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# SOLAR POWERED WATER QUALITY MONITORING SYSTEM USING SENSORS

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## ABSTRACT

Water is essential resource of life for each living organism on the earth. Ph and turbidity level in water plays important role in examining quality of water. Due to bad quality of water, it affects the health issues of human, plant and living organisms on the earth. Generally, main sources of water are dams, lakes and rain. When water flowing through river and flowing over land it contains many contents, may be soluble or insoluble. Acidity of water is decided by the acidic and basic component present in water. General water quality measuring is transparency (just like glass) of water that means insoluble particles mixed in water degrades usefulness of water for particular application. The main aim is to measure the Ph and Turbidity of drinking water as well as water that may be used for agriculture, when we want to measure quality of any liquid (like chemicals, cold drinks) and industrial outlet. The remote access of water quality measurement parameters using wireless communication facilitates record keeping and analysis using simulation software at base station. PH and turbidity level are the parameters that stored on online cloud platform and analysed to improve water quality.

**Keywords:** MQTT, Thingspeak, Turbidity, Ph, Node-Mcu, IOT.

## I. INTRODUCTION

The 21st century is said to be a century of inventions, century of development, a century of globalization but on the other side the 21st century is the century of pollution, global warming, insecurity. The situation in some developing countries is not good, where dirty or contaminated water is being used for drinking without any proper & prior treatment. One of the reasons for this is the lack of information of quality of the water & public response and the lack of a water quality monitoring system, which creates serious health issues. The idea of this system is to implement a system to continuous measure and monitor water quality easily so that some critical factors of water can be easily analysed to take preventive actions for quality maintenance. This system is used to record and monitor the water quality by temperature, pH, oxygen density, and turbidity. The sensor collects the data and show on the cloud platform like Things peak using MQTT protocol.

## II. MODELING AND ANALYSIS

To fulfil solar power supply and multi-sensing features, each sensor node in this system is constituted by four modules: solar power, sensor, interface circuit, and things speak. The first is the solar power module, which uses solar cells to provide power to other modules. In the sensor module, 2 types of sensors are used: 1) Turbidity sensor 2) pH sensor. Interface circuit module transfers voltage output from solar power module (+12V) to +9V and +5V separately, while turbidity sensor OBS-3+ is powered by +5V and other sensors are powered by +5V. Some op-amps use +-5V dual power. The solar power module contains a solar panel, a regulator, and an accumulator. The solar panel's rated output voltage and power are 13.5V, 1.5W, as the total power consumption of the sensor node is much smaller. The output voltage of the solar panel fluctuates when external light intensity changes and is usually smaller than 13.5V. Because the sunlight changes day and night, an accumulator with 12V output is needed to stabilize the output voltage of the solar power module. A regulator is connected between the solar panel and the accumulator. When the sunlight is more(like afternoon), the solar panel outputs more than 12V, the regulator turns on; thus, solar panel powers other blocks, and the battery is charging.

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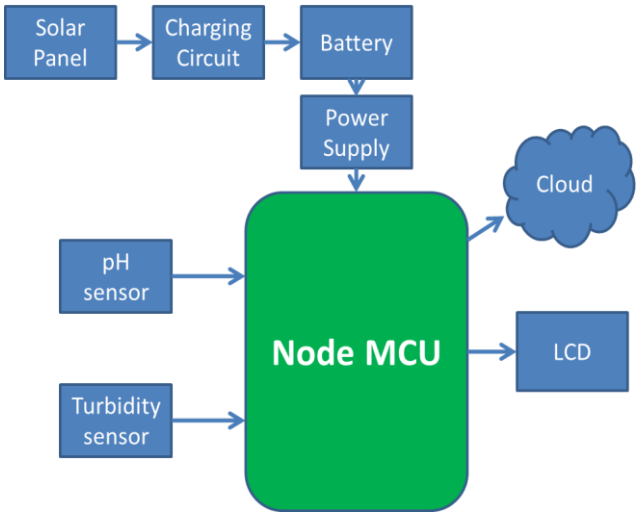


**Figure 1:** Block Diagram

When the sunlight is less (evening) so that the solar panel voltage is less than 12V, the regulator turns off; thus, the whole sensor node is powered by the 12V output of the battery. The data transferring process is implemented as a monitor pattern. The monitor controls access to the shared data set, a hash table that contains the timestamp of the measurement as key, and the measurement itself as a sample value. Since the sensor node works in the field and is powered by a solar panel, its power consumption is limited. A deep sleep mode that consumes much less power than normal is proposed in the node. The sensor node can be transferred to deep sleep mode and wake up easily. Solar panels are used to charge the battery of the system. A battery charging circuit needs to design by considering the power calculation. The charging circuit will charge the 12V battery through the charging circuit. A battery powers NodeMCU through a power supply. The pH and turbidity sensor will be connected to the nodeMCU controller, an inbuilt WIFI module. The water quality measurement pH and turbidity parameters are pushed to the cloud platform, and the progress graph is shown on the Things peak cloud platform.

## III. RESULTS AND DISCUSSION

When ph sensor and turbidity sensor are inserted in water, they start measuring ph value and turbidity value using ionization and light transmission intensity effect. Sensors create signal in anolog form, this signal amplifies using amplifier and send to anolog pin of node mcu. Firstly, it covert into digital signal and then convert into ph value and turbidity value using multipyer. This value sends to things speak online cloud platform using channel id (Through MQTT Protocol).

**Figure 2:** Project hardware

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Where graph is plot between value received from node mcu and its corresponding time. This shown in above fig.2. Values are updated continuously at given interval of time and send to respective field which created in things speak online cloud platform. How values are updated continuously is shown in fig 3

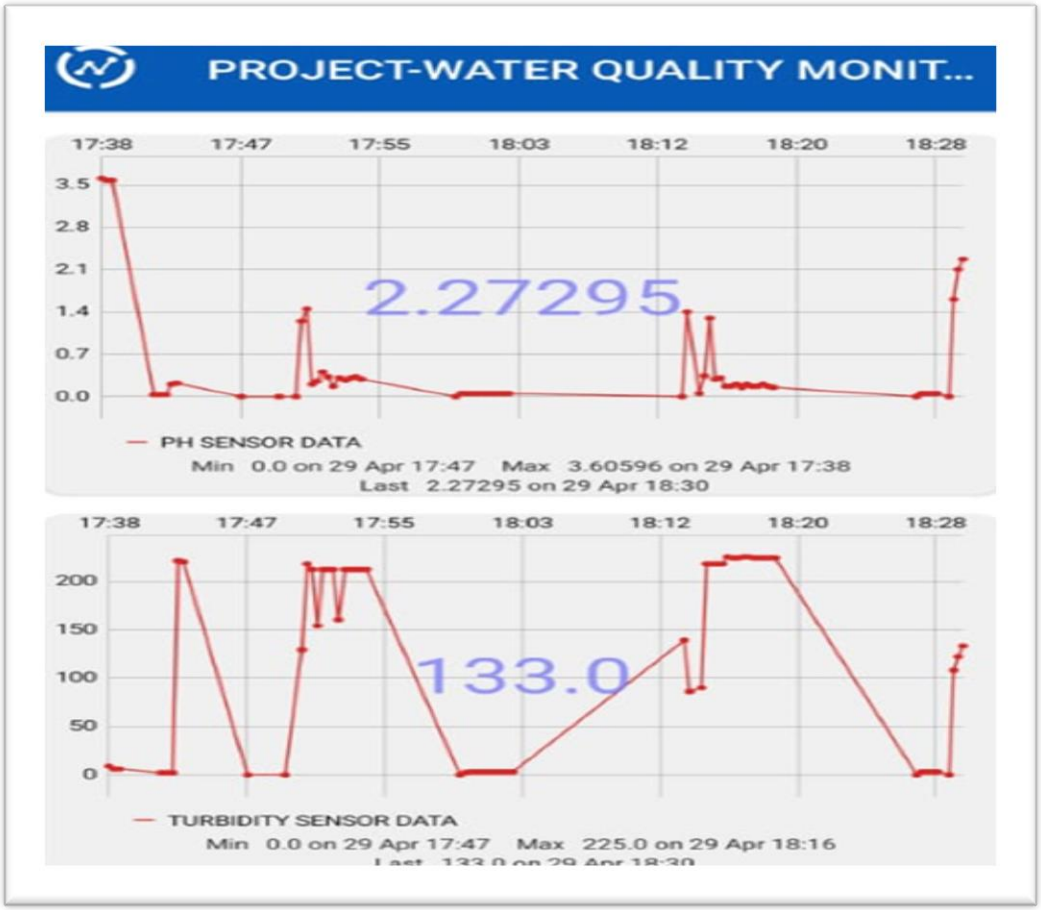


**Figure 3:** Data on application (ph and turbidity value).

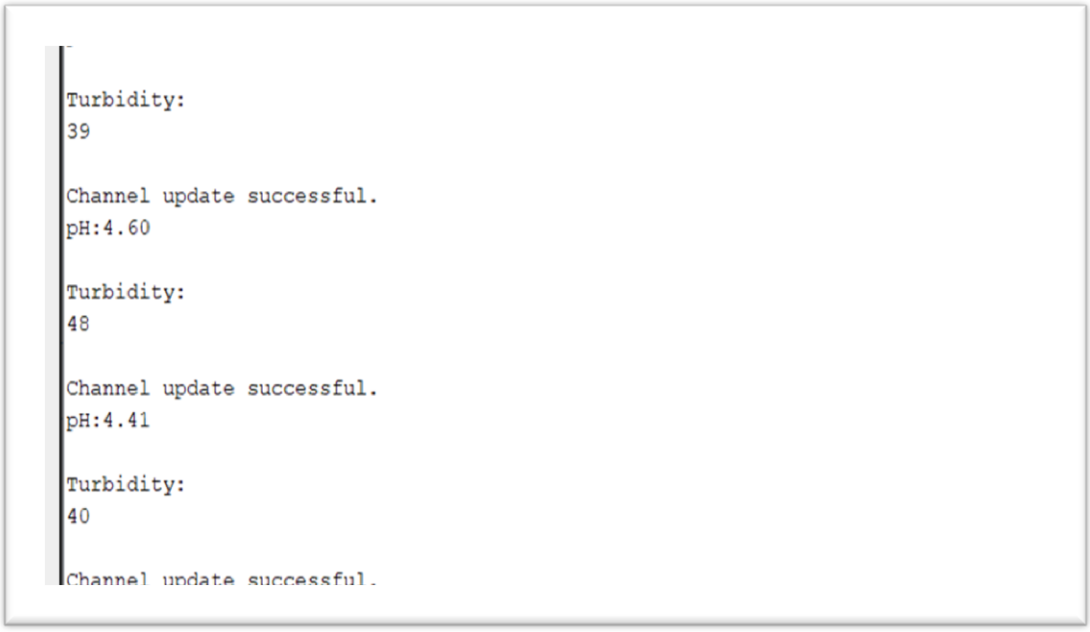


**Figure 4:** Updated value.

## IV. CONCLUSION

Monitoring the quality of water & collecting comprehensive data, achieves sequential follow up of water pollution status in remote region. This system not only provides quality of water but also help to keep good health of all lives. transferring the abnormal water quality information to monitoring centres by faster communication network and provides graphical references (data sheet) for the decision-making department to control the quality of water as per standard parameter.

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