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Reliable and Energy Efficient Data Gathering Protocol in Wireless Sensor Networks

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Abstract: The aim this project is to monitoring farm by using IOT. Emergence of Controlled Environment Agriculture (CEA) ranging from computer-controlled water irrigation system to lightning and ventilation has changed the conventional scenario of farming. This project proposes and demonstrates an economical and easy to use Arduino based controlled irrigation system. The designed system deals with various environmental factors such as moisture, temperature and amount of water required by the crops using sensors like water flow sensor, temperature sensor and soil moisture sensor. Data are collected and received by Arduino which can be linked to an interactive website which show the real time values along with the standard values of different factor required by a crop. This allows user to control irrigation pumps from far distance through a website and to meet the standard values which would help the farmer to yield maximum and quality crops. In India, farming is done by traditional method, farmer's plant crops traditionally without knowing the content of soil and quality of that soil. As a result farmers will not gain sufficient profit from there farming. Due to human intervention there are chances of human errors so farmers may receive incorrect report. So there is need of automated process for soil testing and crop prediction.

Index Terms - soil moisture sensor, temperature sensor, humidity, WSN.

I. INTRODUCTION

The development of the Internet of Things (IoT) has increased the ubiquity of the Internet by integrating all objects for interaction via embedded systems, leading to a highly distributed network of devices communicating with human beings as well as other devices. In recent years, cloud computing has attracted a lot of attention from specialists and experts around the world. With the increasing number of distributed sensor nodes in wireless sensor networks, new models for interacting with wireless sensors using the cloud are intended to overcome restricted resources and efficiency. Virtual sensors, which are the essentials of this sensor-cloud architecture, simplify the process of generating a multiuser environment over resource constrained physical wireless sensors and can help in implementing applications across different domains. Temperature is one of the most important environmental signals for plants. High and low temperatures have a variety of effects that affect plant growth and development profoundly. Further, temperature is an indication of seasonal change. Plants must survive under severe conditions in winter and prepare to resume growth and reach their reproductive stage in the following spring. Soil moisture information plays an important role in environmental monitoring, agricultural production and hydrological studies. Particularly, agricultural yield depends on several growing parameters like temperature, humidity, soil moisture etc. In this paper, we have designed and developed a system for measuring and monitoring soil moisture by interfacing low-cost soil moisture sensor.

In summary, this paper makes the following contributions:

1] We model a location-based interactive approach for IoT-cloud to served mobile cloud computing applications.

2] We present an on-demand scheduling scheme for WSNs on the top of the model. In the scheme, the cloud plays a role as a controller that schedules sensing operations of WSNs based on mobile users' location on demand;

3] Through comprehensive analysis and experiments, we show that the location-based model .Achieves a significant improvement in terms of energy efficiency and network lifetime compared to the periodic sensing model.

II. LITERATURE REVIEW

2.1. HISTORY

The model decouples information producers (IPDs) (i.e., physical sensors) from information providers (IPVs), which are implemented as IPDs' virtual sensors in the sensor cloud, to enable IPVs to provide sensing services when IPDs sleep. In the model, we design an efficient interactive sensing data prediction scheme for IPDs and IPVs to predict and control the accuracy of the sensing data prediction of IPVs using internal temporal information correlation, community detection, and external information correlation among sensors. According to the data accuracy requirement of applications, the model controls: 1) the number of IPDs required to be active and 2) when an active IPD transmits sensing data to the sensor cloud, to maintain the quality of sensing data meeting the requirement. Through extensive experiments with data collected from the real-world Intel Lab sensor deployment, we show that the model achieves significant improvements in terms of data transmission suppression ratio, energy efficiency, and response latency compared with the existing schemes.

1] We propose a novel information-centric integration model for WSNs and the sensor cloud, which exploits the trade-off between the data accuracy requirement of applications and energy efficiency to reduce workloads and energy consumptions for resource-constrained sensors. The model decouples IPVs from IPDs (physical sensors), and enables IPVs (implemented as virtual sensors in the sensor cloud) to provide sensing services even when IPDs sleep, thus allowing most of the physical sensors sleep deeply.

2] We design an efficient interactive prediction scheme for IPDs and IPVs to predict and control the sensing data prediction. In particular, the scheme is designed using an internal temporal information correlation, community detection, and external information correlation among sensors. According to the accuracy requirement of applications, the scheme groups IPVs and IPDs into highly information correlated communities. Only one IPD per an ICC is required to be active to update sensing data and control the accuracy of data predicted by the IPVs, while other IPDs are scheduled to sleep deeply for energy saving.

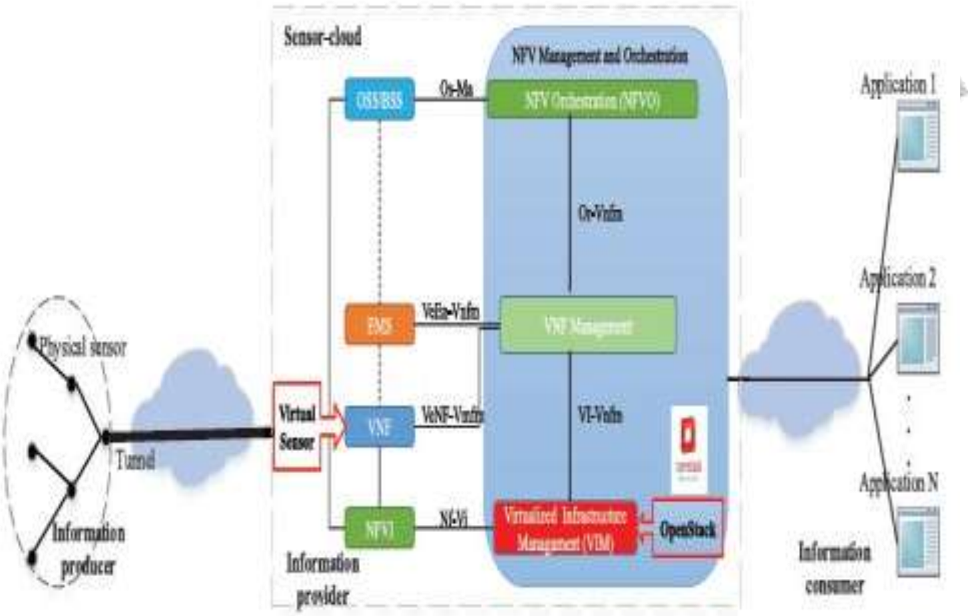

Fig 1. Previous Working Model

II.1.RELATED WORK

A] Arduino IDE:-

Arduino IDE is open source software that is mainly used for writing and compiling the code into the Arduino Module. It is official Arduino software, making code compilation too easy that even a common person with no prior technical knowledge can get their feet wet with the learning process. It is easily available for operating systems like MAC, Windows and Linux and runs on the Java Platform that comes with inbuilt functions and commands that play a vital role for debugging, editing and compiling the code in the environment. A range of Arduino modules available including Arduino Uno, Arduino Mega, Arduino Leonardo, Arduino Micro and many more. Each of them contains a microcontroller on the board that is actually programmed and accepts the information in the form of code. The main code, also known as a sketch, created on the IDE platform will ultimately generate a Hex File which is then transferred and uploaded in the controller on the board. The IDE environment mainly contains two basic parts: Editor and Compiler where former is used for writing the required code and later is used for compiling and uploading the code into the given Arduino Module.

B] Android Studio:-

Android Studio is the official integrated development environment (IDE) for **Android application** development. To support **application** development within the **Android** operating system, **Android Studio uses** a Gradle-based build system, emulator, code templates, and Github integration. Every project in Android Studio has one or more modalities with source code and resource files. These modalities include Android app modules, Library modules, and Google App Engine modules. Android Studio uses an Instant Push feature to push code and resource changes to a running application. A code editor assists the developer with writing code and offering code completion, refraction, and analysis. Applications built in Android Studio are then compiled into the APK format for submission to the Google Play Store.

C] Firebase Cloud:-

Firebase is a Backend-as-a-Service — BaaS — that grew up into a next-generation app-development platform on Google Cloud Platform. Firebase frees developers to focus crafting fantastic user experiences. You don't need to manage servers. You don't need to write APIs. Firebase is your server, your API and your data store, all written so generically that you can modify it to suit most needs. Yeah, you'll occasionally need to use other bits of the Google Cloud for your advanced applications. Firebase can't be everything to everybody. But it gets pretty close. Formerly known as Google Cloud Messaging (GCM), Firebase Cloud Messaging (FCM) is a cross-platform solution for messages and notifications for Android, iOS, and web applications, which as of 2016 can be used at no cost.

III.FRAMEWORK

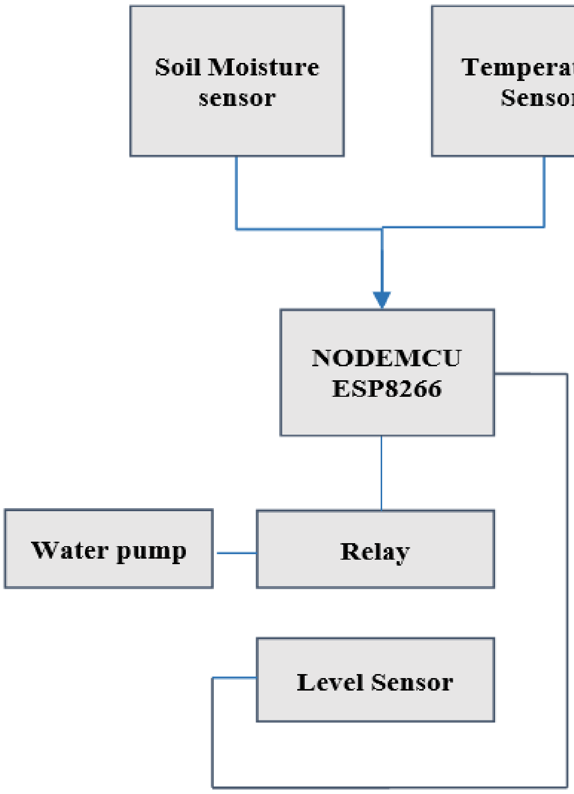

Fig 2. Working Model

A] Soil Moisture:-

Soil is the base of agriculture. Soil provides nutrients that increase the growth of a crop. Some chemical and physical properties of soil, such as its moisture, temperature and its pH, heavily affect the yield of a crop. These properties can be sensed by the open-source hardware, and they can be used in the field. In this chapter, a soil health monitoring system is proposed in which farmer will be able to monitor soil moisture, soil temperature and soil pH in his android smart-phone. The farmer will also get the recommendations of lime and sulphur on the basis of pH of the soil. Internet of Things (IoT) is an advanced technology for monitoring and controlling device anywhere in the world. It can connect devices with living things. Agriculture is one of the major sectors which contribute a lot to the financial of India and to get quality product, proper irrigation has to be performed, to reduce man power using modern technology of internet of things IoT in today's life. Soil moisture is an integral part of plant life, which directly affects crop growth and yield, as well as irrigation scheduling.

B] Temperature Sensor:-

The DS18B20 Digital Thermometer provides 9 to 12-bit (configurable) temperature readings which indicate the temperature of the device. The DS18B20 communicates over a 1-Wire bus that by definition requires only one data line (and ground) for communication with a central microprocessor. This sensor is waterproof sensor. This sensor connected with the Arduino and it provides the data to the Arduino from the soil. Power supply range is 3. 0V to 5. 5V.

C] Node mcu:-

NodeMCU is an open source Io Ti. e. Internet of Things platform. It includes firmware which runs on the ESP8266 Wi-Fi Syste-on-Chip (SoC) from Espressif Systems and hardware which is based on the ESP-12 module. The term "NodeMCU" by default refers to the firmware. It uses many open source projects.

IV.CONCLUSION

In this paper, soil moisture sensor, temperature and humidity sensors placed in root area of plant and transmit data to android mobile. Threshold value of soil moisture sensor that was programmed into a microcontroller to control the water level quantity. Temperature, humidity and soil moisture values are displayed on the android application. This paper on "A wireless application of drip irrigation automation supported by soil moisture sensors" the farm monitoring is carried out using soil moisture values but extend to this system displays temperature and humidity values. The purpose of designing of Automatic Farm Monitoring System is successfully achieved and fulfills the desired objectives. The hardware and software used performed their function properly to produce desired result which is the required for the farmers in the irrigation field. The system, which is designed, will help the farmers to do the irrigation process in night also. The system designed do not requires the physical presence of the farmers during irrigation in the fields. The system is automatically monitored and controls the pump on and off.

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