Insolation, Reservoir In Tilling & Safe Future Against Living Things

*1S.ALIYA BANU, *2G.MANJUNATH *3B. SREEKANTH
1,2Final Year UG Students, Department Of CSE Aditya College Of Engineering, Madanapalle.
3Assistant Professor, Department Of CSE, Aditya College Of Engineering, Madanapalle.

Abstract—
Solar energy is renewable energy source. It is useful in various applications such as emergency lighting, water heaters, and industrial applications. Sun is the renewable energy source available to everyone. Unlike hydro or Thermal electricity it does not cause any pollution this paper proposes the design of a cost effective and solar based automatic irrigation system. The objective is to design a low cost microcontroller based irrigation system. The sensor senses the moisture of soil and provides signal to the motor to turn ON or turn OFF the irrigating pump for optimal utilization of water by the farmers. The proposed solar-driven mechanized irrigation system senses the air humidity, moisture content in the soil and irrigates the field as per the appropriate requirement of water to the crop thereby decreasing the water wastage. The proposed system results in reduction of the water scarcity problems, increases the effective utilization of the solar power and as an outcome enhance the crop yield. In this paper an effective security against animal attack i.e. Solar Powered Audible animal Scarcer has been developed. Different sounds or voice messages played to overcome by animal attack.

Keywords: solar energy, hydro and thermal energy, crop protection.

I. INTRODUCTION

India is a country where the major occupation is the agriculture. 73% of Indian population depends directly or indirectly on agriculture. Cultivating a crop influences World science and climatic conditions. Farmers depend upon monsoon mostly for water resource, which is inadequate. Hence, irrigation system is of major concern, which involves watering the plants depending upon their soil type, soil fertility, atmospheric temperature and moisture content. Asour India is an agro-based country, the requirements are enhancing day-by-day. Out of them, first and foremost need is the source of power for agriculture. In early days, the source of power for agriculture is the electricity fed from nonrenewable resources and in recent years switching towards renewable energy sources. Different techniques and technologies have been proposed in literature to limit the water consumption by the land and power consumption from conventional energy sources. IoT is an enabling technology that connects the things or objects through Internet to facilitate the minimization of human intervention.

LITERATURE REVIEW

Anis et al. [1] discussed in their work about control of sprinkler according to the moisture of the

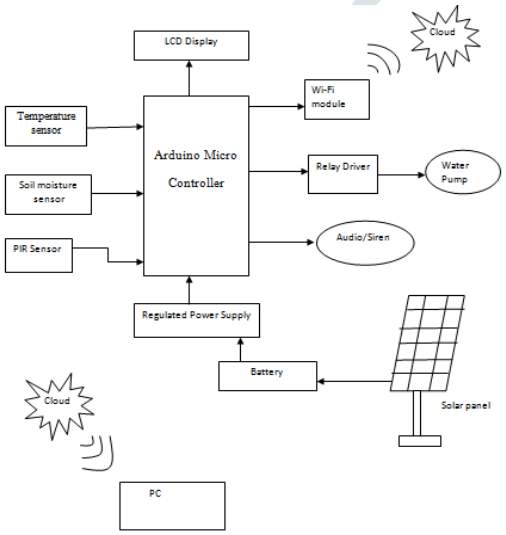
Soil. They also introduced Laboratory Virtual Instrumentation Engineering Workbench (Lab VIEW) software and photo voltaic. The fuzzy logic technology for irrigation controller in cultivation of vegetable plants has been used by Singh et al. [2]. The automatic microcontroller having variable rate on which irrigation system is based has been proposed by Jia et al. [3]. The overall system works on solar power. Paddy field contains the sensors and these continuously sense the water level. They also modeled it to send the message to farmers. When the sun rays are intense then we need more water and solar power is sufficient at that time. Ingale and Kasat [4] added deep-cycle leisure/marine battery, they stated that the best time to water plants during summer is evening [5]. They used SCADA-based and this method is useful where plenty of sunshine is available but required water isn't present. Norocel et al [6] they used multi-sensor device which soil and environment parameters by specific sensors and wireless system is used to send signal to central unit. Sandip [7] used the concept of stochastic precipitation and insolation forecasts and design. Binoy et al. [8] proposed Maximum power point tracking system to get maximum solar energy for powering their irrigation system. they used single axis solar tracking device based LDR sensors and rotated PV panel according to sun. Shiraz [9] talked about automatic farm and nursery irrigation system that allows farmers to give right amount of water without availability of labor to turn OFF and ON the pump. These farmers are also able to reduce run off over water saturated soil, avoiding irrigation at wrong time. Harishankaret al. [10] incorporated automatic water flow control and solar powered water pump. Rupali et al. [11] they used microcontroller 89S52b to build low cost, time based irrigation controller system. it consists of relay GSM modem, LCD and microcontroller. The designed sample [12] Underground water tanks of eight meters which are collected during rainy season are used to fed 100m2 of field through photovoltaic system. The reason behind adapting 100m2 field is that Rwanda is a congested populated territory which is usually used in horticulture to increase export. Power source used is a photovoltaic system in which a pump is connected with an electric motor in order to drive it, also a hosepipe is used to transfer water to the smallest tank. Driver section received the signal send by the sensor and at the same time microcontroller received the signal which controls the driver unit with connected relay, relay switch off the motor at the time when water level drops to the minimum level. The domestic load and power demand of the irrigation system situated in toshka, Egypt has been calculated by Mazen et al. [13]. For irrigation, the pipe line system is designed. For hybrid PV-wind system, an economic feasibility study has been made in order to power this combined load. MATLAB code is used to investigate the sizing of components of the hybrid system. Karan et al.

[14] Time, money and power of the farmer is saved by using this automatic irrigation system. An interrupt signal is given to the microcontroller by the sensors whenever there is a change in the humidity and temperature of the surrounding. Alex and Janakiranimathi [15] designed a low cost and time based irrigation system with the help of microcontroller. Microcontroller is used in the automation system resulting in low cost and time saving irrigation system.

OBJECTIVES

1. Monitor atmosphere temperature and soil moisture and control the water pump as per the sensor inputs
2. Monitor the farm field using PIR sensor to detect animal entry and turn ON audio or siren to make animal fear.
3. Upload the sensor data and animal attack to farm field information to cloud and one can tack live monitoring.

BLOCK DIAGRAM

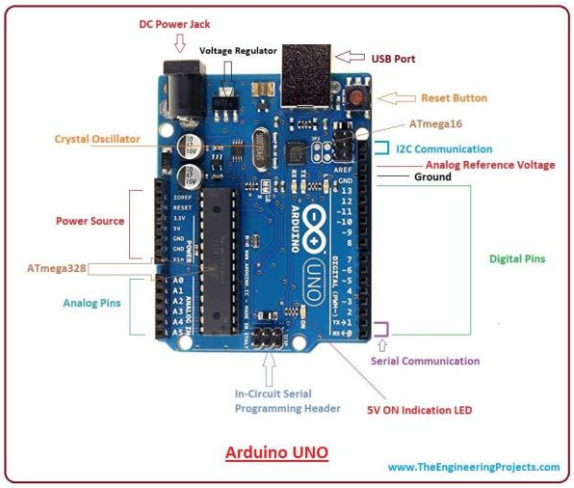


HARDWARE COMPONENTS

- Arduino UNO
- Temperature SENSOR– LM35
- Wi-Fi
- Relay
- Water pump
- Alarm
- Soil moisture sensor
- PIR sensor

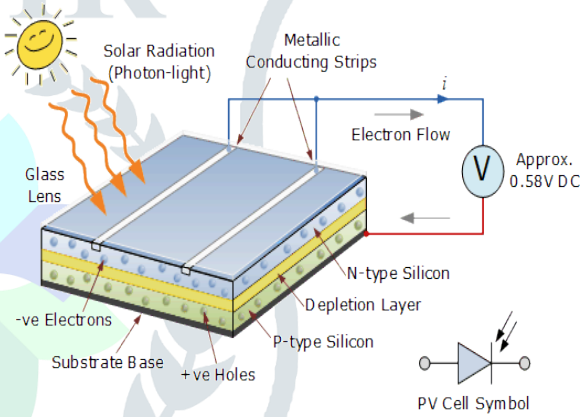
ARDUINO:

The Arduino Micro Controller is a open source platform which has 6 analog pins, 14 digital pins, one serial port, one power jack and one USB jack for code dumping.



SOLAR PANEL:

Solar panel consists of a group of photo voltaic cells which observes solar light and generates current.



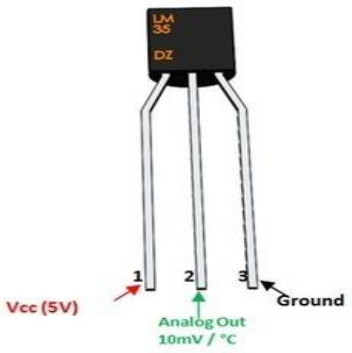
RELAY:

Relay is electromagnetic switch that operates the electrical loads. Relay is mostly used to switch smaller circuits. Relays have five terminals and COM, terminal1 and terminal2, NC, NO.

Figure 5: Relay

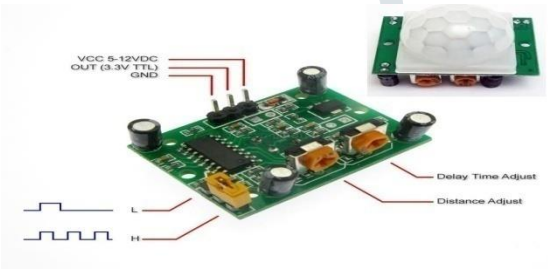
LM35:

LM 35 is used to measure the Environmental temperature and the output of sensor is proportional to the temperature. It produces more accurate values compare to the thermistor. It has three terminals 1.VCC 2.GND 3.OUTPUT.



PIR Sensor:

PIR sensors allow you to sense motion, almost always used to detect whether a human has moved in or out of the sensors range. They are small, inexpensive, low-power, easy to use and don't wear out. For that reason they are commonly found in appliances and gadgets used in homes or businesses. They are often referred to as PIR, "Passive Infrared", "Pyroelectric", or "IR motion" sensors.

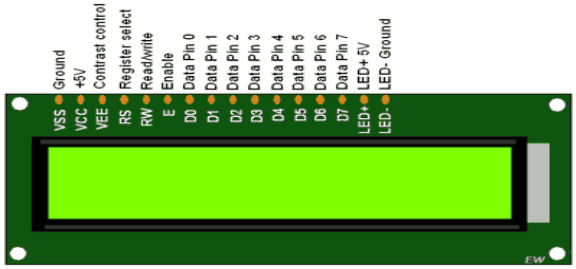


ESP8266 or Wi-Fi module:

ESP8266 is a 3V Wi-Fi module very popular for its Internet of Things applications. ESP 8266 maximum working Voltage is 3.6V and its very important to note. You must know how to power it, how to serial-connect it with Arduino safely, how to ping and many other things. You should use software like Circuito.io, Tinker cad, Fritzing to simulate and work with the board safely. You should also use Logic Level Controller to use with ESP8266 module.

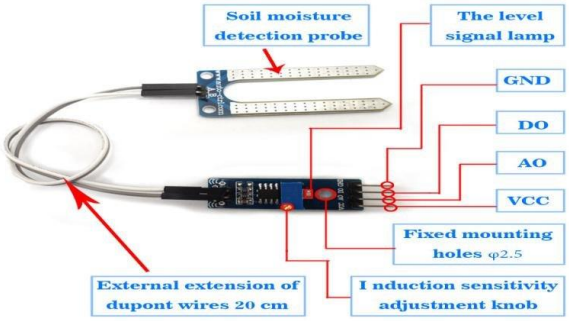
LCD (Liquid Crystal Display):

LCD (Liquid crystal Display) is used to display the values and monitor.16X2 LCD is used in most basic modules and electronic devices. This cheap cost compare to other type of displays. easy to program. It has 16 pins .it operates on two operates 4-bit mode and 8-bit mode.



THE SOIL MOISTURE SENSOR:

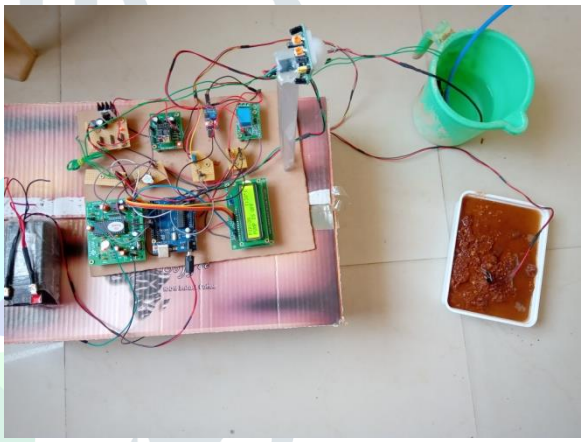
The soil moisture sensor is used to measure the water level content in soil and it has two probes which are used to allow the current to pass through the soil and then it gets the resistance value to measure the moisture value

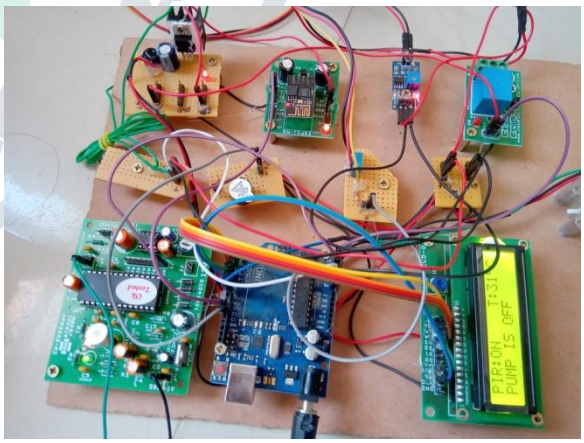


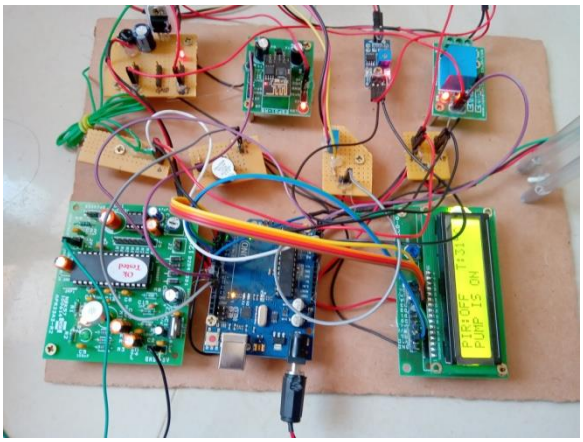
SOFTWARE

- Arduino IDE
- Embedded C

RESULTS:







CONCLUSIONS

The proposed system may be advantages for farmers and government. For the administration, this may provide a solution for electric energy shortage. By utilizing automatic irrigation system framework, it is possible to improve the use of water by minimizing wastage of water and decrease the human involvement in farming. The extra energy can be given to grids. This will help farmers to generate revenue. This model is easy to install, implement and environment friendly. In long run, the benefits are high and overall system is economical and it helps for farmers from animal attack by making high volume sound or by playing audio.

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