Terrace Drip Irrigation and Smart Automation Using IP

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ABSTRACT

This Project is for advance automatic monitoring & control of Terrace farming using Drip Irrigation & Home Automation technologies with the help of Internet. Drip irrigation is a method in which water drops right near the root zone of a plant in a dripping motion. If properly installed reduction in the loss of water through evaporation and runoff. Drip irrigation is the most water efficient method of irrigation as it supports easy installation, efficient fertilization and saves water upto 80%.A pipe is connected from water pump and the other opening is kept near the root of the plant, with drip irrigation mechanism attached to it. The flow of the water from the pipe is controlled by a pump. The opening and closing of pump is done by microcontroller.

This project is based on the Ethernet connectivity to microcontroller (AVR-ATMEGA 32). Microcontroller stores the main application source code, web pages and TCP/IP stack which is the vital element of the system software. An Ethernet controller chip is used to handle the Ethernet communications and it is interfaced with microcontroller using SPI protocol. The site can be viewed on any system with Internet /LAN connection by configuration the specific IP address. There are several I/O pins at the microcontroller which are used for the water supply near the root zone of the plants drip by drip using a motor by which a large quantity of water is saved. Several other available pins can be used to interface with sensors, Motors and relays for monitoring and controlling AC appliances. In industries or in home appliances, most of the time we need to monitor and control different parameters using microcontrollers. Once we enable Ethernet interface to such systems, we can communicate with them remotely over the internet. This is better than GSM due to its global connectivity and access to World Wide Web.

1. INTRODUCTION

Due to population growth the demand for food crop has increased and also for advanced technologies .Efficient irrigation system provides a consistent moisture supply to crops , water deficiencies can be overcome during periods of drought, more than one crop per year can be achieved and the efficient use of all production resources improved dramatically. These days' farmers use manual irrigation and flood irrigation techniques. These techniques are highly time consuming and require lot of effort and continuous monitoring. This process sometimes consumes more water or water reaches late due to which the crops get dried .Once these manual techniques are made automating more than half of the work is done smoothly and efficiently. Today's world is highly dependent on internet. Everyone knows how important it is to stay connected. Its functionality is worldwide. So it's a great idea to relate the greatest source of income farming to internet, so that it can be accessed from anywhere in the world. In this project we are using the technique of drip irrigation to water the plant along with various sensors to monitor the temperature and moisture. These sensors and water pump are controlled using internet from anywhere. Once the setup has been made all the connection can been monitored efficiently. Drip irrigation is a method where water reaches directly near the root zone of plants without wastage.

Another important aspect of this project is automating monitoring of home appliances using IP. Internet technology applied to home automation is more or less standard internet, i.e. making devices, components and appliances web aware so that managing and monitoring can be done by web browser

2. PROPOSED SYSTEM
2.1   IRRIGATION SYSTEM
In the drip irrigation section we are showing four important aspects of farming –

1 .Irrigation of water in drop form- Drip irrigation also known as trickle irrigation or micro irrigation or localized irrigation, is an irrigation method that saves water and fertilizer by allowing water to drip slowly to the roots of plants, either onto the soil surface or directly onto the root zone, through a network of valves, pipes ,tubing, and emitters .It is done through narrow tubes that deliver water directly to the base of the plant. Primitive drip irrigation has been used since ancient times. Modern drip irrigation began its development in 1860.

Advantages of drip irrigation-
A) Fertilizer and nutrient loss is minimized.
B) Water application efficiency is high nif managed correctly.
C) Field with irregular shapes are easily accommodated.
D) Moisture within the root zone can be maintained at field capacity.
E) Soil erosion is lessened.
F) Weed growth is lessened.

Disadvantages of drip irrigation-
A) Initial cost can be more than overhead systems.
B) Drip irrigation can be unsatisfactory if herbicides or top dressed fertilizers need sprinkler irrigation for activation.
C) Waste of water, time and harvest if not installed properly.

2.1.1. Temperature control -This also called Controlled Environment Agriculture (CEA). It is any agriculture technology that enables the grower to manipulate a crop's environment to the desired conditions. The crops can easily get the environment they want. For controlling the temperature we will use temperature sensor. The temperature sensor can continuously measure the temperature level so that farmers can be alerted.

Advantages of temperature control –
A) Reliable harvest
B) Low labour cost
C) Low water usage
D) Maximum crop yield
E) Wide range of crops

2.1.2. Soil Moisture control- Controlling the soil moisture level before actually irrigating the specific area will lead to increased efficiency by saving up to 40% of water. For this we will use soil moisture sensor. Soil moisture sensor measures the water content in soil. Soil moisture sensor also measures electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for moisture content. The relation between the measured property and soil moisture must be calibrated and may vary depending on soil type.

Advantages of using soil moisture control system-

A) Provide feedback on soil moisture level for correct scheduling of irrigation.
B) Switching of irrigation controller

C) Detect leaching of nutrients.
D) Assess the effectiveness of rain water.
E) Reduce water wastage
F) Determine effectiveness of irrigation

2.1.3. Pest control - Insects are able to see UV radiation. Insects are often attracted to light sources that emit large amounts of UV radiations, and devices that exploit this behaviour , such as light traps for forecasting pest outbreaks , and electric insect killers have been developed .It is found that irradiation with short wavelength visible (blue) light killed eggs, larvae and these lights are also lethal to mosquitoes and flour beetles. Findings shown that highly toxic wavelengths of visible light are species- species in insects, and that shorter wavelength are somewhere more toxic than UV radiation.

2.2 SMART AUTOMATION SYSTEM

Transistor had made electronics more affordable in the mid 20th century, appliances started to control themselves in a very limited way, using built-in sensors and programmers. With the INTERNET, it's easy to set up virtually any electric appliances in our home so we can control it from a WEB browser anywhere in the world.

Home automation could make all the difference between them being able to live happily and independently in their own home or having to move into expensive sheltered accommodation.

In our project we have given few examples relating to this application-
  A) Switch fan ON and OFF
  B) Switch light ON and OFF
  These are just few examples of what we can do with this technology but it can be enhanced to a larger level like –
  A) Thermostat
  B) Security and smart meters
  C) Locks
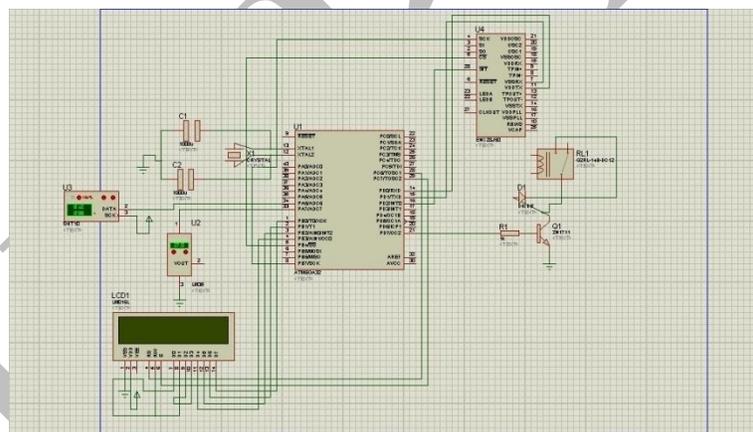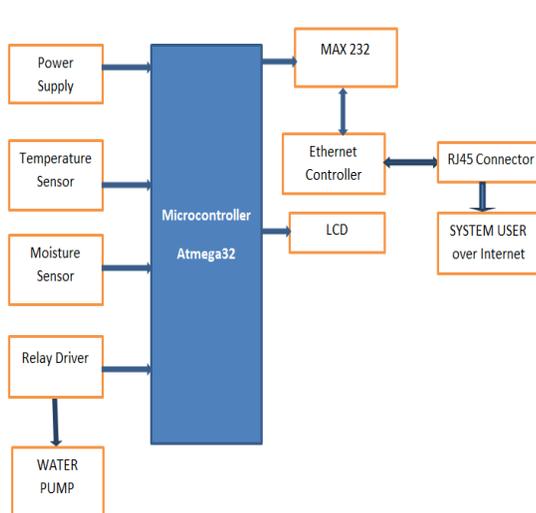 D) Home entertainment

3. Circuit Diagram and Block Diagram

Fig. 1 Circuit Diagram

Fig. 2 Block Diagram

4. CONCLUSIONS

In this paper we presented concepts about smart automation which can fit into home with the use of internet.. Internet-enabled hardware products are becoming very common. We are able to connect our devices over internet through the use of Ethernet Shield. Ethernet Shield gives the connectivity throughout the world. Hence giving Command Over the internet can enable any device to work immediately. With this we are also able to monitor the sensor readings attached to our system. So we can take fast decision anywhere over internet to operate any machine.

REFERENCES

1. Ryan J.L, "Home automation", Electronics & Communication Engineering IEEE Journal, volume 1, issue 4, Page 185 – 192, 2002.
2. noue M, Uemura K, Minagawa Y, Esaki, Mitsunobu, Honda Y, "A Home Automation System", Consumer Electronics, IEEE Transactions ,volume CE-31 , issue 3, Page 516 – 527,2007Van Der Werff, M. ; Gui, X. ; Xu, W.L., "A mobile-based home automation system", Mobile Technology, Applications and Systems, 2005 2nd International Conference , Page: 5 pp. – 5, 2005.[4] Gill, K. ; Shuang-Hua Yang ; Fang Yao ; Xin Lu "A zigbee-based home automation system", volume 55 , Issue 2, Page 422 – 430, 2009.
3. [5] Felix, C. ; Raglend, I.J., "Home automation using GSM", Signal Processing, Communication, Computing and Networking Technologies (ICSCCN), Page: 15 – 19, 2011.
4. [6] Nunes, R.J.C., " A Web-based approach to the specification and programming of home automation systems",Electrotechnical Conference,MELECON, volume: 2, Page: 693 – 696, 2004.