AUTOMATED SOIL IRRIGATION AND FERTILITY DISPENSING MAINTENANCE FOR ROOF TOP HORTICULTURE

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ABSTRACT

In the field of Horticulture, the Manpower plays a major role in the planting and gardening. As it is a time consuming and quite difficult for the employee people, so we need to change the system with fully automatic basis with the help of well-known and familiar technologies. Our project descripts that the parameters of the soil such as micro and macro nutrients, temperature and moisture are monitored through the system and requirements are fulfilled by the automatic dispensing technology [1].
Index Terms-**microcontroller, soil moisture control, automated irrigation mechanism, Roof Top Horticulture.**

I. INTRODUCTION

Maintaining the soil parameters and making it well suitable for better growth and yield of plants on rooftops it requires the automated dispensing system which includes the identification of proper sensor, calibration, controller, design, creating algorithm, implementation for high yields and try to reduce manual work through automation. An Automated system is made to monitor the soil parameter like moisture, N,P,K (Nitrogen, Phosphorus and Potassium) [11], [7] and heat. These soil nutrients are served and given to microcontroller as Input. Irrigation systems in crop production can and has also been automated [5]. This solves the challenge brought about by the unreliability of climate changes thus need for water optimization. Automation of the irrigation systems is one of the most convenient, efficient and effective method of water optimization. The systems help in saving water and for to obtain rich yield of crop through rooftop horticulture [8] be brought under irrigation. Crops grown under controlled conditions tend to be healthier and thus give more yields. Controlled watering system results in reduction of fertilizer use and thus fertilizer costs go down. This issue can be impeccably redressed on the off chance that we utilize programmed smaller scale controller based trickle water system framework in which the water system will occur just when there will be exceptional prerequisite of water. In the current trickle water system frameworks, the most noteworthy favorable position is that water is provided close to the root zone of the plants because of which an expansive amount of water is spared in [1] brought about by sensor inputs. In addition, the framework ought to be anything but difficult to investigate in case of blames in any of the majority of zones. Using the temperature sensor and

Moisture sensor, the necessity of water to the yield can be detected and its estimations in [2] are shown in the Liquid Crystal Display (LCD) utilizing PIC controller. As indicated by the prerequisites of the yield, water is permitted to move through the pump. The product utilized is complier

II. EXISTING SYSTEM

While studying about the automated soil management technologies, we come to know that the parameters of the soil such as Moisture, Temperature, Humidity and pH are sensing automatically by using sensors and according to the need of water by the plant, it is supplied manually [4], [1]. Only sensing is done automatically but dispensing is made manually. The technology such as IoT is used [3]; Due to manual dispensing methods the man powers was needed [11].

III. PROPOSED SYSTEM

The primary point of our framework is to lessen labor and make working ladies/men to get the propensity for Horticulture. Alongside, an automatic detecting innovation. We incorporated that administering of the water and required micronutrients as mechanized. As per the aftereffect of detecting gadget and the orders, the measure of required water is administered. The water, which is utilized to diminish the temperature and expanded the moisture level of the soil water and micronutrients, which are the parameters which are extremely basic for the development of the plant. The micronutrients, for example, nitrogen, phosphorus, potassium, magnesium, Sulfur which are likewise required for basic plant development [10]. So, the required measure of micronutrients is likewise apportioned consequently once in a week or twice every week. In view of this completely mechanized soil administration and water system framework, the need of labor is diminished. So notwithstanding working individuals can ready to keep up their pastime of agriculture

IV. DESCRIPTION OF BLOCKS

Our roof top cultivation is completely computerized with the assistance of PIC16F877A Microcontroller [6]. As the info, we are utilizing are the profitable 6 sensors to be specific temperature, moisture, N, P, K [10]. As the temperature sensor, which distinguishes the temperature of the soil and

excessively climate conditions and moisture which recognizes the in soil and also in environment then the N, P,K [10] sensor which identifies the Nitrogen, Potassium and Phosphorus supplement
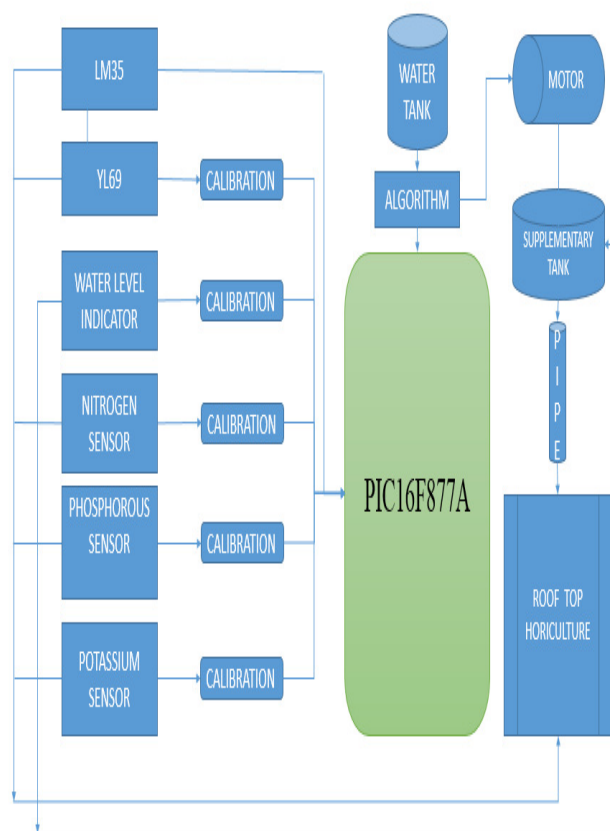

Fig .1 Block diagram

content in the soil. Subsequent to recognizing the entire vital datum, the sensors forward them to PIC controller then the controller which controls the water stream and manure supplement through the engine and supply to the plants as per the poor of the plants. This procedure, which lessens the human observing framework. The main obligation of the human is to check manure tank. All the 3 compost are put away as fluid in the tank. The water tank is filled consequently through the underground bore water. If there should be an occurrence of force cut, when the water tank is void a quick message was sent to the particular proprietor of the house. State-of-the-art data are sending to the individual proprietor day by day. The clarification has been given in the Fig 1. PIC16F877A [6] has 5 ports in which PORT An is appointed for sensor inputs, Port b for motor interfacing, port d for lcd show, port e for control pins of LCD. Figure .1

V. STUDY OF CROPS

The prerequisites for development of different products at the distinctive seasons were examined. The temperature and moisture are two fundamental parameters which impacts the development of the harvest [4]. Thus, the significance is given to both of this parameter. Each harvest requires diverse temperature and moisture levels at different stages. In any case, there is ideal scope of qualities in [1]. The temperature and moisture are the between related parameter. At the point when the soil temperature expands, soil moisture diminishes. Consequently, the examination of these both parameter can be utilized for the better yield of products. The temperature and moisture level of the different yields, for example, tomato, chilies, beans, greens in [2], sugarcane were examined.

VI.WORKING OF THE SYSTEM

The zone which is to be flooded will be separated into majority of discrete zones of conceivable distinctive soil
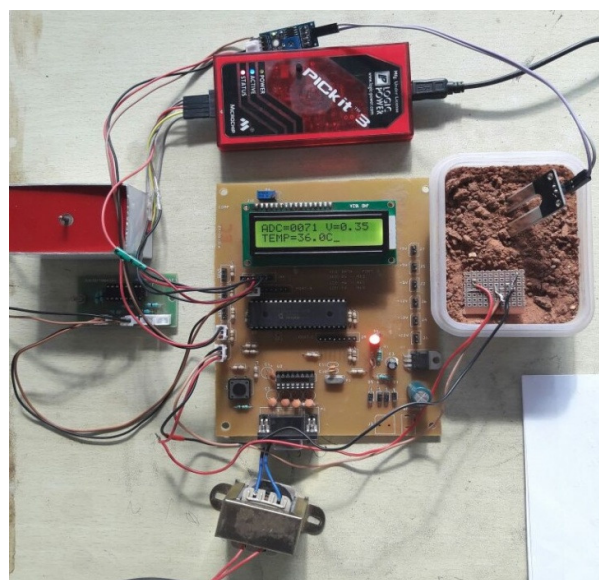

Fig .2 Prototype Model of the System

conditions, where each zone incorporates no less than one sprinkler head, soaker hose or, then again other water apportioning gadget and a valve having an "on" state and an "off" state for controlling the stream of water to such gadget for that zone and which includes a moisture sensor arranged in the soil in each of the zones and, whenever cross examined, produces an electrical flag corresponding to the level of moisture in the soil proximate that sensor [4]. The microcontroller is coupled in controlling and is viable to occasionally transmit the cross-examination signs to each of the moisture sensors [3].

The moisture sensors then react by transmitting the previously mentioned electrical flag to the microcontroller. The microcontroller incorporates hardware and programming for specifically activating the valves in the majority of zones to an "on" state at foreordained circumstances amid a week after week time frame, unless the moisture sensor for that

given zone shows a foreordained adequate level of moisture display. Subsequently, the microcontroller actuates each of the valves on a given watering day for a foreordained watering interim start with the pre-modified begin time and enduring for a pre-modified interim unless that interim is abbreviated in a specific zone where the moisture sensor for that zone demonstrates that the foreordained adequate level of moisture has been obtained in field.
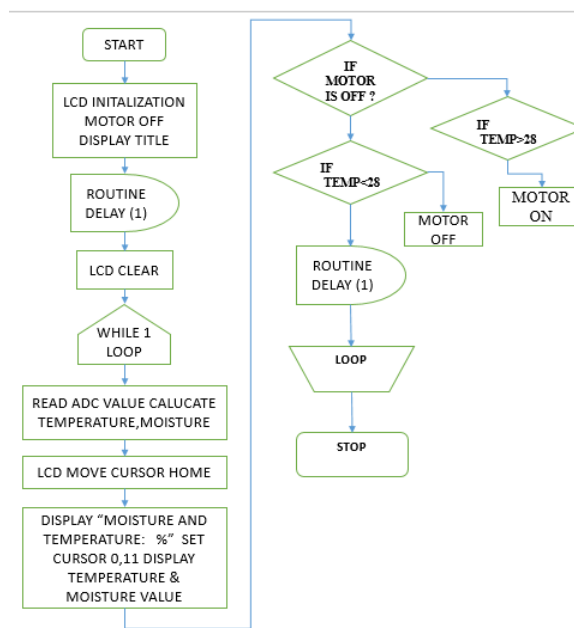

Fig.4 soil temperature monitoring

Fig. 3 Flow chart for software

Fig .5 soil moisture monitoring

VII.RESULTS

The output of LM35 - Precision Centigrade Temperature Sensor is in the form of analog. The input supply voltage is 5 volts. The output will be in the form of voltage. The room temperature is 29 degree Celsius. The output will be in millivolts, 290 millivolts. This analog is converted to digital data through ADC0808. It is directly connected to microcontroller. Its calibration is simple and easy.

The output value of temperature sensor is displayed in the LCD. Figure.4.The soil moisture sensor is specifically associated with the microcontroller. The info supply voltage given to the sensor is 3-10 volts. The yield voltage is in computerized frame. The advanced information is straightforwardly sent to the controller. As per the dampness level of field, the water is provided to the field. In the event that the dampness level of the field is low,then the water is streamed to the field.

When it achieves the level, consequently microcontroller shuts the valve in[9]. The water source to plants and bushes at a painstakingly controlled rate by a methods for adaptable tubing with modest drippers, sprayers, hoses, and bubblers connected to it. This framework is prudent, proficient and mechanized figure.6.
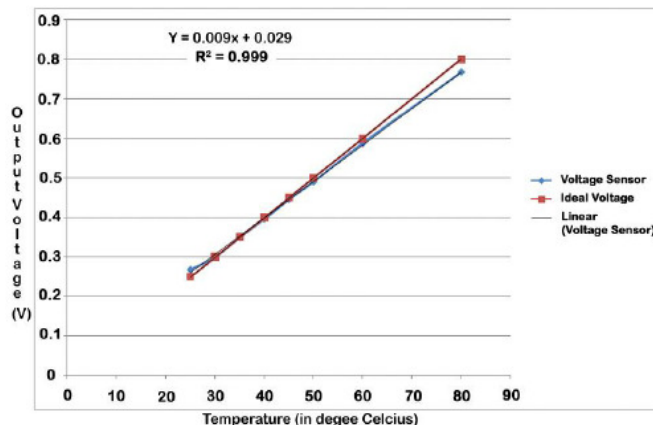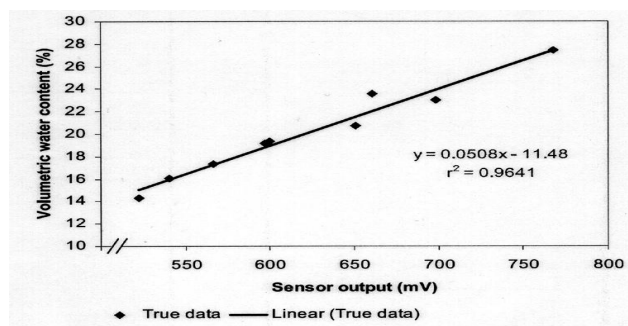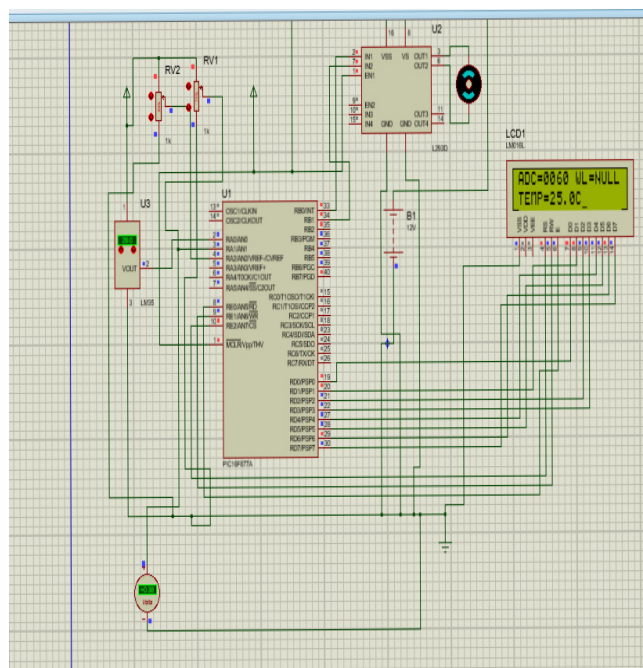

Fig.6 software simulation diagram

VIII. CONCLUSION

Normal soil supplements fundamental for plants development and yield like NPK, moisture have been examined at different temperature and various atmosphere condition the framework which indicate positive outcome for the better development and yield of plants. This framework can be further enhanced by dissecting more soil supplement like Sulfur, calcium, press, zinc and so on. In this way, the change of different middle of the road and micronutrients may create the yield for different plants for enhancing diverse product assortments.

The Microcontroller based dribble water system framework screens and controls every one of the exercises of trickle water system framework productively.

The moisture of the soil and the temperature of the environment will be measured and water is provided to the product as needs be which avoids water stopping up. This framework spares water on the grounds that the water is specifically encouraged to the root and the nature of the product gets made strides. It likewise helps in efficient, evacuation of human error in changing accessible soil moisture levels and to expand their net benefit. After nitrogen, phosphorus is presumably the component well on the way to be insufficient in soils.

The soil mineral apatite is the most widely recognized mineral wellspring of phosphorus. While there is by and large 1000 lb. of phosphorus for every section of land in the dirt, it is for the most part inaccessible as phosphates of low dissolvability. Add up to phosphorus is around 0.1 percent by weight of the dirt, yet just a single percent of that is accessible. Of the part, accessible, the greater part originates from the mineralization of natural matter. Maybe horticultural fields ought to be treated to compensate for the phosphorus that has been expelled in yield.

IX. FUTURE WORK

Water resources can be utilized efficiently and effectively based on various other parameters so that agricultural Sector becomes more productive. Automatic roof top horticulture at different seasons is another future scope. Water is allowed to the field of crops depending upon the particular season. Few more, parameters such as plant growth at different stages, weather condition is to be taken into account to determine the water requirement for the crop this will improve agriculture leading to economic development of our nation.

Further plan is to implement N, P, and K (Nitrogen, Phosphorus and Potassium) monitoring and dispensing technology depending on the need of fertilizers by plants. During winter or rainy season the optimum temperature condition does not satisfy the plants growth so for that we are going to use LED based intelligent lighting solution for Greenhouse. Full spectrum LED, such as our sunlight LED, produces a balance of cool and warm light that replicates the natural solar spectrum. These lights are phenomenal for seedlings as well as Houseplants.

X. REFERENCES

[1] M. Linzy Luciana1, B. Ramya2, A. Srimathi3, "Automatic drip irrigation unit using PIC controller" *IJLTET Vol.2*, **(2013).**

[2] J. Dhivy1, Siva Sundari2, S. Sudha3, R. Thenmozhi4 "Smart sensor based soil monitoring system" IJAREEIE Vol.5, (2016).

[3] PatilKalikaMilind1, P.C.Bhaskar2, "Microcontroller based adaptive irrigation system using WSN for variety crops and development of insect avoidance system for better yield " *IJRET Vol.3,* **(2014).**

[4] Nagaraja pandian M1, Ram Prasanth U2, Selva Kumar G3, Tamil Selvan S4, "Automatic irrigation system on sensing soil moisture content" IJIREICE Vol.3, (2015).

[5] Ashok1, k. Ashok2, "Microcontroller based drip irrigation system" *IJMETMR* **(2010**).

[6] K. Prathyusha1, Chaitanya Suman2, "Design of embedded systems for the automation of drip irrigation" *IJAIEM Vol.1,* **(2012).**

[7] Deepa V. Ramane1, Supriya S. Patil2, A. D. Shaligram3, "Detection of NPK nutrients of soil using fiber optic sensor" *ACGT* **(2015)**

[8] Nilesh1, D. Kuchekar2, R.A.Pagare3, "GSM based advanced water deployment system for irrigation using a wireless sensor network & android mobile*" IJEEDC Vol.3,* **(2015).**

[9] Bah.A1, S.K. Balasundran2, M.H.A. Husni3, "Sensor technologies for precision soil nutrient management and monitoring" *AJABS* **(2012**).

[10] Hak-Jin Kim1, Kenneth A. Sudduth2, John W. Hummel3, "Soil macronutrient sensing for precision Agriculture" *Journal of Environmental Monitoring* **(2009).**

[11] Mr. Gaikwad1, S. V, Prof Galande S. G.2, "Measurement of NPK, Temperature, Moisture, Humidity using WSN" *JERA Vol.5*, **(2015).**