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# Aqua Monitoring System for Fish Farming using Raspberry pi

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**ABSTRACT:** Fish production is one of the important factor in several developing countries to boost economy. Fish farming is a difficult process as it is necessary to maintain water quality such as pH, Temperature, Dissolved Oxygen level, Salinity, water level. In our proposed model an Aqua Monitoring System is developed to sense the water level and water quality parameters. The water quality parameters are monitored in remote location with web enabled controller module. The information from our proposed system can be used to take preventive measures by itself (Recycling of water, Addition of water, Addition of dissolved oxygen) to improve fish production.

**KEYWORDS:** Raspberry pi-3, pH sensor, Temperature sensor, Camera module.

## I.INTRODUCTION

Aqua culture plays a major role in Indian economic but the major problem faced by farming fish is monitoring of farming ponds and taking effective measures. The use of (IOT) Internet of Things devices collects and share the data through internet. Aqua monitoring System keeps an account of monitoring the water quality and keeps updating to the farmer. Our system collects information on various parameters such as pH, Temperature, water level, camera for identifying color of the water that can be used to recycle our pond. With the available information from the sensor our system is capable of taking preventive actions such as recycling of water, adding dissolved oxygen, maintain pH level and monitoring temperature. The collected data are transmitted to the hosted web page with the help of Raspberry pi-3, so that farmer can know at what time which process has been taken by our system. The quality of water is monitored continuously with the help of sensors to ensure growth and survival of aquatic life.

## II.PROBLEM STATEMENT

The existing system can only sense the quality parameters, it doesn't have any output modifier (pump for water recycle, pump for dissolved oxygen) that can be used to take any preventive actions based on our sensed report. We have to take measures by ourselves based on the sensed data.

## III.OBJECTIVES

The main objective of proposed system is to develop a system, which would continuously monitor the water quality parameters such as dissolved oxygen level, pH, temperature, water level and take preventive measures by itself with the help of the sensor information.

## IV.RASPBERRY PI 3

The Raspberry Pi 3 Model B is the third generation Raspberry Pi. This powerful credit-card sized single board computer can be used for many applications and supersedes the original Raspberry Pi Model B+ and Raspberry Pi 2 Model B. Whilst maintaining the popular board format the Raspberry Pi 3 Model brings you a more powerful processor, 10x faster than the first generation Raspberry Pi. Additionally it adds wireless LAN & Bluetooth connectivity making it the ideal solution for powerful connected designs. With its built-in wireless connectivity, the new Raspberry Pi is clearly positioned as a low-cost hub for Internet of Things devices, or as the flexible, low-cost basis of new types of connected gadgets. The

new bump to a 2.5 amps power source means it will be able to power more complex USB devices without the need for a second power cable.

**PIN DIAGRAM**

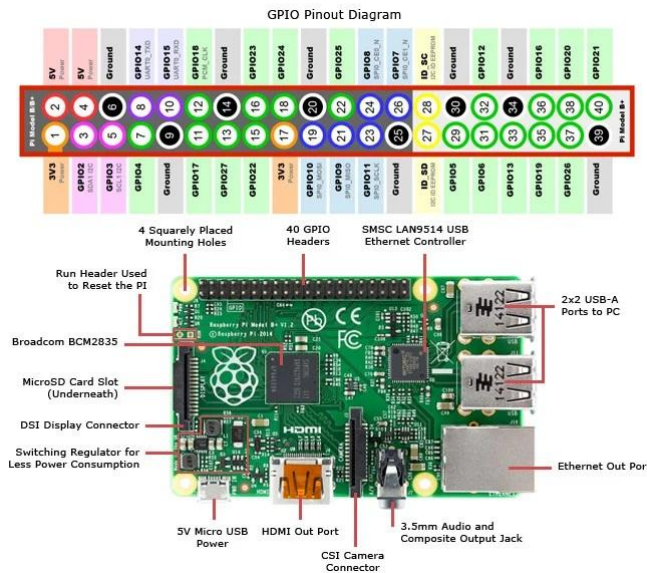


Fig1.Pin Configuration

**V.ARDUINO UNO**

ARDUINO UNO is a micro-controller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the micro-controller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. "UNO" means one in Italian and was chosen to mark the release of ARDUINO Software (IDE) 1.0. The UNO board and version 1.0 of ARDUINO Software (IDE) were the reference versions of ARDUINO, now evolved to newer releases. The UNO board is the first in a series of USB ARDUINO boards, and the reference model for the ARDUINO platform; for an extensive list of current, past or outdated boards see the

**VI.PH SENSOR**

pH is the numeric representation of gram-equivalent per liter of hydrogen ion-concentration in any solution. It varies between 0 to 14. It is the logarithmic measurement of moles of hydrogen ions per liter of solution. The solutions having pH value between 0 to 7 are acidic solutions with large concentration of hydrogen ions whereas solutions having pH value between 8 to 14 are basic solutions with small hydrogen concentration. The solutions having pH value of 7 are neutral solutions. Measuring the pH gives the measure of alkalinity or



Fig 2 :pH Sensor

### VII. TEMPERATURE SENSOR

The DS18B20 is one type of temperature sensor and it supplies 9-bit to 12-bit readings of temperature. These values show the temperature of a particular device. The communication of this sensor can be done through a one-wire bus protocol which uses one data line to communicate with an inner microprocessor. Additionally, this sensor gets the power supply directly from the data line so that the need for an external power supply can be eliminated. The applications of the DS18B20 temperature sensor include industrial systems, consumer products, systems which are sensitive thermally, thermostatic controls, and thermometers.

#### DS18B20-temperature-sensor

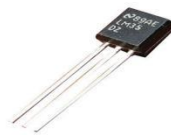


Fig 3: Temperature Sensor

### VIII. WEB CAMERA

Webcam is a compact digital camera which works same as conventional digital camera but is designed to interact with the web pages and other internet pages. It captures the real time images through a tiny grid of light-detectors, known as charge-coupled device (CCD) from the location where it is placed. The CCD converts the image into digital format so that computer can access this data. Web-cams don't have the internal memory to store the images so it transmits the data immediately to the host device through the USB or other analog cable. Some of these devices also come with built in microphone for video calling. Webcam does two things, capturing the image or video and to transfer it to the predestined device.

### IX. RELAY

A relay is an electro mechanical switch, it consists of a coil. When small current flows through the coil, magnetic field is induced that causes the switch to move, to close or open the electrical connection. Typically a Relay is used to control High voltage (AC or DC) circuit using small DC voltage circuit without any direct electrical connection between them. It means, high voltage circuit and low DC voltage circuit are magnetically linked but electrically separated.

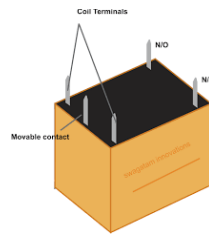


Fig 4:Relay

### X.METHODOLOGY

The proposed methodology is also based on IOT,which detects the Dissolved oxygen level using pH sensor. The sensor range will be programmed in such a manner that if the level goes below the threshold, the pump for dissolved oxygen will be turned on with a relay.Detect the water level-Using Water level sensor,if the water level does not meet our required,the pump for pure water will be turned ON.The color of the water is monitored by the web camera connected to Raspberry pi and the image is processed,with the output extracted it shows whether we need to recycle our water or not.If the output extracted is green,then the pump for water recycle will be turned ON on.The combined information of the sensors will be frequently updated on the web application.

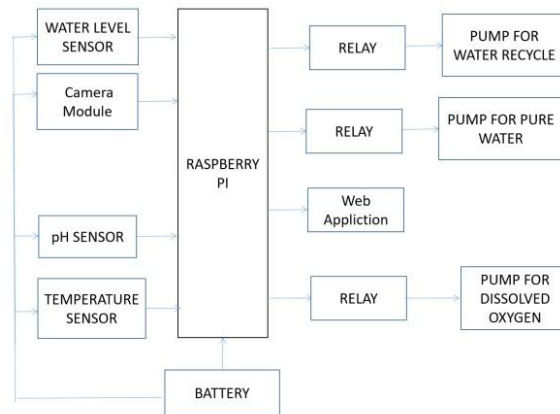


Fig 5: Block Diagram of Proposed System

### XI. EXPERIMENTAL RESULT

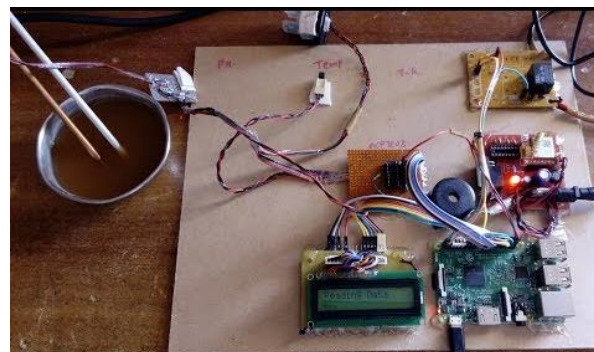


Fig 6: Implementation Result



Time	pH	Temperature	Preventive measures taken
13:29:01	6.6	74	NO measures
14:50:02	6.0	70	DO is added
19:27:00	7.0	69	No measures
22:34:22	10.0	60	water recycling is done
05:10:09	9.0	64	water is added

Fig 7: Test result

As soon as our water needs any measure to be taken, our proposed system will make some preventive measures and also inform aqua-farmer through the web-page, it will display them as a result.

## XII. CONCLUSION

This system provides reliability and accuracy to the Aqua-Farmer. This system also saves time as manual measuring of these parameters will take more time when compared to this. Our system also provides automatic preventive measures such as Recycling of water, Addition of water, Addition of dissolved oxygen, this will be more helpful for Aqua-Farmers. This system also helps in increase the productivity when compared to normal methods. The initial cost may be high but after that there will be no additional cost.

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