'Solar based irrigation system using Bluetooth and full status over mobile'

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Abstract : This paper offers the layout and the implementation of a smart irrigation system furnished from solar energ y using offshelf components as a part of a senior layout challenge. Introducing smart irrigation technology complemen ts the effectiveness of water usage and could assist farmers make their activities more beneficial. In addition, it's far to boom the agriculture sustainability in common and considering the traits of irrigation inside the rural regions. This pap er brings forward new device based on wireless networks including solar photovoltaic era, arduino based totally controllers, transmitters, receivers, and sensor nodes are used to measure soil moisture, humidity, tempera ture, and the sensor readings are transmitted to a faroff station. Experimental outcomes indicated that the developed de vice should offer a sustainable method to decorate the efficiency of water use and to preserve it inside the agricultural fields at the same time as the usage of solar photovoltaic electricity as a renewable power supply.

Keywords-
Smart irrigation system, solar photovoltaics, water/energy savings, Bluetooth, Arduino controller, sensors

I. INTRODUCTION

India is the agriculture based country. Our ancient people completely depended on the agricultural harvesting. Agriculture is a source of livelihood of majority Indians and has great impact on the economy of the country. In dry areas or in case of inadequate rainfall, irrigation becomes difficult. So, it needs to be automated for proper yield and handled remotely for farmer safety. Increasing energy costs and decreasing water supplies point out the need for better water management. Irrigation management is a complex decisionmaking process to determine when and how much water to apply to a growing crop to meet specific management objectives. If the farmer is far from the agricultural land, he will not be noticed of current conditions. So, efficient water management plays an important role in the irrigated agricultural cropping systems. A lowcost alternative solution for efficient water management currently in use is drip irrigation systems that consist of an automated controller to turn on & off the control values, which in turn helps the farmers by managing the water supply to the crop fields and further maintains the moisture levels of soil that helps in be tter crop production. This project probes into the design of the automated irrigation system based on Arduino. This Embedded project is to design and develop a low cost feature which is based on embedded platform for water irrigation system. This project uses temperature and soil moisture sensors to detect the water quantity present in agriculture. The p roject uses Arduino micro controller which is controller to process the information. The aim of the implementation was to demonstrate that the automatic irrigation can be used to reduce water use.

II. PROPOSED APPROACH

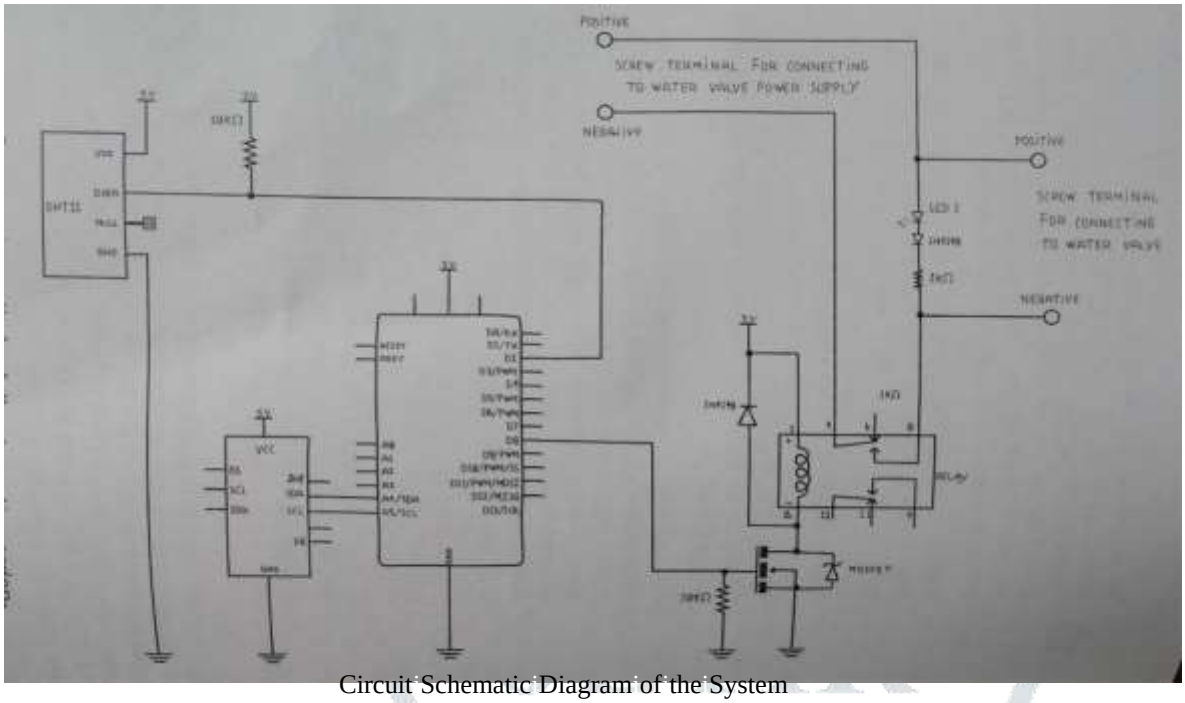
In this proposed system we utilize the solar energy from solar panels to automatically pump water from bore well directly into a ground level storage tank depending on the intensity of sunlight. While conventional methods include p umping of water from bore well into a well and from this well onto field using another pump, our system uses only a s ingle stage energy consumption wherein the water is pumped into a ground level tank from which a simple valve mechanism controls the flow of water into the field. This saves substantial amount of energy and efficient use of renewable energy. A valve is controlled using intelligent algorithm in which it regulates the flow of water into the field depending upon the moisture requirement of the land. In this system we use a soil moisture sensor that detects the amount of moisture present in the soil and depending upon the requirement of level of moisture content required for the crop the water flow is regulated thus, conserving the water by avoiding over flooding of crops.

The proposed SBIS prototype has the below functionalities:
a. It focuses on monitoring of status (ON/OFF) of the DC water pump at the site.
b. GUI interfaces helps in viewing of the status used for screening purposes.
c. Controlling action over working of water pump based on periodically recorded data.

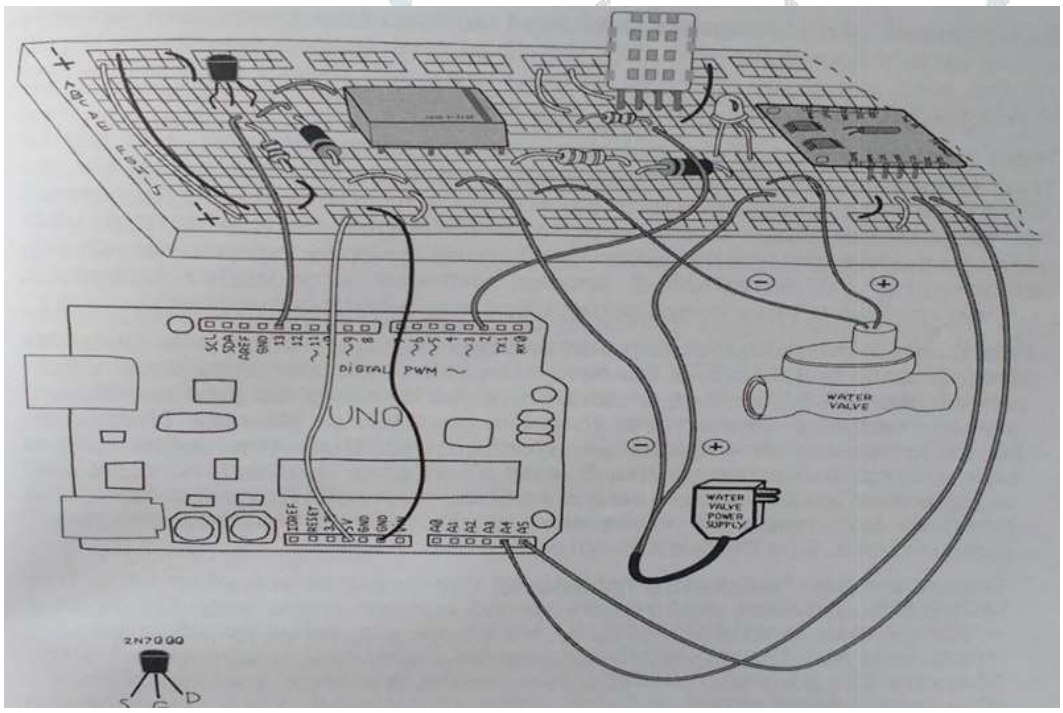
III. SYSTEM OVERVIEW

The smart irrigation system consists of four major components. These are the power supply, the controller, the communication network, and the pumping system. The power supply is based on offgrid solar photovoltaic energy, while the control unit consists of low cost and commercially available Arduino controllers. Similarly, the communication network consists of Arduino Unobased transmitters and receivers. Finally, the pumping system consists of DC water pumps, relays, water tank, and ultrasonic sensor for water level detection. Finally, t he sensing system consists of temperature and moisture sensors.

IV. SYSTEM IMPLEMENTATION

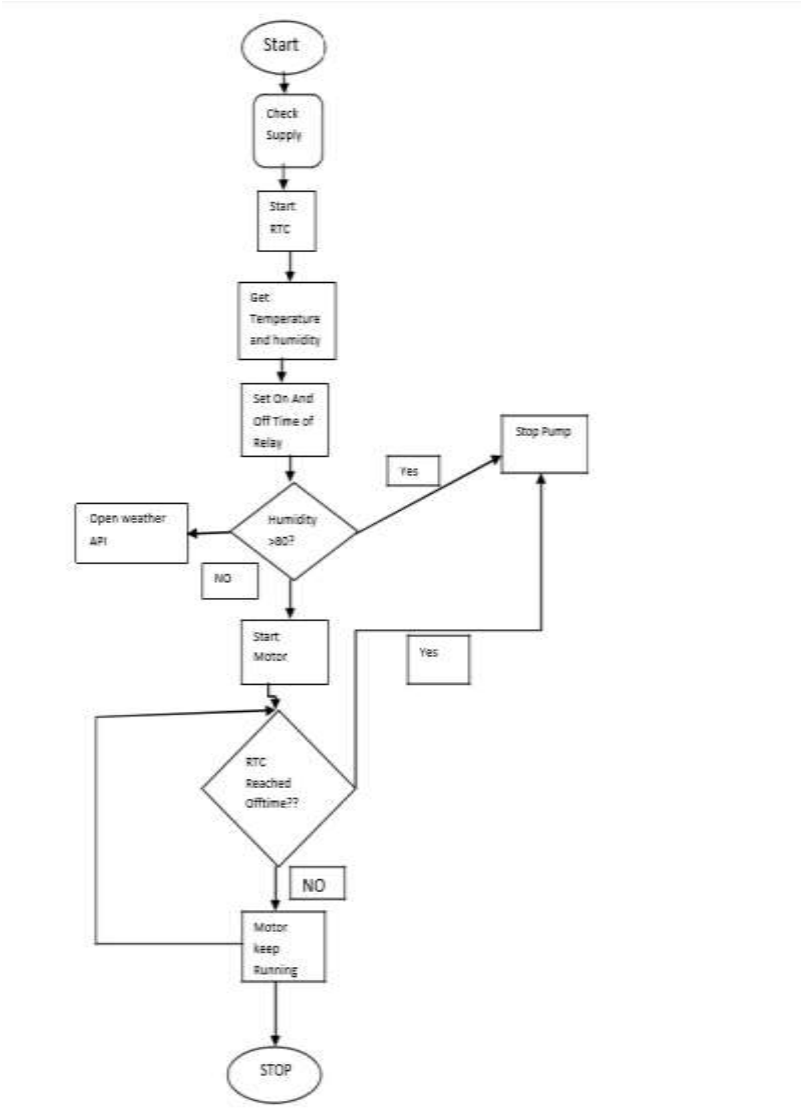


Circuit Schematic Diagram of the System



Pictorial circuit diagram of the system

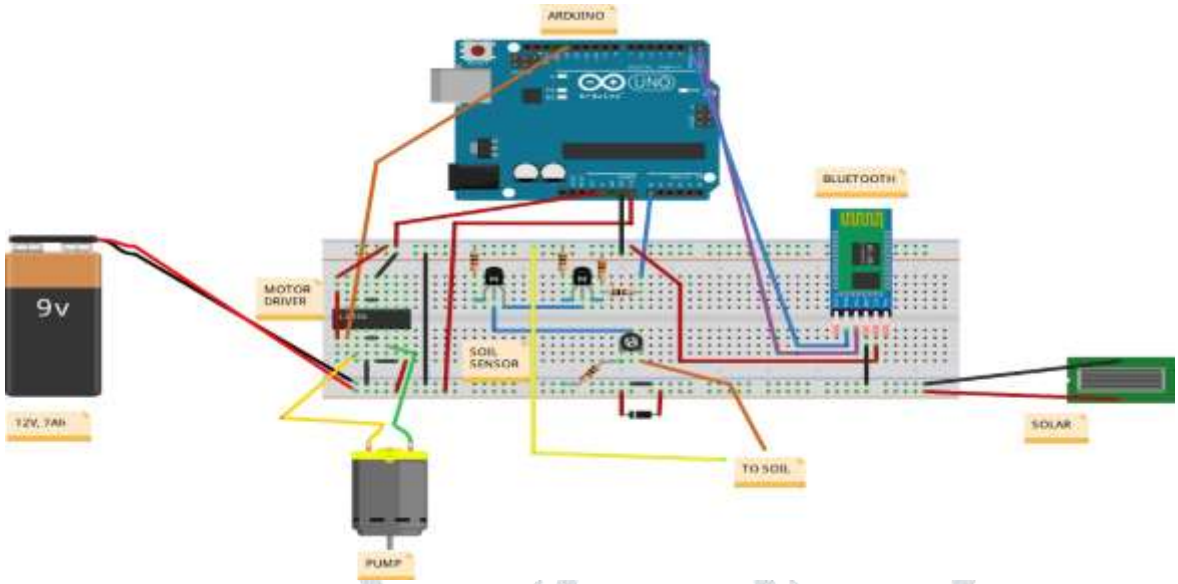
V. FLOWCHART



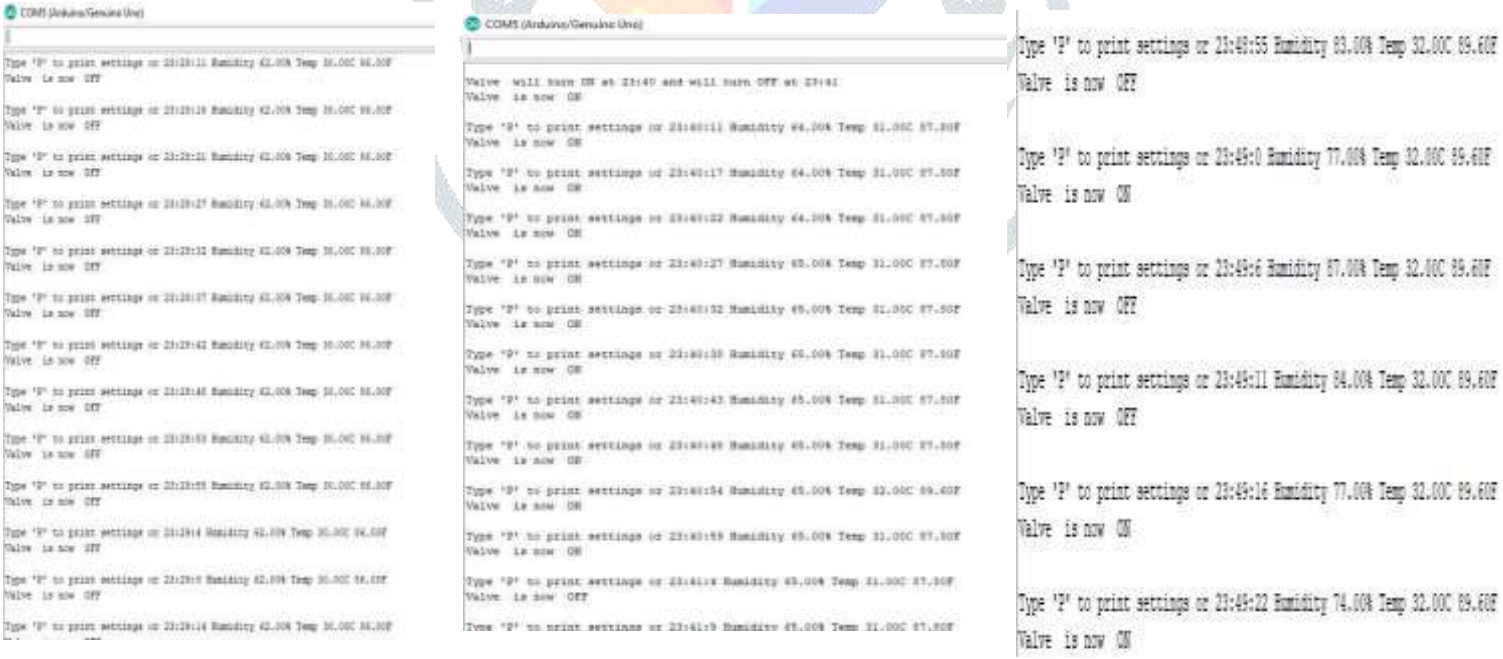
VI. BRIEF ABOUT PRACTICAL IMPLEMENTATION

For the implementation of the proposed system, we are using a 2 HP water pump and various modules which are designe d and
fabricated separately and then finally they are assembled together to implement the proposed system. Solar energy is harness ed using solar panel PVL-
68 that generates 53W at Nominal Operating Cell Temperature. It is 24V, amorphous silicon type solar cell.
Proposed irrigation system mainly consists of two modules.
Solar pumping module and automatic irrigation module. In solar pumping module a solar panel of required specification is mounted near the pump set. Then using a control circuit it is used to charge a battery. From the battery using a converter circ uit it
gives power to the water pump which is submerged inside the well. Then the water is pumped into an overhead tank for stori ng
water temporarily before releasing the water into the field. In automatic irrigation module the water outlet valve of the tank i s
electronically controlled by a soil moisture sensing circuit. The sensor is placed in the field where the crop is being cultivate d. The
sensor converts the moisture content in the soil into equivalent voltage. This is given to a sensing circuit which has a referen ce
voltage that can be adjusted by the farmer for setting different moisture levels for different crops. The amount of water neede d for
soil is proportional to the difference of these two voltages. A control signal was given to a stepper motor whose rotational an gle is

proportional to the difference in voltage. The stepper motor in turns controls the crosssectional area of the valve to be opened controlling flow of water. Therefore, the amount of water flowing is proportional to the moisture difference.



VII. RESULTS AND DISCUSSION



VIII. CONCLUSION

The automatic irrigation control using arduino uno has been experimentally proven to work satisfactorily and we could successfully set the timer and managed to control the motor over time.This process not only records values of temperature and humidity it also controls the motor accordingly.Analyzing the weather condition motor will automatically maintain water supp ly making it possible to maintain greenery without human intervention.

IX. FUTURE WORK

Using this system as framework, the system can be expanded to include various other options which could include mobil e

application control of motor and Wifi controlled monitoring. These will expand the working capability and efficiency of this prototype. It can be implemented not in agriculture but in gardens in any places using the sprinkler concept. It has a vast scope

when it is mixed with IOT. Automation will get a new dimension through this.

X. References

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