Hydroponics Irrigation System using IoT

Mrs. Chitrapaavai, Akshya R, Devadharshini G, Jeevika G, Pavithra P
Knowledge Institute of Technology,
Salem

***Abstract*— In this project, we are focusing on continuous and real time monitoring of hydroponics liquid supply in nursery or indoor gardens. Hydroponics is a special type of farming where the growth of plants takes place in a soil-free medium, provided with a blend of water along with nutrients. As an alternative for soil, we are here using Rockwool as support for plants to withstand. We provide the water with nutrients required by the plant, the plants do not have to call for root system on the lookout for water, nutrients, oxygen. In this process, the plant is permitted to spend its energy on its production.**

Hydroponics allows us to make farms in certain locations where conditions of soil are too poor to support farming, space is limited. The IoT system continuously monitors the farm and also displays the data with regards to the plant growth by which we can get the values of pH, water level, temperature, and humidity in the hydroponic reservoir

Keywords*— *IoT, smart-farming, monitoring,Hydroponics

I INTRODUCTION

Pulsed electric fields (PEF) for the preservation of food products is a widely investigated area today. The use of submerged streamer discharges for the inactivation of micro-organisms has only recently become an area of interest. For optimization research of micro-organism inactivation with PEF, a pulsed power source was developed. We can see how the technology is spreading its wings. The wingspan of technology covers almost all the sectors that include medical, industrial, agriculture. There are a wide variety of applications for IoT in our daily life as smart agriculture systems.The challenges begin with the integration of existing technologies for the creation of an IoT ecosystem. But in recent years it has been a boon to farmers where the role of technology is thriving towards the benefit of farmers. Various methodologies are being implemented in the farming sector through IoT. The real automation is implemented and results are as desired. As agriculture is the backbone of economy in various developing countries government supports the farmers to increase the income by adopting technological advancements and establish smart farming instead of traditional methods. The urbanization and industrial revolutions caused in reduction of fertile agricultural land area. Intense research works are undergoing in various parts of the world to overcome the lack of fertilized soil farms. A few technologies evolved from such research works and they are hydroponics, aquaponics and aeroponics. Hydroponics provides the assurance to do cultivation without soil and limited resources. Hence it created a great impact in urban areas where hydroponics made it possible to do terrace farming. Among these, hydroponics has better impact as its more user friendly and profitable .The traditional farming has its own pros and cons. Control of pest might be the greatest drawback of all times. But in the case o f hydroponics, it supports to eliminate the risk o f pests and weeds. As here, providing all the needed essentials through water, the production will be pure and healthy.Environmental parameters like temperature and humidity , water quality and water levels have to be periodically monitored here. A new technique added in this project is used to cultivate and grow crops from all environment condition using hydroponics.

II LITERATURE SURVEY

A linear, single-stage, nanosecond pulse generator for delivering intense electric fields to biological loads

A compact pulse generator capable of producing high voltage pulses with half maximum widths as short as 2.5 ns and amplitudes as high as 5 kV has been developed to enable current and future in vivo and in vitro research into the effects of ultra-short, intense electric fields on biological matter. This pulse generator is small, simple, and free of saturable magnetic cores, which frequently introduce amplitude jitter and an undesirable correlation between amplitude and pulse width. In place of a non-linear pulse forming network is a single-stage resonant network that drives a bank of junction recovery diodes. The diodes function as an opening switch that commutes current from an inductor to a resistive load. The use of air-core inductors in the resonant network results in a stable output pulse with an amplitude that scales linearly with input voltage and a pulse width that is independent of amplitude. The ability to scale the output amplitude independently of the pulse width simplifies the setup for experiments that require pulses with different electric field strengths but the same rise time and duration. Jurkat T lymphoblast cells exposed to 2.5 ns fields produced by this pulse generator showed an increasing degree of electro permeabilization with increasing pulse dosage and electric field intensity.

Study of effect of pulsing sequence of nanosecond pulsed electric fields on viability of HeLa S3 cell

Here, we demonstrates the influence of the pulsing sequence of repetitive nanosecond pulsed electric fields on the viability of human cancer cells. A commercially available repetitive magnetic pulse compression generator was used to deliver 70 ns- long high voltage pulses to cultured HeLa cells in a 4 mm-gap cuvette

electrode. Two kinds of pulsing sequential patterns, simply repetitive ns pulses and repetitive burst pulses, were used. The repetition frequency is varied from 0.01 to 250 pulses per second (pps), which corresponds to the interval from 100 to 0.004 s, respectively. The electric field and the number of pulses were fixed at 25 kV/cm and 25, respectively, so that the cells were subjected to the sub-lethal condition. Propidiumiodide (PI), which fluoresces in red onlywhen being intercalated to DNA, was used to identify dead cells in a population. Statistical analysis of the death ratio in thousands of cells wasdone with a flow cytometer. The experiment usingthe simply repetitive pulses shows the cell viability was changed with the repetition frequency even though the electrical dissipated energy in the medium was the same for all conditions. We found that the death ratio was increased with decreasing the pulse repetition frequency down to 0.33 pps, whereas the ratio is decreased with decreasing the frequency below 0.1 pps. Generally speaking, biological processes advance in their own time constant, for instance, the resealing mechanism of nanopores caused by the application of ns pulses lasts for minutes. The dependence of the cell viability on the pulsing sequence might be associated with time constants of biological processes related to the recovery from the field induced damage

III. METHODOLOGY

A. Hydroponics:
A technical blend in agriculture Recent trends in agriculture has shown better results and also revealed new paths to achieve favorable outcomes. Understanding the present technology, noticing key issues and making advancements that address those issues is said to be the thoughtful way of making the lives easier. Here, the present implementations that paved a path to agriculture to continue its rest of journey with technology. In the present scenario, to address the key issues with an effective solution the need for IoT and Automation is essential. There are valid reasons which gather importance. The word that best suits the IoT is being connected. We can see the vivid range of connections to any device with any device.

B. Need for Automation Control
As a human, error can be a usual one but one should not neglect it. But in order to reduce the error and human resources, automation is the best solution. With the support of respective sensors, monitoring of environmental parameters as well as water quality and level can be monitored periodically. Farmer can reduce the manpower and resources viaautomated monitoring of farm condition. Automation ensures increase in output, by reducingcosts, lowering the lead times.

IV EXISTING SYSTEM ANDDRAWBACKS

The traditional methods involved in making a composite bin is done by using chemicals. Where aset of substrates are added to a well or a dig in the soil . In existing method implementing only water spraying system for agriculture. All operation based on manually. There is no automatic mechanism for protecting from sunlight. Time consuming ,Needs manual labor , Possibility of health disorders for workers who are involved

V PROPOSED SYSTEM

The proposed system implemented is used to report the detailed about smart gardening mechanism. The water is pumped from the main tank to the automatic nutrient mixing tank, the water pump stops pumping once the water level is reached. Here the water is mixed with the nutrients inappropriate proportions according to selected crop.

After the completion of this process the user is notified through the sensor.The nutrient rich water is then flowed through pH tank with the help of solenoid valve. The user is notified once the pH tank is filled with the nutrient rich water. The pH tank has a pH sensor which monitors the pH of thewater. pH Sensor - In Hydroponics system, pH sensor plays a prominent role. The pH of nutrient-enriched water must be taken care of. Readings aretaken from the water and will track the effective pH. Water Level Sensor — To get to know the level of nutrient enriched water this sensor is used. The level of water in the hydroponic system can benoticed by using this sensor.

VI ADVANTAGES

1. Improvement in the use efficiency of inputs(Soil, Water, Fertilizers, Pesticides, etc.)
2. Reduced cost of production
3. Increased profitability
4. Sustainability

VII CONCLUSION

The health condition of the crops is continuously monitored with the help of data that are collected by the sensors and actuators. Thus, this hydroponicsystem can be adopted in any environmental conditions and it is a fully automated setup that canbe operated through IOT. Power management in IoT deployment is an essential and priority given thing. More sensors and effective arrangement of the network could draw more power. So, in order to reduce power consumption here, in future solar energy will be utilized as an alternative power source. So, with help of solar energy and a good sensor network,

VIII REFERENCES

[I] P.C. Wouters, N. Dutreux, J.P.P.M. Smelt, H.L.M. Lelieveld. “Effects of pulsed electric fieldson inactivation kinetics of Listeria innocua,” Appl.Environ. Microbiol., vol. 65, pp. 5364-5371.1999.
[2] A. Fiala et al., “Coupled Electrical-Fluid Model of Pulsed Electric Field Treatment in a Model FoodSystem,” submitted to Innovative Food Science &Emerging Technologies, 2001.
[3] H. Akiyama, “Streamer discharges in liquids and their applications,” IEEE Trans. on Dielectricsand Electrical Insulation, vol. 7, pp. 646-653, October 2000.
[4] E.J.M. van Heesch et al.. “A fast pulsed power source applied to treatment of conducting liquids and air,” EEE Trans. on Plasma Science, vol. 28, pp. 137- 143, February 2000.

[5] Y.L.M. Creyghton and H.E. Berg, "Pulsed Electric Field (PEF) preservation of food using flexible pulse generator." presented at ElectroMed99, 1" Int. Symp. on Nonthermal Medical/Biological Treatments UsingElectromagnetic Fields and Ionized Gases,Norfolk, Virginia, USA, 1999.

[6] NagaGeetha, M., Ramesh, N.V.K. An efficient IoT based smart irrigation system and plantdiseases detection: A review (2018) International Journal o f Engineering and Technology(UAE), 7, pp. 661-664.

[7] Lashitha Vishnu Priya, P., Sai Harshith, N., Ramesh, N.V.K.Smart agriculture monitoring system using IoT (2018) International Journal of Engineering and Technology(UAE), 7, pp. 308-311.

[8] Narayana, B.V.V.S., Ravi, K.S., Ramesh, N.V.K.A review on advanced crop field monitoring system in agriculture field through topnotch sensors (2018) Journal of Advanced Research in Dynamical and Control Systems,10 (6Special Issue), pp.

[9] Raheman, A., Kameswara Rao, M., Vamsi Reddy, B.,& Ravi Kumar, T.(2018). IOT based self-tracking solar powered smart irrigation system.International Journal of Engineering and Technology(UAE), 7, 390-393.

[10] Mekala, M.S., Viswanathan, P. (t,n): SensorStipulation with THAM Index for Smart Agriculture Decision-Making IoT System. Wireless Pers Commun 111, 1909-1940 (2020). [6]Sathwik, K., Ramesh, N.V.K.,Reshma, S.K.Estimation and monitoring of vital signs in human body by using smart device (2019) International Journal of Innovative Technology and Exploring Engineering, 8 (5), pp.

[11] Padmaja, B. V. S., Kolluru, V. R., & Kota, S. S. (2019). IoT based implementation of vehicle monitoring and tracking system using node MCU. International Journal of Innovative Technology and Exploring Engineering, 8(6), 446-450.

[12] Debata, S., Mantoliya, R., Sahithi, V., & Kolluru, V. R. (2018). Implementation of IoT based smart street light intensity control system using IR and LDR sensors. International Journal of Engineering and Technology(UAE), 7, 316-319.

[13] Krishna Manogna, N., Jeevan Chandra, Y., & Kolluru, V. R. (2018).Implementation of IoT based vehicle theft detection and accident monitoring system using Arduino. International Journal ofEngineering and Technology(UAE), 7, 331-334.

[14] Kavati Srinivas, A.V. Prabu, Kandi Sambasivarao "A Real Time Prototype Model for Enhancing the Security Features in the ATM Units"International Journal Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-8 Issue-7, May 2019. 1936-1939. "Performance monitoring of UPS battery using IoT" International Journal of Engineering & Technology, 7 (2.7) (2018) 352-355.

[15] Kunyanuth Kularbphettong, Udomlux Ampant, and Nutthaphol Kongrodj, An Automated Hydroponics System Based on Mobile Application, International Journal of Information and Education Technology,Vol. 9, No. 8, August 2019.

[16] P Sihombing, N A Karina, J T Tarigan and MI Syarif, Automated hydroponics nutrition plants systems using arduino uno microcontroller based on android, IOP Conf. Series: Journal of Physics: Conf. Series 978 (2018)012014.

[17] Mr. B.P. Kulkami, Mohite Ankita Sambhaji, Pai Susmita Venkatesh,Yedake Priyanka Rajiv, Automation of Hydroponic System, IJSTE - International Journal of Science Technology & Engineering | Volume 3 |Issue 09 | March 2017.

[16] Jay eta Das, Paras Chawla, Gagan Jot, IoT based Hydroponics monitoring system, International Journal of advance science and technology, Vol.29, No.lOS, 2020, pp.1679-1687. *2021*