INTERNET OF THINGS GROUP 4

IOT-SMART WATER MANAGEMENT

PHASE - 5

NAME : D.AJITH

REGISTER NO : 822621106003

NM ID : au822621106003

DEPARTMENT : Electronics &Communication Engineering

COLLEGE CODE : 8226

COLLEGE NAME : Arifa Institute Of Technology- Nagappattinam

EMAIL ID : ajithnvk1@gmail.com

ABSTRACT

The efforts required in achieving required output can be effectively and economically be decrease by the implementations of better designs. If you design well of the project then will easily be able to create your project in less time with respect to others. So it is very important to create your designs or patterns first.

Over the past few years, IoT has become one of the most important technologies of the 21st century. Now that we can connect everyday objects Kitchen appliances, cars, thermostats, baby monitors to the internet via embedded devices, seamless communication is possible between people, process, and things.By means of low-cost computing, the cloud, big data, analytics, and mobile technologies, physical things can share and collect data with minimal human intervention. In this hyper connected world, digital systems can record, monitor and adjust each interaction between connected things. The physical world meets the digital world --- and they cooperate.IoT (Internet of Things) is an advanced automation and analytics system which exploits networking, sensing, big data, and artificial intelligence technology to deliver complete systems for a product or service. These systems allow greater transparency, control, and performance when applied to any industry or system.IoT systems have applications across industries through their unique flexibility and ability to be suitable in any environment. They enhance data collection, automation, operations, and much more through smart devices and powerful enabling technology.IoT systems allow users to achieve deeper automation, analysis, and integration within a system. They improve the reach of these areas and their accuracy. IoT utilizes existing and emerging technology for sensing, networking, and robotics.IoT exploits recent advances in software, falling hardware prices, and modern attitudes towards technology. Its new and advanced elements bring major changes in the delivery of products, goods, and services; and the social, economic, and political impact of those changes.

Here in my project "Smart Water Management System" it's all about IoT based project where its entire process is done using Arduino uno in which it is connected with Relay switch and main electricity and water pump. They are interconnected in such a way so that it will take an input from the users/consumers and will give the proper output.

Introduction

This project aims to learn how to save water from continuous degradation. Smart water management is essentially a system designed to gather meaningful and actionable data on the flow, pressure and distribution of a city's water. Its main goal is to ensure that the infrastructure and energy used to transport water are managed effectively.

Nowadays, every individual are using water and making some mistakes like when they are using for some purpose such as bathing, for fresh or many more. They leave the tap opened until unless their works did not completed. They don't have idea that water is degrading time by time and will not be available for the next generation event it might be problem for ourselves but they are ignoring this and thinking that water is renewable resources and can be renew time by time or many more.

Methodology

Developers believe that these features are important for all the people once they shall be the part of the community further. It'll be open source, it means whatever new features should anyone want to add they have need permission of the author to add extra functionality. Also collaboration with other teams, automation of the repetitive process, continuous integration of development branch changes to the application source code, continuous delivery of the updates to the application, continuous testing of the development branch code, continuous monitoring of all the processes involved in the software development.

1.Collaboration

Development and IT operation teams work together for building awesome products to serve their customers better. The communication gap between the groups is the cause for this concept and it is not only limited to the Software Developing Organizations as collaboration is needed by everyone. Its success is directly proportional to how well the teams or individuals collaborate to get their work done rapidly and efficiently.

2. Automation

This Concept is based on automation so we need tools to perform it. Either build the tools or buy them or you can make use of available open-source tools. Also we need these tools to automate the repetitive tasks of the software development and also the deployment process as the product needs to be deployed for production.

3. Continuous Integration

Continuous Integration is a technique for integrating the source code updates from all developers working on the project into the main branch regularly and automatic build checks for errors. The continuous integration of code prevents developers from merge conflicts.

4. Continuous Testing

The testing process is easy till cost starts rising exponentially, impact of software failures is also very dangerous, no one wants to make a release that may affect the user experience of its customers, introduction of new features may expose the organization to a security threat, affects reliability, and compliance-related risks.
It is not only a Quality Assurance function but it starts from the development phase.

System Components & Functionalities:

Arduino: Arduino is a prototype platform (open source) based on an easy to use hardware and software. It consists of a circuit board, which can be programmed (referred to as a micro controller) and a ready-made software called Arduino IDE(Integrated Development Environment), which is used to write and upload the computer code to the physical board.

Arduino provides a standard form factor that breaks the functions of the microcontroller into a more accessible package.

Arduino has many key features:

- Arduino boards are able to read analog or digital input signals from different sensors and turn it into an output such as activating a motor, turning LED on or off, connect to the cloud and many other actions can be performed.
- You can control your board functions by sending a set of instructions to the micro controller on the board via Arduino IDE.
- Arduino software does not need another piece of hardware in order to load a new code onto the board. You can simply use a USB cable with comparison of other circuit boards programming.
- The Arduino uses a simplified version of C++, making it easier to learn to program.

It makes IOT works easier and breaks the functions of the microcontroller.

Relay Board:

Relay boards are the computer boards with an array switches. They have input and output terminals and are design to control the voltage supply or also can say that it's working is as similar as the transformer. Means both can worked for voltage control. Relay boards independently programmable and provide a real control for each several onboard relay channels.

Following are the test a relay:

1. Keep the multi meter in the continuity check mode.
2. Check for continuity between the N/C contacts and pole.
3. Check for discontinuity between between N/O contacts and the pole.
4. Now energize the relay using the rated voltage.
5. Now check for continuity between N/O contacts and pole.

Water Pump:

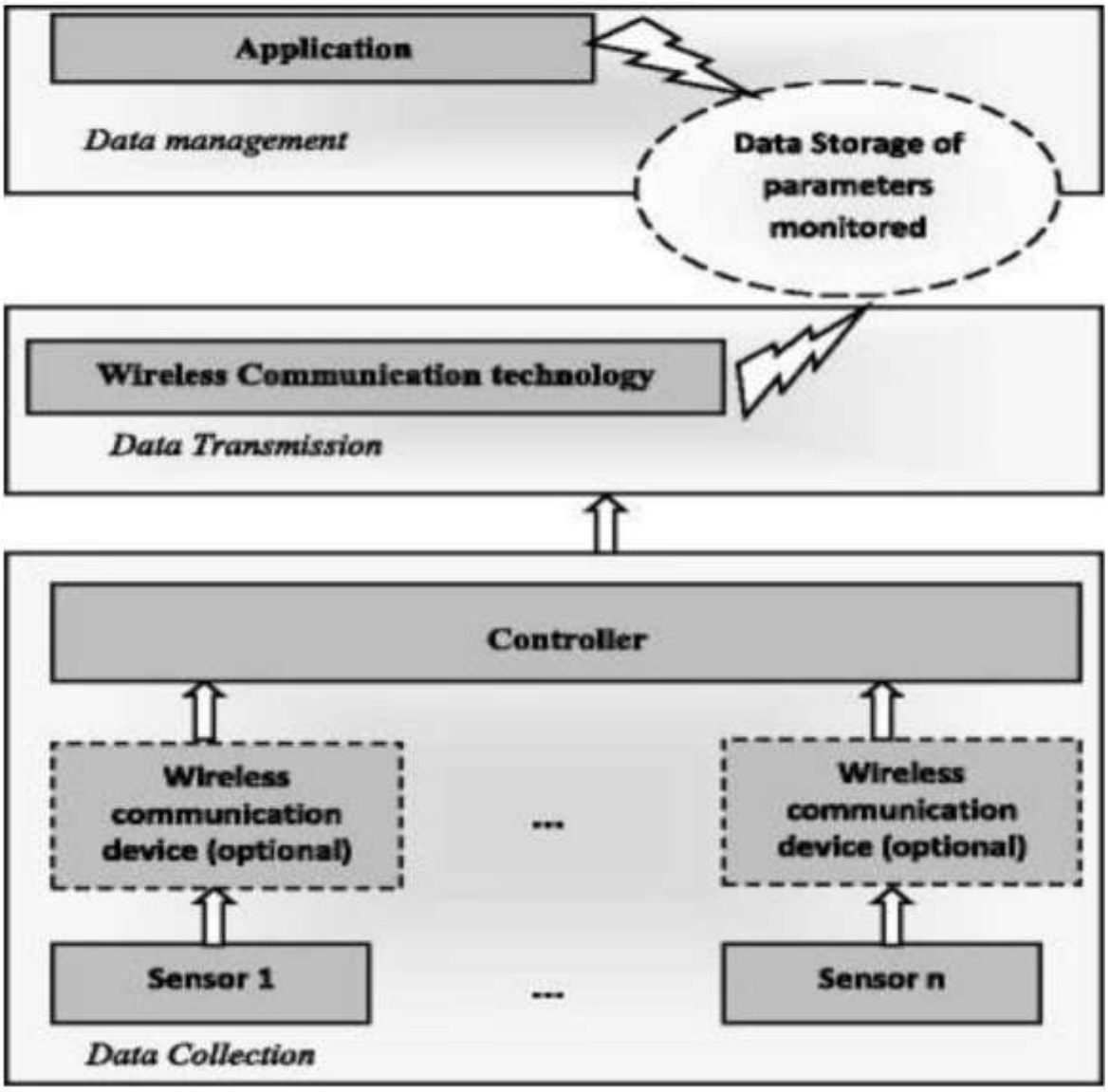
Water Pump is so a common type of pumps that they can be found at home, in fields, on farms and other places. They are exclusively used for displacing water. Water pumps run on different sources of power.Also in water cooler you can see water pump and how the whole process are carry on. Firstly it is connected to the electricity and whole part is dipped into the water and having some inner process where all the pumping steps done and is able to pull water and pour into some other places.

Smart Water Quality Monitoring

Watching the quality of water that comes into our houses is crucial. Rivers, lakes, and reservoirs may contain contaminants that are dangerous to us, and the increasing world population combined with urbanization has also worsened water quality. In our changing world, IoT can help monitor and analyse distributed water and ensure it complies with regulatory standards.

A water quality management system using IoT can deal with quality issues effectively. You only need to consider a simple comparison to appreciate the difference: Without IoT, water samples need to be collected and analysed manually. This process is costly and time-consuming because it requires large equipment and an expensive workforce. In contrast, IoT sensors can measure a variety of parameters like temperature and turbidity. Operators receive regular data from multiple samples, enabling them to remotely perform quality control on water reserves.

Block diagram of smart water quality monitoring



III. PROPOSED SYSTEM:

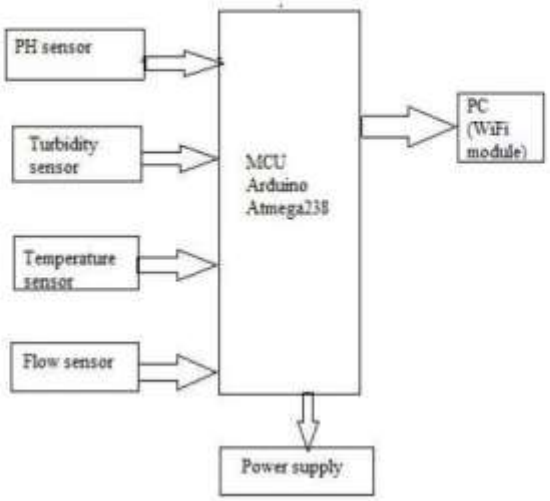


Fig: Block diagram of our project

In this, we present the theory on real time monitoring of water quality in IoT environment. The overall block diagram of the proposed method is explained. Each and every block of the system is explained in detail.

In this proposed block diagram consist of several sensors (temperature, pH, turbidity, flow) is connected to core controller. The core controller are accessing the sensor values and processing them to transfer the data through internet. Ardunio is used as a core controller. The sensor data can be viewed on the internet wi-fi system.

pH sensor: The pH of a solution is the measure of the acidity or alkalinity of that solution. The pH scale is a logarithmic scale whose range is from 0-14 with a neutral point being 7. Values above 7 indicate a basic or alkaline solution and values below 7 would indicate an acidic solution. It operates on 5V power supply and it is easy to interface with arduino.The normal range of pH is 6 to 8.5.

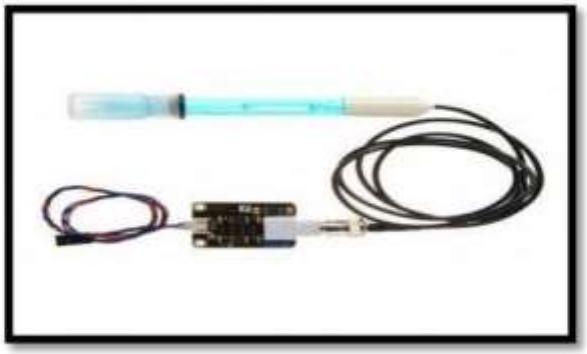


Fig: pH sensor

a) **Turbidity sensor:** Turbidity is a measure of the cloudiness of water. Turbidity has indicated the degree at which the water loses its transparency. It is considered as a good measure of the quality of water. Turbidity blocks out the light needed by submerged aquatic vegetation. It also can raise surface water temperatures above normal because suspended particles near the surface facilitate the absorption of heat from sunlight.

Fig: Turbidity sensor

b) **Temperature sensor:** Water Temperature indicates how water is hot or cold. The range of DS18B20 temperature sensor is -55 to +125 °C. This temperature sensor is digital type which gives accurate reading.

Fig: Temperature sensor

c) **Flow sensor:** Flow sensor is used to measure the flow of water through the flow sensor. This sensor basically consists of a plastic valve body, a rotor and a Hall Effect sensor. The pinwheel rotor rotates when water / liquid flows through the valve and its speed will be directly proportional to the flow rate. The Hall Effect

sensor will provide an electrical pulse with every revolution of the pinwheel rotor.

Fig: Flow sensor

d) **Arduino Uno:** Arduino is a microcontroller 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 microcontroller. 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 Arduino index of boards.

Fig: Arduino uno

e) Wifi module:

The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware. The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community.

Fig: WiFi module

IV. SCHEMATIC CIRCUIT WITH ITS WORKING

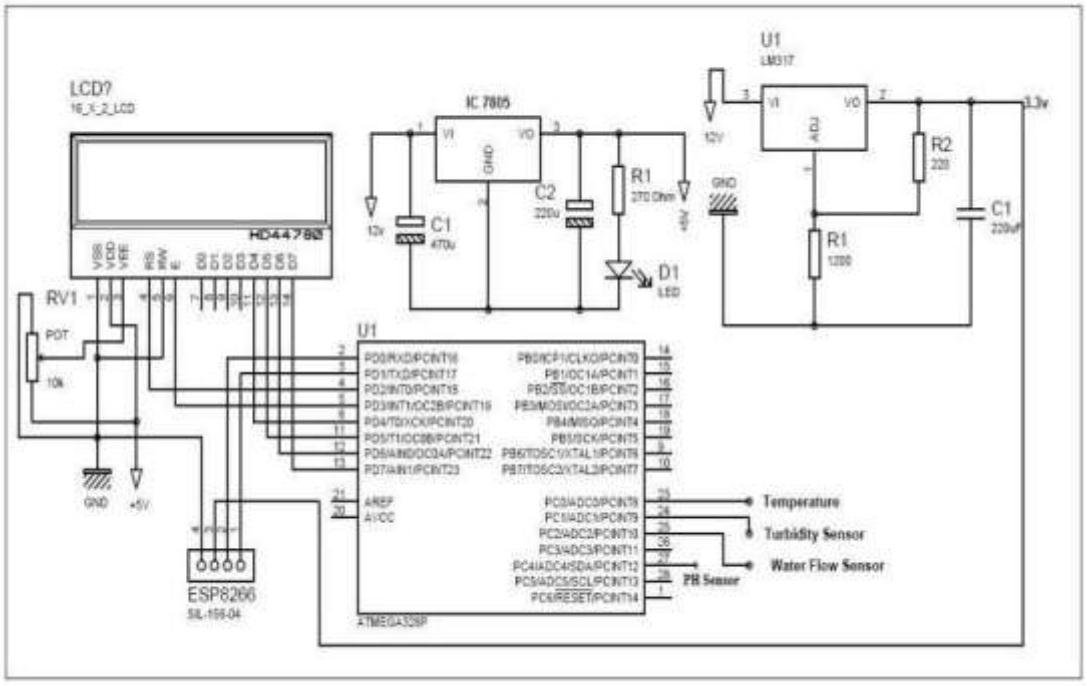


Fig: schematic circuit

The whole design of the system is based mainly on IOT which is newly introduced concept in the world of development. There is basically two parts included, the first one is hardware & second one is software. The hardware part has sensors which help to measure the real time values, another one is arduino atmega328 converts the analog values to digital one, & LCD shows the displays output from sensors, Wi-Fi module gives the connection between hardware and software. In software we developed a program based on embedded c language.

The PCB is design at first level of construction and component and sensors mounted on it. BLYNK app is installed in the android version to see the output. When the system get started dc current given to the kit and arduino and WIFI gets on. The parameters of water is tested one but one and their result is given to the LCD display. The app went provided with hotspot gives the exact value as on LCD display shows on kit. Thus like this when the kit is located on any specific water body and WIFI is provided we can observe its real time value on our android phone anywhere at any time.

PROGRAM

```
{
 // 1. Declare an object for the sensor
 Aqualabo_PHEHT my Sensor(XTR_SOCKET_C);
 // 2. Turn ON the sensor
 mySensor.ON();
 // 3. Read the sensor. Values stored in class variables
 // Check complete code example for details
 mySensor.read();
 // 4. Turn off the sensor
 mySensor.OFF();
}
{
 // 4. Print information
 USB.println(F(\"PHEHT\"));
 USB.println(F(\"Temperature: \"));
 USB.printFloat(mySensor.sensorPHEHT.temperature, 2);
 USB.println(F(\" degrees Celsius\"));
 USB.println(F(\"pH: \"));
 USB.printFloat(mySensor.sensorPHEHT.pH, 2);
 USB.println();
 USB.println(F(\"pH: \"));
 USB.printFloat(mySensor.sensorPHEHT.pH, 2);
 USB.println(F(\" mV\"));
 USB.println(F(\"Redox: \"));
USB.printFloat(mySensor.sensorPHEHT.redox, 2);
USB.println(F(\” mV\”));

}

{

 // It is mandatory to specify the Smart Water Xtreme type

Frame.setFrameType(INFORMATION_FRAME_WTR_XTR);
}
```