALITY MONITORING AND CHEMICAL NEUTRALIZATION SYSTEM" is designed with the hope that it is very much economical and helpful to river and Pond cleaning. On the basis of it design and estimating cost and availability it is very cheap and very useful for the society.

S.no	Parameters	Existing project	Proposed project
1.	Application control	Button control	Wireless control
2.	Sensor	Ultrasonic sensor	PH sensor, lumination, turbidity sensor
3.	Wireless	Button	IoT module
4.	Buffer solution	Nil	Laser purifier
5.	PH sensor	Nil	
6.	Lumination sensor	Nil	
7.	Turbidity sensor	Nil	
8.	Arduino		ATmega 328P

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