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NPK MEASUREMENT, AUTOMATIC FERTILIZER DISPENSING ROBOT & AEROPONIC SYSTEM

Utkarsha Shinde, Neha Chalvade, Kalyani Chaudhari, Prof. Shradha Andhare

Dr. D. Y. Patil Institute of Engineering and Technology, Pimpri, Pune –411018
Department of Electronics & Telecommunication Engineering

Abstract – *Agriculture is backbone of India and farmers need advanced knowledge to take decisions like digging, seed sowing, and fertilizer dispensing, etc., so that we can get high yield. This project measures the amount of nitrogen (N), phosphorus (P) and potassium (K) in soil and displays the contents of NPK on LCD. According to requirement robot dispense the fertilizer in soil. This project reduces the human efforts and manpower required for doing this. The NPK contents in soil can be measured by adding solution into it and comparing it with color chart. NPK are mainly required in soil and their contents must be in specific amount in soil. If they will become greater or less, it will directly affect the growth of crop. For this our system first makes the hollow on the land, after that robot automatically dispenses the major fertilizers NPK in soil according to requirement. Seeding mechanism sowing seeds in soil. This is all about agroponic system. Now aeroponic system is one which can grow plants without using soil. Aeroponic system maintains the temperature and humidity inside the chamber and grows plants in air. When temperature inside chamber increases then fan will automatically get on through relay. Similarly when humidity decreases below desired value, nebulizer will maintain the humidity and increases it. Thus, by maintaining temperature and humidity inside chamber, plants can grow automatically without soil.*

Key words:-NPK, digging, seed sowing, dispensing of fertilizer, aeroponic system.

1. Introduction

The base of Indian economy is agriculture and still it is done in traditional way. There is need to replace it by advanced method to improve the performance and take high yield. The technics which are preferred by farmers are time consuming, required large amount of manpower and are done in inappropriate way, which affects the quality of soil, quality of crop and amount of yield .as the lands are farming lands are reducing day by day, So we have to replace this traditional way of farming which will help to grow more crops in small areas. Now a days plowing, seed sowing and digging is done by using advanced system but still fertilizers are dispense in random way. Due to this the quality of soil reduces and it affects growth of plants, quality of crop as well.

The major components which are necessary for growth of plant are: nitrogen, phosphorous and potassium. (Nitrogen) is most important element in soil which helps in growth of leaves and vegetation.in similar way P (Phosphorus) is key element for root and physical growth. K (Potassium) keeps regulation of water and nutrient in plant cell, flowering, fruiting. If we maintain the proper ratio of all these components then this will maintain the quality of soil and improve the growth of crop.

Aeroponic system is the system which has ability to grow plants in air with no soil. For this aeroponic maintain humidity and temperature inside chamber.

2. PROBLEM STATEMENT

The main issues in Indian farming technic are time consuming high man power lack of knowledge no proper resource use. India is developing very fast in automation industry but in agricultural field, old and manual technics are used. As agriculture have huge impact on Indian economy. There is need of advanced technics.as day by day the population is increasing; food resource should be increased according to that. The essential components of soil are nitrogen, phosphorous and potassium. They should be present in proper amount in soil. If they become less or greater, it will not good for crop growth. Hence for proper distribution of fertilizers, this system idea is developed.

3. Literature Survey

[4] As soil is an important source of food and fertilizers are necessary for plant growth to maintain their fertility, proper type and amount of fertilizer application improves both the quality and yield of food raw material. On the other hand, in case of both deficiency and excessive utilization, such problems as low quality and yield, unhealthy crops, increased input costs or environmental pollution of groundwater are encountered. The most important and deficient nutrients are known as nitrogen, phosphorus and potassium With the aid of laboratory analyses and soil sampling procedures, it is possible to acquire data about fertility status of soil and to apply the necessary amounts of fertilizers. Such laboratory analyses are Dumas method for total nitrogen determination, Olsen, Bray or Mehlich methods for plant

[1] The main aim of this proposed system is to measure of the N, P and K contents of soil and according to result, we can add the necessary elements in the soil. The N, P and K

amounts in the soil sample is determined by comparing the solution with color chart. This will describe amount of N, P and K as high medium, low and none. The types of nutrients present in the soil - macronutrients (nutrients required in large quantities) and micronutrients (nutrients required in smaller quantities). Nitrogen, Phosphorus, Potassium are mainly y required in large amount in soil. "NPK measurement, automatic seeding and fertilizer dispensing robot" system will check the amount of the three main fertilizers which are nitrogen, phosphorus and potassium in the soil and will dispense the required amount of nutrient. A NPK kit which is used for testing of the soil sample is in existence but the fertilizers dispensing is to be done manually. This problem will be rectified in this system. This proposed system will saves labor, time and obtain better results with using less amount of fertilizers. The same system can be used for seeding also.

[5] Aeroponics is the process of growing plants in an air or mist environment without the use of soil or an aggregate medium (known as geoponics). The word "aeroponic" is derived from the Greek meanings of aero- (air) and ponos (labor). Aeroponic culture differs from conventional hydroponics, aquaponics, and in-vitro (plant tissue culture) growing. Unlike hydroponics, which uses a liquid nutrient solution as a
growing medium and essential minerals to sustain plant growth; or aquaponics which uses water and fish waste, aeroponics is conducted without a growing medium. Because water is used in aeroponics to transmit nutrients, it is sometimes considered a type of hydroponics Air cultures optimize access to air for successful plant growth. Materials and devices which hold and support the aeroponic grown plants must be devoid of disease or pathogens. A distinction of a true aeroponic culture and apparatus is that it provides plant support features that are minimal. Minimal contact between a plant and support structure allows for 100% of the plant to be entirely in air. Long-term aeroponic cultivation requires the root systems to be free of constraints surrounding the stem and root systems. Physical contact is minimized so that it does not hinder natural growth and root expansion or access to pure water, air exchange and disease-free conditions The basic principle of aeroponic growing is to grow plants suspended in a closed or semi-closed environment by spraying the plant's dangling roots and lower stem with an atomized or sprayed, nutrient-rich water solution. The leaves and crown, often called the "canopy", extend above. The roots of the plant are separated by the plant support structure. Many times closed cell foam is compressed around the lower stem and inserted into an opening in the aeroponic chamber, which decreases labor and expense; for larger plants, trellising is used to suspend the weight of vegetation and fruit. Ideally, the environment is kept free from pests and disease so that the plants may grow healthier and more quickly than plants grown in a medium. However, since most aeroponic environments are not perfectly closed off to the outside, pests and disease may still cause a threat. Controlled environments advance plant development, health, growth, flowering and fruiting for any given plant species and cultivars

4. Block diagram

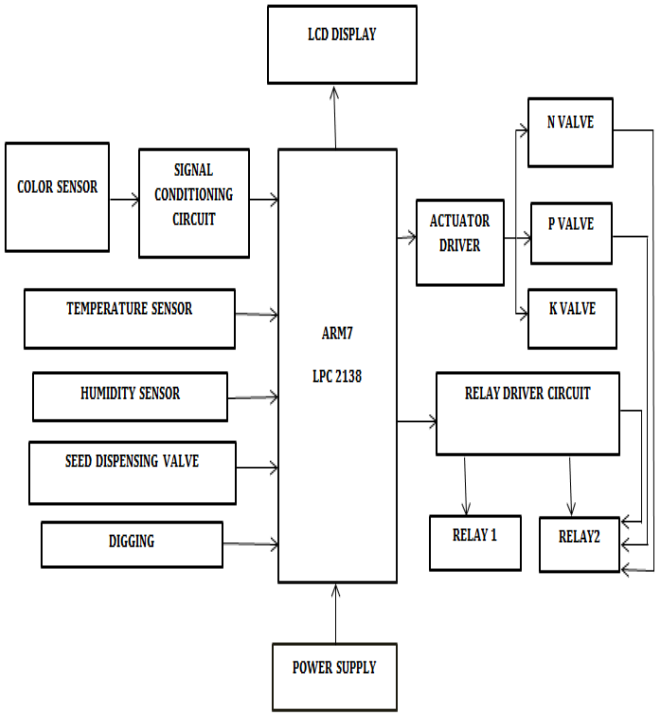

Fig 4.1.*Block diagram of NPK MEASUREMENT, AUTOMATIC FERTILIZER DISPENSING ROBOT & AEROPONIC SYSTEM*

5. WORKING PRINCIPLE

There are two sections in our system: first is agroponic system and other is aeroponic system.in agroponic system, firstly, in land there is necessity to take a hollow, for this by using dc motor digging can be done through relay. After digging, for the measurement of NPK, the soil samples are taken into test tube which are then mix with the chemical and then the whole solution is kept in front of RGB colour sensor. The colour sensor senses the amount of RGB from that solution and according to that, displays the amount of contents of NPK on the LCD display. After this as per measurements, fertilizers are dispensing in the soil. Then system will proceed with process of seeding. This process continues till we change the mode from agroponic to aeroponic. After changing mode to aeroponic, system first displays the temperature and humidity on the LCD display. This is done by using the temperature sensor and humidity sensor. The temperature and humidity are set at particular value. If temperature increases above desired value, the fan gets automatically on through relay. And if humidity decreases below desired value, the nebulizer gets on through relay to maintain the humidity inside the chamber. Thus by

Controlling the temperature and humidity inside the chamber, the atmosphere is created which is essential for growth of plant.

6. CHALLENGES AND FUTURE SCOPE:

The main challenge of this proposed system is dispensing the proper amount of NPK in soil. If this amount gets varies then it will affect the growth of plant and quality of soil as well. This present system is only for one crop but in future we can extend it to more than one crop.

7. CONCLUSION

By implementing this system, the quality of soil can be maintained by proper use of fertilizers which will helps in high yield.

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Utkarsha Shinde,born in 1994, in Maharashtra, India. Pursuing BE in Electronics and Telecommunication Engineering from Dr.D.Y.Patil Institute of Engineering and Technology, Pimpri. Her areas of interest are Embedded systems, Fiber optic communication, mobile communication & computer networks.

Neha chalvade, born in 1993, in Maharashtra, India. Pursuing BE in Electronics and Telecommunication Engineering from Dr. D. Y. Patil Institute of Engineering and Technology, Pimpri. Her areas of interest are Embedded systems, mobile communication.

Kalyani chaudhari,born in 1992, in Maharashtra, India. Pursuing BE in Electronics and Telecommunication Engineering from Dr.D.Y.Patil Institute of Engineering and Technology, Pimpri. His areas of interest are Embedded systems, Fiber optic communication, mobile communication & computer networks.

Prof.Shradha Andhare, Working as an Assistant Professor at E&TC Department in Dr.D.Y.Patil Institute of Engineering and Technology, Pimpri from 1-1- 2010,teaching experience of 6 years in same institute. Total paper published are 6, all are national and attended 18 workshops.