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Intelligent Agricultural field Monitoring and Controlling System using Renewable Source

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ABSTRACT

Agriculture is the source of living of majority Indians and it also has a countless influence on economy of the country. The objective of our work is to reduce this manual involvement by the farmer by using an automated irrigation system and enhances water use for agricultural crops. The inspiration for this work came from the countries where economy is based on agriculture and the climatic conditions prime to shortage of rains & scarcity of water. The farmers working in the farm lands are only dependent on the rains and bore wells for irrigation of the land. Even if the farm land has a water-pump, manual involvement by farmers is required to turn the pump on/off when needed and our work deals with solutions for many agricultural problems such as farm security, man power problem and over rainfall detection. Our work provides the solution for all agricultural problems and also helps to improve the economy of the country.

Keywords: *Agriculture system, Internet of things, Solar power.*

I. INTRODUCTION

The proposed model aims at developing an intelligent agricultural field monitoring and controlling system using a Microcontroller and IOT which continuously monitors and controls different parameters like soil moisture, fire, temperature, obstacle controlling can be done using electromagnetic relays. The system also has a buzzer for audible alerts. Now a day's technology is running with time, it completely occupied the life style of human beings. It is being used everywhere in our daily life to fulfill our requirements. We can not only increase the speed of life but also increase security with good ideas by making use of advanced technology. The main controlling device of the whole system is a Microcontroller, Wi-Fi module Soil moisture sensor, temperature sensor, motor theft sensor, obstacle sensor and the two way supply like renewable source and ac source. Here Solar power is a utilized along with some new engineering techniques. This technique will be a very good option for the small and medium farmers who suffer every year just because of failure of crops that took place every year. The implementation of this technology has a wide scope in the nearby future.

II. LITERATURE SURVEY

This internet of things in agriculture provide an overview of existing application, enabling technologies and main challenges ahead. The result of the literature survey shown that this subject received attention by the scientific

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community from 2010 on an the number of papers has increasing since then. The literature on IOT in agriculture and it is very much dominate by Asian scientists from china.India is among the 15 leading exports of agricultural products in the world. Total agricultural exports from INDIA grew at a CAGR of 16.45 per cent over FY 10-18 to reach US$ 38.21 billion in FY18. The contribution of agricultural to total export was 12.26 per cent in FY17. Tea export from INDIA reached a 36 year high of 240.68million kgs in CY 2017.

S. Harishankar1 et.al proposed a system which utilizes 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 pumping of water from bore well into a well and from this well onto field using another pump, our system uses only a single 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[1].

M.Abu-Aligah et.al in his paper discussed about the locations where electricity is unavailable, other means are necessary to pump water for consumption. One option is a photovoltaic (PV) pumping system. Advantages of PV pumping systems include low operating cost, unattended operation, low maintenance, easy installation, and long life. These are all important in remote locations where electricity may be unavailable. So far, in the development of this research, the focus has been to estimate the available radiation at a particular location on the earth's surface and then analyzed the characteristics of a photovoltaic generator and a photovoltaic network. The purpose of this research is to examine all the necessary steps and key components needed to design and build a pump using photovoltaic system[2].

III. PROBLEM DEFINITION

Generally, the current irrigation systems are manually operated. Farmers face many agricultural problems like Electrical power supply problem, man power problem, agricultural farm security problem, over rainfall losses, Failure of crops due to animals and motor theft problem. Our proposed model provides the overall solution for farming and also improves their productivity. The main objective of this work is to design a small scale irrigated system that would use water in more well-organized way in order to prevent excess water loss and minimize the cost of labor and to design a solution to over come the real time agriculture problems like motor theft, losses of crops due to animals, labour problem, electricity problem.

IV. HARDWARE DESIGN

Figure shows the block diagram of the proposed hardware model and design aspects of independent modules are considered. The working principle of this system is simple. When the soil moisture sensor is placed in field it senses the condition and the aensor will compare with set value of microcintroller. If the value is less, than it will read as soil is dry and send signal to the signal processing unit. The signal processing unit commands the

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relay drive to close the circuit and switch ON the pump for supply of water. At the same time signal processing will display the status in the LED display as well as it will command AND CONTROL the pump status. If the value cross the set value of microcrontroller, the SIGNAL PROCESSING again sends signal to relay driver to open the circuit to switch OFF the pump. Hence, the automatic system works. In the case of any failure in automatic system the pump also can be operate by switch but for that one have to visit in the field and ON the switch. After the irrigation is done again have to OFF the switch. Besides irrigating the field, pump also can be used during the cultivating land and other purpose through manual switching. In the same way all the sensors are operated by signal processing unit and further relays are activated by relay driver and the pump is controlled and different alert system is activated. then if any animal detected in farm premisis the IR sensor detect the animal and signal send to the signal processing unit and heavy sound will be produced also LED will indicate.if any one is trying to cut the tree then sensors which mounted on tree will be sense it and send the signal to the processing unit and theft will be caught easily. Further if heavy rain occurs the excess water which collected in the farm will be detected and motor will take the signal from relay unit and excess water will be moved out from the land automatically and motor is placed on an metal plate it is attached with an sensor when any one is triying to lift the motor the signal will go to microcrontroller and buzzer will make the sound indicating that someone is stoling the motor and through mobile we can turn off the buzzer.All the condition will operate through mobile only.

PIC compiler is software used where the machine language code is written and compiled. After compilation, the machine source code is converted into hex code which is to be dumped into the microcontroller for further processing. PIC compiler also supports C language code.

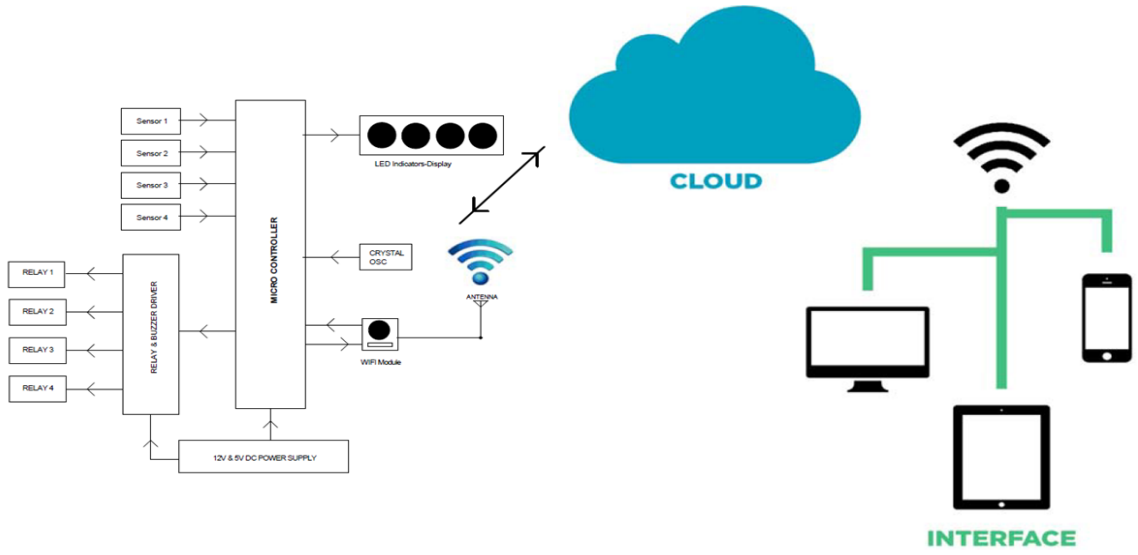

Figure 1. Block diagram

It's important that you know C language for microcontroller which is commonly known as Embedded C. As we are going to use PIC Compiler, hence we also call it PIC C. The PCB, PCM, and PCH are separate compilers. PCB is for 12-bit opcodes, PCM is for 14-bitopcodes, and PCH is for 16-bit opcode PIC microcontrollers. Due to

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many similarities, all three compilers are covered in this reference manual. Features and limitations that apply to only specific microcontrollers are indicated within. These compilers are specifically designed to meet the unique needs of the PIC microcontroller. This allows developers to quickly design applications software in a more readable, high-level language. When compared to a more traditional C compiler, PCB, PCM, and PCH have some limitations. As an example of the limitations, function recursion is not allowed.

PIC C is not much different from a normal C program. If you know assembly, writing a C program is not a crisis. In PIC, we will have a main function, in which all your application specific work will be defined.

Solar panels harness the sun's energy in the form of light and convert the energy into electricity. Although the average consumer might associate solar panels with residential rooftop assemblies, solar panels are available for a wide range of applications, including powering individual gadgets, electronic devices and vehicle batteries. The smallest unit of a solar panel is the solar cell, also called a photovoltaic, or PV cell; it's the individual PV cell that turns sunlight into electricity. Individual cells arranged in a group are called a "module" or panel; a collection of two or more panels is called an array. According to the National Renewable Energy Laboratory, the typical residential or business solar panel holds approximately 40 cells and the average residential array consists of 10 to 20 panel.

Soil moisture sensor is used to measure the soil resistivity or volumetric water contain of soil in terms of threshold. When sensor is placed in field, it measures the moisture or water level content in it. It gives a digital output of 5V when moisture level is high and 0V when the moisture level is low in the soil.

IR obstacle sensor basically consist an IR LED and a Photodiode, this pair is generally called IR pair or Photo coupler. IR sensor work on the principal in which IR LED emits IR radiation and Photodiode sense that IR radiation.

Temperature Sensor works on the principle of thermistor. Here we have used NPN transistor MJE3055 but any high current transistor can work here like BD140.

V. SOFTWARE DESIGN

This project is implemented using following software's: Express PCB – for designing circuit, PIC C compiler- for compilation part and Proteus 7 (Embedded C) – for simulation part.

By implementing the automatic irrigation system proper irrigation is done which maximizes the productivity of crops. The scarcity or deficiency of water in field is controlled and regular irrigation is done. By implementing manual switching we use the pump to supply water for other purpose also. The pump is also used for filling the tank and used during cultivation of land. Beside that it helps to operate the irrigation system if any short circuit or failure in automation system. The solar panel used helps to overcome the energy crisis problem, and adopter used is for alternative used to subsidy for damage of battery or for cloudy days when solar will not get enough charge for charging the battery. And our project comes with solution for all agricultural problems like motor thefting, and protection against animals. Hence our idea works successfully.

Our aim is mainly intended to develop an intelligent agricultural fields monitoring and controlling system using a microcontroller. The proposed system continuously monitors and controls different parameters like soil moisture,

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temperature, obstacle, humidity, water, Light level. Alerting of the parameters is on LCD display and controlling can be done using electromagnetic relays. The system also has a buzzer for audible alerts.

The main controlling device of the whole system is a microcontroller. Soil moisture sensor, temperature sensor, fire sensor, obstacle sensor, electric fault switch, water level probe, humidity sensor and light sensor are interfaced to Microcontroller. The sensor input is fed as input from microcontroller. The microcontroller displays the alerts on LCD display along with alarm. The microcontroller also alerts through voice messages. To perform the intelligent task, Microcontroller is loaded with an intelligent program written in embedded 'C' language and operated with function of IOT.

Express PCB has been used to design many PCBs (some layered and with surface-mount parts. Print out PCB patterns and use the toner transfer method with an Etch Resistant Pen to make boards. However, Express PCB does not have a nice print layout. Here is the procedure to design in Express PCB and clean up the patterns so they print nicely.

Proteus is software which accepts only hex files. Once the machine code is converted into hex code, that hex code has to be dumped into the microcontroller and this is done by the Proteus. Proteus is a programmer which itself contains a microcontroller in it other than the one which is to be programmed. This microcontroller has a program in it written in such a way that it accepts the hex file from the pic compiler and dumps this hex file into the microcontroller which is to be programmed. As the Proteus programmer requires power supply to be operated, this power supply is given from the power supply circuit designed and connected to the microcontroller in proteus. The program which is to be dumped in to the microcontroller is edited in proteus and is compiled and executed to check any errors and hence after the successful compilation of the program the program is dumped in to the microcontroller using a dumper.

Figure 2: Software design

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VI. CONCUSION

Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced IC's with the help of growing technology, the hardware model has been successfully implemented. Thus the hardware model has been successfully designed and tested.

REFERENCES

[1]. S. Harishankar1, R. Sathish Kumar, Sudharsan K.P, U. Vignesh and T.Viveknath, Solar Powered Smart Irrigation System, Volume 4, Number 4 (2014), Department of Electrical and Electronics Engineering, Amrita University Ettimadai, Coimbatore, India.

[2]. M.Abu-Aligah et.al, Design of Photovoltaic Water Pumping System and Compare it with Diesel Powered Pump, Volume 5, Number 3, June 2011,Jordan Petroleum Refinery Company (JPRC), Irbid LPG Filling Station Hall, PO Box 3396 Amman 11181, Jordan

[3]. K.S.S. Prasad, Nitesh Kumar, Nitish Kumar Sinha and Palash Kumar Saha "Water-saving irrigation system based on automatic control by using GSM technology" Middle-East Journal of Scientific Research 12 (12): 1824-1827, 2012

[4] ZachariaMzurikwao, Dr. Wang Liqiang, Zigbee "GSM technology based irrigation control system", International Journal of Engineering Research &Technology (IJERT), Vol. 2 Issue 3, and March – 2013, ISSN: 2278-0181.

[5] Sanjay Kumawat, MayurBhamare, ApurvaNagare, AshwiniKapadnis "Sensor based automatic irrigation system and soil pH detection using image processing"; International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056 Volume: 04 Issue: 04 Apr -2017.

[6] Anithasree.E, Aruna.S, Asha.B.S, Ashikayasmeen.I, Ms. V. Preethi "Solar based automatic irrigation for an agronomical enclosure"; 5th National Conference on Frontiers in Communication and Signal Processing Systems (NCFCSPS '17), ISSN: 2319 – 8753, Volume 6, Special Issue 3, March 2017.