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Wireless Agriculture Monitoring using Raspberry Pi

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***Abstract* – In this paper focus on a today energy resources are becoming scarcer and therefore more valuable. In conjunction with the population growth over last century, the need for finding new, more efficient, and sustainable methods of agricultural cultivation and food production has become more critical. To facilitate this process, we are designing, building, and evaluating a system for precision agriculture which provides farmers with useful data about the soil, the water supply, and the general condition of their fields in a user friendly, easily accessible manner. Our system aims to make cultivation and irrigation more efficient as the farmer is able to make better informed decisions and thus save time and resources. The diversity of location and climatic effects upon agricultural cultivation, along with other environmental parameters over time makes the farmer's decision-making process more complicated and requires additional empirical knowledge. Applying wireless sensor networks for monitoring environmental parameters and combining this information with a user-customized web service may enable farmers to exploit their knowledge in an efficient way in order to extract the best results from their agricultural cultivation.**

Keywords - Raspberry-Pi 3, Automation, Wireless Sensor Networks (WSNs)

I. INTRODUCTION

The contemporary world is in a transition stage where problems concerning global issues, such as global warming and alternative energy sources, are combined with new challenges demanding immediate solutions. Society's focus has shifted from economic growth to sustainable development, where environmental, social, and economic aspects are considered together, rather than separately. Policies that promote sustainability in all sectors of the economy (manufacturing, agriculture, and services) are now considered as a part of good governance. Problems such as climate change, population growth, and poverty (especially hunger), occur in a context of a gradual depletion of natural resources and the fear of diminishing coal energy reserves. These are some of the global issues that are thought to require multidisciplinary approaches in order to be addressed successfully. This system focus on agricultural production and cultivation. This overall process has a significant role in fulfilling the basic human need for food. The production, preparation, packaging, distribution, etc. of food also generates a lot of income. The aim of this project is to exploit modern technologies and tools to improve monitoring and management of crops, in order to improve the efficiency and sustainability of farming and food production. To this end, we have designed a system for precision agriculture, which relies on a wireless sensor network combined with a service to provide individual farmers with access to data that they find useful. The system utilizes wireless sensor nodes that collect and transmit data about the quality of the water supply, the soil, and other parameters in an agricultural field. While such sensor-based systems have been investigated earlier, one of the key innovations to be explored in this project is the combination of these sensors systems with a service-driven business model to increase their ease of use and to amplify the gains that can be realized via an *integrated* system. The goal is to give a farmer a more complete picture of the current and historic crop status in order to foster better informed decision making. It is expected that such decisions will benefit *both* farming and irrigation by saving time and resources.

Factors such as the diversity of conditions which vary depending on location (for example weather, presence of insects, and disease) combined with the inability to predict the future characteristics of the environment during the different seasons over time complicate the decision making process and require specialized knowledge. This project is an attempt to bring some of these micro-environmental sources of information into the decision making process of farmers.

II. LITERATURE REVIEW

After the research in agriculture field, researchers found that the yield of agriculture goes on decreasing day by day. We use of technology in the field of agriculture plays important role to increasing the production as well as reducing extra man power , water requirements.

A fully automation accessing of irrigation motor where Prototype includes number of sensors node placed in different directions of Polly house farm field. Each sensor is integrated with a wireless networking device and data received . The RASPBERRY Pi 3 is used for send message through internet [1].

Used closed loop irrigation system and determined irrigation amount based on distributed soil water measurements [2].

Irrigation systems can also be automated through information on volumetric water content of soil, using dielectric moisture sensors to control actuators and save water, instead of a predetermined irrigation schedule at a particular time of the day and with a specific duration [3].

The technological development in Wireless Sensor Networks made it possible to use in monitoring and control of greenhouse parameter in precision agriculture [4].

III. SYSTEM OVERVIEW

The block diagram of the proposed system as shown in Fig. 1 consists of different types of sensing unit such as Soil Moisture Sensor to measure water content of soil, DHT11 is the Temperature and Humidity Sensor that detects the temperature and Humidity. Float sensor is device used to detect the level of water within a tank. The switch may be used in a pump, an indicator, an alarm .Sensor to measure the presence of water in air.

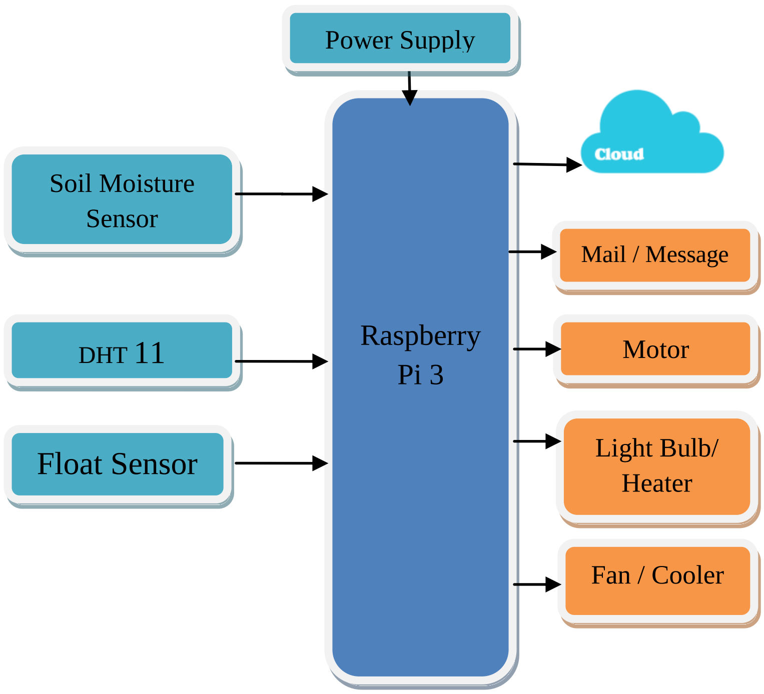


Figure 1: Proposed system design

3.1 Component Description

3.1.1. Power Supply:

One of the most exciting updates/upgrades of the new Model B+ is a fancy new power supply. The power supply is what takes the micro USB port voltage and creates the 5V USB, 3.3V, 2.5Vand 1.8V core voltages. The 3.3/2.5/1.8 is for the processor and Ethernet.

3.1.2 Sensors: The Soil Moisture Sensor is used to measure the volumetric water content of soil. This makes it ideal for performing experiments in courses such as soil science, agricultural science, environmental science, horticulture, botany, and biology. Here DHT11 is a basic, low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and spits out a digital signal on the data pin (no analog input pins needed). Its fairly simple to use, but requires careful timing to grab data. The only real downside of this sensor is you can only get new data from it once every 2 seconds. DHT11 output calibrated digital signal. It utilizes exclusive digital-signal-collecting-technique and humidity sensing technology, assuring its reliability and stability. Its sensing elements is connected with 8-bit single-chip computer.

3.2 Flow Chart:

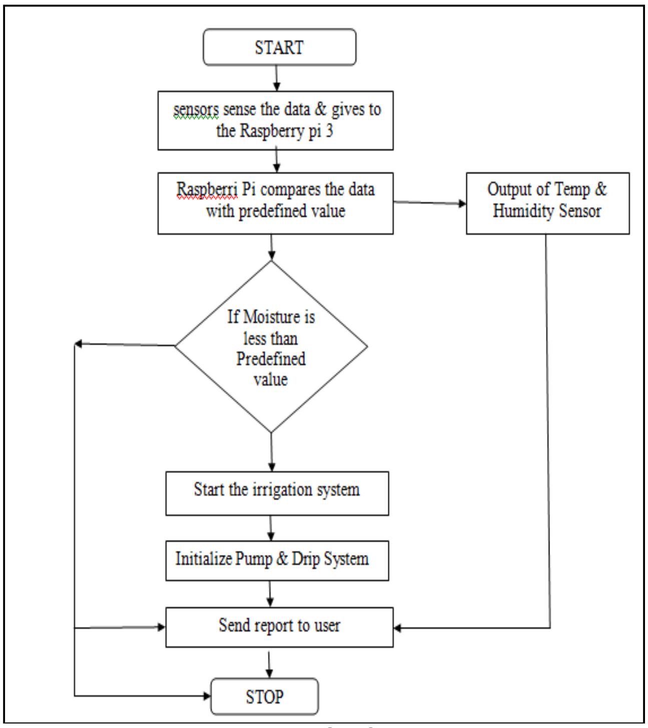
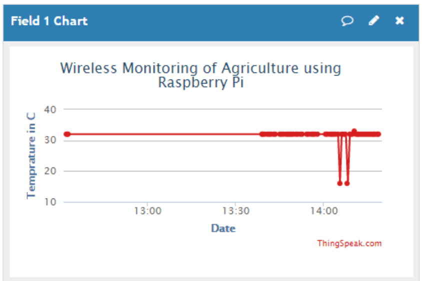


Figure 2. Flowchart.

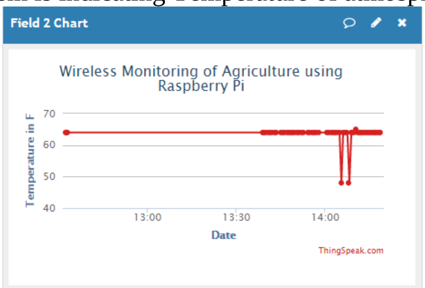
3.2.1 Algorithm:

1. Start
2. Sensor sense the data & gives to the raspberry pi 3
3. Raspberry pi compares the data with predefined value
4. Output of Temp & Humidity Sensor are directly given to user
5. If Moisture is less than Predefined value
6. Start the irrigation system
7. Initialize pump & Drip system
8. Send report to user
9. Stop

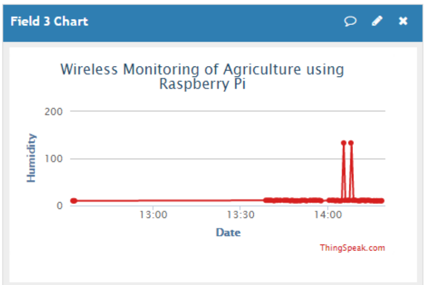
IV. RESULTS



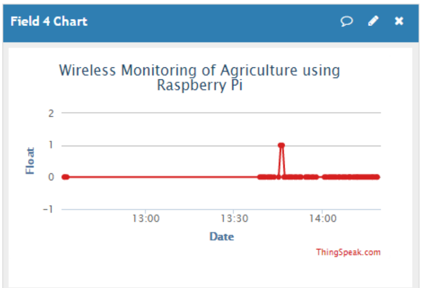
Here system is indicating Temperature of atmosphere in 0_C



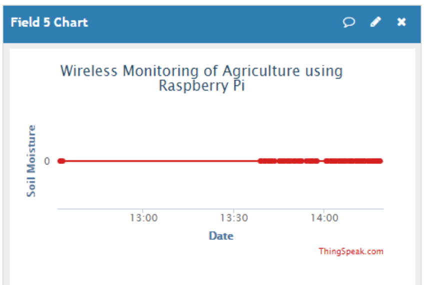
In the above image system is indicating Temperature of atmosphere in 0_F



Inabove result system is indicating Humidity level



Above graph is indicating water level available in water tank



Soil Moisture is indicating as above

5. APPLICATION

1. This system is useful for monitoring all activities related to farming
2. Also useful to track the growth of plant
3. This system maintains the moisture level to maintain the steady growth of plant so that production will be maintained.
4. System will monitor the soil moisture level to control the drip irrigation system.
5. This system is also useful to supply liquid fertilizers, for this purpose level maintenance of water and liquid fertilizer will be maintain.

6. CONCLUSION

The agricultural monitoring system that will be implemented would be feasible and cost effective for optimizing water resources for agricultural production. The system would provide feedback control system which will monitor and control all the activities of drip irrigation system efficiently. This irrigation system will allow cultivation in places with water scarcity thereby improving sustainability. Using this system, one can save manpower, water to improve production and ultimately increase profit.

7. REFERENCES

[1] Chandankumar Sahu, Pramitee Behera, "*A Low Cost Smart Irrigation Control System*", IEEE Sponsored 2nd International Conference on Electronics and Communication System (ICECS 2015)

[2] JoaquínGutiérrez, Juan Francisco Villa-Medina, Alejandra Nieto-Garibay, and Miguel Ángel Porta-Gándara, "*Automated Irrigation System Using a Wireless Sensor Network and GPRS Module*",IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT, 0018-9456,2013

[3] G. Yuan, Y. Luo, X. Sun, and D. Tang, "*Evaluation of a crop water stress index for detecting water stress in winter wheat in the North China Plain,*" Agricult. Water Manag., vol. 64, no. 1, pp. 29–40, Jan. 2004.

[4] F. R. Miranda, R. Yoder, and J. B. Wilkerson, "*A site-specific irrigation control system,*" presented at the ASAE Annu. Int. Meeting, Las Vegas, NV Jul. 27-30,2003, Paper No. 031129.