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E-IRRIGATION: An Automation of Irrigation using Wireless Networks

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***Abstract*—** The major influencing parameter of Indian economy is agricultural. Also in agricultural the most important factor is irrigation. Irrigation must be in time and proper for a better crop yield. The major irrigation is performed using electric water pumps. Irrigation by electric water pump introduced problems of frequent, intermittent, low voltage supply. This causes monitoring the supply of power and hurdles in irrigation. The unreliable power supply and frequent power cuts disturb the farmers and it leads to decrease the efficiency of farmers. This turns into the movement of farmer's from farming to urban area. In this paper I introduced a system which shows how automation of irrigation is performed to solve the problems introduced by intermittent electrical power supply. In this paper I designed an embedded system which is controlled by sending a SMS from mobile phone. This embedded device can control maximum 8 devices.

***Keywords*—**Agriculture and irrigation, WSN, GSM.

I. INTRODUCTION

India is the country of agriculture. Most of the people of India live in villages and are fully dependent on agriculture. The heart of the agriculture is irrigation. Most of the farmers are dependent on tube wells for irrigation. And supply of power to agricultural areas is limited to only a fixed hour in a day which is not predictable always. The frequent power cuts and low voltage supply create big hurdle to the farmer and thus it needs continuous manual monitoring. Lately, there has been significant interest as regards electrical monitoring[1-2].Additionally, several studies have been carried out to monitor electrical changes[3-4-7] and lots of work has been done for this [5-6-10]. The object of our system is to provide a solution for these problems. By using this proposed system a farmer can monitor power on/off , voltage supply level from home or any where using a mobile phone as well as he can switch on or off the motor from anywhere far from the actual field.
The system at the field consists of-

AT command supporting GSM mobile phone

1. AT-89c51 Microcontroller
2. Max 232 IC.
3. Voltage regulator 7805.
4. Computer
5. Relays, for controlling the motor on/off for irrigation.
6. Power supply
7. Mobile for data transmission
8. LCD for monitoring the current reading of all the parameters.

II. PROBLEMS IN AGRICULTURE

The backbone of Indian economy is Agriculture; nearly 20% of the farmers are dependent on electric water pumps for irrigation which demands electricity. The research study conducted by K V S Ram Chandra Murthy (2009) shows that there is a growing demand for electrical energy for irrigation requirements in India and many states electrical utilities companies have been facing acute shortage of power which has led to unrest in the farmers. On top of the power shortage issues, increased demand for power in urban areas (due to globalization, IT, BPOs), have further deteriorated the power supply to agriculture sectors along with frequent and unreliable power cuts and low voltages. Also, It has been observed that source of electrical energy generation is slowly depleting. The underground water level is slowly falling down and forests are being cut which reduces the rainfall as well. With increasing area available for cultivation and the need for increasing the productivity from the farm land, there is a growing need for electrical energy for irrigation. The generation of electricity is not growing proportionately to the demand. The supply to agriculture is limited to few fixed hours throughout the day. Agriculture receives power mostly during mid night (off-peak) as this reduces the cost of electricity supply for the transmission and Distribution Company. Because of the unpredictable nature of supply of electrical energy, the farmers have to be on their guard all the time. They have to immediately switch on their equipment after electricity supply resumes. Since the supply to agriculture is mostly during non-peak hour, the farmers are made to wait for the whole day for electricity supply to resume so that they can start their equipment for irrigation

purposes. We see results of this in reduction in productivity, wastage of labor, and equipment lying idle. Moreover, most of the times the farmers would be engaged in one corner of the field where as the equipment would be installed at another place. It becomes imperative for a farmer either to be physically available at the equipment site or employ a labor only to switch on the equipment when electricity supply resumes. The frequent, intermittent, low voltage supply of power to the agriculture sector has caused a big headache to the farmers who are just spending their time monitoring the supply of power. And due to the fluctuation if their equipment burns or have other technical problems then they waste hours for just withdraw the pump out of the bour and get it repair and reinstall the equipment back to its proper place. The highly unreliable power supply with frequent power cuts have not only lowered the efficiency of farmers but also have led to the frustration of the farmers to give up agriculture and move on to urban areas for better prospects in the globalized world. In this thesis, I am going to discuss an example of how the mobile technology can benefit millions of farmers by providing a solution for the irrigation problems due to an intermittent electrical power supply in rural India.

III. ARCHITECTURE OF E-IRRIGATION

Motor controls, such as ON/OFF can now be controlled by my proposed System using the mobile SMS technology. "This System" is directly connected to electric motor or any other home appliance controls. The system informs the farmer availability of electric power through SMS. Once the farmer receives the message, he can decide to send an SMS message to the unit on the motor unit, to start the electric motor using his mobile from anywhere. He need not have to be near the farm or field or even in his house. He can be anywhere outside tending to his various activities. Since this system works on mobile network, the farmer can receive messages wherever there is wireless network (roaming). Once the farmer sends an SMS to the system, it decodes the message. Based on the message code, let us say 1, it will turn ON the motor and if the code is 2, will turn OFF the motor. Also, he can set a timer to turn off motor automatically for a predetermined time.

Some of the other useful messages sent by our system are:

a. Power supply indication – sends a message indicating the availability of electric supply to motor

b. Low voltage indication – sends a message indicating voltage level or single phase supply to decide whether sufficient power voltage is available to turn on the motor.

c. Monitoring of agriculture appliances remotely.

The objective of this system is to make a farmer's life easier. Using this, a farmer can do his water irrigation anytime, from anywhere without worrying about frequent power cuts, fluctuation of voltages, lack of water or the period of water that is required to be pumped. Following are some of the benefits a farmer can derive by installing this system:

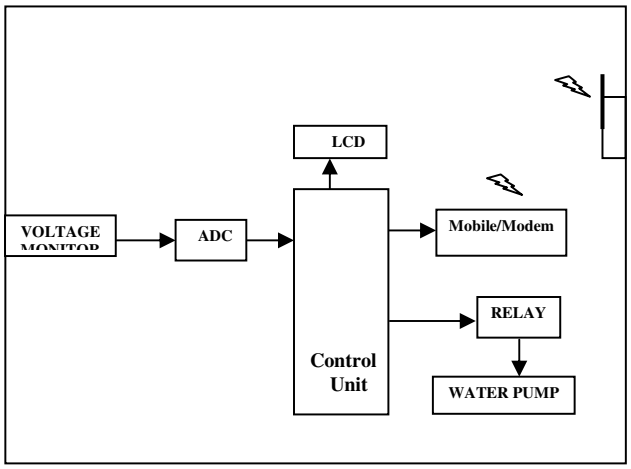

Fig:1 Architecture of E-irrigation.

a. Higher Production - Operations using SMS codes on wireless mobile network, a farmer can be potentially anywhere conducting other works, yet at the same time, be operating irrigation activity remotely

b. Efficient Utilization of Electric Power – Motor operations (ON and OFF) are automatically controlled – when enough water has been pumped, the motor is switched off automatically and hence saves power energy

c. Significant Decrease in Wastage of Water – There is no wastage of water due to automation of Motor operations (ON and OFF)

d. Operation Cost is Reduced – Proposed system will not turn ON the motor until the required conditions are not available.

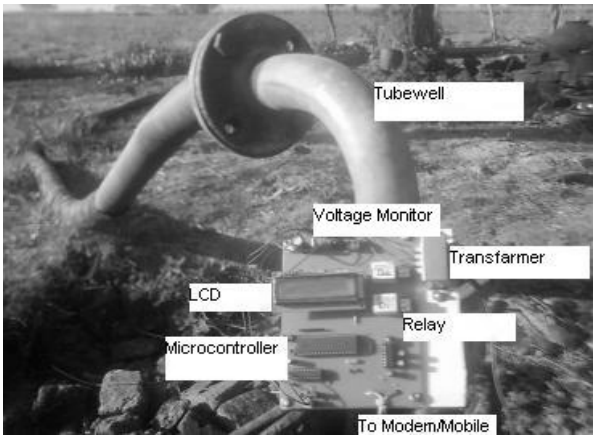

Fig:2 Proposed System**.**

IV. EXPECTED OUTCOME OF E-IRRIGATION

This system sends a message indicating the availability of electric supply to motor as well as it can also sends a message indicating voltage level or single phase supply to decide whether sufficient power voltage is available to turn on the motor. We can also control other appliances of irrigation such as autoswitch or electric bulb at the field by using this system.

This graph shows the voltage reading with time measured by E-IRRIGATION.

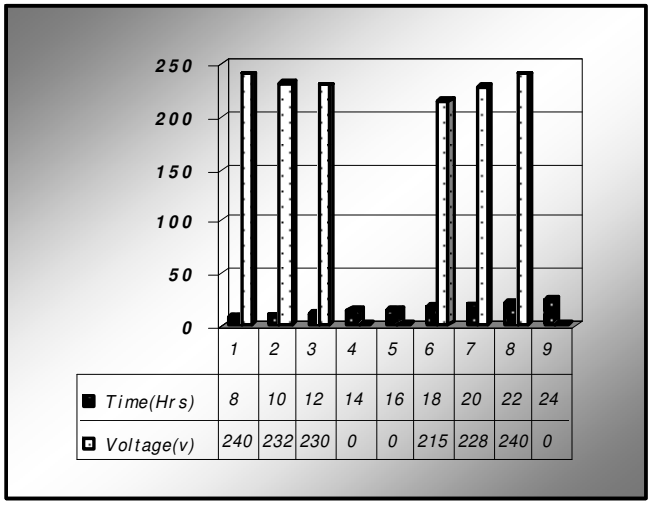

Fig:3 Graph shows results.

V. CONCLUSION

In this paper, we report the results of real-development of E-IRRIGATION system which is designed and implemented to realize automated agriculture. The solution gives the information about electric supply. This system can increase the operational efficiency of a farmer and can make his life easier. The advancement of technology has helped rural India, particularly farmers; This system presents the mobile technology as the solution for irrigation problem.

VI. FUTURE SCOPE

At present this system can provide information about the electric supply, but in future we can control various appliances related to agriculture such as drip irrigation system as well as we can monitor environmental and agricultural parameters such as temperature, humidity etc at the field by enhancing the system.

REFERENCES

[1]. Subhash, M., and Bansal, N. K. **2009**. Sectoral Analysis forelectricity demand in India. www.ignou.ac.in

[2]. Padmanaban, S., and Ashok Sarkar. **2006**. Electricity Demand Side Management (DSM) In India – A Strategic And Policy Perspective. Office of Environment, Energy and Enterprise, US Agency for International Development, New Delhi, India.

[3]. S. Padmanaban, C., and Govindarajalu. **2006**. Economic Sector Work on Power Supply to Agriculture: Sub-Task Report on Cost Minimization Through Integrated Agricultural DSM. Office of Environment, Energy and Enterprise, US Agency for International Development, New Delhi, India.

[4]. Nezhad, H. G., and Sarkar, A. **1997**. Demand-Side Management: A Policy Model for India. Proceedings of the Twentieth Annual International Energy Conference of the International Association for Energy Economics (New Delhi, India). Volume II. 448-458.

[5]. Siriginidi Subba Rao., **2008**. Social development in Indianrural communities: Adoption of telecentres. International Journal of Information Management. Vol 28. 474–482.

[6]. Sharma, G. Mission **2007** in India: Every village a knowledge centre. i4donline.net/sept04/mission2007

[7]. Overview of power sector in India. **2005**. India Core Publishing.

[8]. wirelessdevnet.com/channels/sms/features/sms.ht

[9]. Umesh Hodeghatta Rao, Sanjay Mohapatra Mobile Technology for Irrigation Problems in Rural India, November **2009** ICIS '09: Proceedings of the 2nd International Conference on Interaction Sciences: Information Technology, Culture and Human

[10]. N. Wang, N. Zhang, M.Wang, Wireless sensors in agriculture and food industry-Recent development and future perspective, Computers and Electronics in Agriculture,**2006**,Vol.50,pp.1-14

[11]. R. Beckwith. D. Teibel, and P. Bowen Jones, "Report from the Field: Results from an Agricultural Wireless Sensor Network", proceedings of 29th IEEE LCN'04, Tampa, Florida, November 15-17, **2004**

[12]. A. Baggio, "Wireless sensor networks in precision agriculture", proceedings of REALWSN'05, Stockholm, Jun 20-21, **2005**

[13]. K. Langendoen, A. Baggio, 0. Visser, "Murphy Loves Potatoes: Experiences from a Pilot Sensor Network Deployment in Precision Agriculture", 14th 14th Int. Workshop on Parallel and Distributed Real-Time Systems (WPDRTS), Rhodes, Greece, April, **2006**

[14]. D. Kim, T. Sanchez Lopez, S. Yoo, J. Sung, J. Kim, Y. Kim, Y. Doh, "ANTS: An Evolvable Network of Tiny Sensors", Lecture Notes in Computer Science (LNCS vol. 3824), pp. 142-151, **2005**

[15]. Jose A. Gutierrez, Ed. Callaway, and Raymond. Barrett, "Low-Rate Wireless Personal Area Networks: enabling wireless sensors with IEEE 802.15.4", IEEE Press, **2004**

