Chunk by Chunk Irrigation of Farm Field -Through Wireless Sensing Technique

Shaik Vahida, Rayudu Srinivas, Rama Reddy T, Sheik Shabuddin, B.Durga Anuja

Abstract: Farming act as a heart to Indian economy and is a work of farmers. Farmers pursue certain set of stages to farm a field and irrigation is essential stage among all stages. Farmers are using so many irrigation methods to farm a field and the Irrigation methods must be in such way that, it have to boost plant development while minimizing salt inequities, leaf injuries, soil erosion, and water loss. To get good results in irrigation we should use good irrigation system. Now a days, farmers are using so many irrigation systems to pump water on the farm like traditional, modern and automated methods. Even though farmers facing problems like current shocks, standing long time and monitoring each and everything to pump water on the entire farm. In this paper modernistic sensor-based water pumping system is proposed to made irrigation easy to the farmers by chunk by chunk irrigation and each chunk is supervised with the help of soil moisture, temperate and humidity sensors. One more criteria, farmer need to concentrate while selecting an irrigation method is power supply, especially in Andhra Pradesh there is a regular power cuts in the nights.so that farmers can't go every time to monitor how the irrigation is in the nights. Because in the nights snack and poisonous insects will be there in farm field, so it will be dangerous to the farmer's life.so, by using proposed irrigation method irrigation will be easy in regular power cut areas, sloppy area and irrigation at night time.one more benefit from this proposed method is man power will decrease.

Keywords: Farming, Irrigation, Sensor, Power-cuts.

I. INTRODUCTION

In every country, Farming is the Prime area of economy and farming makes straight usage of natural resources. Farming sector is key to less industrialized nations and fewer importance in countries which have good industrialization. Till industrialization, most people worked in farming. Before industry revolution most of the human beings worked as farmers and farmers cultivate maximum of their crops for their personal eating instead of buying. Currently, farming sector is the biggest income provider in India and is work of

Shaik Vahida*, Assistant Professor in Computer Science and Engineering Department, ACET, Surampalem, India. Email: vahida.shaik@acet.ac.in

Rayudu Srinivasa, Professor in Computer Science and Engineering Department,AEC,Surampalem,India.India.Email:rayudu_srinivas@rediiffmail.com

Rama Reddy T, Professor in Computer Science and Engineering Department, AEC, Surampalem, India. Email:ramareddy@gmail.com

Sheik Shabuddin, Assistant Professor in Computer Science and Engineerin, Aditya College of Engineering and Technology, Surampalem, India. Email:shabuddin.sheik@acet.ac.in

B Durga Anuja, Assistant Professor in Computer Application Department, Govt Degree College for women's , Sri Kalahasti, India. Email:anujabalireddi@gmail.com

people we lived in rural areas of a country. And farming also play an important role to figure out the GDP of country. Maximum industries also use farming sector for raw materials. Over the past century a extraordinary alterations happened in farming practices as a result of the development of world market and improved technologies in farming sector [1].

In this farming sector farmer play a key role. Every human being eating food three times a day because of farmer only. Here farmer will follow some step like selection of crop, preparation of land, selection of seeds, sowing, irrigation, growth of a crop, fertilizing and lastly harvesting to cultivate the crop.in these all step one most important step is irrigation. Proper irrigation of farm field will result in good crop.so, we should select good irrigation method to get good results in farming in all aspects. And we need to consider the following thing before selecting irrigation method [2][3][4]

1. Manpower should reduce
2. Safe night time irrigation of farm field(to save farmer life from snacks and dangerous insects)
3. Based on crop type and season, irrigation should be done
4. SMS to information about irrigation work to the farmer to monitor from home itself

In this paper an automated method called "Chunk by Chunk Irrigation of Farm Field -Through Wireless Sensing Technique" is proposed which will act as good irrigation system by considering above things.

II. LITERATURE SURVEY

Here, a method is developed which will be better when compare with the following methods which are already in use with respect of man power reduction and save farmer life in night time while irrigation from snacks and poisonous insects.

A. Irrigation using traditional approaches

Pulley system, Chain Pump, Dhekli and Rahat are treated as traditional methods of Irrigation. These methods require animal or human labor to function. The first one is Moat, it contains drawing up water from a well to wet the farm field. Moat approach is cost effective and it consumes time and wastage of water will be avoided with this approach. And the next one is pump chain, this approach comprises of big dual wheels attached with a chain. For chain, buckets will be attached. On side of the chain is dints into water. When wheels will rotate, Water will pick up from the water source with the help of bucket and pour water into a source. And third one is Dhekli, in this method a rope and bucket will be tie to a pole and on the other side of a pole counter balance (it may be any heavy object) will be tied. And we use this to take out water.

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The last one is Rahat, in this approach animals (cow or ox) will be used to irrigate a farm field [3].

B. Irrigation using modern approaches [5]

Irrigation using Modern approaches include the following:

1. Border check approach
2. Furrow approach
3. level basin approach
4. sprinkler central-pivot approach
5. sprinkler hand move approach
6. solid fixed sprinkler approach
7. drifting gun sprinkler approach
8. Side-roll wheel-move approach and other.

The first approach is Furrow and it have chain of small shallow canals to direct the water to sloppy areas and in this approach ruts are commonly a straight or curved on sloppy lands. The second approach is border check system and in this system farmer divide the paddock into bays separated by borders. Flow water down to paddock slope this approach is applicable for pastures, vineyards, orchards and grain crops. The third approach is level basin approach, in this approach water is flowed at high volume to reach a uniform, quick ponding within basin. The fourth approach is sprinkler central pivot approach, it is a self-propelled approach in which 2 to 4 meters mobile towers will be suspended above the ground in row. From the central pipeline water will be pumped and with the help of tower rotation along a pivot point, Water is pumped into the central pipe and as the towers rotate slowly around the pivot point, a huge rounded area will be irrigated.

The next approach is linear move approach and is same as central pivot and the difference between these two is for linear move approach there is a continuous movement of tower and lateral lines across a rectangle farm field. Along field edges water will be supplied flexibly.

When coming to sprinkler type approach, they are three. First one is hand move sprinkler approach, second one is solid set sprinkler approach, and travelling gun sprinkler approach. In hand move sprinkler approach for successive irrigation lightweight pipelines are connected and moved manually to irrigate a land. The next sprinkler approach is fixed sprinkler approach and in this approach below the soil surface pipelines are arranged and above the surface sprinkler nozzle will move around the surface. The last sprinkler approach is gun sprinkler approach, in this approach sprinkler will mount on a wheel by using flexile rubber tube. But this approach need very high functioning pressure, nearly 100 psi. For hand move sprinkler approach man power requirement is more when compared with other sprinkler approaches and solid set approache useful for crop cooling and landscaping.

In side roll wheel move approach have large radius wheels will mount on a pipelines, it enables the line to be rotate as units to consecutive places in the field. In drip and trickle irrigation approach a small diameter tubes placed below and above the surface to wet the surface.

Now a days, farmers are using modern methods to pump water to the farm that are mention above. Even though farmers facing problems like current shocks, standing long time and monitoring each and everything to pump water on the entire farm. So, later automated irrigation methods are introduced.

C. Irrigation using automated approaches

B.R.Shiraz Pasha , Yogesh B, Hassan, Department of Mechanical Engineering developed an irrigition system called micro controller based automated irrigation system.by using this method right amount of water at the right time can be applied to a farm or nursery without manpower to monitor about motor switch off and on. Some more added features are decrease over watering, this will increase crop output. This system consist of soil moisture sensor, solar panel, battery, ac to dc converter, micro controller and relay driver. This method is environmental friendly[7],[8].

Sensor based Automated Irrigation System with IOT: A Technical Review is developed by Karan Kansara , Vishal Zaveri , Shreyans Shah1 , Sandip Delwadkar , Kaushal Jani: The main objective of this paper is to provide an automatic irrigation system thereby saving time, money & power of the farmer. The traditional farm-land irrigation techniques require manual intervention. With the automated technology of irrigation the human intervention can be minimized. Whenever there is a change in temperature and humidity of the surroundings these sensors senses the change in temperature and humidity and gives an interrupt signal to the micro-controller [7],[9].

Automated irrigation system using solar power is developed by Jia Uddin ; S.M. Taslim Reza ; Qader Newaz ; Jamal Uddin ; Touhidul Islam ; Jong-Myon Kim: In this proposed method adjustable rate of automatic MC related irrigation model involved. The source to monitor this system is solar power. On the paddy field sensors will be placed and sensor will sense water level every time and sms the information to farmer. Motor will automatically switch off when water reaches danger level [7],[10].

Joaqum Gutierrez, Juan Francisco Villa-Medina. Alejandra Nieto-Garibay, Miguel Porta developed a method called automated irrigation system using a wireless sensor network and GPRS Module. In this, under the root zone of the plant soil and temperature sensors will be placed. Through web application sensor data, trigger actuator will be handled.to monitor water quality some algorithm was developed with values of sensors and that was programmed in MC.in this method entire irrigation monitor through web application.[7],[11].

Automated Irrigation system using Wireless Sensor Network is developed by shahin A pathan Student,G. H Raisoni Institute of Engineering and Technology Wagholi-Pune, India and MR. S. G. Hate Faculty, G.H Raisoni Institure of Engineering and Technology Wagholi-Pune,India in this paper through centralized server water supply will be controlled. Sensor send information to centralized server.Here, Matlab programs used to display sensed data in excel sheet[7],[12].

The above mentioned automation methods are not suitable to irrigate firm fields in the slope areas.so, in this paper proposed a method which can irrigate firm field sloppy area, irrigation in regular power cut areas, night time irrigation and the proposed method minimize man power.

III. PROPOSED WORK

When reviewing collected works and understanding need an innovative technique called Irrigation Made Easy: Block Wise Filling of Firm Filed using WSN is proposed.

To implement the proposed work the following Software and Hardware components will require:

1. Soil moisture sensor
2. DHT Sensor
3. Raspberry Pi Kit
4. Motor
5. Latest Version of Python Software
6. Racks

A. Block Diagram

In our proposed work firm field is divides into n-blocks, block-1 will be opened initially and motor will be connected to block-1.In firm field we arrange one vertical rack at the end of the first block and n-1 horizontal racks will be arranged to each block to make work our system. For each block there will be one DHT and one Soil Sensor will be coupled to observe temperature, Humidity and level of wetness of a soil. Initially we will set moisture and temperature. And we are using raspberry pi as a processor to control the system activates.
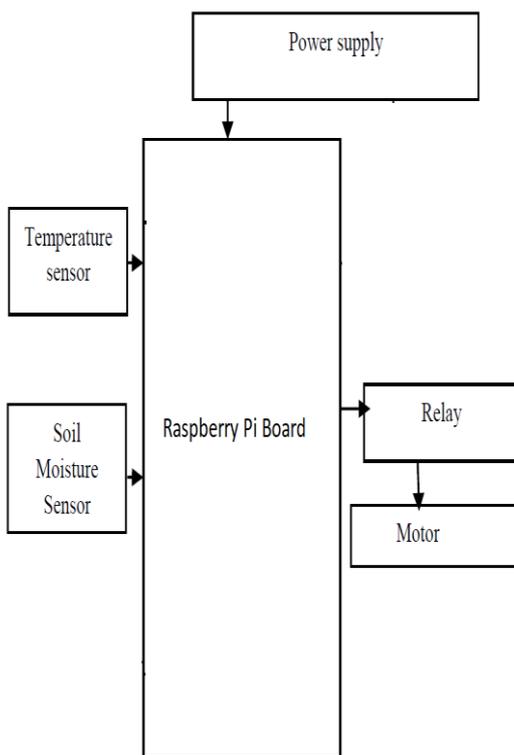

Fig. 1.Block Diagram of Proposed Work

B. Algorithm

If field is dry the following steps will happen:

Step-1: Automatically motor will on with the help of sensors information

Step-2: The pumping will be starts from first block.

Step-3: After reaching moisture and temperature value that we set, sensors will send signal to controller and then the horizontal rack will move back and vertical rack will move front with the help of motion sensor.
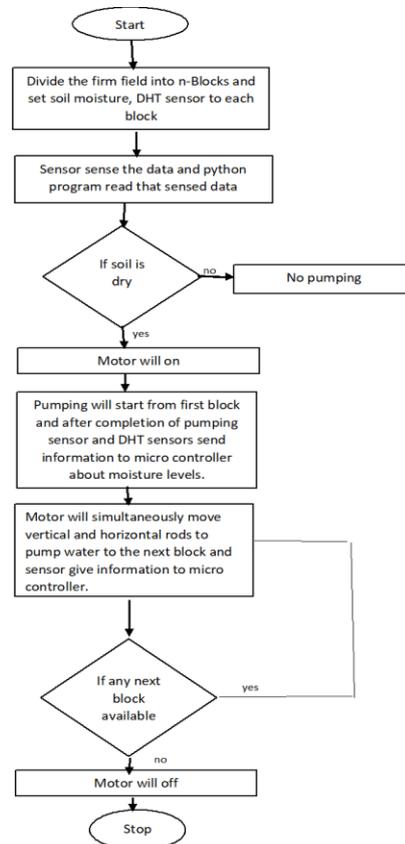
Step-4: And now water flows to the second block and step-3 will repeat till all n-block get wet

Step-5: And finally block-n will send a signal to controller about the completion of work so that motor will off automatically.

Step-6: A SMS is sent to the farmer every time about the irrigation work (about work completion, about soil condition wet or dry etc...).

As mentioned above Micro Controller will switched on motor automatically by taking information about wetness of farm field from sensor. After that farm field will get wet block by block with the help of sensor. While pumping water block by block the entire method consist of n-1 horizontal gates (where n=no.of block in farm field) arranged from second block to the end block and one vertical gate will be arranged at the end of first block. Gates will move automatically block by block after completion of work of each block. This process will repeat until all blocks will be wet. And work completion notification will be send to micro controller then it will switch off the motor and send status of work to the farmer through SMS.

C. Flow Chart

Retrieval Number: C9003019320 /2020©BEIESP
DOI: 10.35940/ijitee.C9003.019320

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Published By:
Blue Eyes Intelligence Engineering
& Sciences Publication

IV. RESULTS

The following results are written as per observations [13]

Table- I: Analysis of Human Hour and Man Power Required

Method	Human Hours (for one acre)	Man Power (for one acre)
Traditional Methods	Almost the full day(2 to 3 days)	More Man Pwer Required (100%)
Modern Methods	Decreased to 1 day	50% required
Automated Methods	Decreased to some hours.	10% required
Proposed Method	Decreased to some minutes	2% required

V. CONCLUSION

Chunk by chunk irrigation of farm field –through wireless sensing system observe and Controls all the actions professionally. This system is accurate soil moisture control in sloppy areas, irrigation in regular power cut areas, night time irrigation. It also helps in time saving, removal of human error and reduce human hours while irrigation.

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AUTHORS PROFILE

Shaik. Vahida has a 6 years of experience in teaching and is working as an Assistant Professor in Aditya College of Engineering and Technology, Surampalem, India. She received her M.tech Degree in CSE from JNTUK in Nov, 2014. Her interested research areas include Data Mining, IOT, and Networking.

Dr. Rayudu Srinivas has 18 years of experience in teaching and is working as a Professor in Aditya Engineering College (A), Surampalem, India. He received his doctoral degree in CSE from JNTUK in Sep, 2016. His research areas include Image Processing, Data Mining and Algorithms. He is also extending his research in Machine learning and IOT.

Dr. Rama Reddy T has 22 years of experience in teaching and is working as a Professor in Aditya Engineering College (A), Surampalem, India. He received his doctoral degree in CSE from Acharya Nagarjuna University in April, 2017. His research areas include Wireless Communications & Networking, Scheduling algorithms and Cryptosystems. He is also extending his research in multi-disciplines spanning to Mobile Computing, Android Programming, Machine learning and Internet of Things.

Sheik Shabuddin has 12 years of experience in teaching and is working as a Assistant Professor in Professor in Aditya College of Engineering and Technology, Surampalem, India. He received his M.Tech degree in CSE from JNTUK in Dec, 2013. His interested research areas include Big Data, Machine Learning and Data Mining.

B.Durga Anuja has 8 years of experience in teaching and is working as an Assistant Professor in Government Degree College for Women, Sri Kalahasti. She received her M.tech degree in CSE from JNTUK in Dec, 2012. Her Interested research areas include Wireless sensor networks and Machine learning.