Smart Water Quality and Monitoring of Motor in Bore Well by IoT

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Abstract. Due to increase in population and over abuse of water and ground water resources, water level has diminished. Irregular distribution of rainfall and monsoon failure makes people to depend on ground water. So they are compelled to bore wells and rely upon it. But Water quality is affected by both the natural and human activities. Most of the waste are thrower in the landfills and buried on the land. This affects the water quality and also affects the farmland. The progressions in innovation like Internet of things, cloud computing, Web office can be utilized to structure a system to overcome these huge significant problems like low quality drinking water, expanded labour prerequisites, irreversible harm caused to inadequately checked motor. The breakdown of the motor can be avoided by monitoring the water quality and motor parameters. The framework has two sensors for in particular pH sensor to check water quality, ultrasonic sensor to check the water level, temperature and current sensor for motor observing. Single micro-controller chip is used to collect the data from the sensors and a Wi-Fi chip is utilized to send the collected information of a bore well to the cloud. If the data of the water and the motor is abnormal compared to threshold which is set through the code, the information is sent to the mobile application of the person in that locality. In this manner by this framework it is convenience to screen various parameters of borewell remotely in a mobile application.

1. Introduction:
On account of augmentation in urbanization, brisk budgetary improvement, an ever-expanding number of troublesome issues rise. Water defilement and groundwater destroying are the critical concern for all people. The water quality boundaries that are routinely checked are pH, turbidity, shading, conductivity, broke down oxygen, chloride, sulfate, smelling salts, nitrogen, nitrate, nitrite, regular carbon, phosphate, distinctive metal particles, and so forth. The customary methodology for water quality testing squanders an inordinate measure of solidarity and material resources and durable separating, the developing of preliminary equipment and various issues [1,2].

Sensors are a device which can deal with all of these issues. It can without much of stretch, exchanges and controls the signs. In light of straightforwardness utilization of the sensors, observing of water quality turns out to be more basic [3,4]. The structure executes mechanization, knowledge and arrangement of water and engine. The most conventional strategy for water quality testing is to accumulate tests from the wellspring of water and a short time later sending the example to the exploration office for testing and dissecting the idea of water [5,6]. It has drawbacks as it requires the piece of work, space, and money and besides it is a dreary system. Another watching system reliant on IoT entryway which crushes all the obstructions of the standard procedure and it doesn't require a checking Center where various people are ought to have been used to screen the bore wells.
The pH, turbidity of water and engine temperature, and ebb and flow drawn by the engine are completely recognized perseveringly the whole day. The single micro-controller chip gets the data from the sensors, which recognize the estimations of the water boundaries and engine boundaries, after that forms and look at them. The distinguished characteristics are sent through the IOT section. If the boundaries of the water and the engine is extraordinary diverged from a breaking point which is set through the code, the information is sent to the versatile application indicating a data to the individual in that area who introduced the application[5,7].

In this way it is advantageous to take convenient measures and to recognize the continuous circumstance of water quality remotely. The ordinary arrangements for Internet of things (IoT) are of two sorts; entrance without utilizing sensors and utilizing with sensors. IoT perform out a couple of fundamental limit from making a translation of shows to encoding, taking care of, managing data, filtering data [4,6]. IoT assembles messages from the sensors, stores data reasonably until they can be pre-arranged. It by then sends the results, picks if the data at a given period of planning should be passing, determined or kept in memory. With the goal that we can gather the data at whatever point required and can be handled.

2. Materials and methods

2.1 pH SENSOR:
P pH is an extent of destructive and base estimations of the fluid. pH is acceptably related to the hydrogen molecule center in the fluid. The extent of pH starts from 0 to 14. The nonpartisan arrangement has a pH of 7 and if the pH regard is lesser than 7, it is a base arrangement. If the pH regard is lesser than 7, it is an acidic arrangement. pH is a proportion of free hydrogen and hydroxyl particles in the water. When there are on the whole the more free hydrogen particles in water, by then it exhibits it is acidic in nature however when there are for the most part the more free hydroxyl particles in water, by then it shows it is basic in nature. pH can be impacted by synthetic compounds in the water. pH is a basic pointer of water that is advancing artificially. pH is imparted in "logarithmic units". Unreasonably high and low pH regards can be utilized for the use of water. High pH causes a severe taste. The water with low pH will expend or separate metals and distinctive substances. The sensor is utilized to quantify the acridity of water in the range between 0-14.Here, each sort of sensor to gauge the diverse nature of water. Our pH Sensor can be used for any lab or display that should be conceivable with a traditional pH meter, including destructive base titrations, watching pH in an aquarium, and investigating the water idea of streams and lakes.

2.2 CURRENT SENSOR:
At the point when the current is coursing with a conductor will leads to voltage drop. At that point the connection among current and voltage is here done by means of Ohm's law. Perspective on voltage is devolved endeavor and it will in general be overseen without impacting the work. While estimation of current is a Meddling task which can't be recognized straightforwardly as voltage. For surveying current in a circuit, a sensor is required. ACS712 Current Sensor is the sensor that can be utilized to check and register the extent of current applied to the conductor without influencing the presentation of the system.ACS712 Current Sensor is a completely arranged, the passageway sway influence based direct sensor IC. This IC has 2.1kV RMS voltage disengagement close by a low prevention current conductor.

To recognize current a liner, low-balance Corridor sensor circuit is utilized right now. This sensor is organized at the outside of the IC on a copper conduction way. Right when current courses through this copper conduction way it conveys an engaging field which is perceived by the Hall sway sensor. The thickness of the copper transmitter licenses continuance of the device at up to 5x over current conditions. The terminals of the conductive way are electrically disconnected from the sensor drives (pins 5 through 8). This allows the ACS712 flow sensor only in segregation without the usage of opto-isolators or other extreme separation systems

2.3 ULTRA SONIC SENSOR:
Ultrasonic sensors are nothing but which transmitting sound waves at a recurrence preposterously high for individuals to hear. It trusts that the sound will be reflected back, finding out detachment subject to the time required. This resembles while the radar of time which takes a radio wave to return resulting to
exception a thing. The sensor chooses the detachment to a target by evaluating time sneaks past between
the sending and getting of the ultrasonic heartbeat. The working guideline of this module is simple. It
sends an ultrasonic heartbeat out at 40 kHz which experiences the air and if there is a trick or thing, it will
reflection back to the sensor. By figuring the development time and the speed of sound, the detachment
can be determined. While a couple of sensors use an alternate sound maker and authority, it's furthermore
possible to join these into one bundle gadget, having a ultrasonic part move back and forward among
communicating and getting signals.

When it changes to be radar and ultrasonic sensors is used for a bit of comparable purposes,
sound-based sensors are speedily available they can be had for just a few dollars every so often and in
explicit conditions .For case, while radar, or even light-based sensors, gain some inconvenient
experiences precisely, ultrasonic sensors have no issue with this Then again, if an article is made out of a
material that holds sound or is surrounded with the objective that it the sound waves from the recipient,
readings will be unaltered. Division = ½ T x C.At 20°C (68°F), the speed of sound is 343 meters/second
(1125 feet/second), yet this movements depending upon temperature and clamminess.

2.4 TEMPERATURE SENSOR:
DHT11 sensor involves a capacitive with a thermistor which used for determining temperature. The
industriousness recognizing capacitor has two anodes with a moistness holding substrate as a dielectric
between them. Change in the capacitance respect happens with the alteration in moisture levels. The IC
measure, process this changed resistance regards and change them into modernized from .Temperature
sensor DHT11 appeared in figure 3.5 utilized for assessing temperature that determines the negative
temperature coefficient, which causes a decrease in its obstacle regard with rise of temperature. The
temperature degree of DHT11 is from 0 to 50 degree Celsius with a 2-degree exactness. Wetness degree
of this sensor is from 20 to 80% with 5% accuracy. The testing pace of this sensor is 1 Hz .for example it
gives one looking at for dependably. DHT11 is little in size with working voltage from 3 to 5 volts. The
most unbelievable current utilized while surveying is 2.5 mA

2.5 VOLTAGE REGULATOR:
The voltage regulator IC 7805 is actually a person from the 78xx course of action of voltage regulator
ICs. It is a fixed straight voltage regulator. The xx present in 78xx addresses the estimation of the fixed
yield voltage that the particular IC gives. For 7805 IC, it is +5 V DC coordinated power gracefully. This
regulator IC also incorporates a course of action for a warmth sink. The voltage controller appeared in
figure 3.6 has input voltage that can be up to 35 V, and this IC can give a consistent 5 V for any
estimation of data not actually or comparable to 35 V which is similarly as possible. The input voltage
will be in the scope of 7v to 35 v. Then we can apply the unregulated voltage to the pin for the guideline.
The ground pin is associated nonpartisan and the yield pin is to take the controlled voltage which is in the
scope of 4.8 v to 5.2v.

2.6 ESP-8266 WIFI MODULE:
The ESP8266 Wi-Fi Module is a free SOC with encouraged TCP/IP show stack that can give any littler
scope controller access to your Wi-Fi make. The ESP8266 is set up to do either promising an application
or offloading all Wi-Fi sifting through cutoff points from another application processor. Each ESP8266
module comes pre-adjusted with an AT request set firmware, which implies, you can basically connect
this to your Arduino contraption and get about as a ton of as a Wi-Fi Shield offers. To send the
information that is detected from the sensor to a far off distributed storage a Wi-Fi module is vital here we
picked NodeMCU esp8266 Wi-Fi module. It is a will be a System on a Chip (Soc) structure with
processor in it and it comprises of 9 pins for broadly useful information and yield reason alongside Rx, Tx
pin for transmission and gathering. The Tx and Rx of ESP8266 is associated with the second (Tx) and
third (Rx) pin of the Arduino Uno to send the temperature and mugginess esteems to it. It chips away at
an information voltage of 3.3v.

2.7 VDC Motor:
An electric engine is an electrical contraption which changes over electric vitality into mechanical force.
The major running rule of a DC engine is: "on each event a current wearing conductor is set in an
attractive territory, it examines a mechanical weight”. The course of this power is given by method of Fleming’ s left-hand rule and its significance is given by utilizing $F = BIL$. Where, $B =$ attractive transition thickness, $I =$ forefront and $L =$ time of the channel inside the magnetic discipline. Fleming’ s left hand rule: If we stretch the essential finger, second finger and thumb of our left hand to be opposite to each unique, and the course of attractive subject is spoken to by the essential finger, way of the contemporary is spoken to through the subsequent finger, at that point the thumb speaks to course of the weight gifted by methods for the conveying conductor.

When armature windings are connected to a DC gracefully, an electric fueled current units up in the winding. Attractive zone can be given by subject winding (electromagnetism) or with the guide of the utilization of never-ending magnets. For this situation, present day conveying armature conductors experience a weight because of the attractive subject, in accordance with the guideline said above. Commutator is made fragmented to get unidirectional force. Something else, the heading of power could have switched each time while the way of movement of conductor is turned around inside the attractive territory. This is the means by which a DC engine works.

2.8 PROBLEM DEFINITION:
To manage the water scarcity most of the people still depends on ground water. Hence water monitoring is the most important one and it should be done for people in an easy manner. Sometimes the motor which is combined for it will become abnormal. It leads to severe damage. Hence the monitoring of water quality and motor parameters are necessary.

3. Working:
On account of the nonattendance of work and helpless help of open bore wells, it is more brilliant to screen the bore wells halfway utilizing IoT. The dry run of engine is appeared by increase in temperature before the breakdown of engine. In this manner engine temperature ought to be checked. The water quality boundaries like pH which shows whether the water is acidic, essential or suitable for drinking reason; turbidity which shows the obscurity or pollution of water are checked. PH sensor is used to check the water quality also, DHT 11 sensor is used to look at the dry run, high engine temperature shows various abnormalities in engine. Current sensor (ACS712) is used to check the current drawn by the engine which shows whether the motor is running under stacked or emptied condition. To measure the profundity of the water in borewell we are utilizing ultrasonic sensor.

The pH sensor is mounted on the borewell containing water. The temperature and momentum sensor are kept faultless with engine. Under engine running condition and water proximity in borewell the person characteristics are assessed by the sensors. These sensors are related with Arduino Uno using wired connections. The sensor yield is sent to Arduino micro controller which is altered using Arduino IDE programming portraying the breaking point regards. ESP8266 Node micro controller is a wi-fi chip giving the framework organizes to entire module by going about as the close by hot spot.

The data from the sensors is taken to Arduino and it moves to ESP8266 hub MCU. Since ESP8266 goes about as wi-fi chip, data can be brought from ESP8266 hub MCU to the worker distantly.
3.1 WORKING PRINCIPLE:
The figure 1 shows the stream chart of the proposed framework. The DC engine is associated with an
current sensor to realize the current devoured by the engine. The yield of the current sensor is given to the
analog pin(A0) of the Arduino. The trigger and echo pin of the ultrasonic sensor is connected with digital
pin 9th and 10th of Arduino. pH sensor is connected with 2nd and 3rd pin of Arduino. DHT-11 is
connected with an 7thpin of Arduino. ESP-8266 wi-fi module TX is associated with RX and the other
way around to empower the information trade. The communicated information is gone be set to Thing
Speak stage so register in Thing Speak and afterward login to the ID and by picking make new channel
there will be API key accessible for each direct enter the Programming interface in the program
determining Programming interface key. Presently the Wi-Fi name and Secret word are supplanted with
the client Wi-Fi and Secret word individually.

4. Result and discussion:

The figure 2 shows the graph of the pH value in water. The pH value ranges is 7 to 8 shows the
water quality is good and suitable for drinking. The pH value above 9 shows the solution is base
The figure 3 shows the graph of the temperature value of the motor. The normal temperature value lies between 31°C to 36°C. If the temperature goes beyond this value the motor will get damaged. The figure 4 shows the turbidity value which can be calculated from the pH value.

![Figure 3 Graph of the Temperature](image1)

![Figure 4 Graph of the Turbidity](image2)

Figure 5 IoT based water quality and motor monitoring in borewell
5. Conclusion:
Web of things is the rising territory which doesn’t demand human mediation. This venture gives us a
genuine observing of water quality and engine boundaries of a given situation utilizing IoT. The gotten
temperature, pH and current information is sent to a distant distributed storage utilizing Wi-Fi for
graphical examinations of the given information and it can likewise be seen enthusiastic. The
framework is a reduced, minimal effort and results in time utilization so variations from the norm were
rapidly perceived. It likewise can be actualized in ventures to screen the engine and waste water
quality.

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