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Krisidvista An approach for Visualizing & monitoring of water harvesting Across Small lands by Using IOT

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Abstract: Agriculture is a backbone of India and around 50% of the people dependent on agriculture. Most of the people get water for irrigation from reservoirs through canals and many of the people do not have land more than acre that even in many cases come to 25cent. These people have to coordinate with others who are near to main canal and only after their completion they will get water. In many cases it will be a month after main canal people started irrigation the rare end people start. In this proposed system *"Krisidvista"* An approach for visualizing & monitoring of water harvesting Across Small lands by Using IOT, we are planning to propose a system which gives the Visualization of water flow and provides a time required to fill up a land using IOT devices. Further it allows a former to get water to his land randomly by monitoring the system, which is centralized to all people who are having their land in particular geographical area it also enables.

***Keywords: Agriculture, former, Krisidvista, canals, Visualization*.**

Introduction:

Agriculture plays major role in the economy of the country. More than 50% of Indian population relies on agriculture for their sustenance. The traditional irrigation system that has been followed from the past is the flow irrigation. water resources like reservoirs are placed at great heights and flows in main canals then following it connects nearby villages and sub canals are opened to connect as many as villages possible to so that water can be provided for irrigation purpose. If we take a particular geological area say a village normally may connected by 2 or more main canals. On a statistics those few main canals serves for hectares of land distributed across Krsidvista: formers who are having land less than a acre or near (Sanskrit).

People or farmers near the main canals will get water for irrigation as soon as few days after the water released from the dam and they will start farming. The main canals will be subdivided into small canals and serves many farmers who are farming more than 4 to 5 mile away from the main canals of that village. These rare end formers from the main canals need to wait till the people complete their initial stage of farming due to lack of coordination between farmers. Meaning that near end people take more time may be to fill even excess of water to land due to lack of knowledge of amount of water required or due to water leakage in canal. Which takes some time to rectify where water flows with no use. Due to this, the rare end people need to travel at nights or need to travel even in day time many times just to get the knowledge of where water is flowing and to get idea of when they can avail water to start farming.

We are planning to propose a system which gives the Visualization of water flow in the canals by using water level sensors. Also it provides time required to fill up a land by using moisture sensors, IOT devices intern works with these sensors for Visualization and Monitoring. Further it allows a random former to get water to his land by monitoring the system and which is centralized to all people who are having their land in particular geographical area.

Literature Survey:

Various websites and published papers are consulted and undergone to collect the necessary necessary information as well as the recent research in the area of Internet of Things and the agriculture smartening. Currently we have drip irrigation: which provide a drip by drip water supply for the crops. But the thing is we cannot give drip irrigation for all the crops. Also using IOT Only there are many papers published for smart irrigation and farming [1][2]. But the thing is it can only apply for the people who are having land at same places with hectares. Also The Main Source of Water supply is underground motors [2]. Which can only be afford by large scale formers and knowledge people and are not suitable for canal irrigation.

So here we are proposing the system where in it concentrates on Krishidvistas(Group of small land owners in a specific geographical location). They are mainly depend upon the canal water from various reservoirs. Our System gives the centralized system which can be operated and maintained by farmers just with graphical use interface. It uses mainly IOT

devices Such as *Arduino* and Zigbee[3]. Zigbee can directly interact with the wireless sensors and gatewalls but interact with the processing system it needs interfacing with *Arduino* [3][7]. To Control the gatewalls for water flow monitoring actuates are used[6]. The sensors such as moisture to sense the water content required in the land and water level sensors to collect information such as level of water and water flowing details[4]. Arduino is mainly used to interact between the monitoring system and the zigbee node, which gets the sensors information[5]. Also IOT (Internet of Things) Technology alllows for interfacing different things so that visulization of the water flow made easy.

System Requirements

A. Water Level Sensor :

The CS451 is a pressure transducer with a a stainless-steel case. It is used for water-level measurements and can be submerged in most canals, wells, ponds, lakes, and streams. The CS451 outputs either a digital SDI-12 or RS-232 signal to indicate observed pressure and temperature.

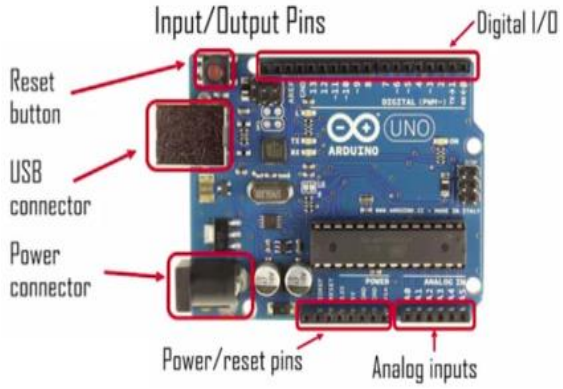
Canals are fitted with water level sensors wherever its necessary. Whenever water flows these sensor send the details such as level of water and status information to the coordinating device. This information intern send to the system to process and to represent in the visualization system.

B. Actuators:

Once enough water is filled for the particular land, moisture sensor sends these details to the centralized system. Once the details has been processed by the system, it issues Gate Wall close action. Which intern carried via Arduino and zigbee. Zigbee at the rare end coordinates the particular gateway to be closed(/open).

C. Arduino :

It's a development board. It has of 8-bit microcontroller, Universal Serial Bus programming interface and I/O pins. The input pins can be digital (0 – 13) and analogue (A0 – A5), output pins are only digital (0 – 13). Arduino has an integrated software environment which has a cross-compiler, a debugger and a serial monitor to control the inputs and outputs. The Arduino integrated development kit can be downloaded from arduino.cc official portal, is supported by a wide community.



Here the Arduino is used to collect details from the zigbee of various information such as gatewalls status (Open/Closed) , Water level sensors details, soil sensor details. These details are are then translated by the Arduino to the connected PC. Where the further process takes place. Since Arduino is not powered for long distance wireless sensors and coordination between them, Zigbee is interfaced with Arduino to overcome.

Arduino also provides a development platform to manage the details and to do the action as per requirements. Also it offers development environment to control the external IOT devices attached to it. In our case it manages the gatewalls of the lands when the water sufficient signal is raised from the system.

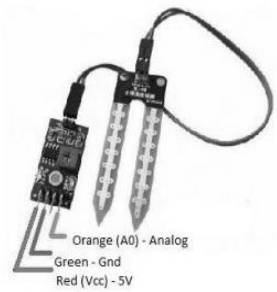
D. Zigbee :

The ZigBee network layer natively supports both star and tree networks, and generic Mesh networking. Every network must have one coordinator device, tasked with its creation, the control of its parameters and basic maintenance. Within star networks, the coordinator must be the central node. ZigBee builds on the physical layer and media access control defined in IEEE standard 802.15.4 for low-rate WPANs.

Here we have used zig bee for getting the details from the sensors and the water flowing details using water level sensors as and when request arise from the system. It also coordinated between various gatewalls , moisture and water sensors to get the details and forwarding it to the centralized system.

E. Moisture Sensors:

A moisture sensor was placed in the soil and was connected to IoT device that can sense the humidity level, the moisture level of the soil .It measures the range from 0-60%. SM300 sensor is used. It measures the dielectric constant of the soil. Higher the dielectric constant, higher the moisture content. This sensor will return the resistance of soil. More the resistance, less the moisture content and vice versa.



F. Geographical area Map as Virtual map:

Krishidvista can visualize the water flow across the specified geographical area. To represent this, it needs accurate map details of the land and canals. There is a need of high degree of accuracy since it's a real time visualization and if any diff makes losing hope on the system. The map information such as main canals, subbands, area of the distributed lands, maximum distance water flows and deviation details collected on a survey. Otherwise can go for ready map that is obtained from the popular project such as Bhoomi by Indian government.

A centralized system is mainly a touch screen system where in the areas, canals and gate walls for each particular distributed area is represented. Whenever a random former irrespective of the distance wants to get water just need to select the gate wall of his land by coordinating with other formers. Any opened gate wall for a particular land is kept closed

and only the gatewalls that makes water to flow to the mentioned land will be enabled. The visualization of the water flow is arranged on the screen with some other relevant details.

System Design

Lets say its started getting water into canals. Now canals are filled with water. The water level sensors detects it and coordinates with the coordination node and send these details to zigbee receiver. Once Zigbee receives the signal and it process the details and send it to Arduino for further actions. Arduino is connected with the centralized system. Which takes the input from the Arduino further process it and represents the water flow in the respective visualizable map. So that the farmers come to know that water is started running in the main canals.

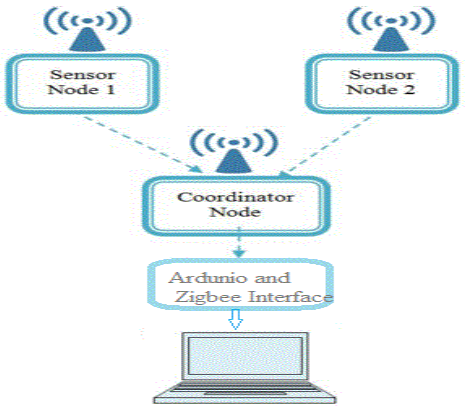
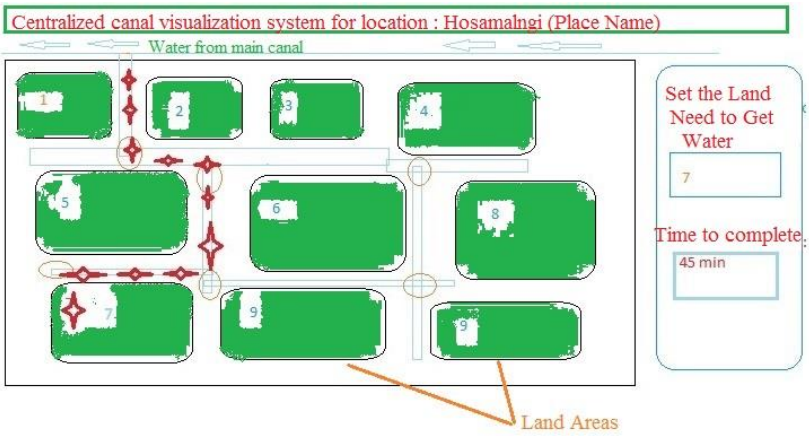


Fig. 1. System Design

Now lets consider a random farmer across the geographical area wants to get water into his land. He just need to specify the land details such as land number number or name. Once he specified it in the visualizable input screen, Arduino gets the details and sends it to zigbee. Zigbee which intern gets the details and sends the signal for actuator which involves all the wall gates needs to open or close so that for the specified land will get water. Also the moisture sensors placed in that will send the details of how much time it required to fill the land the water.



The above designed map shows a typical view of various lands distributed across krishidvista. This is how actually system is visible to farmers for monitoring. The above figure acutely speaks about the main canal and distributed areas, distributed canals and monitoring window.

Lets Consider in the above snap if a former say a number 7 or landowner wants to get water and may be he is far or near. Once he just mention his land details automatically all the gatewalls at land 1,2,5,5,6,7,9 is kept opened and remain is kept closed. So that water flows only to the 7th land. Once water flowing is started moisture sensors senses and sends the details to the centralized system reached by passing intermediate system. Further it processes and Represents the same in visualization system. Once it fills up then automatically all gates will be closed. Then until next request from any krishidvista arises system sit idle.

Also figure 1 represents the different sensors belongs to land or water communication with the coordinating node and further processing at zigbee and Arduino to reach the centralized system. If any physical action need to be taken then it will be done via the reverse direction.

Algorithm of System Flow:

1.IF water in main canal Then Do

2.GOTO Step 3

GOTO Step 7

3.WaterLevel Sensor Senses the Level of water and send to Zigbee node.

4. Zigbee collects the details from all the sensors of the current status and Send the details to Arduino node for further actions.

5. Arduino node itern collects sensor information from zigbee node and intercts with the main centralized system.

6. System Then Represensts the waterflowing path in the visualization system and GOTO Step 8.

7. NO Waterflow visibility.

8. Get the input from the farmer to whoom water is required.

9. Send the necessary signals to make physical arrangement for flow of the water.

10. Signals transferred to the coordinator node.

11. It takes the signal for the correct actuators to make open or close moments.

12. All the gates are closed except that the wall gates necessary to make water flow for the Specified land.

13. Once Water flow is started flow is represented in the system.

14. Also details from moisture sensor is collected.

15. IF Peak Moisture required IsEQAL to moisture sensed details Then GOTO step 16 Else Goto 18.

16. Send the details to the processing system via zibgee and Arduino nodes.

17. System sends the details of necessary gate walls to Block and GOTO step 19.

18. Let the system made to water flow.

19. IF any request from KrishiDvista a raised for water

20. GOTO Step 9.

21 . ELSE GOTO 7.

Conclusion and Future Scope :

The proposed system is a visualization and monitoring system for a group of small scale farmers across a geographical location(Krishidvistas) which is designed on IOT technology. Which offers visualization of waterflow and monitoring the water flow for their land from a centralized system which needs coordination between other farmers. Also proposed system saves the time of farmers in walking on the banks of canals for more than 2 miles just to get water flow location and whey they can avail water.

This system can be evaluated to provide crop maintain ace at different levels of growth. Which involves much research since there will be variety of farmers distinguished by variety of crops growing at the same time. Maintaining such a diversed system can be enhanced.

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