Smart Utilization of Ground Water Resources in Agriculture Field using the Internet of things

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Abstract— Ground water resources are a lifeline for living begins on this earth. These resources have been used in the agriculture field, drinking water and industry sector. The researcher believes that India is gradually moving towards the excess use and contamination of groundwater. In India 89% of ground water used in the irrigation sector, making it the highest category user in the country. Last decade, there has been a continued increase in ground water utilization for irrigation and it would decrease surface water level. In the conventional systems to farmer personally visited Wells or tanks checking water availability and check irrigation condition in the field by focusing various aspects such as observe water Level in wells or tanks, pump condition for on or off, for testing water quality required the manual collection of water samples and detect any intrusion in agriculture field. This older system had drawbacks such as time-consuming, wastage of ground water in irrigation. So to mitigate all drawbacks, there must be a requirement of effective utilization of ground water resources in the agriculture field using the Internet of things (IoT). Propose work which makes use of various technologies like, Internet of things, sensors, actuators, and WiFi module. It will provide many services to the farmer in agriculture field include automatic pump on/off the system, which make help to save the water without human interaction, finding the amount of water using water level sensors, weather observation, Intrusion detection at water resources area and test water quality of ground water, etc.

Keywords— WiFi, Raspberry Pi 3b+, Ultrasonic sensor, PIR sensor, DHT sensor, Water Quality, Turbidity Sensor, PI camera

I. INTRODUCTION

Ground water resources are doing a measure role in the agriculture sector and drinking water. Without water, a farmer cannot imagine for good production of food, grains, and raw materials. The largest component of ground water in India used for the water extracted for irrigation. The main resources of irrigation in India are canals, tanks, and wells, including tube-wells. Of all these sources, ground water constitutes the largest share. Wells used 61.6% of water for the agriculture field, including dug wells, shallow tube-wells, and deep tube wells, etc. Canals used for irrigation 24.5% in this country. This proposed system work on ground water resources which will make help to solve crises of ground water overuse and contamination. These crises mitigate by using new technology like the Internet of Things (IoT). It has opened up a suitable solution for ground water crises and smart agriculture in India.[1][12].

 IoT is widely used for connecting different nodes such as sensors, microcontrollers, mobile phone and collecting data. Internet of Things is used with IoT frameworks to handle and connect with information and data. In the process, users can register their sensors, create a flow of data and execute information. IoT is applicable in various methodologies of agriculture. Applications of IoT are Home Automation, e-Health, Smart Metering, Security, Emergency, Industrial Control, Smart Agriculture, Smart Cities, Smart Environment and Smart Water, etc.' Internet of Things' is based on the device which is suitable of analyzing the sensed data and then transfer it to the end-user.[2].

IoT can transfer data over the network without requiring human to human or human to computer interaction.[3] In this case, IoT will work on a WiFi-based long-distance network that successfully been used to connect the sensor, actuator, different user devices, etc. In this paper, IoT has to do a pivot role to save ground water, avoid overuse of water or excess irrigation using an automatic pump system. This paper discuss about some sensor, which provides support to identifying water quality, detection of water level and detection of intrusion in term of animal, theft on a field of wells, tanks, or canal, etc. IoT also provides suitable help to the farmers by irrigating crops by supply adequate water to yield by giving otherwise restricted low-power, low-cost devices.

II. LITERATURE SURVEY

N. Ahmed et al...[1] In this paper the 6LoWPAN based network use connected wireless sensor and actuator for communication and transferring data over a web server. It is a low power wireless PAN. The network has been monitors the environment to provide precision farming and agriculture management. It has provided security, identifying, managing, and to collect and deliver data to the end-user devices using a gateway.

A. Khanna et al...[2] The study brings out the concept of the Internet of things and a significant impact on the agriculture field. It has been covering the aspect of Evolution of Internet to IoT, Objectives of IoT, Communication technologies of IoT, Agriculture, and breeding and open issues, challenges & future research directions, etc.

Olakunle Elijah et al...[3] The authors of this paper are presented as follows the IoT ecosystem for agriculture, which consists of four major components including IoT devices, communication technology, the Internet and data are presented. In this case the classification of IoT discussion done about monitoring, tracking and tracing, agricultural machinery, and precision agriculture and greenhouse production. One of the sections discussed the importance of IoT and Data Analysis which includes following key parameter prediction, storage management, decision making, farm management, precision farming, and insurance. These included the use of IoT to promote community like farming, safety and, competitive advantages, prevent fraud, wealth creation, cost reduction, operational efficiency, awareness, and asset management.

P. Srinivasulu et al...[4] In this proposed system a cloud service-oriented architecture of agriculture was designed. This architecture uses various advanced and emerging technologies such as the Internet of Things, Cloud Computing, Big data collection and management methods and techniques through the Internet. The architecture provides services for the farming and farmer to such as farming monitoring, Farmer training, market-oriented service, warehousing information, fostering agribusiness services. It will give help to the farmer for minimizing the cost of farming, labor and respectively saves the time and improves the crop field, Provides the marketing information, shares ideas among the farmers, banking and finance information, suitability of crop for a particular soil and scientists advises regarding the pest control, etc.

M. Shirode et al...[5] Proposed system work on different sensor like pH, conductivity, turbidity, temperature, Arduino Uno microcontroller. These sensors generate signals in an analog form and transmit this signal into digital form using an ADC converter to the microcontroller.This communication possible with the help of a WiFi base network or any other communication technology in IoT. The network sends data to different devices available with a user such as a tablet, phone, PC, LCD, etc.

A. E. Abioye et al...[6] In this case the Atmega 32 microcontroller worked as the main brain for components because it monitoring the overall irrigation system. This microcontroller takes input from four input sensors as follows temperature sensor, Water level sensor, Soil moisture, and LDR sensor and four output sensor like Buzzer sensor, Sprinkler/drip water pump, Reservoir water pump, and display unit. These sensors generate signals in an analog form and transmit this signal into digital form using an ADC converter to the microcontroller. This will work according to the program and take necessary action against the signal.

Dr.Veena S et al...[7] IoT allows a farmer to get connected to his farm from any location of the world at any time. A device empowers farmers to keep updated with the ongoing conditions in anywhere. This technology helps in collaborates data about conditions like temperature, moisture, weather, and fertility of the soil and Crop online monitoring. The microcontroller is used to control and automate the farm processes using wireless sensor networks. Remotely an access farm condition camera has been installing in the field and detection of any vulnerable activity.

Dr. R Suresh et al… [8] This system proposed the utilization of wetness level of soil on the device of liquid crystal display. The sensors are utilized to perceive the dampness at soil at the set area, clock is used to set the structure duration for watering the plant, and once it begins the water the plant when showed up distinctively in connection to the regular watering framework that goes with no microchip, it turns off the valve when the level of moistness of the dirt is achieved at the set area or field. This Project contains the smaller scale model for the auto watering structure framework, drenched state sensor, clock, and a liquid crystal display to exhibit the wetness of the dirt.

N. Vaitheeka et al...[9] In this case Drones are used in the agriculture field for soil analysis, which helpful seed planting. It scans the ground and spray the correct amount of irrigation and monitoring the crops in agriculture fields. Drones used to improve production efficiency. It detects the pest and weeds and monitors the crops overtime for that drones can be used spraying pesticides. Drones taking care of high precision crop control, useful data collection, and automated farming techniques.

M. B. Kalpana... [10] In this paper focuses on measuring water quality parameters, such as conductivity, pH, turbidity. Sensors send data to Raspberry pi3 model B which stores data in a database in a specific format. This data are transmitting over the network using different communication technology to end-user devices like mobile phone, PC, tablet,

laptop, etc. In this case, cloud computing technology is used which provides the local server.

Y. N. Kishore et al...[11] The Wireless sensor network uses ZigBee Technology for communication between a sensor and end-user devices. In this case, the automated irrigation system divided into two components, wireless sensor units and wireless information unit, linked by radio transceiver that allowed the transfer of soil moisture and temperature data. This information monitored online through a graphical application using IoT
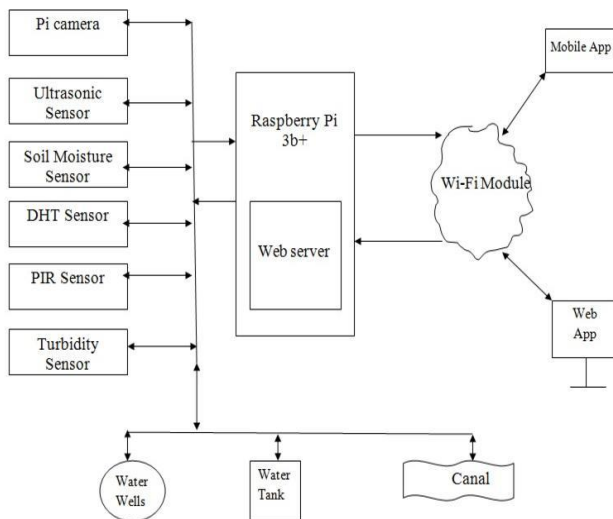
III. METHODOLOGY

Figure 1: Block Diagram of Smart utilization of Ground Water Resources in Agriculture Field using IoT

Figure 1 depicted different category like sensors, Wireless networks, Ground water resources, and end-user devices. The sensors are ready to fetch data from Ground water resources, which do collect all relevant Data in terms of analog and digital signals using ADC. Data sensed by sensors and transfer to Raspberry Pi, It works as a microcontroller or Single broad computer to handling and all connected devices. In this case, raspberry pi also works as a web server, which displays the current condition of sensors on the web page. The farmer will be easy access WebPages on his mobile phone without any hurdle

Raspberry pi connect to wireless sensor network as Communication technology called WiFi network. Such type network performed the role of mediator, which is communicating between the end-user to raspberry pi or vice versa. Here Farmer doesn't need to give a frequent visit to the agriculture field because of all relevant information available with him without any hurdle anywhere and anytime using IoT. In such case smart way the farmer access, control, and monitor Ground water Resources as well as agriculture

field related functionality. It will be helpful to save water, electricity, time and Protection of wild animal, theft etc.

IV. CONCLUSION AND FUTURE SCOPE

In this paper, we have proposed the architecture of how smart the utilization of ground water resources in the agriculture field using IoT. This paper has the main aim how to save ground water resources using excess use in irrigation. It will be helpful to save our country's naturals ground water resources, today our farmers facing problems like drought, no availability drinking water, although water is the available quality of water gets contaminated. Another work regarding this system is intrusion detection in terms of water security from theft. Prevent hazards happening with the human being, wild animals and pet animals on the area of wells, cannel and tank etc. There is a large future scope in the smart utilization of ground water resources in the agriculture field using IoT. In the future, the system can be implemented on a larger scale with the help of the availability of various resources. The traditional systems were a waste of time and water but in a modern age by using technology of IoT, we can make the work easy and time-efficient.

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