International Journal of Electrical and Electronics Research ISSN 2348-6988 (online)
Vol. 6, Issue 2, pp: (96-100), Month: April - June 2018, Available at: www.researchpublish.com

Design of Sensor Network for Water Quality Monitoring System

[1]Ujjaval Dave, [2]Dr. Kirit Bhatt

Electronics & Communication, Electronics & Communication,

SVIT, VASAD

Abstract: **The design and development of a water quality monitoring system, with the objective of notifying the user of the real-time water quality parameters. The system is able to measure physiochemical parameters of water quality, such as flow, pH, TDS and Turbidity. These physiochemical parameters are used to detect water contaminants. The sensors which are designed from first principles and implemented with signal conditioning circuits are connected to Arduino based measuring node, which processes and analyses the data. In this design, Raspberry pi is used for communication between the measuring node and notification node. The notification node presents the reading of the sensors and outputs an audio alert when water quality parameters reach unsafe levels. Various qualification tests are run to validate each aspect of the monitoring system. The sensors are shown to work within their intended accuracy ranges. The measurement node is able to transmit data via router to the notification node for Buzzer, LED, Solenoid Valve and Web server. The results demonstrate that the system is capable of reading physiochemical parameters, and can successfully process, transmit and display the readings.**

Keywords: **Raspberry Pi, Water quality monitoring, Arduino, pH Sensor, Turbidity Sensor, TDS Sensor, Real Time.**

I. INTRODUCTION

The world runs on water. Human body contain 75% water for living life. Clean, Reliable water supplies are vital for industry, agriculture and energy production. Now days, world's water system face formidable threats. So, we can develop a low-cost, wireless, multi-sensor network for measuring the quality of water, enabling real-time monitoring.[1]For good health & sustain life the water is the most important resources. Now days, water pollution is biggest problem in world wide. More than billion people currently lives & drinking in pollution type water. So, here we can develop a system which is measure quality of water & supply clean water in more rural areas.[6]The current water quality tests that are performed in government water quality institutions in India & they require taking manual samples. The water samples are taken to the institution automates this process, a water quality monitoring system based on WSN is proposed.[2] The parameters involved in the water quality determination such as the pH level and TDS level is measured in the real time by the sensors that send the data and blow LED. This project proposes how such monitoring system can be setup emphasizing on the aspects of low cost, installation and easy handling and maintenance. The use of sensor system for monitoring purpose will not only reduce the overall monitoring system cost in term of facilities setup and labour cost, but will also provide flexibility in term of distance or location.[3]

II. EASE OF USE

A. Hardware Description:

In my project, I am working for measure the real-time water quality monitoring system. To measure the quality of water I am using pH & TDS sensor. I am using raspberry pi for communication between the measuring and notification node. The measuring node is used to transmit data to notification node for display. Here the system is capable of reading physiochemical parameters and can successfully process transmit and display the reading.

.

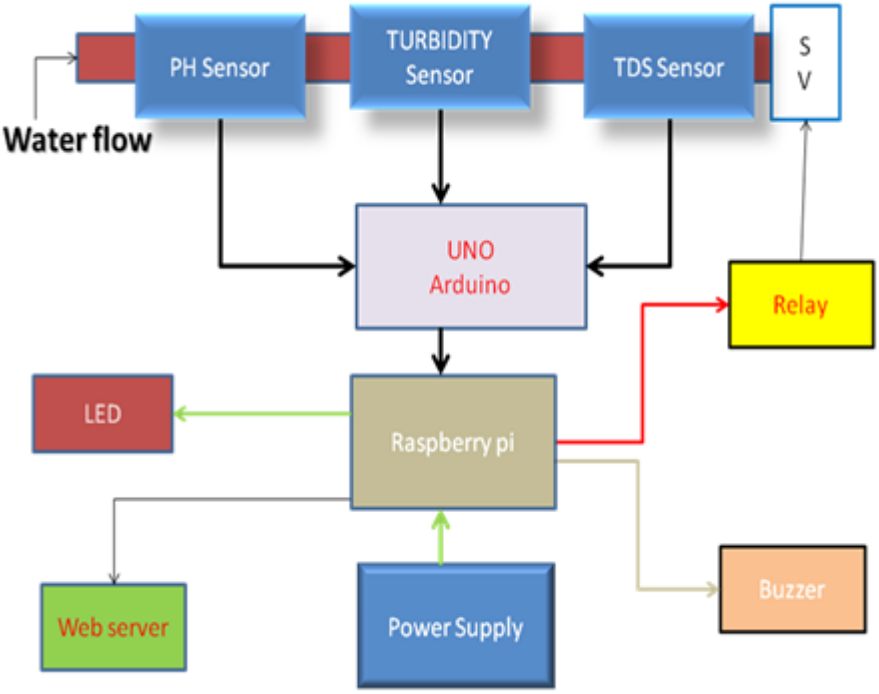

Fig 1: Block diagram of system

III. DESIGN METHODOLOGY

As shown in figure number 2 PH sensor is placed on the bottom of the system .The wifi router connected to the raspberry pi. The data of ph sensor is display on the server of raspberry pi using putty software.

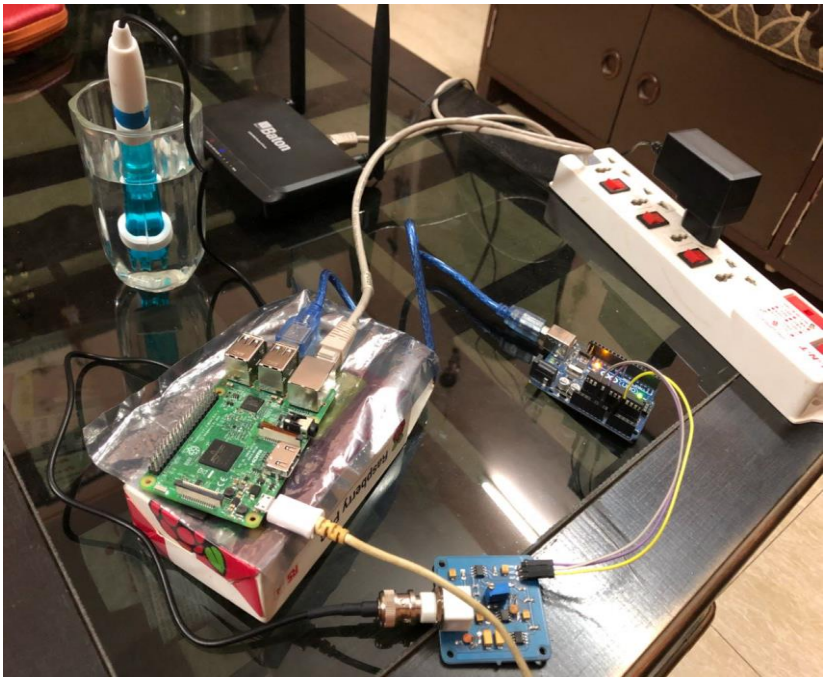

Fig 2: Hardware

RASPBERRY PI 3:

The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor and uses a standard keyboard and mouse. The Raspberry Pi Model B+ has dual core ARM11 processor with 512MB SDRAM and powers through Micro USB socket of 5V [16].

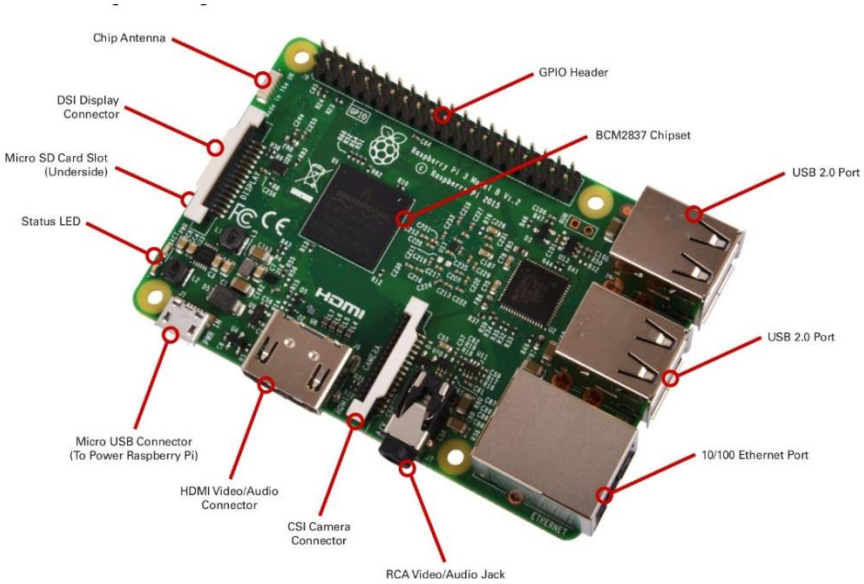

Fig 3: Raspberry pi model B

pH sensor:

A pH meter provides a value as to how acidic or alkaline a liquid is. The basic principle of the pH meter is to measure the concentration of hydrogen ions. Acids dissolve in water forming positively charged hydrogen ions (H+). The greater this concentration of hydrogen ions, the stronger the acid is.

Fig 4: pH sensor

ARDUINO UNO:

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins. It has 6 analog inputs. 16 MHz ceramic resonator USB connection. A power jack. An ICSP header, and a reset button. As shown in figure number.

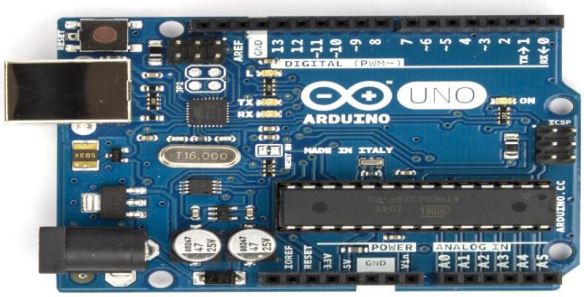

Fig 5: Arduino UNO

IV. RESULT

Flow chart of pH sensor:

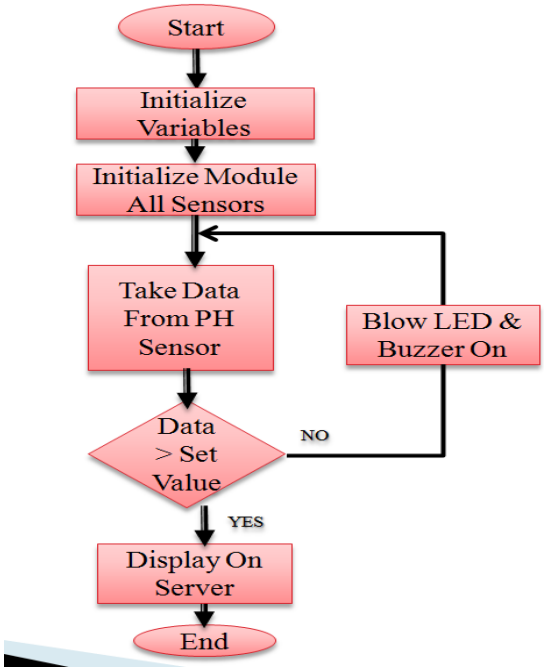

Fig 6: Flowchart of pH Sensor

pH sensor is use to measure water quality by acidic or alkaline a liquid is

SOFTWARE:

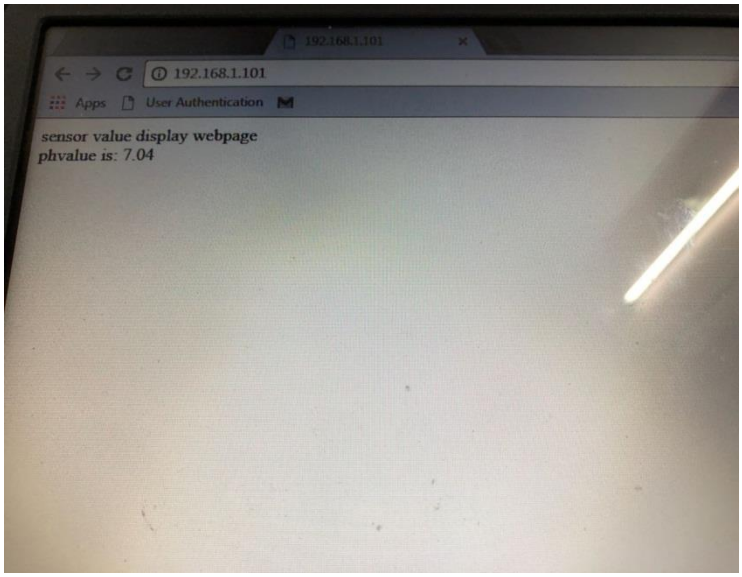

Fig 7: Results of hardware

As shown in figure number 7 show the data of ph sensor show on server of raspberry pi using putty software.

V. CONCLUSION

A sensor node with a pH and TDS sensors was designed and constructed on a Veroboard, which also included the respective signal conditioning circuits. The signal conditioning circuit yielded acceptable results. The pH sensor made use of a glass electrode and yielded acceptable results. A measurement node consisting of a Arduino was implemented to process the raw sensor data into usable measurement values. The Arduino then transmitted the measurements wirelessly to the notification node via the wireless Router. A notification node consisting of a Arduino, Raspberry pi, LED and

Buzzer was implemented as a user interface to display the different water quality parameters. The buzzer was used as an audible alert when a specific parameter was at an unsafe level. The accuracies of the different sensors and other findings are as follows: pH sensor: 8.79.The raw sensor data was processed successfully. Wireless communication between the measurement and notification nodes with a maximum non-line-of-sight wireless range of 33 m was achieved. The water parameters were displayed clearly on the LED and audible warnings were heard from the buzzer when parameter is at an unsafe level. Future work could include the design and implementation of a turbidity sensor, as this a also an important quality monitoring parameter. The current design is able to display the parameters in real-time, however a history of the readings is not available, thus data logging of the sensor measurements could also be considered.

FUTURE SCOPE:

Currently pH sensor Local host are interface to raspberry in future Turbidity sensor & TDS sensor interface with raspberry, And design TDS sensor the project will be implement .

REFERENCES

[1] R. Malekian and L. Nai, N. A. Cloete, "Design Of Smart Sensor For Real-Time Water Quality Monitering ," IEEE Access , vol. 4, no. 9, pp. 3975 - 3990, July 2016.

[2] Lin Gu,Lu Lian,Song Guo,Hong Yao,Jiankun Hu Deze Zeng, "On Cost-Efficient Sensor Placement for Contaminant Detection in Water Distribution Systems," *IEEE* Transactions *on* Industrial Informatics, vol. 12, DEC 2016.

[3] Libu Manjakkal ,Krzystof Zaraska , and Ravinder Dahiya. Mitar Simić, "TiO2 Based Thick Film PH Sensor. ," IEEE SENSORS JOURNAL, 2016.

[4] Mr. Pranav Medsinge, Mr. Akash Chavan, Mr. Sudhakar Pati. Mr. Vikas Mane, "Water Quality Measuring System Using Wireless Sensor Network," INTERNATIONAL RESEARCH JOURNAL OF ENGINEERING AND TECHNOLOGY, vol. 4, no. 2, February 2017.

[5] C. G. Panayiotou,C. C. Anastasiou T. P. Lambrou, "A Low-Cost System for Real Time Monitoring and Assessment of Potable Water Quality at Consumer Sites." in SENSORS, 2012 IEEE, Taipei, Taiwan, 2013, pp. 978-1-4577-1767-3.

[6] ubhas Chandra Mukhopadhyay. Mohd Amri Md. Yunus, "Novel Planar Electromagnetic Sensors for Detection of Nitrates and Contamination in Natural Water Sources," IEEE SENSORS JOURNAL, vol. 11, no. 6, pp. 1440-1447, June 2011.

[7] Pedro Silva Girão Octavian Postolache, "Wireless sensor network-based solution for environmental monitoring: water quality assessment case study," IET Science, Measurement & Technology, vol. 8, no. 6, pp. 610 - 616, NOV 2014.

[8] https://www.raspberrypi.org/

[9] https://www.raspbian.org/FrontPage.