

A MODIFIED WEB-BASED AGRO-CLIMATIC REMOTE MONITORING SYSTEM VIA WIRELESS SENSOR NETWORK

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Abstract: Weather and climatic monitoring plays a significant role in agriculture, so the collection of information about the temporal dynamics of weather or climatic changes is very important. This does intend to advance our previous work by modifying it and focus on Web based Remote monitoring and data acquisition of Agro-climatic parameters using wireless sensor system. The system which has been designed to operate remotely consists of the temperature/humidity sensor, soil moisture sensor interfaced to the ATMEGA 2560 Microcontroller, a local display and the CC3000 Wi-Fi shield also interfaced to it. When the system is active, the sensors sense these physical parameters and then, the LCD displays the current conditions sensed locally. Furthermore, a connection is established between the CC3000 Wi-Fi shield and the access point in order to transmit the sensed parameters to the web application via the web address for remote monitoring and data acquisition. The entire system is capable of sensing parameters, display them locally and transmit the same parameters to the web where they can be remotely monitored, acquired and analyzed. The result obtained from this developed system in comparison with an existing system capable of measuring temperature and humidity respectively shows that, the percentage error for temperature and humidity from the existing system was evaluated as 7.91% and 9.52% respectively and the percentage error for temperature and humidity from the developed system was evaluated as 8.21% and 9.45% respectively. Based on the result obtained, the accuracy of the different sensors used is assumed to be responsible for this variation. Therefore the percentage error of the system is a function of the accuracy of the sensors that were used. The developed system prototype could be deployed in areas like agriculture so as to boost farm and climate monitoring and data acquisition.

I INTRODUCTION

A Background of Study

The productivity of crops in agriculture is highly affected by the conditions such as temperature, humidity, and soil moisture level, and light intensity level, amount of carbon dioxide and microbial activities. These environmental and climatic factors determine the quality and better productivity of the plant growth. Continuous monitoring of these factors gives relevant information pertaining to the individual effects of the various factors towards obtaining maximum crop production [1]

Agriculture can be defined as the science, art or practice of cultivating the soil, producing crop and rearing of livestock for the sustenance of human life. Agriculture is an essential component of societal well-being. Agricultural production influences, and is influenced by, health, water quality and quantity, ecosystem, biodiversity, the economy, and energy use and supply[2] The seasonality and ubiquity of agriculture make agricultural practices and production amenable to efficient synoptic monitoring[2] Remotely monitoring of environmental parameters is important in various applications and industrial processes most especially in agriculture.

Temperature, a measure of quantity of heat energy possessed by a body is caused by heat transfer[12]. Soil temperature is degree of hotness or coldness of a particular soil which is influence by Rainfall, Irrigation and Soil physical properties[3,12] Soil Temperature plays an importance role in seed germination and growth as optimum temperature is required for proper germination, effective growth and development because planting before optimum temperature can result to poor germination, limited growth or total death of the seed[4]. The optimum temperature for all crops ranges from 15 to 40 degree Celsius. Microbial activities that increase soil fertility survive at the maximum range[12]. When the temperature is above optimum value, this activity get reduce as