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Advanced Agricultural Controlling and Monitoring Of Greenhouse Using Li-Fi Technology

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Abstract
Li-Fi based irrigation system mainly consists of two parts they are transmitter part and receiver part. This contrast describes a complete wireless networking system and uses bi-directional communication system. The sensors in the transmitting part collect the information of soil moisture and temperature of different crops in different period and then an algorithm was developed with the threshold values of temperature and soil moisture that was programmed into a micro-controller based gateway to control water quantity. Communication is achieved by switching LED lights on and off at a speed higher than what is perceptible to the human eye.

Key words *- Light fidelity (Li-Fi), Visible Light Communication (VLC), Light Emitting Diodes (LED), Soil moisture sensor, Temperature Sensor.*

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I. Introduction

Appropriate environmental conditions are essential for plant growth, progressed crop yields, efficient use of water for other resources. Light fidelity (Li-Fi) is a new short range optical wireless communication technology which provides the connectivity inside a nearby network, through using Light-Emitting Diodes (LED's) to transmit data which depending on light illumination properties and it will reduce the consumption of water and fertilizers. The techniques of irrigation includes micro irrigation, drip irrigation, sprinkler irrigation, subsurface irrigation etc. This modern system is one of the way of enhancing the irrigation system to optimize the using of water. The successful irrigation control depends on water control, time control and to give security for the crops. The data packet coming from wireless sensor unit is received, identified, recorded and analyzed by the ATmega328P micro-controller and perform the corresponding irrigation movement and those data are transmitted to computer using wireless communication unit, Li-Fi module for data inspection and irrigation scheduling to be programmed through an web page.

II. Literature Review

[1] Joaquin Gutierrez, Juan Francisco Villa-Medina, Alejandra Nieto-Garibay, and Miguel Angel Porta-Gandara, "Automated irrigation device the usage of a wi-fi sensor network and GPRS Module."An automatic irrigation system turned into evolved to optimize water use for agricultural crops. In addition, a gateway unit handles sensor information, triggers actuators, and transmits information to an internet application. The gadget turned into powered via way of means of photovoltaic panels and had a duplex conversation hyperlink primarily based totally on a cellular-Internet interface that allowed for information inspection and irrigation scheduling to be programmed through an internet web.

[2] Jacqueline, Mohammed hayder and Hashim Ahmed, "A survey on seen Light Communiction" Visible-mild communications (VLC) is a era for wi-fi communique the usage of mild that may be perceived through the bare eye. VLC makes use of frequencies apart from radio, and they may be unrestricted and licence free. Visible mild communique refers back to the communique era which makes use of the seen mild supply as a sign transmitter, the air as a transmission medium, and the perfect photodiode as a sign receiving component.

[3] Periasamy and Vimal, "LED Lamp Based Visible Light Communication in Under water Vehicles" VLC can help excessive facts quotes underneath the water, wherein different wi-fi technology like RF do now no longer work .

[4] Namon, Changqiang and Kim, "Smart Parking Information System Exploiting Visible Light Communication" A clever parking statistics gadget exploiting seen mild verbal exchange era to assist drivers getting the real-timeparking statistics in addition to course guide. By imparting correct statistics on to be had parking spaces, drivers shop time and gasoline and boom performance of the parking process.

III. Objectives Of The Project

- To improve the products quality, as well as maintain a sustainable agriculture by collecting real time data from the environment.
- To the need for water saving irrigation technology for agriculture and also to give security for the crops.
- To increase the growth of farm houses, estates and so on.
- To implement technology in agriculture as social concern and cost effective.

IV. Proposed Methodology

Li-Fi system mainly includes two parts that is transmitter and receiver. The input signal at the transmitter section can be modulated with a specific time period then send the data using LED bulbs in 0's and 1's. At the receiver end, a photo-diode is used to receive the LED flashes strengthens the signal and gives the output. The input of transmitter can be any kind of data like text, voice, etc. The speed of this system is very high. Li-Fi uses normal LEDs to allow the data to transfer and increase the speed up to 224Gigabits/sec.

Irrigation system that consists of a distributed wireless network of soil moisture and temperature sensors deployed in plant root zones. Each sensor node involved a soil-moisture probe, a temperature probe, a micro-controller for data acquisition. The micro-controller permits the automated activation of irrigation when the threshold values of soil moisture and temperature are reached. The micro controller sends data to the computer via Li-Fi transceiver. The receiver unit also has a duplex communication link using Light Fidelity technology, which is a new technology in optical wireless communication. The Internet connection allows the data inspection in real time on a website, where the soil-moisture and temperature levels are graphically displayed through an application interface and stored in a database server. This access also enables direct programming of scheduled irrigation schemes and trigger values in the receiver according to the crop growth and season management.

Hardware Requirement

1. Atmega328- Arduino Uno
2. LM35 Sensor-Temperature Sensor
3. Moisture Sensor
4. Relay
5. Water Pump Motor
6. Li-Fi Transceiver

Software Requirement

1. Arduino IDE ver 1.8
2. Proteus Software
3. Terminal

Block diagram

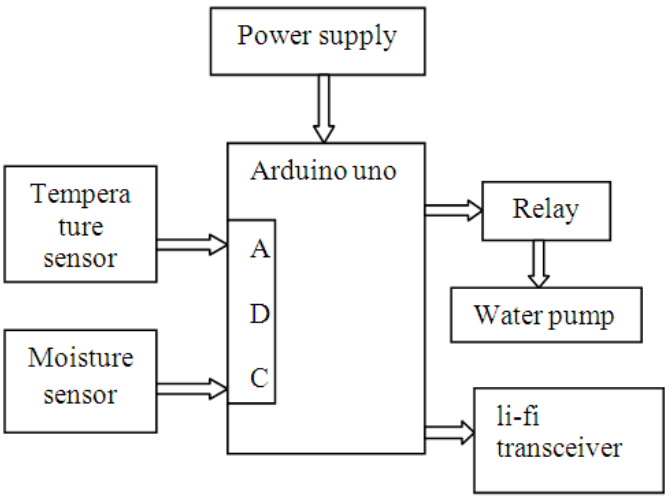

Fig 1. Block diagram of irrigation system- Transmitter part

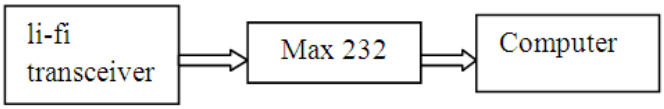

Fig 2. Block diagram of irrigation system- receiver part

V. Result

The automated irrigation system implemented was found to be feasible and cost effective for optimizing water resources for agriculture production. This irrigation system allows cultivation in places with water scarcity thereby improving sustainability. The automated irrigation system developed proves that the use of water can be diminished for a given amount of fresh biomass production. The irrigation system can be adjusted to verity of specific crop needs and requires minimum maintenance. In addition, other application such as temperature monitoring in compost production can be easily implemented. The crops can get proper temperature for its growth. The Li-Fi communication and Internet connection allows the data inspection in real time on a website.

VI. Conclusion

This paper presents the application of Li-Fi wireless sensor network in irrigation system. It can be used in irrigation system but needs some improvements like point to multipoint communication, covering range. This irrigation method permits farming in areas with water scarcity thereby making improvements to hold water. The best strategy for deciding the water requests of harvests is based on the real time controlling of soil moisture.

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