ISSN No:-2456-2165

Hydroponic Farming

Arshdeep Singh, Mallikarjuna, Shreyas S Hampole & Paras Pandhare
Department of Electronics and Communication Engineering
Nitte Meenakshi Institute of Technology, Bengaluru - 560064

Prajna K B (Guide)
Department of Electronics and Communication Engineering
Nitte Meenakshi Institute of Technology, Bengaluru - 560064

Abstract:- Hydroponic farming is focused on the growth of plant without any use of soil or harmful/redundant chemicals, but still attain all nutrininal needs. This type of farming uses DFT (Deep Flow Technique) in which plants are basically kept in pipes filled with water & nutrients, but it is difficult to maintain the environmental parameters like temperature, humidity, light intensity, flow of water & pH of water. In this project we are trying to solve these problems using sensors & actuators. As sensors are going to read the important environmental parameters and the growth of plant, we can send this data to cloud and analyze this visually in a web app to see the factors affecting the plant growth.

Keywords:- *Hydroponics, Deep Flow Technique, IoT.*

I. INTRODUCTION

It is important to create a system in which we can manage all the different components used in Hydroponic farming to grow a plant in the most efficient way. This project fulfills the criteria of automation in the hydroponic farming.

In this project, we will focus on various factors like Automation of the water supply, maintaining the temperature of farms at a required level, maintenance of the PH level and EC (Electrical conductivity) at required level, automation in the required sunlight, alarms and indicators to indicate some unusual conditions for farms. All the related information regarding plant growth will be displayed on the display panel and can be accessed by the owner whenever required.

II. PROPOSED ALGORITHM

To build an automation system with monitoring of water circulation controller in hydroponic farming, fuzzy Sugeno method is employed. In this method, water circulation is based on the parameters of temperature and humidity.

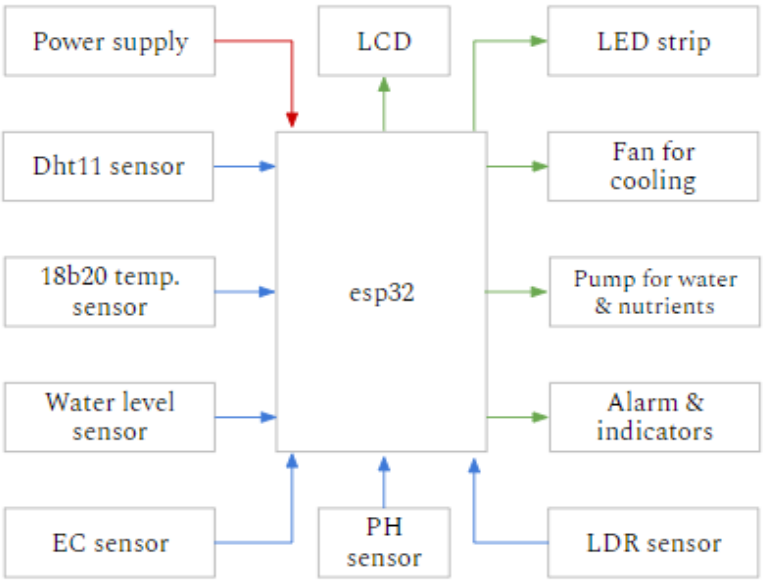

Fig 1:- Proposed system (Block diagram)

Currently, we have 6 different sensors to monitor environmental parameters:

➢ Temperature & Humidity:

- Dht11 sensor: To monitor the temperature of the plants surrounding.
- 18b20 temperature sensor: Monitors temperature of the water inside the pipe.
- Fan for cooling: Triggered when threshold of temperature is crossed.

ISSN No:-2456-2165

- Water flow:
- Sensors: Water level sensor, EC sensor & pH sensor.
- Actuator: Pump for water & nutrients.

- Light intensity:
- Sensor: LDR.
- Actuator: LED strips.

Others components: 12V power supply is used with LCD, Alarm & indicators.

We are trying to control all factors contributing to the growth of plant by implementing IoT and analysis the plants growth behaviour in our cloud. We are working trying to plot graph on plants responding behaviour to the environment. Our system which is installed in Raspberry pi will calculate the required parameter values and send it to cloud which will get plotted to graphs and visible to us in a website. We can also remotely control the components of our system & they also automatically controlled by sensors & actuators integrated on the system. Components of hydroponic system are:

- Growing media: Plants that need to be grown in hydroponic system should be kept in inert media that can handle the weight of the plant and is able to hold its root structure.
- Air stones and air pumps: Plants must must be provided with sufficient air supply. Air stones can disperse bubbles of oxygen through our nutrient solution container.
- Net pots: Mesh planters like Net pots can hold these plants. Latticed material allows the roots to grow out of the sides & bottom of the pot, giving more oxygen and nutrients. They also provide more drainage compared to traditional clay/plastic pots.

III. EXPERIMENT AND RESULT

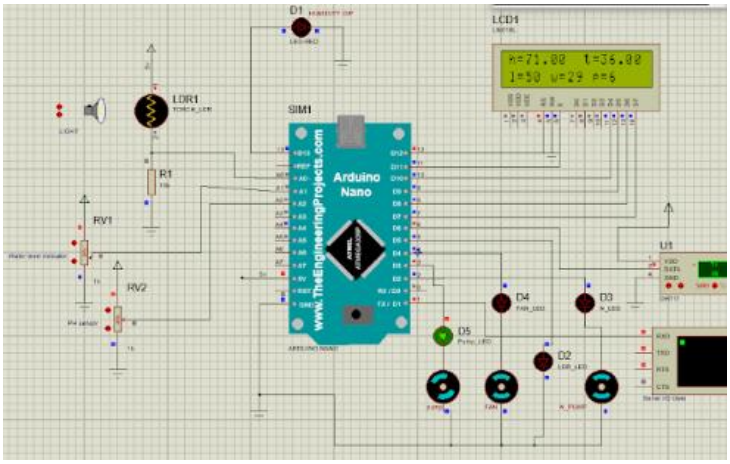

Fig 2:- Project is simulated & tested on Proteus 8 Professional Tool.

The entire project is simulated and tested for different values on Proteus 8 Professional Tool. This tool contains all the necessary components required to build a complete circuit of IoT based Hydroponic Farming System. Further results of our project are indicated by the figures below.

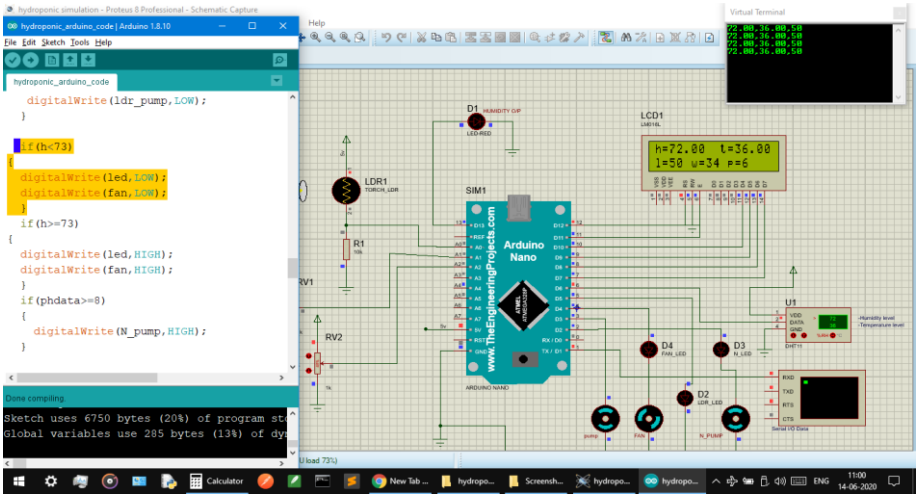

Fig 3:- Value of humidity of the surroundings

ISSN No:-2456-2165

If the value of humidity is 72, the Fan is in OFF condition and is switched ON only if the value of Humidity exceeds 72. This is indicated by D4 and D5.

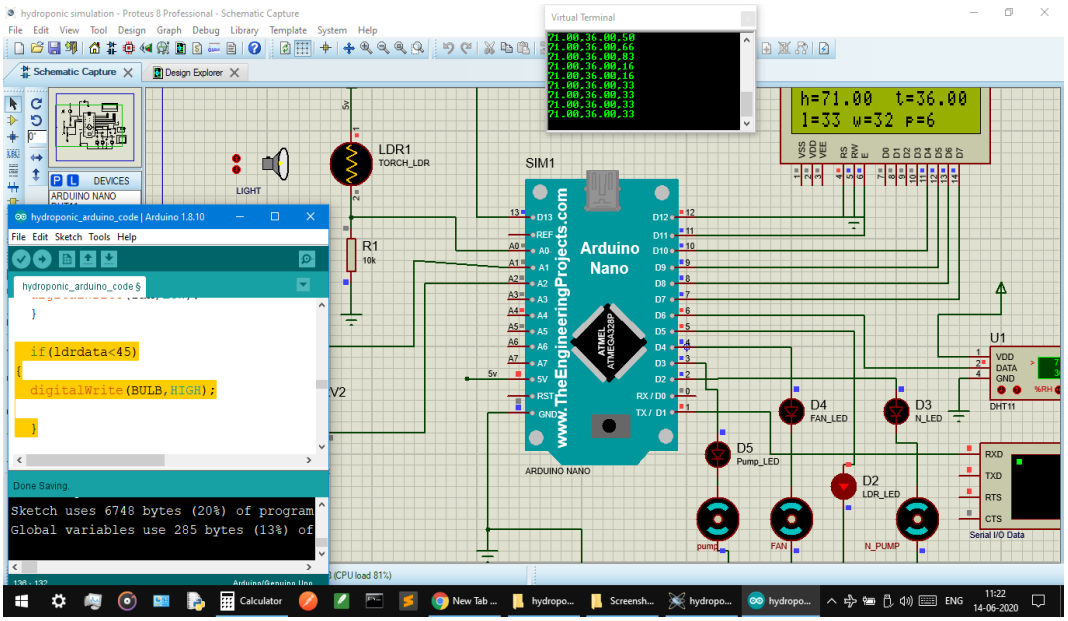

Fig 4:- LDR data

If the LDR data is less than 45, Lights will be switched ON. The lights will be switched OFF if the LDR data is greater than 45. This is indicated by D2.

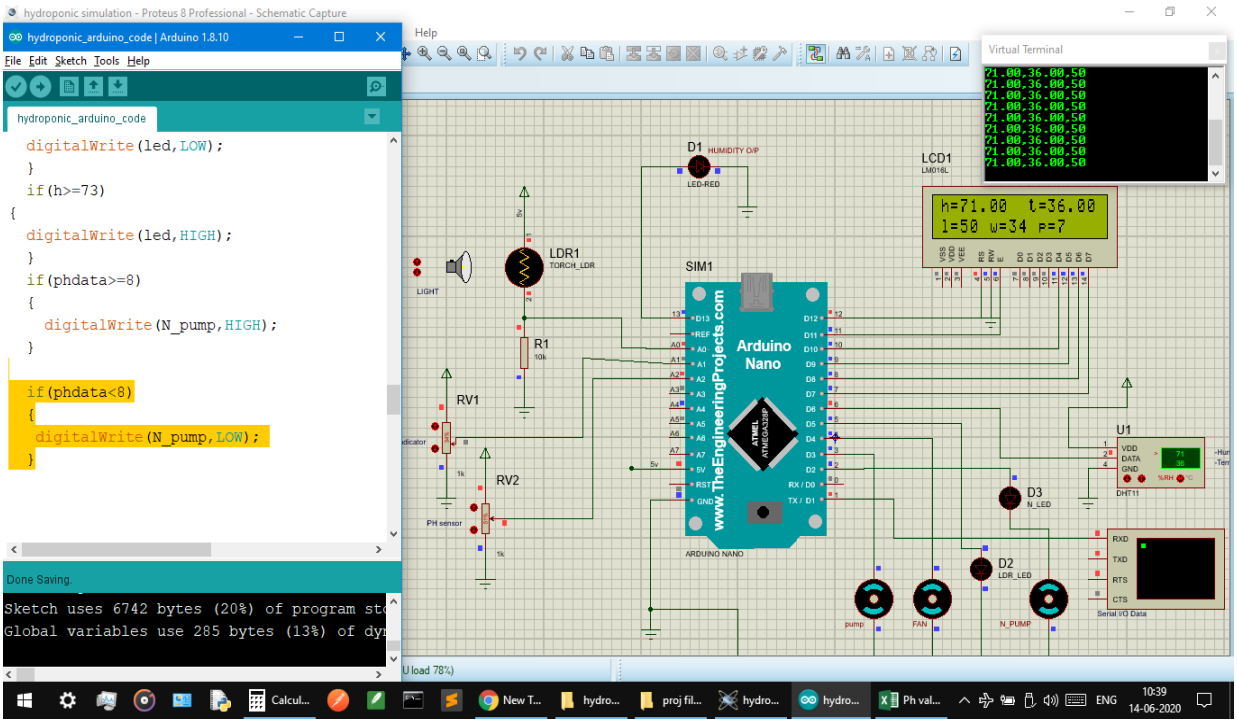

Fig 5:- Value of PH

If the value of PH is greater than 7, Pump will be switched ON which adds necessary minerals to maintain a neutral PH of 7.

ISSN No:-2456-2165

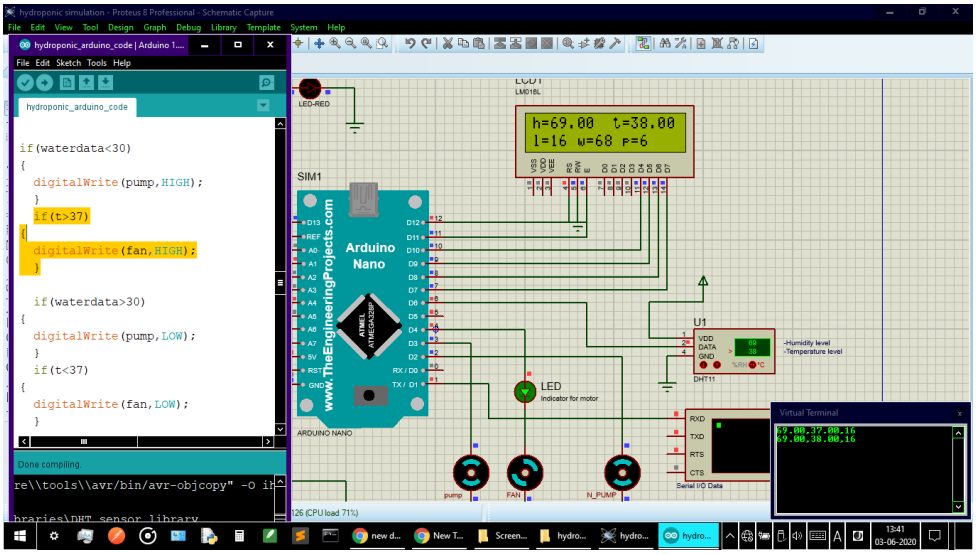

Fig 6:- Temperature data

If the temperature of surroundings is greater than 37, fan will be switched ON. The fan will be switched OFF once the temperature of surroundings falls below 37.

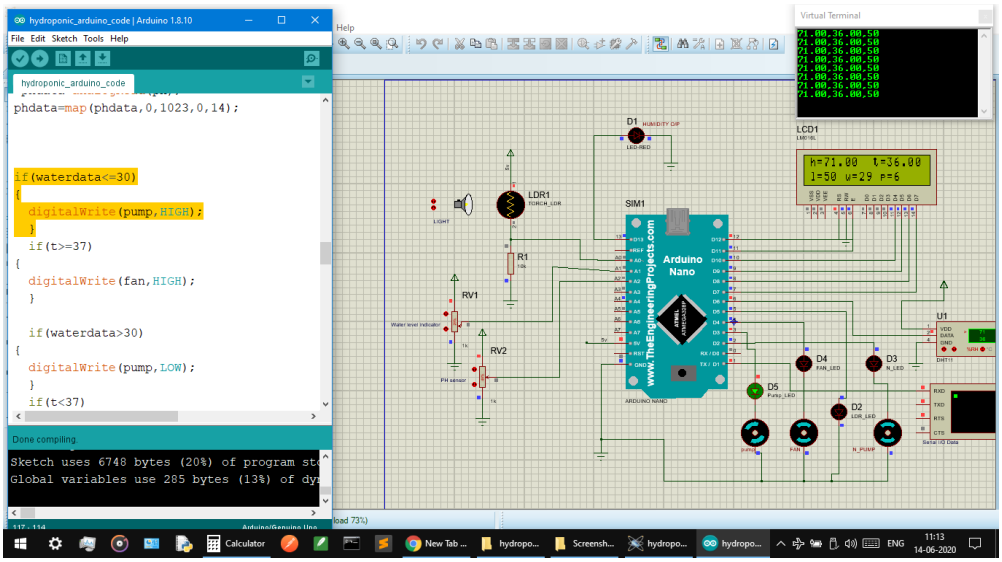

Fig 7:- Water level

If the Water level falls below 30, Pumps are switched ON else switched OFF. This is indicated by D5.

REFERENCES

[1]. Melchizedek I. Alipio; Allen Earl M. Dela Cruz; Jess David A. Doria; Rowena Maria S. Fruto ,*"A smart hydroponics farming system using exact inference in Bayesian network"*.

[2]. Tomohiro Nishimura; Yuji Okuyama; Ayaka Matsushita; Hiromichi Ikeda; Akashi Satoh," *A compact hardware design of a sensor module for hydroponics"*.

[3]. TheerametKaewwiset; ThongchaiYooyativong ,*"Electrical conductivity and PH adjusting system for hydroponics by using linear regression"*.

[4]. OtorresAdrianes; Genaro Martín Soto Zarazúa ,*"Potassium acrylate: A novelty in hydroponic substrates"*.

[5]. S.Umamaheswari; A.Preethi; E.Pravin; R.Dhanusha,*"Integrating scheduled hydroponic system"* .

[6]. Chit Su Hlaing; Sai Maung Maung Zaw, *"Plant diseases recognition for smart farming using model-based statistical features"*.

[7]. Oran Chieochan; Anukit Saokaew; Ekkarat Boonchieng ,*"Internet of things (IOT) for smart solar energy: A case study of the smartfarm at Maejo University"*.

[8]. Inkyu Sa; Zetao Chen; MarijaPopović; RaghavKhanna; Frank Liebisch; Juan Nieto; Roland Siegwart ,*"WeedNet: Dense Semantic Weed Classification Using Multispectral Images and MAV for Smart Farming"*.

[9]. OranChieochan; AnukitSaokaew; EkkaratBoonchieng ,*"IOT for smart farm: A case study of the Lingzhi mushroom farm at Maejo University".*
[10]. Desmira and Didik Aribowo (2016), *Smart home with Raspberry Design Based Wireless Using ATMEGA328 AVR Microcontroller and Fuzzy Logic, Simetrid Journal, Vol. 7. No.2. ISSN: 2252-4983.*
[11]. Hendrik, Alfendo, 2016, *Design and Construction of IoT Based Au-tomation System Prototypes in Hydroponic Agriculture, Bandung: Telkom University.*
[12]. Panjaitan, Musepini, 2016, *Hydroponic Papers, [Online], Available: https://www.academia.edu/5418625/ Paper hy-dro [January 30 2018].*
[13]. Prasetyo, et al, 2017, *Growth and Content Mustard Plant Protein Spoon (Brassica Rapa L) With Provision of Liquid Organic Ferti-lizer (POC) From Waste Tea Waste and Jackfruit Seed Waste, Su-rakarta: Muhammadiyah University Surakarta.*
[14]. Purnomo, Rezak Andri, et al, 2018, *Implementation of the Fuzzy Sugeno Method on the Embedded System to Detect Indoor Fire Conditions, Malang: Brawijaya University Malang*
[15]. Tajrie, Achmad Mahdiyatul, et al, 2017, *Watering and Lighting Control Systems Automatic Plants in Smart Greenhouse Using Fuzzy Logic, e-Proceeding of Engineering, Vol. 4, No. 3, p. 3216, ISSN 2355-9365*
[16]. Ulhaq, Avicienna, 2014, *Mustard Hydroponic Technology for Plants Using the DFT Method, Department of Mechanical Engi-neering and Biosystems, Faculty of Agricultural Technology, Bo-gor Agricultural University.*
[17]. Wachdani, Rosida, et al, 2014, *Application of Fuzzy Inference Sys-tem (FIS) Sugeno Method in Determining Energy and Protein Needs in Toddlers, Malang: State Islamic University Maulana Ma-lik Ibrahim Malang.*
[18]. Wijaya, Indra Dharma, et al, 2017, *Implementation of Raspberry Pi for the Design of Server Room Door Security Systems with Face Recognition Using the Triangle Face Method, Informatics Journal Polinema, [Sl], vol. 4, no. 1, p. 9, ISSN 2407-070X.*