IOT AND GSM BASED SOLAR OPERATED WATER PUMP SYSTEM: A TECHNICAL REVIEW

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Abstract

Electricity is one of the important parameters for making growth and development of a country. Solar energy is largely available and clean source of energy in the world. As per as land concerned India has the second largest available agricultural land in the world. Still the problem of electricity not resolved most of the user (farmer) not getting electricity for their agriculture land. The transportation and condition of roads is also hurdles in the development agriculture land. This paper discusses about the various techniques available for the farmer. The key objective of this paper is to provide solar operated water pump which is controlled by IoT and GSM. This minimizes the human effort (farmer) in the remote places. The user (farmer) can control all operations through his mobile device.

Keywords: Agriculture, Solar power plant, Energy generation, Water Pump, GSM Mobile, IOT

I. INTRODUCTION

India is the second largest populated country in the world. The primary source of income for most of the population is still farming. Till today, agriculture systems are operated manually which result in less output and wastage of the time, money and energy. This traditional system can be replaced by advanced techniques for farming. Still, there is unbalanced between total power supply and demand to farming. In some cases power cut down as long more than 6 hrs. So, it better to use renewable source of energy government also encourages its use in various sectors, including irrigation system for farming. IOT and GSM Based Solar operated water pump use for farming which uses solar panel to drive the water pump. The pump is control by DOL starter and it is operated through

GSM or we can use automatic starter. For better connectivity RF module is used. So it can be operated from any place.

Internet of Things (IoT) is an ecosystem of connected physical objects that are accessible through the internet. The Internet of Things refers to the ever-growing network of physical objects that feature an IP address for internet connectivity, and the communication that occurs between these objects and other Internet-enabled devices and systems. The whole water pump is operated through the IOT and GSM and electricity is supplied to water pump is through solar system.

II. LITERATURE SURVEY

In solar water pumping system by B. Eker [1] provide detailed about solar powered water pumping system. These are PV panels and pumps. The smallest element of a PV panel is the solar cell. Each solar cell has two or more specially prepared layers of semiconductor material that produce direct current (DC) electricity when exposed to light. This DC current is collected by the wiring in the panel. It is then supplied either to a DC pump, which in turn pumps water whenever the sun shines, or stored in batteries for later use by the pump. The aim of this article is to explain how solar powered water pumping system works and what the differences with the other energy sources

In IOT and GSM based automatic water pump control by Poornima Mahesh, Pramod Raut, Akshay Aparaj, Vinay Phale & Wasim

Chaudhari [2] operation of water pump by using "IOT and GSM". For this RF module, GSM module (A6) & WIFI module (ESP8266) are connected to DOL starter, which provide unique IP address to user by entering the IP address in any operating system user can control the water pump and user can operate the water pump by using RF module. This process are used for indoor purpose only for outdoor operation IOT and GSM modules are used and for all the methods of operation authentication is required this will increase the security.

In Automation of Water Pump Controller for Irrigation Using ATMEGA 16 by Snehal R. Mulmane, R.S. Khamitkar [3] which providing a user friendly, reliable and automated 3- phase water pump control system for farmers. Here the automation process is done through the wireless GSM technology. Automation of water pump includes monitoring of availability of proper electric supply, water level inside the reservoir, flow rate of water through pump and also taking care of short circuit conditions related to irrigation pump. The microcontroller ATMEGA 16 is the heart of this system. The design of this system is very much sensitive and should be handled with utmost care because the microcontroller is a 5 volts device and it is employed to control high voltage 3-phase irrigation water pump. The major advantage of this device is, it is very user friendly as the status of the motor can be known by a simple LED indication and more over the device is very economical and can be brought available to the common man.

In Embedded Controller in Farmers Pump by Solar Energy by K.Ganesh, S. Girisha & G. Amirtha Kannan [4] the primary aim of this project is to develop and atomize the solar farmers pump (water pump) considering the power supply, direct current (DC), Alternating current (AC), inverter frequency, a well, water level in the well, submersible monoblock pump. The solar pumps which work by utilizing the energy from the SOLAR ARRAYS and the power from the PV are stored in a battery. The power from the battery is inverted and given to the pump for irrigation. This pump is also controlled by the GSM module. The use of GSM mode is to start and stop working of pumps using mobile phone; the water level monitoring is also done by the GSM mode which this also provides the message for each hour. This is done with the embedded C in PIC16F877A microcontroller. The main advantage of this project is optimizing the power and also saving government's free subsidiary electricity (22% of total power production in India). This proves an efficient and economy way of irrigation and this will automate the agriculture sector.

In Solar Energy Conservation in Domestic & Irrigation Water Supply by Sayantika Saha, Madhurima Santra, Soumyendra Nath Basu [5] India has the second largest agricultural land in the world (World Bank data shows that about 60.3 percent of India's land area is agricultural land). With approximately 60% of the earth's fresh water being used to irrigate crops it is not reasonable to assume that all the farmers in the world grab their buckets and do watering of crops. However, typical irrigation systems consume a great amount of conventional energy through the use of electric motors and generators powered by fuel. Solar panels are now used for running street lights and to meet domestic loads. The cost of solar panels has been decreasing. One of the applications of this technology is used in irrigation system for farming. The objective is to supply water for the fields through solar powered water pump and automate the system for better management of resources using GSM technique. This system conserves electricity by reducing the usage of grid power and easy to implement and environment friendly solution for irrigating fields. Solar power irrigation system can be a suitable alternative for farmers in the present state of energy crisis in India. The objective of this paper is to supply water for the fields through solar powered water pump and automate the system for better management of resources.

III. PROPOSED SYSTEM

The solution to the above problem is explained in the proposed system. Motor is getting the supply through the solar panel either by using inverter or by battery storage system. The control operation of motor can be possible through mobile SMS. The user can manage the motor ON/OFF through mobile SMS. Electricity is available or not is not the major concern as motor operated through solar energy. The electricity directly from inverter can fed to motor through controller. They can operate the motor even in the night by storing the electric energy into battery and then supply to motor using inverter. The RF module, GSM module &

WIFI module are connected to DOL starter, which provide unique IP address to user (farmer) by entering the IP address in any operating system user can control the water pump. User (farmer) can operate the water pump by using RF module. So, IOT and GSM modules are used for operation of water pump system.
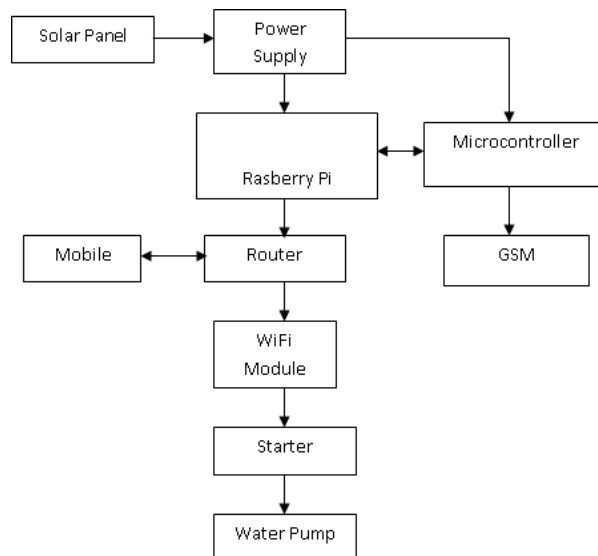

Figure 1: Block diagram of the proposed system

IV. CONCLUSION

The people living in the village are depending on farming for their income. The agriculture sector also provided economic development in the country. Due to poor management of rain water harvesting or availability of water and also increasing demand for agriculture, the water saving and make it available for agriculture is now today's major concern. So that the modern automated irrigation technique can be the better option for farmer. It is the best method for farm irrigation; farmer can operate the water pump from any place which ultimately saves its time and physical work. The use of solar panels for supplying power gives freedom to farmer from power breakdown which is major problem in villages. It also somehow decreases the burden on grid power. This system improves the overall growth of farmer and the system is economical for long period of time.

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