# Application of Solar Energy In Irrigation System And Control of Pumpset Automatically Through SMS

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***Abstract - Solar power is used as only the source of power to control the overall system. Sensors are placed on the paddy field and these sensors continuously sense the water content and give the message to the farmer. Without visiting the paddy fields, farmers can get the information about the Moisture content and farmer can control the pump set by sending a message from his cellular phone even from a remote place where network is available. However, if the Moisture level reaches to the low level the motor will automatically start without intimation to farmer and to ensure the proper water level in the site. At the end of this paper, a complete hardware implementation of this proposed automated irrigation system will be presented.***

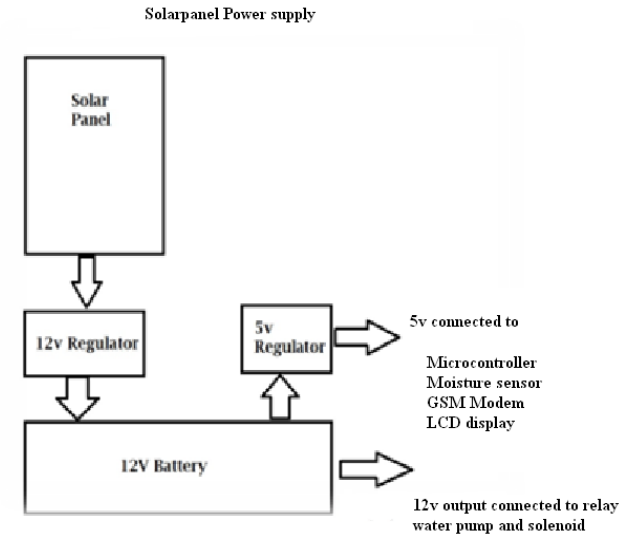
***Keywords: solar power, pump, automatic irrigation***

## I. INTRODUCTION

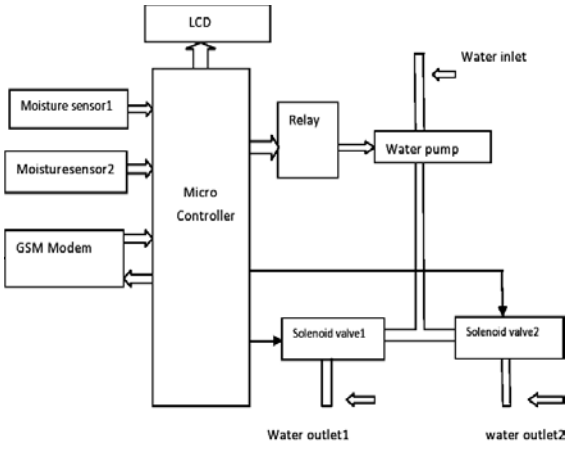
Analysis of the power in rural India shows that the power supplied by Electricity Company is highly unpredictable and highly interrupted. Most of the farmers have their piece of land at far of distance. All crops in these lands depend on the proper irrigation, which makes them to sit in the field and monitor for the power and Turn ON or OFF the pump. This makes them more troublesome in going to the land switching ON the pump for irrigation. Almost a human resource is spent for this operation. A human resource time is taken round the clock for all days in a year and making them more worried. To circumvent this problem a GSM solution to reach the farmer irrespective of his location could be reached. The solution aims at automating the irrigation pump control at a very low cost and relives the farmer from his routine duty of maintaining the irrigation pump mobile phone is one of the most common and useful consumer electronics gadgets in the world today. It incorporate both Communication & Digital Electronics filed. They provide us with countless conveniences in our daily lives.

As the device is so much popular and part of every-day-activities, many add-on circuits are constructed to make it still more feature rich instrument. Such add-on feature is this system which allows user to switch on/off loads from remote end. It finds applications in homes, offices and even in industries. Here is a Mobile phone operated device control circuit which enables switching 'on' and 'off' of appliances through wireless channels. It can be used to switch appliances from any distance, overcoming the limited range of infra-red.

## II. SYSTEM MODEL




i) power supply circuit diagram




ii) Block diagram of proposed system

## III. PREVIOUS WORK

[1]GSM based Automatic Irrigation Control System for Efficient Use of Resources and Crop Planning by Using an Android Mobile by Pavithra D. S[1], M. S .Srinath[2]in this paper author discussed about the greenhouse based modern agriculture industries are the recent requirement in every part of agriculture in India. In this technology, the humidity and temperature of plants are precisely controlled.

Due to the variable atmospheric circumstances these conditions sometimes may vary from place to place in large farmhouse, which makes very difficult to maintain the uniformity at all the places in the farmhouse manually. It is observed that for the first time an android phone-control the Irrigation system, which could give the facilities of maintaining uniform environmental conditions are proposed.

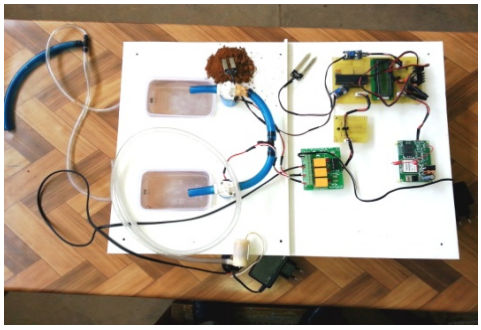
The Android Software Development Kit provides the tools and Application Programmable Interface necessary to begin developing applications on the Android platform using the Java programming language. Mobile phones have almost become an integral part of human life serving multiple needs of humans. This application makes use of the GPRS [General Packet Radio Service] feature of mobile phone as a solution for irrigation control system. GSM (Global System for Mobile Communication) is used to inform the user about the exact field condition. The information is passed onto the user request in the form of SMS.

## IV. PROPOSED METHODOLOGY

Main intension of our project is by using solar energy to run the whole operation. The solar panel generates 12v of voltage that can be converted to 5v by using regulator and the regulated voltage from regulator which is not exact 5v it contains some ac harmonic contents it can be filtered by using capacitor filter circuit. Solar energy stored in the battery (1.58Ah back up) directly connected to pump, relay & solenoid valve. Those are operated at 12v & 200mA current. All the apparatus are internally connected to the microcontroller (PIC 167877A). It control's the whole operation of our project.

All the conditions of the land displayed in LCD display and the same message send to former or owner by using GSM system. It also displays the solenoid valve operating conditions & SMS received by the former. When the crop land becomes dry automatically pump & solenoid valves are turned on and supplies the water to the land. When the crop land is in wet condition the both pump & solenoid valves are turned OFF. For further necessary of the water to the land we can turn ON the pump by sending the SMS to GSM modem which contains customer SIM card.

The moisture sensor is used to sense the water content (level) of the land. By using relay the microcontroller will sends the signals to the relay to make opening &closing of pump close & open the pump, depend upon the information from moisture sensor. Before the operating system choosing the operation of each operator. The GSM shows blinking in three second means network is present in inserted SIM. If it shows blinking in one second means network is not present in inserted SIM. The pump is completely immersed in the water tank or bore well for proper operation. Because the pump we can used in the system is sub-immersible type



## V. RESULTS

Various experimental tests showed that the system was able to function as expected and observed that the sensitivity of sensor was affected by temperature during checking of soil moisture level to determine watering.

This somehow resulted in variations in the measured moisture values at different times from the set moisture values to trigger watering. 80% out of10 trials were successful in responding correctly. Similarly, the pump shut-down mechanism was depend largely on the soil moisture values, small deviations in the measured values affects the control algorithm leading to the auto-stop not to respond when the tolerable moisture level was attained.

The system was however, able to send SMS to the user and LCD system upon starting and completing a scheduled task as well as the occurrence of events at all the 10 trials. Similarly, the system was able to respond to the SMS command to turn the irrigation pump on and off for watering at all the trials.

The system also showed a success rate of 80% out of 10 trials using SMS to change the control parameter for operation, set system operational conditions, and modify user records. One challenge encountered during the testing is the duration of the back-up battery power supply. Since power supply is very critical to the smooth operation of the controller system, it is important that the battery power source should be able to serve the system for a long time so as to provide the user with field records even though unavailability of the main power source will render the irrigation pump non functional.

To provide sustainable power to the system for long power supply outage or areas without regular power supply, possible supply such as solar power is under investigation consideration. Although the implemented controller system produces expected results, it was however, difficult to examine the complexities associated with handling of congestion from multi-sensor system and multi-user environment since only one-sensor system and single-user case was used for the testing. Since this is an on-going project, new results emerging from the expansion work and field tests may be reported as a follow up to this paper.

## VI. CONCLUSION

In this project automatic controlling of solar pump sets and SMS alert has been discussed fruitfully. The overall idea is that users to take advantage of the globallydeployed GSM networks with its low SMS service cost to use mobile phones and simple SMS commands tomanage their irrigation system.

To demonstrate the functionality and performance of the controller system, theprototype was implemented and tested. Results showed that it will be possible for users to use SMS to monitordirectly the conditions of their farmland, schedule the water needs for crops, automatic control of water and set control operational conditions in accordance with the water needs of crops. This will help to minimize overwatering and crop production cost. Further, it will help users to take advantage of the prevailing GSM networks to provide value added services

## VII. FUTURE SCOPE

The solar powered automatic irrigation system is going to be very useful in the future. It has various advantages over the other conventional type irrigation system. The components required for this type irrigation system is moisture sensors, relays, solenoid valves, and sub-immersible type pump and GSM. It doesn't have any complicated components like any other irrigation system. The irrigation is proposed by sensing the soil condition as wet or dry .It produces an efficient use of water in irrigation system. This is more effective for the farmers.

In future the advances in nanotechnology, improvements in smart grid and power electronics have major role in implementing solar energy policies. Our government, Research and laboratories, various solar organizations are working hard to make this solar pump set as agriculture and user friendly. Let we have a hope so that in one fine day all farm lands in India are provided with solar pump sets with SMS alert.

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