

Automatic Rain Water Harvesting and Electrical Power Generation Using Solar Panel in Agriculture Fields

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Abstract- Solar power is being increasingly utilized worldwide as a renewable source of energy. India has huge untapped solar off-grid opportunities. Power problem to farmers for irrigation is a regular problem where still a permanent solution has not been found out. In such situation we can go for an alternate power solution-solar power. Solar light is readily available where we will not pay for it. There will be a number of works in the field like water pumping that require a certain amount depending upon crop and time. Some time excess of water and some deficiency of water makes crop difficult to grow. In such situation automation plays an important role to maintain water level without human interaction. The farmer (user) can water the fields from any place using GSM technique which provides an acknowledgement message about the job status. The main advantage of this project is optimizing the power usage through water resource management and also saving government's free subsidiary electricity. This proves an efficient and economical way of irrigation and this will automate the agriculture sector.

Index Terms—Solar panels, Sensors, Motor.

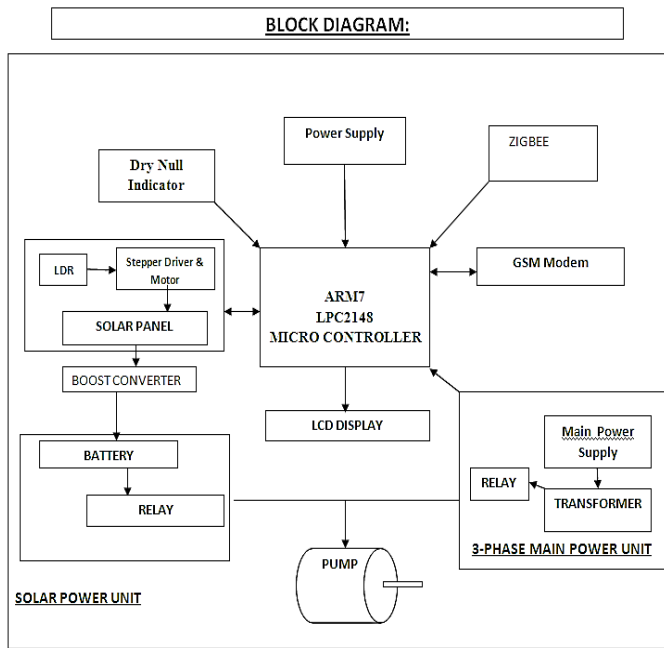
1. INTRODUCTION

The people in developing countries like India, China, are mainly depending on the agriculture productivity, agricultural involves efficient usage of resources like water, pesticides and other things. For agriculture activities in India more manpower and maintenance is required unlike the western countries. Efficient usage of water means that, providing water for agricultural fields whenever they require water, so that a person must be there to water the agricultural fields. If we did not water the fields in time, it may degrade the total productivity. So we require an efficient system that should monitor the weather conditions and soil conditions too. By predicting the weather for upcoming days, we can estimate resources required. Here there is an advantage of the weather monitoring, prediction is, we can estimate the water usage for fields based on the temperature, humidity during the high temperature, the field may require more water, during the lower temperature days the field may require less water. Here by using the CO₂ sensor, we can estimate the amount of CO₂ in air. We can monitor the air pollution, through the CO₂ presence in air. There may be a chance to take appropriate action when the CO₂ presence exceeds the predefined level. Using primary sensors (rain drop) we monitor the moisture in soil and we on/off the motor as per requirements. So by using these types of equipment's, we can achieve the automation in the field agricultural. This greatly reduces the manpower in agricultural activities. This system provides the remote monitoring facility. We can monitor the weather and motor conditions in the remote web server.

To carry out the project in a phased manner it is necessary to conduct the literature survey. To establish communication we use the concept of wireless communication. The fundamental concept and information about wireless communication is excellently described by Theodore S Rappaport. Mobile computing service creation are completely discussed by Asoke K Talukder, Roopa R Yavagal in Mobile computing, Technology Applications and Service creations[1]. The information regarding the latest developments in GSM have been obtained from the websites [6]. Various websites have been visited to get necessary information. The project is implemented using Embedded C language. To develop the code for establishing communication between the terminals, we refer to the books of The Complete Reference C. Knowledge about the usage of AT commands to exchange Short Message Service (SMS) was learnt from AT commands Manual. The information regarding programming in C was referred from Muhammed Ali Mazidi, Janice Gillispie Mazidi, Rollin D. Mc Kinlay, The 8051 Microcontroller and Embedded System using Assembly and C and the 8051 Microcontroller and Embedded System, by Kenneth J Ayala.

II. LITERATURE SURVEY

A. Figures



1) Weather monitoring:

This system has the advanced feature is weather monitoring; it ceaselessly overhauls the information in regards to the CO₂ vicinity in air, temperature and humidity percentage in air.

2) Automatic operation & remote operation:

Automatic operation means that, it turns on the motor pump or turn on the motor pump, if temperature exceeds or moisture content in the soil having less than the predefined level.

3) Remote monitoring:

The owner of the crop field can continuously monitor the data regarding the crop field and weather of that particular crop field.

4) Estimation of resources:

By analyzing the data provided by the Real-Time Atomization of Agricultural Environment for Indian Agricultural System Using Arm7, we can estimate the resources required and can predict the weather in the future days. We have to know one thing, that in two or three days before rain the parameters like temperature and humidity may change tremendously than the normal. So by analyzing the parameters we can predict weather in future.

II. MATH

$$P = VICOS(\Phi)$$

Where P=power in watts

V=voltage in volts

I=current in amps.

III. UNITS

Use either SI (MKS) or CGS as primary units. (SI units are strongly encouraged.) English units may be used as secondary units (in parentheses). This applies to papers in SI units.

IV. WORKING:

Firstly the processor checks for the availability of the solar energy, the solar panel is interfaced with the motor, which in turn is connected with the driver. The solar panel rotates both in clockwise and anti-clockwise 180° and stops, stores the solar energy in a battery. The humidity sensor checks for the soil moisture content whose maximum and minimum. When the soil moisture content is less the pump motor will pump the water to the field. The temperature sensor will measure the surrounding temperature of the farm, The rain sensor will sense the heavy rain and closes the panel to protect the crop. All the above information will be informed to the user using GSM technology. Relay is connected to the pump which starts pumping water when the moisture sensor senses the land as dry. Moisture sensor is used for sensing the soil moisture of the crop land to feed them water, we also checking for the Ph value of water, if water is acidic the motor pump will remain off, Ph is no acidic supply will given.

The proposed framework has the accompanying details:

Here above figure show shows the block diagram of the Real-Time Atomization Of Agricultural Environment For Indian Agricultural System Using Arm7, this system is implemented over the ARM7 (LPC2148) [5] micro controller. 16x2 LCD [8] display is here to display the status of the process. LM35 [3] is for the temperature measurement, LM35 [3] having the sensitivity about 10mv/1°C. MQ2 [2] is carbon dioxide sensor, which senses the CO₂ [2] in air. Humidity sensor [9] is for monitoring the humidity in air. Rain drop sensor is for detecting the moisture from soil. Here we are using the simple DC motor in place of the actual water pump. Micro controller [5] not having capacity to drive DC motor straightforwardly, that is way we are utilizing engine driver L293D [7]. GPRS [6] module is here to update the physical parameters like temperature, humidity, CO₂ [2] and motor status to the remote web server.

V. ADVANTAGES

1. When power is off, this is very helpful for the farmers to depend on this solar powered pump.
2. As solar energy is plenty and renewable we can depend on this and we can save the power which is generated by other non renewable energy sources.
3. No need of employees.
4. It saves water and farmers time.
5. Compact and low cost.
6. Protection for Water Pumps during dry null.
7. Adding Zigbee based Wireless Sensor Network Makes the System real time Implementable.

VI. APPLICATIONS

- Large fields.
- Gardens.
- This can be used in agriculture fields which is very helpful and useful for the farmers.

VII. CONCLUSION

In our project we have designed a model to help the farmers in rural zones.

- Our Remote Controller could be installed on existing pump sets for a nominal cost.
- Operating our Remote Controller does not require any special skills. It is as simple as sending a SMS or a missed call.
- The user can send a SMS message from anywhere in the world to operate this equipment. The security feature in the software will make sure that it works only with pre-assigned phone numbers.
- Implementation of Wireless Sensor Networks.

REFERENCES

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