INNOVATIVE WATER SAVING AGRICULTURE BY USING RESOURCES

NARESH KUMAR REDDY.BEECHU, B.SIVA HARI PRASAD, B.Y.V.N.R.SWAMY

1, 2&3 Department of Electronics and Communication Engineering, LBRCollege of Engineering, Mylavaram, India

(naresh.klu@gmail.com,bapihari1@gmail.com,swamyyvnr@gmail.com)

ABSTRACT

Indian economy is mainly based on agriculture. The most important parameter for the agriculture is timely and sufficient supply of water. The frequent, intermittent, low voltage supply of power to the agriculture sector has caused problems to the farmers who are spending their time monitoring the supply of power without which their work cannot start. In this paper we are going to propose a system. A novel concept of this paper is the use of protocol sensor which gives the water level content information in agriculture in the form of missed call to a prescribed number. Duration of missed call is minimum (i.e. one missed call) water level content is very low. If water content level is high mobile keeps continuous ringing. Alerts and messages are passed through the routing protocol sensors to the user cell phones. After receive missed call /missed calls to the cell phone, user can change on/off state of the motor. Rural areas many states in India plugged by frequently power cuts. In this research we are going to propose a system which shows, how Produce Electricity from Solar Energy and Mobile technology can benefit millions of farmers in rural India. The system is based on Routing Protocol sensors mainly we design a wireless sensor network, which consists of sensor node cluster, coordinator node and irrigation controller nodes. Here sensor node cluster is responsible for gathering information such as soil moisture and regularly send it to the coordinator node. and 8051 microcontroller embedded in the coordinator node takes soil moisture error and error change rate as its input and obtained water demand amount of crops under certain soil moisture through controller inference and controller judge and output it to irrigation controller node making protection against single phasing, over-current, dry running.

Index Terms: routing protocol sensors, 8051 Micro-controller, Cell phone, solar panels.
I. INTRODUCTION

This India is the country of agriculture. Most of the people of India live in villages and are fully dependent on agriculture. Supply of power to agricultural areas is limited to only a fixed hour in a day which is not predictable always. This approach offers simple interface with only destination cell phone address and message requirement without any header / protocol overhead. So this method is suitable for remote monitoring of systems with moderate complexity. Wireless sensor networks also offer attractive opportunity for remote monitoring [4]. This consists of wireless network of sensor nodes connected to adjacent nodes and Base Station (BS). Each node consists of microcontroller, radio-transceiver and set of sensors. BS acts as gateway for Internet connectivity. The deployment entails substantial investments in infrastructure. Major applications are in field of environment monitoring, defense. Many farmers use induction motor pumps to irrigate their farms from wells, rivers and nearby streams. However, shortage of electric power in many states has resulted in unplanned load shedding of long durations in rural areas. Moreover, in villages, single-phasing connections have been implemented. The electricity companies allocate lower priority to 3-phase power supply to rural areas due to unpaid electricity bills running into millions of rupees. In many cases, the distance between location of pump (water source) and the region of distribution of water (farm) might extend to few kilometers. In case of power failure, farmer has to go back to pump region and wait for power restoration For surface based irrigation, water is discharged through pipe at ground surface and gradient is created to distribute the water through the various regions. There are frequent instances of burning of motor due to unequal phase voltages and dry running of motor. Repairing cost of pump and non-distribution of water during motor failure period cause substantial reduction in yield of crop. Relative omnipresence and drastic reduction in rates makes cellular networks best choice for communication [2]. Moreover, simple cell phones having just voice call and missed call facility are available at throwaway prices due to migration of population towards higher end models[1-2]. Such simple models or cell phones with non-working display can be easily adapted for remote control applications. Conventional remote monitoring systems using cellular network use dedicated GSM modem for AT command interface. Such modem increases the cost of system compared to reuse of existing cell phone

Here paper is classified into 4 folds, where the first part describes about routing protocol sensors, second fold describes regarding controlling node and its working mechanism, where third fold describes the mode of communication and the way the mobile automates for control and monitoring. Finally how produce power and how this embedded technique is helpful for farmers for a better optimized irrigation.

II. IMPLEMENTATION OF SYSTEM HARDWARE

Sensor node in wireless sensor network periodically collects information of soil moisture and sends it together with the node location information to the coordinator node [3]. Coordinator connects to irrigation controller node through the serial port and uploads data. Coordinator node and sensor node have the same hardware, only different on software configuration. The followings are the hardware designs for these two types of nodes.
A. Sensor Node and Coordinator Node

Sensor node and coordinator node consist of data acquisition module, data processing module, turn-off serial transceiver and power supply modules. Data acquisition module uses digital humidity sensor SHT11, which is responsible for collecting the information of soil moisture on surveillance region. Data-processing module, we select basic 8051 Micro controller it is responsible for controlling the operation of the entire sensor node, including storage and processing data collected by itself, implementation of wireless data transceiver. Single-chip microcomputer in CC2431 communicates with sensor by its figure port [4]. Self-shutdown serial transceiver SP3223 is a transceiver that can automatically work or shut down according to the state of serial cable connection. When there is no serial cable connection or without data communications, the chip is in shutdown state and its consumption of current is only 1µA. Coordinator node connects to the irrigation controller through RS232 serial interface in chip SP3223. Energy supply modules, CR2032 are selected is responsible for energy supply of entire node.

![Diagram of Sensors communicating mobile structure](image)

B. Controller Node

Irrigation controller takes low-power 8051 that is based on the ATMEGA AT89c51 core as its main part, which is a cost-effective microcontroller solution scheme. Designed by Atmel for handheld devices and general applications. In the system, a lot of modules are used, such as an 8-way 10-bit A/D converter module, LCD controller; 8-bit timers [3], UART, PWM output module, etc. Irrigation controller receives the information transmitted from the serial port of coordinator and sends corresponding irrigation command through I/O port to control the action of electric control valve. Opt coupler isolation is set between general-purpose I/O ports in microprocessor and control valves, each I/O port corresponding to an electric control valve.
ATMEGA 89c51 has as many as 40 multi-function I/O ports, so the system has a high expansibility. The composition of irrigation controller node is shown in Fig 2

![Architecture Diagram](image)

Figure 2. Architecture

For making an effective utilization of water resources in this model we are using a wireless sensor network to control and monitor the water level content, here in the agricultural field the sensor nodes are distributed in a unique format at an equal distance, the sensor nodes sends the information to the coordinator node the information to the coordinator node is the summation of the information sent by the nodes in the fields [4], the routing protocol sensors sends the analog data to the A/D converter at an appropriate time intervals the analog to digital converter converts the analog data sensed by the sensor to digital, the data is always compared with a a standard reference value at the converter and sends the information to the controller, here we use 8051 microcontroller which is 8 bit controller stores the information temporarily and it send the indication state to the farmer who is remotely located to the farm field via mobile modem. Mobile modem is fixed to a standard number of the farmer where the required information like ringing of the mobile to specific duration is controlled through the controller by obtained information from the reference voltage from the sensors. Farmer can change the state of the motor by his mobile the information sent by the farmer is sent to modem located at the farm field is sensed by the controller, the controller take the intelligent decision in changing the state of the relays, here relays acts as a switch between the motor and controller in making change of state by remotely located farmer.
C. Communication Protocol

When designing a wireless sensor network, the first thing needed to consider is how to get low power consumption and how to prolong the network life cycle as long as possible. In this paper, routing protocol standard wireless network technology is introduced to design the wireless sensor network. Routing protocol sensor is a close range, low-complexity, low power, low data rate, low-cost two-way wireless communications technology that is suitable for the system. Because the primary energy consumption is at idle listening [5], receiving unnecessary data and retransmission of collisions and so on, combining the characteristics of self-localization and RTC wake-up call in CC2431, in order to reduce power consumption the network uses non-beacon access mode [6]. Sensor node dialogues with coordination node only when required for data transmission and it is in sleep the rest of the time in order to save the energy consumption to maintain the network connection. Since each sensor node needs to transmit rare amount of information and the time of dormant state is larger than its working hours, collision of information is almost unlikely.
III. WORKING PRINCIPLE

Motor controls, such as ON/OFF can now be controlled by my proposed System using the mobile phone. The system informs the farmer availability of water level through missed call/missed calls.

Miscall Approach: The operational cost of communication is minimized by using concept of miscall wherein no charges are incurred by using only ring signal for information transfer. A voice call is treated as miscall when either calling party disconnects after receiving ring tones or called party does not respond to call within specified time[5]. It is observed that cellular operators allow 60 secs durations for response from called party after sending ringing tone. For default tone, this duration amounts to 20 rings. However, RING response of AT command interpreter is checked periodically at end of every 5 secs [1] . Hence maximum number of commands using single miscall is 12. The system cell phone is designed to send miscall for specified duration to user cell phone to report various conditions. Similarly, user cell phone sends commands to system cell phone by making miscall for specified duration. This novel concept of miscalls results in substantial savings.

Miscall approach simple code:

```c
if((modem[0]=='R')&&(modem[3]=='G'))
{
    lcdcmd(0x01);
}
```
msgdisplay("MISSED CALL...");
ac_motor = ~ ac_motor ;
if(ac_motor == 1) {
    motorstatus=0;
    lcdcmd(0x01);
    msgdisplay("motor is off");
    j=0;
    send_message("MOTOR IS SWITCHED OFF");
    delay(1500);
    j=0;
}
if(ac_motor == 0) {
    motorstatus=1;
    lcdcmd(0x01);
    msgdisplay("motor is on");
    j=0;
    send_message("MOTOR IS SWITCHED ON");
    delay(1500);
    j=0;
}

That means water level is low in the field Routing Protocol of Sensor Network give one missed call to the Mobile. If water level is high in field thus Routing protocol can give continuous missed call once the farmer receives the missed call/missed calls [1], he can decide to call to the motor, to start/stop the electric motor using his mobile from anywhere. He need not have to be near to the farm or field or even can operate from his house. He can be anywhere outside tending to his various activities. Since this system works on mobile network, the farmer can receive one missed call wherever there is wireless network (roaming). Once the farmer calls to the system, Based on the mobile, let us say 1, it will turn ON the motor and the farmer receive missed calls
continuously if we say 2, will turn OFF the motor. Also, he can set a timer to turn off motor automatically for a predetermined time.

IV. POWER GENERATION
In Ruler areas in India plugged by frequently power cuts. Because if we produce the power this problem can be avoided. That power generating methods are 7 types. The type of power generation used can depend on location, available resources and necessary scale. In India according to former solar power is preferable and cost-effective.

Solar electricity is created by using Photovoltaic (PV) technology by converting solar energy into solar electricity from sunlight. When photons (contained within the sun rays) hit a solar cell, the electrons contained in the solar cell material absorb this solar energy, which transforms the electrons into conduction electrons. If the energy of these photons is great enough then the electrons are able to become free and carry an electric charge through a circuit to the destination. Photovoltaic systems use sunlight to power ordinary electrical equipment, for example, household appliances, computers and lighting. The photovoltaic (PV) process converts free solar energy - the most abundant energy source on the planet - directly into solar power. Note that this is not the familiar "passive" or Solar electricity thermal technology used for space heating and hot water production.

![Image of solar farm](image_url)

Figure 5. Produce Electricity from Solar Energy in agriculture field

A PV cell consists of two or more thin layers of semi-conducting material, most commonly silicon. When the silicon is exposed to light, electrical charges are generated and this can be conducted away by metal contacts as direct current (DC). The electrical output from a single cell is small, so multiple cells are connected together and encapsulated (usually behind glass) to form a module (sometimes referred to as a "panel"). The PV module is the principle building block of a PV system and any number of modules can be connected together to give the desired electrical output[7-8]

PV equipment has no moving parts and as a result requires minimal maintenance. It generates solar electricity without producing emissions of greenhouse or any other gases, and its operation is virtually silent.

Typical PV System Configuration
The components typically required in a grid-connected PV system are illustrated below.

The PV array consists of a number of individual photovoltaic modules connected together to give the required power with a suitable current and voltage output. Typical modules have a rated power output of around 75 - 120 Watts peak (Wp) each. A typical domestic system of 1.5 - 2 kWp may therefore comprise some 12 - 24 modules covering an area of between 12 - 40 m², depending on the technology used and the orientation of the array with respect to the sun.

Most PV modules deliver direct current (DC) electricity at 12 volts (V), whereas most common household appliances in the UK run off alternating current (AC) at 230 V. An inverter is used to convert the low voltage DC to higher voltage AC. Numerous types of inverter are available, but not all are suitable for use when feeding power back into the UK mains supply. Good suppliers and installers of grid-connect PV systems will be able to offer advice on suitability of commonly available models[8]. Other components in a typical grid-connected PV system are the array mounting structure and the various cables and switches needed to ensure that the PV generator can be isolated both from the building and from the mains. Again, good suppliers and installers of grid-connect PV systems will be able to offer advice on these aspects of the PV system.

Finally, a meter will be required to ensure that the system owner can be credited for any PV power fed into the mains supply. Suppliers will normally offer a 12 months warranty on the system, together with 2 years on the inverter and a performance warranty of 10 - 25 years on the modules.

V. CONCLUSION

In this paper, routing protocol nodes, cell phone technology and solar power are introduced to innovative water-saving agriculture by using Resources. We design this technique solve the problem of real-time transmission of irrigation information. We apply embedded technology to innovative water-saving agriculture by using resources, which can meet the requirement and development of intellectualized and protocol-based agriculture. Which is designed and
implemented to realize automated agriculture? The solution gives the information about water 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. We believe that the exploratory study applying routing protocol nodes combined with produce solar power to precise agriculture projects must have a broad popularization value and application prospect in the future. The way discussed by the paper is easy and practical, which can be used as a reference when studying and analyzing other research can help expanding the agriculture field in embedded devices.

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REFERENCES


Authors Biography

B.Naresh Kumar Reddy is native of Kadapa town of Kadapa District of Andhra Pradesh, India. He received B Tech.(ECE) degree from S.V.University(A.P) in India , M.Tech degree from K.L.University, Andhra Pradesh,. Currently he is working as a ASSISTANT PROFESSOR in LAKIREDDY BALI REDDY COLLEGE OF ENGG, Mylavaram, A.P He published 10 international journals & presented 1 IEEE Conference. he is editor review committee member in IJSER & research volunteer in IJAET And his area of interest is EMBEDDED SYSTEMS , MICROCONTROLLERS (naresh.klu@gmail.com).

Siva Hari Prasad B. Presently working as a ASSISTANT PROFESSOR in LAKIREDDY BALI REDDY COLLEGE OF ENGG, Mylavaram, A.P he has 8 years of experience in teaching .His research interests embedded systems, micro controller and antenna design and theory (bapihari1@gmail.com).

B.Y.V.N.R.SWAMY Presently working as a ASSISTANT PROFESSOR in LAKIREDDY BALI REDDY COLLEGE OF ENGG, Mylavaram, A.P he has 5 years of experience in teaching. His research interests embedded systems, micro controller and analog& digital electronics (swamyvvnr@gmail.com).