AUTOMATIC WATER PUMP CONTROL AND SYSTEM MONITORING BY USING INTERNET OF THINGS (IoT) TECHNOLOGY

S. Prasad[1], Dr. K. Prahlada Rao[2]

[1]*P.G Scholar, JNTUA College of engineering, Ananthapuramu, A.P.*

[2] *Professor &Rector of JNTUA College of engineering, Anantapuramu, A.P.*

ABSTRACT:

The main purpose of an automated water pump system for home or any user needing it for filling tanks as well as for using water supply. The system consists of water sensor, temperature sensors and wifi module and GSM modem are controlled by PIC microcontroller. The user can manually send the sms commands to on/off the pump. Whenever the water comes and touches to the sensor, sensor sends the signal to the microcontroller and on the pump automatically .once water stop the pump will automatically off after 3 sec.

The system consists of a float switch for checking water level, if tank fills the pump will automatically off. The tank water reaches above $30^o c$ the system now notifies the user that it has TEMP IS HIGH. The system also consistsof LED light to know the pump condition. The system information can be monitor through the ThingSpeak website

1. INTRODUCTION

Now a day's automation is increased in every field, because of Automatic systems have less manual operations, high flexibility, reliability, and accuracy. Due to this demand, every field prefers automated control systems in their applications. Especially in the field of electronics automated systems are giving the best overall performance.

In Agriculture sector most of the pumps running without water, this causes pump will damage soon. So here we propose an innovation system to eliminate such cases. Our proposed system constantly monitoring the pump conditions by provided sensors. If Water comes pump will automatically on and off when the water stops. Also, the user can manually on or off the pump by using SMS

In another case Everyday thousands of pumps are used to fill up water tanks. The process of switching on the pump and switching it off after the tank is filled is a manual process, i.e., Someone has to check whether the tank has sufficient water filled, then he has to turn the pump on to fill the tank up, then he additionally desires to look if the tank is crammed up or if the water is overflowing and turn the pump OFF for that reason. After a tank is filled up, lot of water is wasted earlier than turning the pump off. Our proposed device will assist to conquer the ones conditions to filling tanks robotically by means of the use of sensors and microcontroller In industries maintain of less temperature in cooling towers are mandatory for smooth operations. Our proposed system will help to run the pump automatically at the same intimate the alert message when the temperature reaches the pre-defined temperature

What is internet of things?

Internet of Things (IoT) is an eco-network of related physical things that are accessible through the web. The 'thing' in IoT could take care of business with a heart screen or a vehicle with worked in-sensors, i.e. objects that have been delegated an IP address and can accumulate and trade data over a framework without manual help or intercession. The introduced development in the things urges them to interface with internal states or the external condition, which in this manner impacts the decisions taken.

Why IoT?

An article by Ashton distributed in the RFID Journal in 1999 expressed, "In case we had PCs that knew everything there was to consider things - using data they gathered with no help from us - we would have the ability to track and check everything, and unfathomably diminish waste, hardship and cost. We would know when things required supplanting, repairing or inspecting, and whether they were new or past their best. We need to draw in PCs with their own specific strategies for social event information, so they can see, hear and see the world for themselves, in the entirety of its discretionary prominence." This is certainly what IoT stages enhances the circumstance us. It enables contraptions/things to watch, perceive and fathom a situation or the surroundings without being dependent on human offer help

How IoT works?

The internet of things (IoT), also sometimes known as the net of everything (IoE), includes all the net-enabled devices that collect, send and act at the internet of factors' also aim to enhance the connectivity to other levels by connecting different devices at a time to web there by facilitating the man to system interactions. These devices, regularly called "related" or "smart" devices, can sometimes talk to other related devices, a technique referred to as system-to-gadget (M2M) conversation, and act as the information they get from each other.

How can IOT help?

IoT stages can empower the relationship to diminish cost through improved process capability, asset use, and effectiveness. With the upgraded following of devices/objects using sensors and system, they can benefit by continuous bits of information and examination, which would empower them to settle on more splendid decisions. The improvement and joining of data, methodology, and things on the web would make such affiliations more huge and indispensable, making more open entryways for people, associations and ventures.

What is scope of IOT?

Internet of things can interface devices implanted in unique frameworks to the internet. On every occasion gadgets/items can speak to themselves cautiously, they can be controlled from wherever. The network at that point causes us to trap more data from more locations, ensuring more strategies for expanding productivity and enhancing well-being and IoT security.

IoT is a transformational constrain that may empower associations to improve execution through IoT examination and IoT security pass on better consequences. Associations inside the utilities, oil and gas, insurance, developing, transportation, establishment and retail divisions can get the prizes of IoT by way of deciding on more informed selections, helped by using the deluge of interactional and esteem-based facts reachable to them.

2. LITERATUREREVIEW

In past, there were some technologies which automate the water pump control. Those technologies are works on the concept of **GSM.** In this system, the model is worked on the basis of android application and water pumps can be turned ON and OFF with the help of wireless radio transmitters and Wi-Fi router by Souvik Paul [1]

In [2], Motor controls, such as ON/OFF can now be controlled bytheir proposed System using the mobile SMS technology. The system inform farmer to availability of power supply. Based on this farmer can send the message to switch on/off the motor. He need not have to be near the farm or field or even in his house. He can be anywhere outside tending to his various activities. Since this system works on the mobile network, the farmer can receive messages wherever there is a wireless network (roaming). Once the farmer sends and SMS to the system, it decodes the message.

3. HARDWARE COMPONENTS TO BEUSED

I. ESP 8266 WIFI MODULE:

The ESP8266 is a beneficial, cheap Wi-Fi module for controlling gadgets over the internet. It could work with a micro-controller just like the Arduino or it is able to be programmed to work on its personal. The ESP8266 comes with factory installed firmware allowing you to manipulate it with popular "AT instructions". You can create and upload your personal code, and this makes it highly powerful and flexible. ESP8266 is a UART to Wi-Fi module which provides a smooth manner to attach any small Microcontroller platform like Arduino/PIC/8051/ARM/RENESAS to internet wirelessly.

Fig1: ESP 8266 WIFI MODULE

II.   FLOAT LEVEL SWITCH:

A float switch is a one type of liquid level sensors, this device is used to find the water level in the tank. The switch is used to control a pump and control other devices too. This is also called as Magnetic float sensor. This float switch consists of hermetical sealed Reed Switch in the stem and a permanent Magnet in the Float. Float rise or fall based upon the water level and reed switch activated by magnet in the float

Fig2: Float switch

III.   WATER PUMP:

Water pump is a device that moves water from one place to other place, by using mechanical action.

Technical details: -	
Dimensions	45mm x 24mm x 30mm
Rate of flow	80-120lit.@ hr
Lift	1mt .max
Consumption	0.4W to 1.5 watt

Fig3: water pump

IV.   LM TEMPERATURE SENSOR:

Description:

The LM Temperature is an integrated circuit sensor that can be used to measure the temperature of water or room temperature based on the electrical signals. This sensor measure temperature more accurately than using of a thermistor. The sensor circuitry area is sealed and no longer challenge to oxidation. The LM generates a better output voltage than thermocouples and might not require that the output voltage be amplified. The LM335 has an output voltage this is proportional to the Celsius temperature. The dimensions factor is .01V/°C. The LM335 operates from −40°C to 100°C.

Fig4**:**LM Temperature Sensor

V.   LCDDisplay:

LCD (Liquid Crystal show) screen is an electronic display module and find a huge range of applications. A 16x2 liquid crystal display could be very primary module and may be very typically used in numerous gadgets and circuits. These modules are desired over seven segments and other multi section LEDs. The motives being: LCDs are within your means; without problems programmable; don't have any trouble of showing special & even custom characters (unlike in seven segments), animations and so on.

**Fig** 5: LCD Display

VI.   RELAY DRIVER:

A Relay driver IC is a switch which control thecircuits electromechanically which is associated with 220V mains supply. The main function of this relay is to contact or break the circuit in order to switch on/off any device The expected current to run the transfer loop is more than can be provided by different coordinated circuits like Op-Amp, etc.
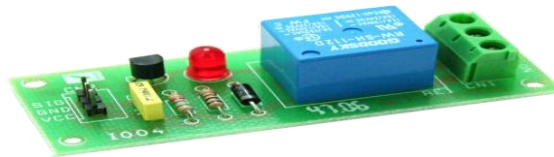
Fig 6: Relay driver

VII.   SOIL MOISTURE SENSOR

This Moisture Sensor can be used to discover the moisture of soil or choose if there is water across the sensor, allow the plants on your lawn attain out for human assist. They may be very to apply, just insert it into the soil after which read it. With assist of this sensor, it'll be realizable to make the plant remind you: hello, i am thirsty now, please supply me a few water.
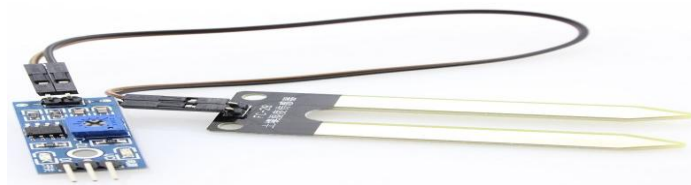
Fig7**:** Soil moisture Sensor

VIII.   GSM MODULE:

A GSM module isaelectronic device which can be either a cellular phone or a modem tool which may be used to make a computer or every other processor speak over a community. A GSM modem need the sim card to operate and communicate with the other network users. when a GSM modem is connected to a laptop, this lets in the laptop to use the GSM modem to speak over the cellular network.Nowadays, it represents a continuously growing percent of all new telephone subscriptions round the sector .A GSM modem may be a committed modem tool with a serial, USB or Bluetooth connection, or it is able to be a cell phone that provides GSM modem capabilities.
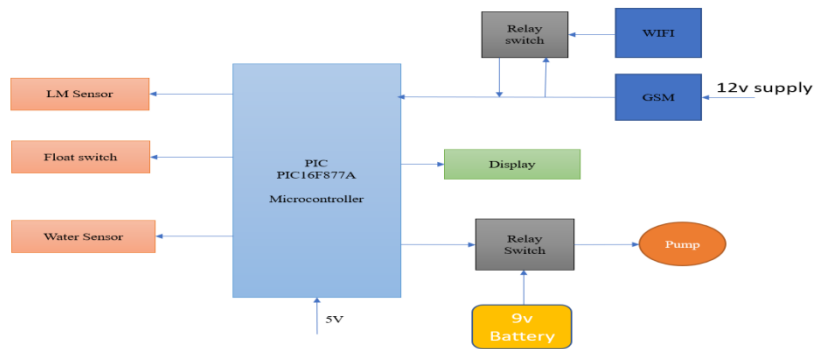
Fig8: GSM Modem

4. BLOCKDIAGRAM

Fig9:Block diagram of water pump control system
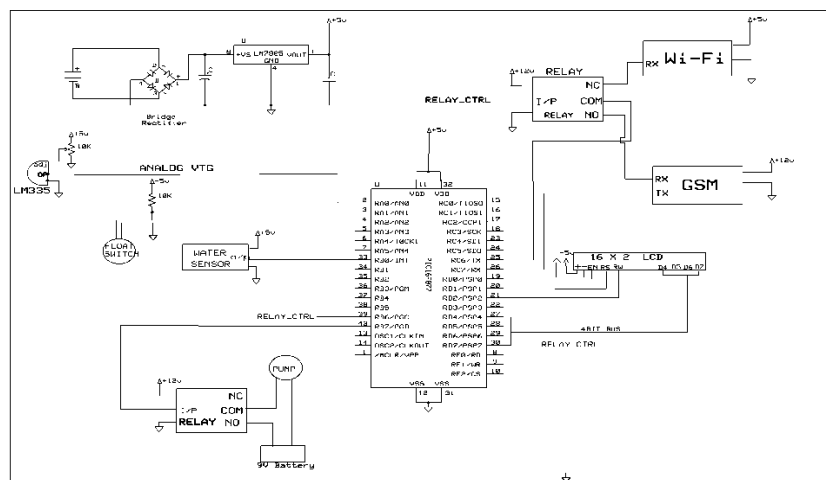
5. CIRCUIT DIAGRAM

Fig 10: Circuit diagram of Water pump control system

5. WORKING

Whenever the water comes and touches to the water sensor, it sends the signal to the microcontroller and switch on the pump after 3 sec and it fills the water tank automatically. Once the water tank full float switch sends the signal to the processor and switch off the pump. If water not touches to the water sensor it automatically off after 3 secs. Here provided 3sec delay time for avoid fluctuations of water in start condition. LM temperature sensor monitoring the water temperature in the tank and displays its value in the LCD. If water reaches above 30°c user proclaims the alert message as TEMP IS HIGH.
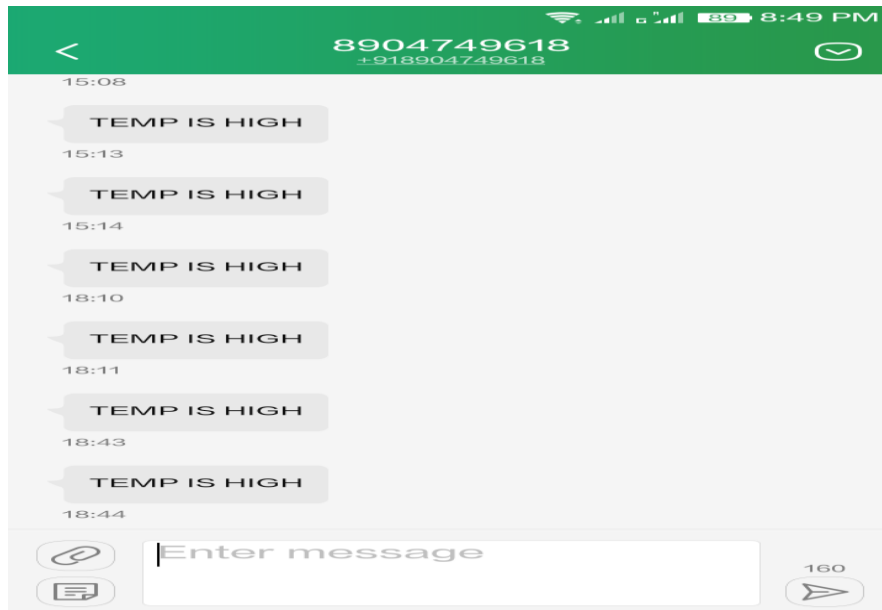
Fig11: Message alert from GSM module

As we written the programme, if the user sends the message PON to the provided mobile number, GSM module send the signal to pump i.e. pump will on continuously until the user sends the POF message. LCD display always shows the pump status.

As we have written a programme and inserted Thingspeak channel id in programme, so that a connection has been made among WIFI module-cloud-server-owner email ID. We monitor the pump and temperature conditions by using Thingspeak account through website or mobile application. Thingspeak website displays the Information in private view and public view. In public view everyone can able to view the information where as in private view needs the API keys to see the personal charts and data information.
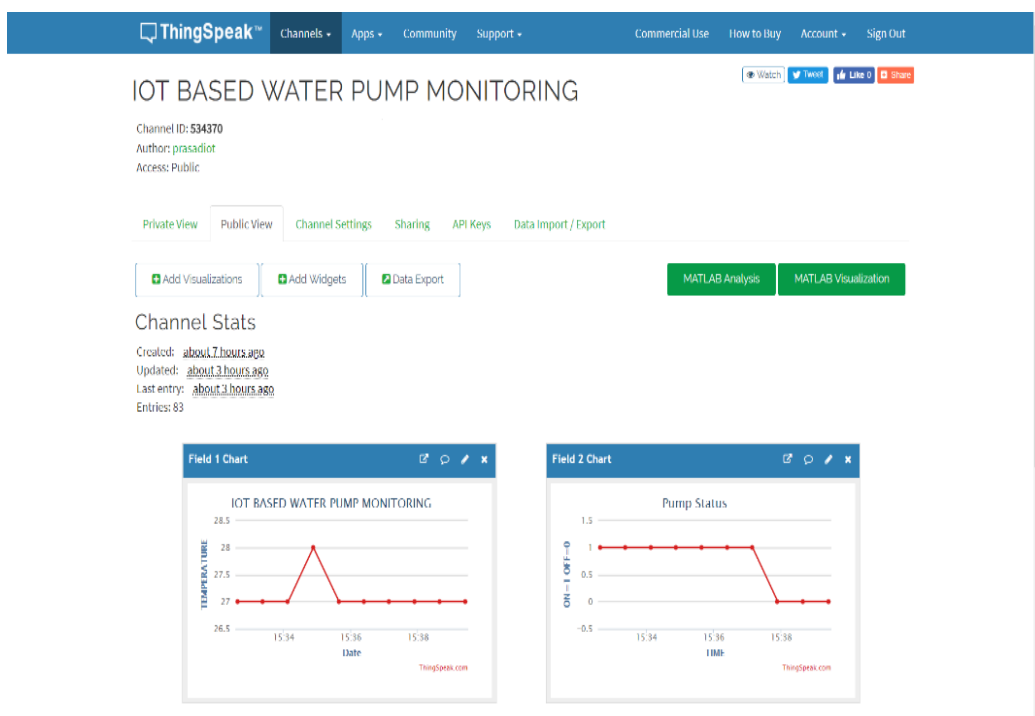

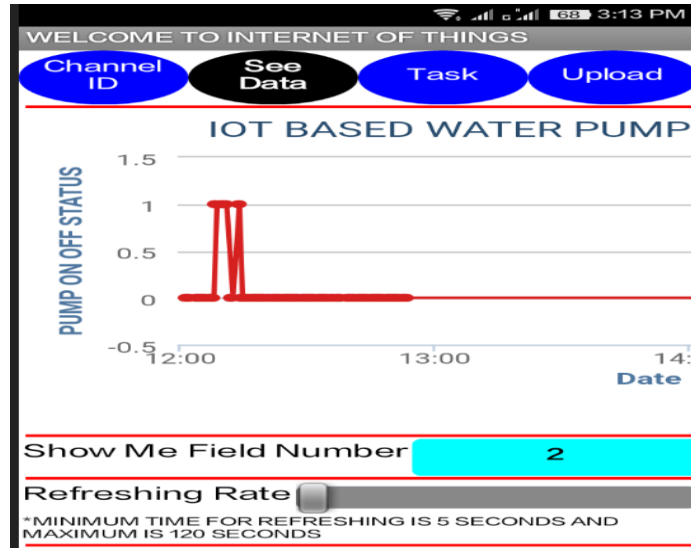**Fig**12**:** System monitoring through Thingspeak website

Fig13**:** System monitoring through mobile application

6. ADVANTAGES

1. Reduce the manual work

2. Eliminate wastage of water

3.Easy to operate-The water pump can be easily operated by the user

4.Stop tank Overflows

5.Save time and energy

6.Eliminate dry run condition of pump

7. APPLICATIONS

1. It can be used to filling the water tanks in household and buildings

2. This system can also used in manufacturing industries

3. This system can also be used in agriculture sector in multiple purposes

8. RESULT

Water pump control by using INTERNET OF THINGS TECHNOLOGY (IoT)' was designed such that automatic control of the water pump. The microcontroller gets the information regarding the water condition through the water sensor and switch on(or)off the pump automatically.Also, user can manually on/off the pump manually through sms commands from mobile. Once the water reaches the temperature above 30°c in the tank, user will notify the alert message as "TEMP IS HIGH". System details are monitor through ThingSpeak website

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