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The ARM Control Based Drip Irrigation System

Authors
Mr. S.G. Galande[1], Dr. G.H. Agrawal[2], Mr. N.B Waditke[3]
[1]Ph.D. Scholar, RTMNU, Associte Prof, PREC, Loni,
Email: *sggalande@gmail.com*
[2]Professor, KDK Engineering College, Nagpur
Email: *ghagrawal66@yahoo.com*
[3]PREC, Loni
Email: *nanasahebwaditake1@gmail.com*

Abstract
The aim of this system is a low-cost intelligent drip irrigation network control system is introduced in this paper in order to solve the status of long-term dependence on imports. In this paper we have design one module for sensing various parameters and control the valves of drip irrigation system. Contents measurement of N,P,K Element. In soil is further useful to decide fertilizer requirement of soil and ultimately useful to manage content of same in chemical mixing during formation of fertilizer.
Keywords—*N, P, K (nitrogen, Pottasium, Phosphate).*

INTRODUCTION

The aim of this system is one of the best water-saving irrigation technology, drip irrigation technology in China has been paid unprecedented attention. It is also helpful to manage and measure agricultural parameters with drip irrigation system. The drip design has been partitioned into sensor, control unit, valves and planning subsystems. Contents measurement of N,P,K Element In soil is further useful to decide fertilizer requirement of soil and ultimately useful to manage content of same in chemical mixing during formation of fertilizer. It finally looks beneficial for the decreasing the quantity of nodes required to measure the parameters from agricultural site.

Therefore in this topic "The design of intelligent drip irrigation network control system" This System deals with the design, optimization and development of a practical solution for application to the agricultural monitoring and control. The proposed system utilizes sensor for Micro parameter measurement (N,P,K), temperature level detection, Humidity , Soil moisture ,Soil Ph For management of Agricultural environment. After the proper measurement of N,P,K content from soil it will become simple to judge about the fertilizer combinations.

With the help of this technology we can increase the production and and reduce the man power. our population is increasing but Agriculture field is decreasing so for decrease in field we have to improve the production. The production is depend on the various parameter such as fertilizer. The fertilizer and the environment is most important. The environment is changing due to change in environment we have feed the fertilizer . But our aim is to sence the parameter and then provide the fertilizer.

THE GOALS OF THE SYSTEM DESIGN

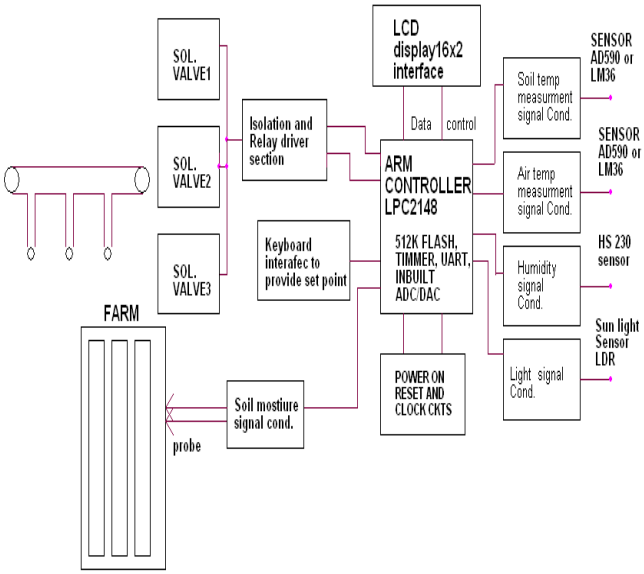
Modular Design:- In this module design we have composed of various drip irrigation networks based on different application.

Low-cost and Stable network:-The system uses low-cost and wired communication network to

achieve intelligent management without the construction of large communication devices

Data Analysis System:-According to different environment, we have to analysis the data.

BLOCK DIAGRAM



SENSOR NETWORK BASED MONITORING AND INTELLIGENT CONTROL

This system required following sensors to measure the various parameter

1) **Humidity Measurement:-**

Humidity is one of the important parameter of any agriculture field. As there are so many types of humidity sensors, here P-Hs-230 humidity sensor is used. The output of this humidity sensor is proportional to output voltage. At 20% relative humidity, the output is 660 mV, while at 90% relative humidity; the output is 2970 mV, i.e. 2.97 V. The output of the Humidity is connected to the ARM processor at pin no.35, which is the analog input (AD 1.2) of the ARM processor.

2) **pH Measurement:-**

A pH measurement is actually, a precise voltmeter that measures the generated voltage of a pH electrodes. Here Alpha pH 500 Transmitter with pH Electrode (EC100GTSO05B) The requirement of such measurement is an amplifier with high input impedance and has the gain of voltage-pH conversion. The standard pH probe generate voltage about 59mV per pH .So a pre-amplifier is required with high input impedance input and with gain = 16.7 to give 1 Volt per pH. The schematic diagram of the pH measurement circuit is as shown below.

3) **Moisture Measurement:-**

Tensiometer with transducer (Soil moisture sensor) is used which having Moisture Tension Range 0-100 Centibar,Output 4-20 mA ,Power Requirements 12 to 24 VDC ,Current Consumption 20 mA max.

4) **LM36/AD590 Temperature sensor for air and soil:-** LM36 or AD590 Temperature sensor is the temperature sensor used to sense the temperature from field .It having Linear + 10 mV/°C Scale Factor ,Calibrated Directly in ° Celsius (Centigrade) ,0.5°C Ensured Accuracy (at +25°C) ,Rated for Full −55°C to +150°C Range, Operates from 4 to 30 V.

5) **NPK Micro sensors [5]:-**

The use of micro-sensors for in-field monitoring of environmental parameters is of great interest, particularly semiconductor-based micro-sensors, due to their many advantages over conventional sensors such as small size, robustness, low output impedance and rapid response. They can further be integrated in circuitry and multiple sensors in the same substrate and accordingly they can be implemented in compact probes for particular applications e.g., in situ monitoring, or on-line or on-the-go measurements.

The sensors are using Ion Selective Field Effect Transistors (ISFETs) based micro-sensors, for environmental applications and are helpful for measuring primary macronutrients in soil.

Selected target ions include potassium, phosphate and nitrates. Required samples are in small volumes and such sensors can be integrated in compact flow cells for continuous measurements.

NPK micro-sensors are enabling precision agriculture to assist in (1) spatial data collection, (2) precision irrigation, (3) variable-rate technology (automated fertiliser) and (4) supplying data to farmers.

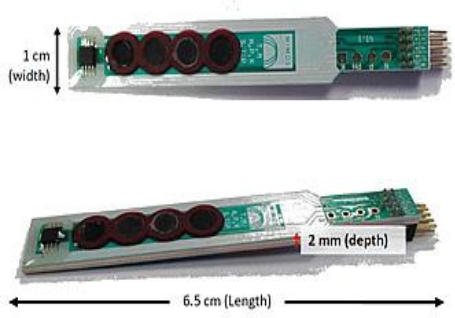


Fig. 1. The NPK sensor[5]

6) **Light Intensity Measurement:-**

For light intensity measurement, LDR is used. LDR is Light Dependent Resistor. As light intensity increases, the resistance decreases, and vice versa. In this project, I have designed a voltage divider network using LDR and a resistance. As the intensity changes, the voltage drop across the LDR also changes, and hence potentialis proportional to the light intensity. Amplifier amplifies this change in potential.

DATA SHARING SYSTEM

In Data Sharing System we are going to used for transferring the data from one node to another node in this data sharing system we are going to sence the various parameter and with the help this parameter the wired communication system will on/off the valve. The controlling of ON/OFF valves is depend on the parameter such as soil temperature, Humidity, LDR, NPK Sensor etc.

RESULTS

At NPK micro-sensors for precision agriculture the cost of each sensor needs to be low and the stability of the sensor membrane needs to be high, especially when such sensor deployed harsh environments; furthermore the sensitivity needs to be high, and they also need to be supported by robust data management systems to be able to collect the data, manipulate it for decision support analysis in fertilizer management.

The benefits of the wireless sensor network platform invention, compared to traditional industry standard technologies are:

- Longer membrane lifetime, and durability.
- Increased sensitivity .
- Increased platform flexibility (easily reconfigurable) that with minor hardware changes different parameters can be monitored.

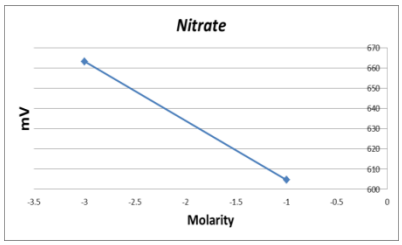


Fig. 2. Proposed Result for nitrogen [5]

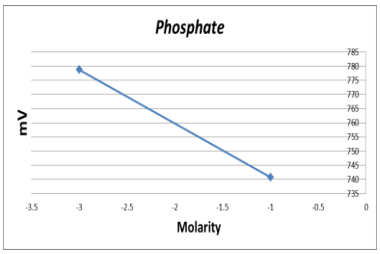


Fig. 3. Proposed Result for Phosphate[5]

CONCLUSION

This system s useful to increase the production and reduce the man power and save the electricity. This System deals with the design, optimization and development of a practical solution for application to the agricultural monitoring and control. The proposed system utilizes sensor for Micro parameter measurement (N,P,K),temperature level detection, Motion detection , Humidity , Soil moisture ,Soil Ph For management of Agricultural environment. It included The design of intelligent drip irrigation network control system .After the proper measurement of N ,P,K content from soil it will become simple to judge about the fertilizer combinations.

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