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Implementation of IoT in Agriculture with Real Time Environmental, Soil Parameter Monitoring and Weather Report

Neelu Sharma[1], K. Priyanka Sahu[2]

[1]*M.Tech student, Department of Electronics & Communication Engineering & Kalinga University, Raipur (C.G.)*
[2]*Assistant Professor, Department of Electronics & Communication Engineering & Kalinga University, Raipur (C.G.)*

Abstract - *Smart farming with the help of Internet of Things (IOT) has been designed and the controlled circuit operates on both automatic and manual modes. The controller keeps monitoring the temperature, humidity, soil condition and accordingly supplies water to the field. And also alert by fire in agriculture filed. In smart agriculture, losses of irrigation water and fertilizer are minimized and create a suitable climate in terms of humidity and temperature. The objective of this paper, proposing the agricultural field control system using soil moisture, and climate sensors. By observing the changes in these parameters, the irrigation system, temperature, and humidity can be monitoring via the internet and automatically controlled if certain criteria differ from reference values.*

Key Words: **ESP8266, LCD16*2, DHT11, Moisture sensor, water pump, buzzer.**

1. INTRODUCTION

Temperature Humidity and soil are three basic parameters to build any Weather Station and to measure environmental conditions. The Indian agriculture is also affected by present climatic conditions like humidity, wind speed, moisture levels have significant role in growth of the crop. The project deals about developing smart agriculture using IoT which is given to the farmers. The Sensor used is DHT11 temperature sensor and Moisture sensor. It is inexpensive and has less weight. Real-time monitoring of temperature and humidity plays a vital role in many fields of agriculture. A Smart IoT based Agriculture parameter which is used to assist farmers in getting live data for efficient environment monitoring which will enable them to do smart farming and increase their overall yield and quality of products. In this project we prevent a solution for monitoring the weather conditions at a particular place and make the information visible anywhere in the world.It is analysis environmental data through weather API.

2.Description

An ESP8266 can be described as a network of WI-FI that understand and control the environment, cooperating jointly with people or computers to control the surrounding environment. The WI-FI is one of the main parts of an ESP8266. Where the database is located, through a developed web API. The web API sends the improvement of environmental conditions.

The web application is suitable for mobile devices to monitor the areas from anywhere via the web while having the possibility of monitoring data weekly or daily. The data transferred to the cloud can be used for more complex analysis that will predict and prioritize more precisely the environmental conditions, optimize the time needed to reach the mentioned locations and provide timely information about the environmental conditions.

Block Diagram

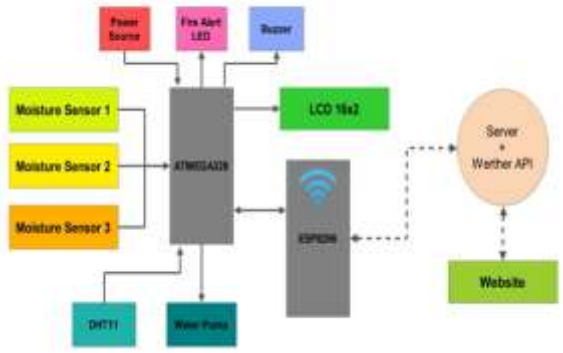

Fig.1: Block Diagram of IoT based Irrigation system

Circuit Diagram

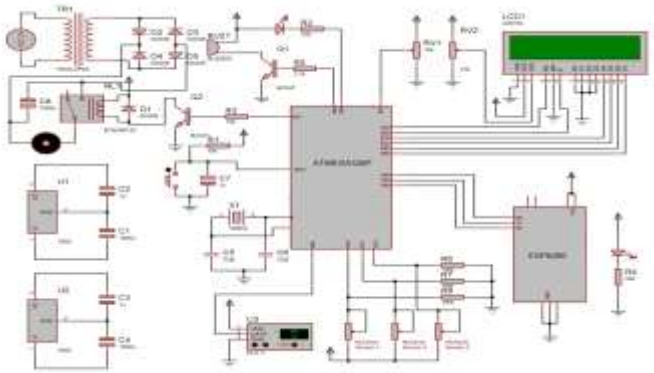

Fig.2: Circuit Diagram

Hardware and Software

ARDUINO IDE

An **integrated development environment** (**IDE**) is a software application that provides comprehensive facilities to computer programmers for software development. An IDE normally consists of at least a source code editor, build automation tools, and a debugger.

API (Application Program Interface)

Think Speak™ is an IoT analytics platform service that allows you to aggregate, visualize and analyze live data streams in the cloud. Think Speak provides instant visualizations of data posted by your devices to Think Speak. With the ability to perform online analysis and processing of the data as it comes in. Think Speak is often used for prototyping and proof of concept IoT systems that require analytics.

Internet of things

The **Internet of things** (**IoT**) is the extension of Internet connectivity into physical devices and everyday objects. Embedded with electronics, Internet connectivity, and other forms of hardware (such as sensors), these devices can communicate and interact with others over the Internet, and they can be remotely monitored and controlled.

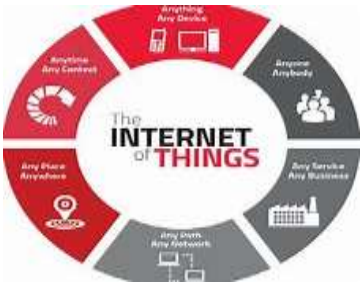

Fig.3: Internet of things

Sensor DHT11

DHT11 digital temperature and humidity sensor is a composite Sensor contains a calibrated digital signal output of the temperature and humidity. Application of a dedicated digital modules collection technology and the temperature and humidity sensing technology, to ensure that the product has high reliability and excellent long-term stability.

The sensor includes a resistive sense of wet components and NTC temperature measurement devices, and connected with a high-performance 8-bit microcontroller

Fig.4: DHT11

Soil moisture sensors

Soil moisture sensors measure the volumetric water content in soil. Since the direct gravimetric measurement of free soil moisture requires removing, drying, and weighting of a sample, soil moisture sensors measure the volumetric water content indirectly by using some other property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture content.

ESP8266 Module

Espressif Systems' Smart Connectivity Platform (ESCP) is a set of high performance, high integration wireless SOCs, designed for space and power constrained mobile platform designers. It provides unsurpassed ability to embed Wi-Fi capabilities within other systems, or to function as a standalone application, with the lowest cost, and minimal space requirement.

Result

To verify the effectiveness of proposed solution the hardware has been designed device. The results of this system can be seen on web server which can be predict environmental parameter through weather API. By the help of Thinkspeak visualization and weather API used to plot sensor graph, weather graph ,weather map and pump controller.

Experimental setup ON/OFF conditions

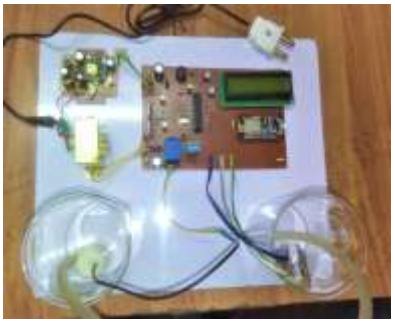

Fig 5 Experimental setup OFF conditions

Fig 6 Experimental setup ON conditions

Graphical Representation

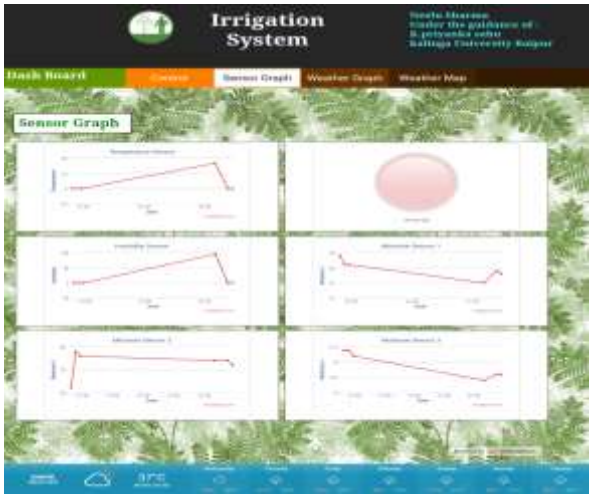

Fig 7 (a) Sensor Graph

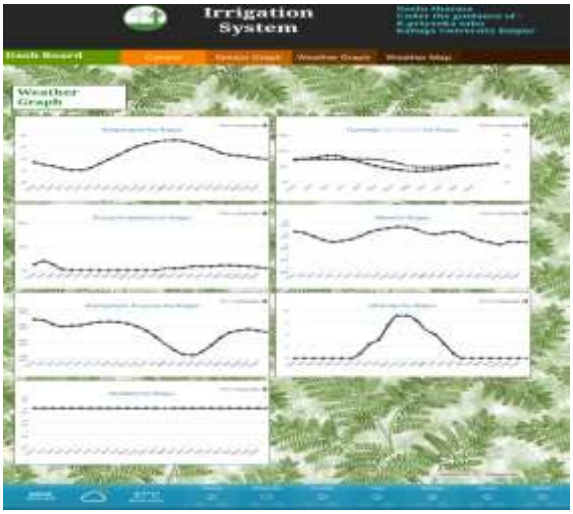

Fig7 (b) Weather Graph

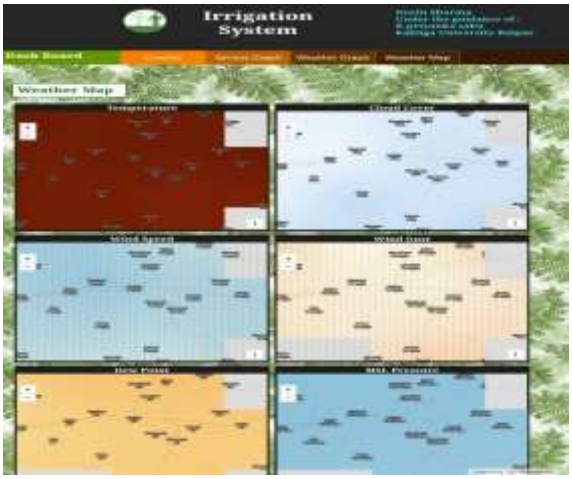

Fig. 7(c) Weather Map

Fig 7(d) Pump control

CONCLUSION

The developed prototype for precision weather station is capable of providing the farmers with real-time weather situation and conditions prevailing in and around the agricultural field. We can predict temperature, humidity and soil moisture level and irrigation system can be monitored. Increase productivity.

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