EFFICIENT ANALYSIS IN AGRICULTURE USING BLUETOOTH LOW ENERGY

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Abstract- Bluetooth low energy (BLE) is the recent technology for communication, due to inherent support for mobile phone accessibility.This paper describes the analysis of soil using moisture sensor, temperature sensor, humidity sensor and BLE technology intended for use in agriculture wireless sensor network system. The output is evaluated based on its effectiveness in agriculture environment. This paper describes the application of Bluetooth Low Energy in analysing moisture level of soil, temperature and humidity in agricultural field. Thus the data extracted from all sensors are admitted to arduino board in which that has an inbuilt program. The required information about the soil is fetched from mobile application as it is acting as a receiver. Monitoring the agriculture system using BLE consumes less power.

KEY WORDS: Bluetooth Low Energy, agriculture, IOT, sensors.

I INTRODUCTION

This world is developing in all fields with new technologies and it is also necessary to develop in agriculture hence wireless system is acting as an answer for agriculture inefficiency problem. Many projects have been implemented and solutions for this problem is derived with the help of wireless system. Monitoring the environmental factors is not just necessary to take agricultural field effectively to the next step. Requirements in the project should overcome the power consumption and efficiency problems. Hence application of power efficient source will be a good turning point to these projects. In order to provide solution to all such problems, it is necessary to develop an integrated system which will take care of all factors that affect the efficiency in each stage with more consumption of energy. But complete remedy for agriculture automation is not achieved due to various issues. Though it is implemented it does not gave any efficient outcome for the problem. Hence this paper will remain a solution for developing agriculture using Bluetooth Low Energy (BLE) that consumes less power.

II EXISTING SYSTEM

India has made many progresses in its agriculture system to increase food production. Also some years in between India faced some severe drought. Irrigation infrastructure was very poor when compared to agricultural policy. New technologies were implemented to irrigate the agriculture land in large. Also the existing method and one of the oldest ways in agriculture is the manual method of checking the parameters. [1] It focuses on evaluating the parameters using IOT. [2] It includes the usage of GSM module that transmits data. [3] It just collects all data and intimate user to enable or disable motor for irrigation manually. [4] Usage of GSM and other source that transmits data which results in high power consumption.[5] It proposes high cost and mainly high power consumption proposal to acquire the required data [6] The irrigation requirement is just determined whether it is necessary or not and the user involved in the process.[7] Overall process include about 80% of the user involvement by just acquiring data and its transmission.[8]Soil Health Report card is arranged and sent to farmer by means of SMS.[9]Remotely sense and monitor various parameters of the soil like temperature, moisture, fertility and regulate the supply of water using microcontroller.[10]Gathering the data that drives a framework and analyse where information is remotely gathered.[11]Implementation of portable handheld device for soil testing and result uploading over Iot.[12]Microcontroller based device connected to EC sensor, pH sensor that reads from sensors and transmits it to mobile application over Bluetooth serial communication.[13]Cloud based data analysis and monitoring allows the user to analyze and monitor the irrigation system through internet.[14]Data acquired from environmental variables, substrate conditions, and over drain measurements are sent over the Internet for the remote analysis.

III. PROPOSED METHOD

The Proposed System Consists of Arduino board, humidity, temperature sensor, Bluetooth low Energy (BLE) and a Motor, The devices which are connected are operated by Arduino .In this system Arduino updates information about the temperature, humidity and irrigation is to be enable or not and transmitts the extracted data through the BLE.The below

figure shows the diagrammatic representation of proposed system

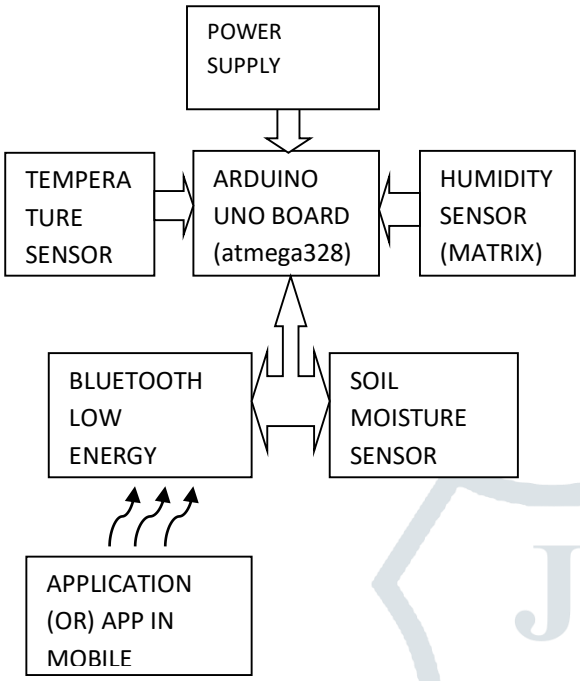


Figure 1: Block Diagram for System

Figure 2: Arduino uno board

Arduino is an open-source electronics hardware based on easy-to-use hardware and software. They can able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED. In this project arduino board is connect5ed with the various sensors including temperature sensor, humidity sensor and soil moisture sensor.The important component of this project Bluetooth Low Energy chip is also connected to this board. Current arduino boards are programmed through Universal Serial Bus (USB).This systems provides a set of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards and other circuits.In this project the input is power supply. Power supply is connected to this board via external power supply pin. The temperature, humidity sensors and driver board are connected to the analog input pins A0-A5. USB plug in the board is not used in this project. Transformer and the driver circuit is used and connected to the arduino board via analog input pins.

The two most commonly used Bluetooth versions to date are Bluetooth BR/EDR (basic rate/enhanced data rate) - also known as Bluetooth classic - (Bluetooth v.2.0+) and Bluetooth low energy (Bluetooth v.4.0+). Both Bluetooth versions operate on the same frequency band of 10 2.400GHz – 2.485 GHz but it vary with their power consumption.In this project the BLE is connected to the arduino board. The data that is acquired from sensors are processed by arduino board and are fetched by the BLE. This fetched data are transmitted to the app which is in the mobile and the transmitting medium acting here is BLE with low power consumption. The main factor in BLE is power consumption and it ranges about 0.01-0.05 W. The peak current is < 15mA.

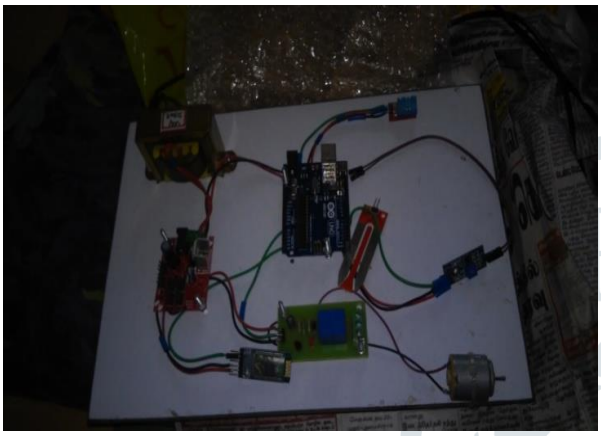
Figure 3: **BLE CHIP**

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. The sensor is connected to the arduino board and the acquired readings from this sensor is transmitted as an input to the board. This data is processed in the board with the help of coding and this information is transmitted to the mobile app through BLE.

A humidity sensor (or hygrometer) senses, measures and reports the relative humidity in the air. It therefore measures both moisture and air temperature. Relative humidity is the ratio of actual moisture in the air to the highest amount of moisture that can be held at that air temperature. In this project the humidity sensor is connected to the arduino board. The reading from the sensor is now transmitted to the arduino board which is processed within it. This data is again transmitted to the mobile app via BLE with less power consumption.

IV RESULTS AND DISCUSSION

The design system provides a flexible, convenient and easy to automatically analyze soil using moisture sensor, temperature sensor, humidity sensor and BLE technology intended for use in agriculture wireless sensor network system The software implementation in this project is achieved using embedded C programming. The program is dumped in the arduino board that enables the sensing process and transmits the data to the mobile via Bluetooth Low Energy. Monitoring the agriculture system using BLE consumes less power.



V CONCLUSION

The design system provides a low cost, convenient, low power consumption and easy to use system for analysis purpose. The sensors are interfaced and wireless communication is achieved using the connector called BLE. All observations and experimental tests prove that this proposal is a complete solution for low power consumption usage and inefficient analysis in agriculture. Implementation of this technology will promisingly improve the agriculture automation to next stage and improve the yield of crops and production.

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