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SOLAR DRIVEN AURDINO BASED AUTOMATIC IRRIGATION USING GSM

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Abstract:-

Irrigation is the artificial application of water to the land or soil. It is used to assist in the growing of agricultural crops, maintenance of landscapes, and revegetation of disturbed soils in dry areas and during periods of inadequate rainfall. In this proposed system, the moisture and temperature of plants are precisely controlled. Irrigation system uses valves to turn irrigation ON and OFF. These valves may be easily automated by using aurdino and solenoids. In this project an attempt has been made to automate farm or nursery irrigation that allows farmers to apply the right amount of water at the right time, regardless of the availability of labor to turn valves on and off. In addition, farmers using automation equipment are able to reduce runoff from over watering saturated soils, avoid irrigating at the wrong time of day, which will improve crop performance by ensuring adequate water and nutrients when needed. The proposed system implemented GSM is used to report the detailed about irrigation.

Keywords: Irrigation, Soil moisture sensor, Temperature sensor, Aurdino, renewable energy.

I. INTRODUCTION

The global irrigation scenario, however, is characterized by poor performance, increased demand for higher agricultural productivity ,decreased availability of water for agriculture, increasing soil salinity and possible effects of global warming and climate change This process sometimes consumes more water or sometimes the water reaches late due to which the crops get dried. Water deficiency can be detrimental to plants before visible wilting occurs. Slowed growth rate, lighter weight fruit follows slight water deficiency. This problem can be perfectly rectified if we use automatic aurdino based irrigation system in which the irrigation will take place only when there will be intense requirement of water.

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II. LITERATURE SURVEY

In M. Guerbaoui , elafou,a.ed-dahhak " GSM based automated drip irrigation system " we proposed a system contribution to the development of greenhouse production in Morocco. The proposed solution involves the
development of an integrated system for automate the drip fertilizing irrigation in green house. The solution adopted
involves a data acquisition card PCL-812PG controlled by PC. The irrigation is provided by a hydraulic circuit based on an electric pump. Water needs are evaluated by measuring soil water status by soil humidity sensor.

In Purnima, S.R.N Reddy, "Design of Remote Monitoring and Control System with Automatic Irrigation System use GSM-Bluetooth", proposed artificially supplying water to land where crops are cultivated. Traditionally hand pumps; canal water and rainfall were a major source of water supply for irrigation. This method has led to
severe drawbacks like under irrigation, over-irrigation which in turn causes leaching and loss of nutrient content of the soil.

To overcome the above drawback, using solar driven aurdino based automatic irrigation system saves more than 50% of the water used by irrigation system and electricity. In this proposed methodology green house based modern agriculture technology will be used. The proposed system would acquire the operating power from renewable solar energy.

III. DESCRIPTION OF COMPONENTS

Following are the major components used from which Solar driven aurdino based automatic irrigation using GSM has been fabricated.

1. Soil moisture sensor
2. Temperature sensor
3. Aurdino board
4. Relay
5. Solenoid valve
6. Liquid crystal display
7. GSM
8. Solar panel
9. Ni-Cd battery

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3.1 SOIL MOISTURE SENSOR

Fig 1: Soil moisture sensor

Moisture sensor can read the amount of moisture present in the soil surrounding it. This sensor uses the two probes to pass through the soil, and then it reads the resistance to get the moisture level. More water makes the soil conduct electricity more easily(less resistance), while dry soil conducts electricity poorly (more resistance).

The moisture sensor is buried in the ground at required depth. The working of the moisture sensor is simple and straightforward. The moisture sensor just senses the moisture of the soil. The change in moisture is proportional to the amount of current flowing through the soil.

3.2 TEMPERATURE SENSOR

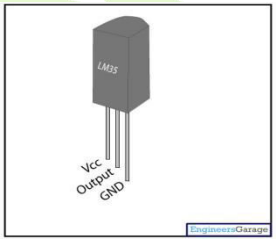

Fig 2: Pin diagram of Temperature sensor LM 35

LM35 is a precision IC **temperature sensor** with its output proportional to the temperature (in ^{o}C). **LM35**, temperature can be measured more accurately than with a thermistor. It also possess low self heating and does not cause more than 0.1 ^{o}C temperature rise in still air.

The operating temperature range is from -55°C to 150°C. The output voltage varies by 10mV in response to every ^{o}C rise/fall in ambient temperature,*i.e.,* its scale factor is 0.01V/ ^{o}C.

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3.3 AURDINO BOARD

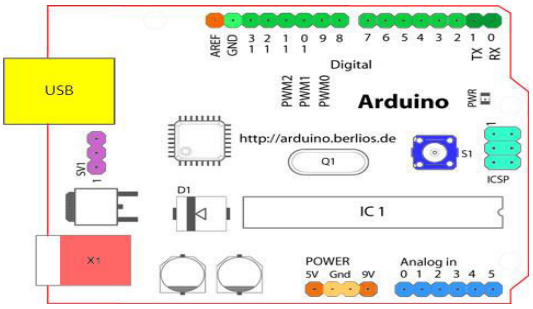

Fig 3: Aurdino board

The aurdino board was shown in above fig3. Aurdino system provides sets of digital and analog i/o pins that can be interfaced to various expansion boards and other circuits, The board feature serial communication interfaces, including USB on some models, for loading programs from personal computers. The first aurdino was introduced in 2005, aiming to provide an inexpensive and easy way for novices and professionals to create devices that interact with their environment using sensors and actuators. Common examples of such devices intended for beginner hobbyists include simple robots, thermostats, and motion detectors.

3.4 RELAY

Relays are devices which allow low power circuits to switch a relatively high Current/Voltage ON/OFF. A relay circuit is typically a smaller switch or device which drives (opens/closes) an electric switch that is capable of carrying much larger current amounts.

3.5 SOLENOID VALVE

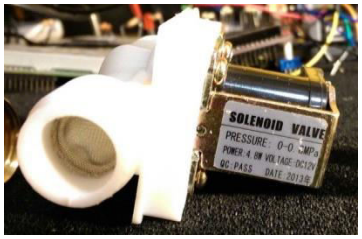

Fig 4. Solenoid valve

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It is nothing more than a valve controlled by an electromagnet. It is, like relays and motors, an inductive load(aka an IC buster, go read on back EMF if it is not already done!). They usually come in two flavors : Normally Open or Normally Closed. Normally refers to when-there-is-no-current-in-the-solenoid. If you put pressurized water in a NC (Normally Closed) solenoid valve, water will be blocked. If you power the magnet with the expected current / voltage, the valve will open and the water will flow. For NO (Normally Open), it is exactly the contrary

.

3.6 LIQUID CRYSTAL DISPLAY

A liquid crystal display is a flat panel display or other electronic visual display that uses the light modulating properties of liquid crystal. Liquid crystals do not emit light directly. LCD's are available to display arbitrary images(as in a general purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as preset words, digits and 7-segment display as in a digital clock. In this proposed system, 16*2 LCD panel would be used to display the values.

3.7 GSM

GSM (Global system for mobile communication) is a cellular network, which means that cell phones connect to it by searching for cells in the immediate vicinity. GSM network operate in a number of different carrier frequency ranges. GSM has used variety of voice codec's to squeeze 3.1KHZ audio into between 6.5 and 13kbit/s.

Fig 5. GSM SIM 300

In this proposed system GSM SIM 300 would be used to communicate hardware system and user mobile phone. SIM300 is a Tri-band GSM/GPRS engine that works on frequencies EGSM 900 MHz, DCS 1800 MHz and PCS1900 MHz. SIM300 provides GPRS multi-slot class 10 capability and support the GPRS coding schemes CS-1, CS-2, CS-3 and CS-4.

3.8 SOLAR PANEL

Solar panel is an assembly of solar cells. Solar cell or photovoltaic cell is made up of silicon semiconductor. Electricity is produced when the sunlight strikes the solar cell, causing electrons to move around. In this project solar panel of 5v Capacity is used.

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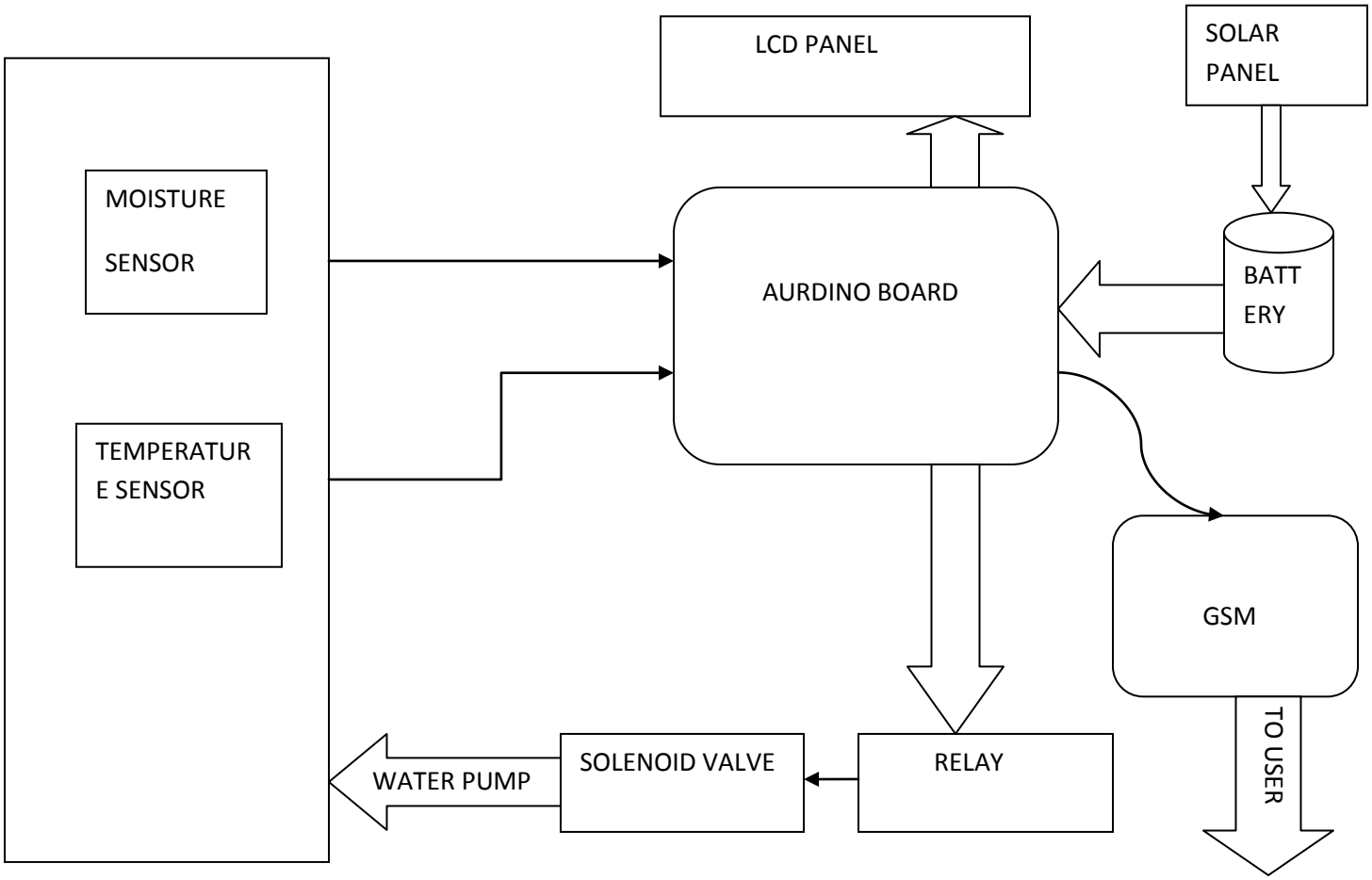
3.9 NI-CD BATTERY

In this project Ni-Cd battery of 6v capacity is used. Ni-Cd batteries use Nickel hydroxide as positive electrode, cadmium as negative electrode, and an alkaline electrolyte.

V PROPOSED HARDWARE SYSTEM:

5.1 BLOCK DIAGRAM



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In this proposed hardware system, the driving element will be aurdino board. Soil moisture sensor and temperature sensor will be buried under the soil. This sensor senses and analyses the moisture content and temperature of the soil. The sensed data will the important play role in this proposed system and this will be sent to aurdino board. Aurdino board will control the pump of the water tank through the controlling of solenoid valve. If the moisture and temperature of soil will be less than threshold value aurdino board to turn the relay, otherwise it will turn off the relay. The sensed data about temperature and moisture content of soil will be displayed on the LCD screen. The information about supplying the water to the field will be sent to the farmer mobile phone via GSM concept. This whole proposed hardware system would ran from the renewable solar energy. Solar based aurdino based automatic irrigation using GSM project is the green house based modern agriculture technology.

VI SOFTWARE IMPLEMENTATION

6.1 SIMULATION RESULTS

In this proposed system Aurdino software will be used for functioning the proposed hardware system. The simulation result will be shown in below fig.

Fig6. Simulation of soil moisture sensor.

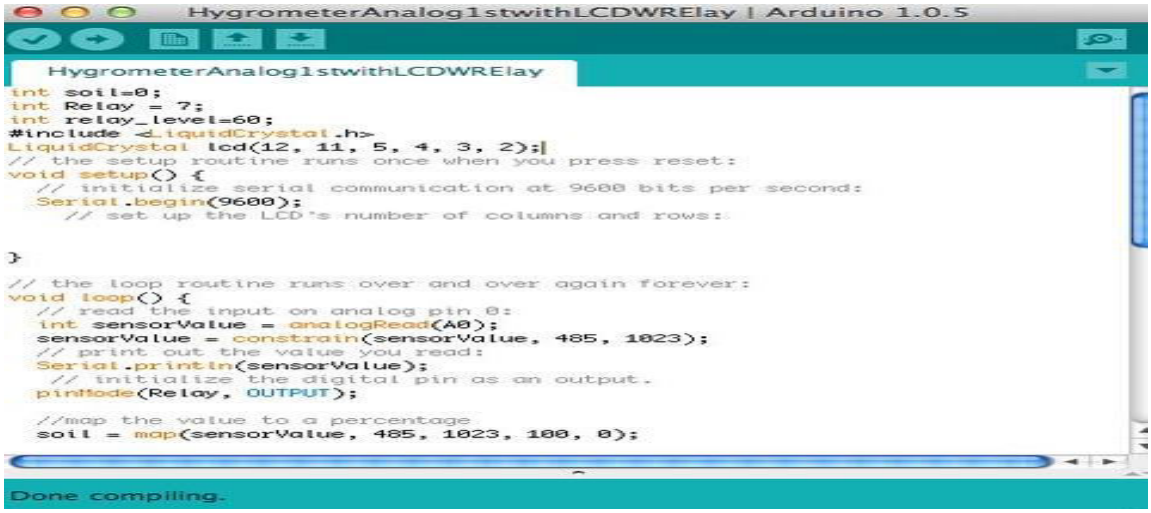

Fig7. Simulation result of temperature sensor.

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VIII CONCLUSION

An Aurdino Based Automated Irrigation System monitors and controls all the activities of irrigation system efficiently. Aurdino Based Automated Irrigation System is a valuable tool for accurate soil moisture control in highly specialized greenhouse vegetable production and it is a simple, precise method of irrigation. It also helps in time saving, removal of human error in adjusting available soil moisture levels and to maximize their net profits. This system supports aggressive water management for the agricultural land. This architecture is based on the capabilities of current. Aurdino used for the system is promising that it can increase system life by reducing the power consumption resulting from lower power consumption.

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