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# IMPLEMENTATION OF REAL TIME WATER QUALITY MONITORING SYSTEM USING RASPBERRY-PI

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## ABSTRACT
Drinking water is basic need of the human being. Even though the earth surface is covered by 79% with water, the drinking water is about 3% of it. Out of this 3 % only 0.4 percent is available in the form of the rivers. In India, around 50% people are getting the water of good quality for drinking purpose. The water quality monitoring system is needed for avoiding the hazards to human health due to use of impure water. The major sources of the pure water are badly affected due to the poor Industrial waste management. Due to addition of waste in the water is can't be used for drinking purpose. Authors have proposed the water quality management monitoring system using Raspberry-pi. The results of the monitoring system are presented in this paper in detail.

**Keywords:** Water Monitoring System, Water Quality, Raspberry-pi, Wireless Network, etc.

## INTRODUCTION
More than 79 percent of earth's surface is covered by the water. Even though the water is available in such a huge amount, still we are facing the issues related to the availability of the water and the water quality assurance. With the industrial developments in various countries, the need of water is increasing day by day. On the other hand, the contamination of the water is also increasing because of improper waste management strategies.

Mainly the waste water when added to the clean water even in small amount, will results in to the contamination of the water in large amount. The clean water available for the use is very less compare to the total water available on earth. The sources of clean water are getting contaminated day by day with extensive developments without prior planning of waste water.

The quality of the water must be monitored for assurance before use. At present, there is no such system popularly used for water quality monitoring. Manual monitoring is expensive and less effective for water quality assurance. Considering this fact, there is need of an effective, cheap and automatic system for water quality monitoring.

Authors have presented the implementation of the water quality monitoring system using Raspberry-pi in this paper. The system is found suitable for the different parameter monitoring related to the water quality. Out of total available water only 0.6 percent water is in the usable form hence it is necessary to monitor and quality of water continuously.

The contaminated water can be reused with proper processing on it, by maintaining the quality of water. The developments in the automation technologies results in to, application of automation in water quality monitoring, processing and maintaining. Authors have developed, the system based on Raspberry pi for water monitoring.

The figure drawn below shows the percentage of the rural people in India having access to the clean drinking water through the tap over five years. It has be observed that, about 50 percent people have the access to the safe drinking water in India in rural places. This shows that, lot of work need to be done for

providing the clean and safe drinking water to the people. The available resources of the water to be monitored for quality of water and requirement of processing.

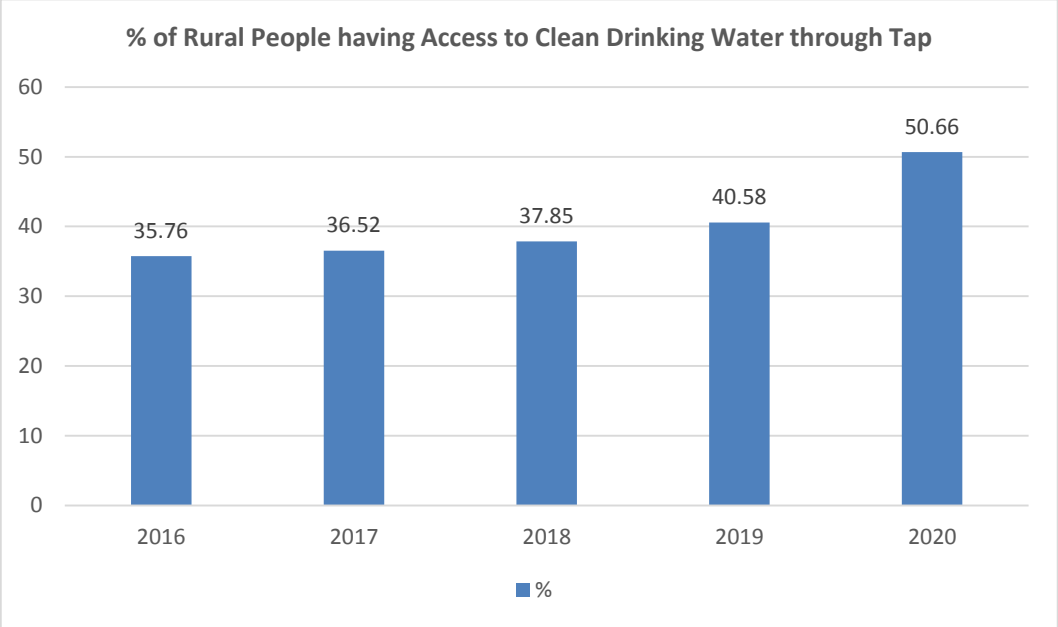


Fig. 1: Percentage of Rural People having Access to Clean Drinking Water through Tap

**PROPOSED BLOCK DIAGRAM:**

Figure drawn below shows the block diagram for the Raspberry-pi based water quality monitoring system.

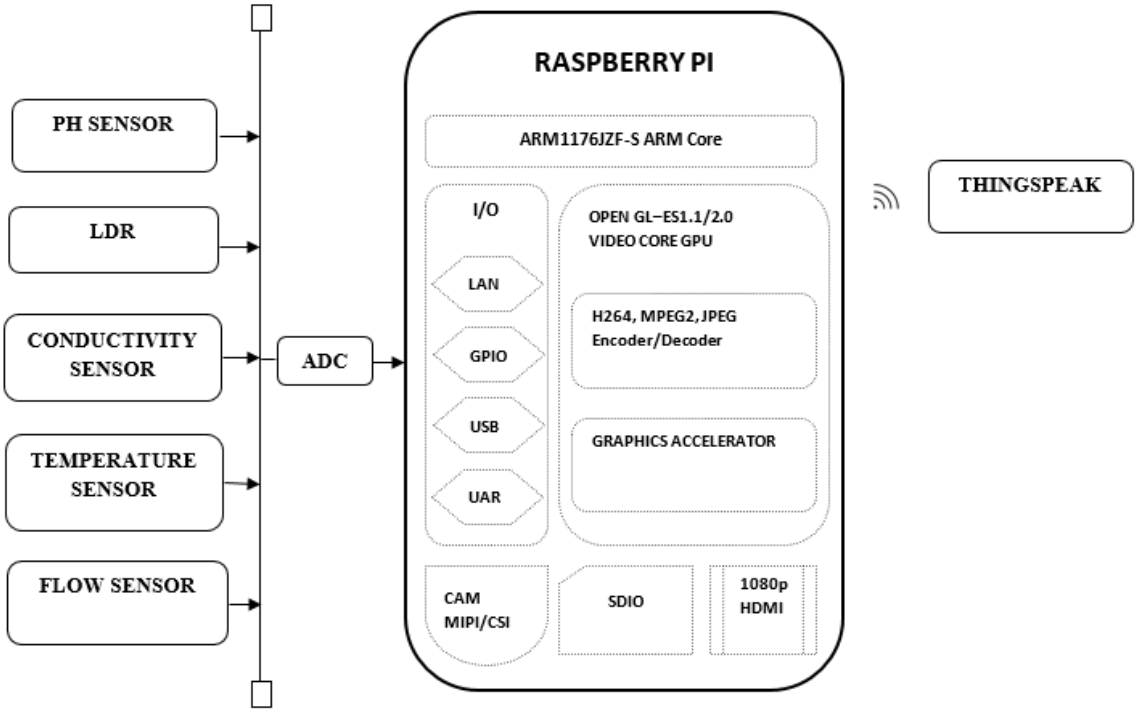


Fig. 2: Block Diagram Representation of Raspberry-pi based Water Monitoring System

The sensors used in the system will monitor the PH, Conductivity, Temperature and Flow of the water. These sensors provides the information, which is then stored in the software. The data is continuously monitored and checked for the quality parameters.

## OBJECTIVES OF THE WORK

The work is carried out in order to achieve following objectives:

- Developing real time water quality monitoring system.
- Reducing the cost of quality enhancement system of water.
- Developing the wireless system for water quality monitoring.
- To obtain various quality parameters of water.
- The obtained data is transmitted via Zig-Bee module to central control unit.
- Using available data central control unit take appropriate decision.

The system is useful for monitoring the real time data of water. The system uses the Zig-Bee module for controlling the parameter of data transmitted.

## OBSERVATIONS AND RESULTS:

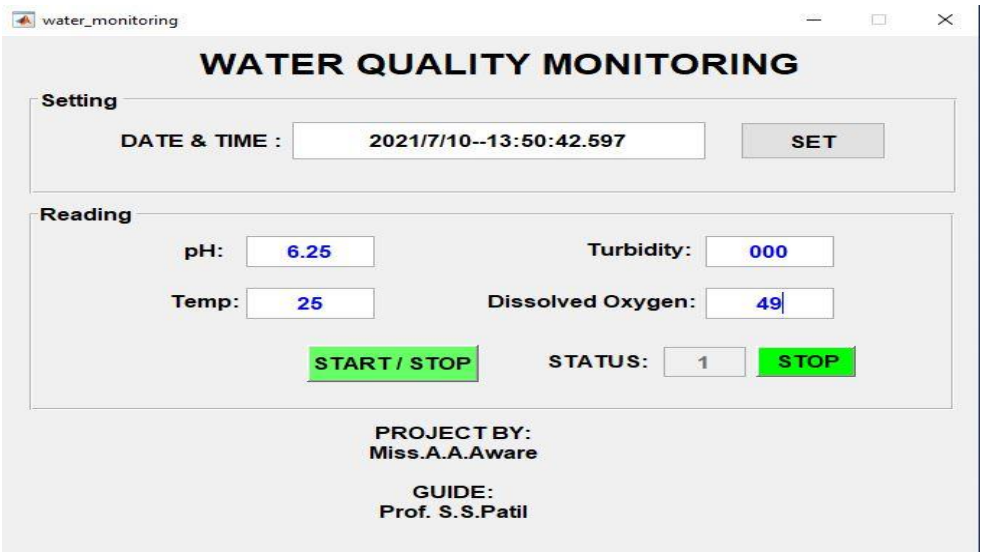


Fig. 3: The Software Interface for the System

The settings of the software interface for water monitoring system is shown in the figure above. The observations for PH Value, Temperature, Turbidity, and Dissolved Oxygen are shown in the above picture.

Table 1: Observations of the System

| Time | pH | Temperature | Turbidity | Dissolved Oxygen |
|---|---|---|---|---|
| 2020/10/13--16:20:33.358 | 13 | 99 | 14 | 97 |
| 2020/10/13--16:21:45.843 | 13 | 99 | 14 | 97 |
| 2020/10/13--16:22:22.101 | 13 | 99 | 14 | 97 |
| 2020/10/13--16:22:43.508 | 13 | 99 | 14 | 97 |
| 2020/10/13--16:23:0.892 | 13 | 99 | 14 | 5646 |
| 2020/10/13--16:24:8.649 | 13 | 99 | 14 | 100 |
| 2020/10/13--16:46:48.611 | 5.01 | 27 | 2 | 49 |
| 2020/10/13--16:47:14.204 | 5.02 | 25 | 2 | 49 |
| 2020/10/13--16:47:36.47 | 5.03 | 27 | 2 | 48 |
| 2020/10/13--16:47:58.72 | 5.03 | 28 | 2 | 49 |
| 2020/10/13--16:48:37.655 | 5.05 | 29 | 2 | 49 |
| 2020/10/13--16:49:18.803 | 5.04 | 25 | 2 | 49 |
| 2020/10/13--16:51:10.067 | 5.06 | 28 | 2 | 47 |
| 2020/10/13--16:51:32.326 | 5.08 | 25 | 2 | 47 |
| 2020/10/13--16:51:40.099 | 5.09 | 28 | 2 | 46 |
| 2020/10/13--17:2:30.949 | 5.08 | 27 | 2 | 49 |
| 2020/10/13--17:3:12.101 | 5.07 | 27 | 2 | 49 |
| 2020/10/13--17:3:34.348 | 5.08 | 25 | 2 | 50 |
| 2020/10/13--17:3:56.59 | 5.08 | 27 | 2 | 49 |
| 2020/10/13--17:4:18.844 | 5.09 | 27 | 2 | 49 |
| 2020/10/13--17:35:35.452 | 5.01 | 27 | 2 | 49 |
| 2020/10/13--17:35:46.571 | 5.03 | 25 | 2 | 49 |
| 2020/10/13--17:36:8.822 | 5.02 | 27 | 2 | 49 |
| 2020/10/13--17:36:48.869 | 5.03 | 25 | 2 | 49 |
| 2020/10/13--17:37:13.338 | 5.05 | 27 | 2 | 49 |

Fig. 4: Results Observed from the System

## CONCLUSION

Authors have implemented the monitoring system for water. The monitoring of the water quality is achieved through the use of the various sensors. Water quality monitoring system is useful for the real time monitoring of the system parameters. The parameters like PH value, Temperature, Turbidity, and Dissolved Oxygen level are observed. The results shows that the system is useful for real time monitoring of the water quality. The wireless system stores the data monitored for water quality. Zig-Bee based system is implemented by the authors and the results of the same system are presented in this paper.

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