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# IoT Based Soil Moisture and Temperature Monitoring Device for Irrigation Water Pump

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***Abstract-The Water Scarcity is increasing very much in the drought prone area. So the consumption of water should be optimally done. The waste of water should be cut down very seriously. As our country is an irrigation based nation, much of the land is used for cultivation. The necessity of water is very essential. An attempt to cut down the wastage of irrigation water will be tried in the present project work the project aims in designing an IOT sensor system which will be capable of detecting the moisture level humidity and PH value of the soil. These sensors will be fixed at predominant positions of the fields. When the moisture level is sufficient,pump will be switched off. The heavy duty water motor pump operating for the fields will be provided with sensor for temperature detection. Increase in the surface temperature of the motor switches of the power supply thereby preventing the damage for motor winding. Thus an attempt to stop water wastage and water pump damage will be made in this research work using the IOT technology.***

***Key words: Arduino Microcontroller at mega 328, DHT11, PH sensor, Soil moisture sensor, Wi-Fi, and D C motor.***

## I. INTRODUCTION

Water is a critical input into agriculture in nearly all its aspects having a determining effect on the eventual yield. Good seeds and fertilizers fail to achieve their full potential if plants are not optimally watered.India is a country with an important agricultural sector, and over 55% of population is dependent on agriculture. India is not a water rich country and is further challenged due to negative impact of climate change, enormous wastage owing partly to poor management and distorted water pricing policies. The Northern Ganga River Basin has abundant water resources, whereas the Southern River Basin has few, but with high levels of pollution in ground water and surface water. Increase in population and changing lifestyles has increased demand for water (largely for irrigation) in both urban and rural areas. India has 18% of world population, having 4% of world's fresh water, out of which 80% is used in agriculture. India receives an average of 4,000 billion cubic meters of precipitation every year. However, only 48% of it is used in India's surface and groundwater bodies. A dearth of storage procedure, lack of adequate infrastructure, inappropriate water management has created a situation where only 18-20% of the water is actually used.
Objective: The monitoring of water supply to agriculture has to be done which can lead to a proper water management. This can be done with the use of technology like IoT. The monitoring of parameters can be done on a mobile application.The live parameters and status of devices can be monitored on the mobile screen available in the system. The monitoring of the devices is done using Wi-Fi with the help of mobile phone application.

## II. HARDWARE DESCRIPTION

In this work, design aspects of independent modules are considered. The block diagram is shown in figure.1.

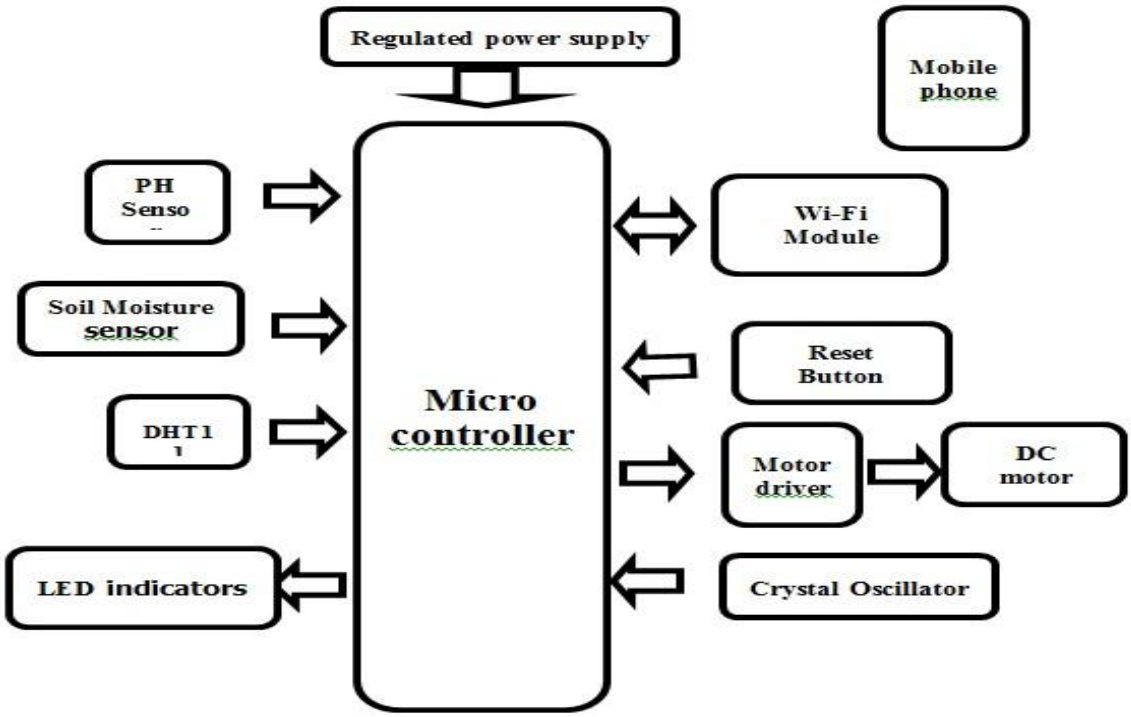


Fig.1. Block diagram of Soil Moisture Sensor and Temperature Sensor for Irrigation Water pump based on IOT

A. MICROCONTROLLERPIC16f73

ATMEGA328**:**

The Atmega328 is commonly used in many research and autonomous systems where a simple, low –powered, low cost microcontroller is needed. The most common implementation of this chip is on the popular Arduino development platform.

Fig.2. Aurdino microcontroller Atmega328

B. DHT11 SENSOR (combination of temparature and humiditi sensor)

The DHT11 temparature range is from 0 to 50 degree celsius with ±2 degree accuracy. The antherone DHT22 sensore the temparature measuring range is -42 to +125 degree celsius with ±0.5 degree accuracy. The humidity range is from20 to 80% with 5% accuracy.

Fig.3.DHT11SENSOR(combination of temparature and humiditi sensor)

C. PH SENSOR

The PH sensor measures the hydrogen ion activity in water based solutions, indicating its acidity or alkalinity expressed as PH.

Fig.4.Soil pH meter

D. SOIL MOISTURE SENSOR LM 324

The Soil moisture sensor uses capacitance to measure dielectric permittivity of the surrounding medium. In Soil, dielectric permittivity is a function of the water content. The sensor creates a voltage proportional to the dielectric permittivity, and therefore the water content of the soil. The LM124 series can be directly operated off of the standard +5V power supply voltage which is used in digital systems and will easily provide the required interface electronics without requiring the additional ±15V power supplies. The LM324 series consists of independent, high gains, which were designed specifically to operate from a single power supply over a wide range of voltages.

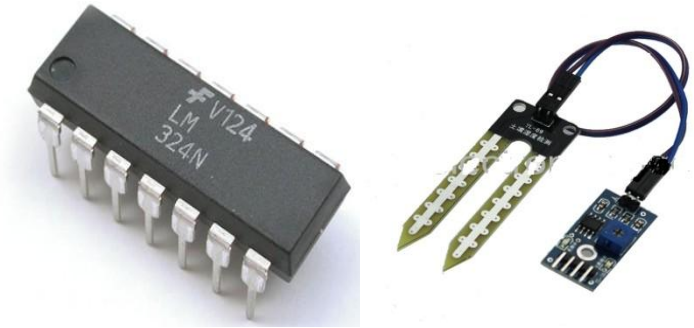


Fig.5.soil moisture sensor LM324

E. Wi-Fi MODULE:

Wi-Fi is a popular term that is used referring to wireless communications between computers and other computer related devices. Regular radio waves are to broadcast and receive just like a pair of walkie talkies, but on a much higher frequency.Products that pass this certification are required to carry an identifying seal on their packaging that states "Wi-Fi Certified" and indicates the radio frequency band used(2.5GHz for 802.11b, 802.11g, or 802.11n, and 5GHz for 802.11a).

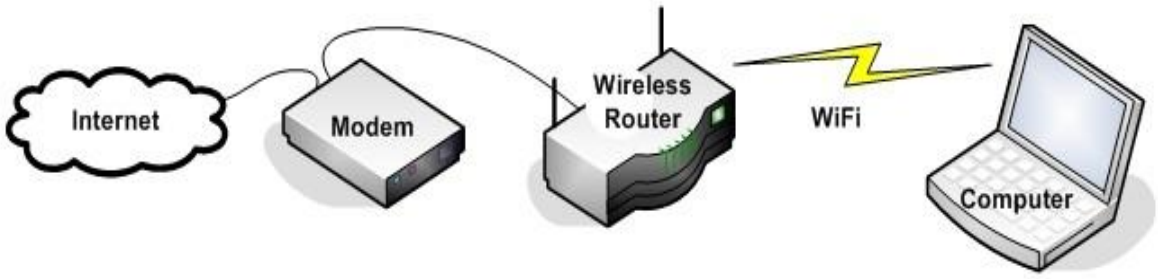


Fig.6.Wi-Fi

F. D.C.MOTOR

A dc motor is used electical energy into mechanical energy, it is very typically through the magnetic fields and current-carrying conductors. In this project 5v d c motor is used.

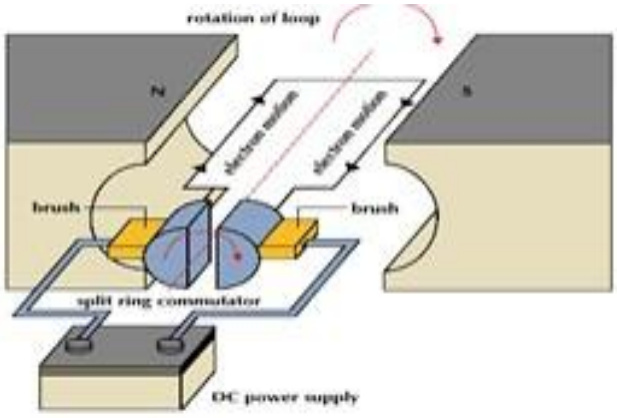


Fig.7.Operation of a DC Motor

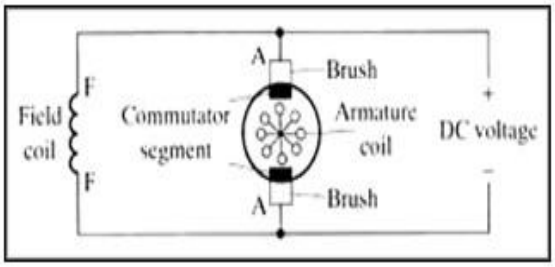


Fig.8.Simple electrical diagram of DC motor

## III. RESULT

The project "Soil Moisture Sensor and Temperature Sensor for Irrigation Water pump based on IOT" was designed an intelligent system capable of monitoring different parameters in the irrigation system through IOT. The controlling device of the whole system is done using Arduino Microcontroller. Whenever the sensors unit gets the input from respected sensors like, soil moisture sensor, PH sensor, DHT11 (combination of temperature and humidity sensor), these inputs are fed to the Arduino microcontroller. If the soil moisture value is less than the predefine value motor will be ON. The Microcontroller performs appropriate task, system from the mobile phone applicationthrough Wi-Fi. The live data is continuously uploaded to a mobile phone application using Wi-Fi module interfaced to microcontroller.

## IV. CONCLUSION

This project presents the design of an IOT based automatic irrigation system. The proposed system can reduce the efforts of farmers and provides high yield. It also conserves water for irrigation by locating the sensor at the right position above the soil level. This work has shown that plants can still sustain at low moisture level when the temperature is moderate. Analyzing more than one parameter has made this system an efficient one for managing the field.

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