Qualitative data analysis and multi-parameter for crop cultivation with irrigation method

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***Abstract*- This paper describes about crop selection based on loam nature and involuntary irrigation system using PIC microcontroller with moisture sensor and Temperature sensor. The pH sensor is also used to ensure alkalinity and acidity of the soil. The contact will be recognized using MAX232 and the control will be sent based on the moisture level of the soil using PIC microcontroller. From the sensor information's, data will be collected in the database and it will be compared with monetary growth of the crops and it will be displayed in LCD. Here when a particular moisture level is reached, depending on the value of the moisture level water flow will be allowed in the pipe and the flow range, water pressure will be rationalized along with the time in a database and also displayed. As a final point information about crops and water flow will be sent to the farmer using GSM.**

***Index Terms*- PIC microcontroller (Peripheral Interface Controllers); PH level sensor; Temperature sensor (LM393); LCD (Liquid Crystal Display; Humidity sensor (LM358); GSM (Global System for Mobile communications); Relay.**

I. INTRODUCTION

An agricultural monitoring system provides crops monitoring, best crop selection and thus maintains the crop growth by providing water flow. This system also improves the cultivation of crops and assortment process. However, existing agricultural monitoring systems are mostly useful and utilized in greenhouses. In toting up, when users want to check the monitored in sequence in existing systems, the user can ensure the status through wireless sensors and automatic cost-effective database updates. In order to overcome the tribulations faced by the farmers concerning economic statistics it is indispensable to develop a crop monitoring system that can monitor crops information and soil information in isolated location.

In the proposed system demonstrates about a crop monitoring to cultivate a preferred crop based on profit or loss instantaneously using economic details of the crop through wireless communication network. The economic status of the crops are unruffled from the government database are compared with current cultivated crops in the land. Then the best crops will be selected according to the economic growth rate. These crop details will be displayed to farmers through GSM according to their regional language.

II. TECHNOLOGY USED

The realm of the proposed system is embedded with wireless communication network. Embedded is a combination of hardware and software so we have used software like VB (Visual basics) to collect data. It is an independent system and can be a part of large system. In embedded system we use microcontroller to perform a specific task.

It has two operating systems namely,

- RTOS (Real Time Operating System)
- GPOS (General Purpose Operating System)

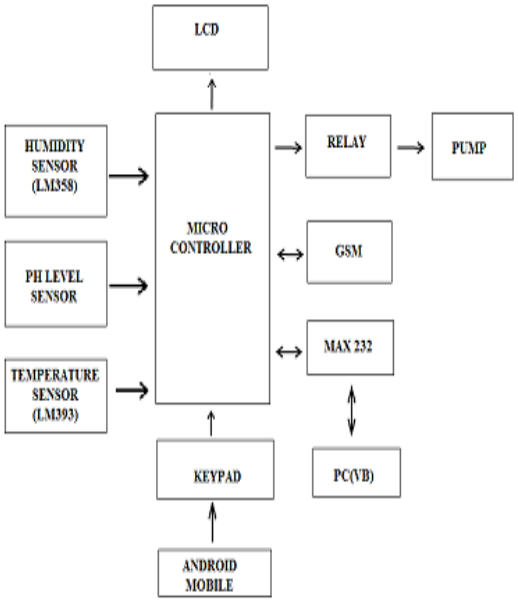
GPOS is been implemented in general purpose ways. It is time independent. So we have used RTOS because it will complete the task within the time. It is only used in large scale embedded system.

III. PROPOSED SYSTEM

Our paper describes the crop selection based on soil nature and automatic irrigation system using PIC microcontroller with moisture sensor and

Temperature sensor. The pH sensor are also used to check alkalinity and acidity of the soil. The communication will be established using MAX232 and the control will be sent based on the isture level of the soil using PIC microcontroller. From the sensor information ,data will be collected in the database and it will be compared with economic growth of the crops and it will be displayed in LCD. Here when a particular moisture level is reached, depending on the value of the moisture level water flow will be allowed in the pipe and the flow range, water pressure will be updated along with the time in a database and also displayed. Finally, information about crops and water flow will be sent to the farmer using GSM.

BLOCK DIAGRAM

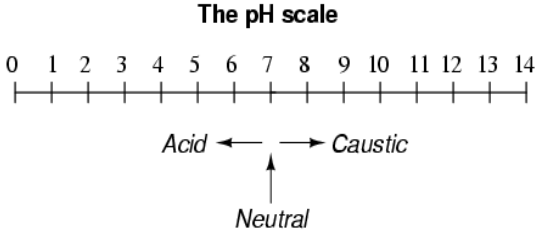


DESCRIPTION

Crops details will be obtained through three sensors namely phlevel, temperature and humidity sensor.ph sensor will sense the alkalinity level of the crop. With the help of these sensors ,the required data for the crop cultivation is predicted and given to the microcontroller for implementation. The economic status of the government database is updated in the system with the use of VB(visual baics)software. The collected crop details is linked to the government database through MAX232.This intimates the farmers through GSM module about profit or loss for the crop cultivation.

PH level sensor

A very important measurement in many liquid chemical processes (industrial, pharmaceutical, manufacturing, food production, etc.) is that of pH: the measurement of hydrogen ion concentration in a liquid solution. A solution with a low pH value is called an "acid," while one with a high pH is called a "caustic." The common pH scale extends from 0 (strong acid) to 14 (strong caustic), with 7 in the middle representing pure water (neutral):



pH is defined as follows: the lower-case letter "p" in pH stands for the negative common (base ten) logarithm, while the upper-case letter "H" stands for the element hydrogen. Thus, pH is a logarithmic measurement of the number of moles of hydrogen ions (H^+) per liter of solution.

Incidentally, the "p" prefix is also used with other types of chemical measurements where a logarithmic scale is desired, pCO2 (Carbon Dioxide) and pO2 (Oxygen) being two such examples. The logarithmic pH scale works like this: a solution with 10^{-12} moles of H^+ ions per liter has a pH of 12; a solution with 10^{-3} moles of H^+ ions per liter has a pH of 3. While very uncommon, there is such a thing as an acid with a pH measurement below 0 and a caustic with a pH above 14. Such solutions, understandably, are quite concentrated and *extremely* reactive.

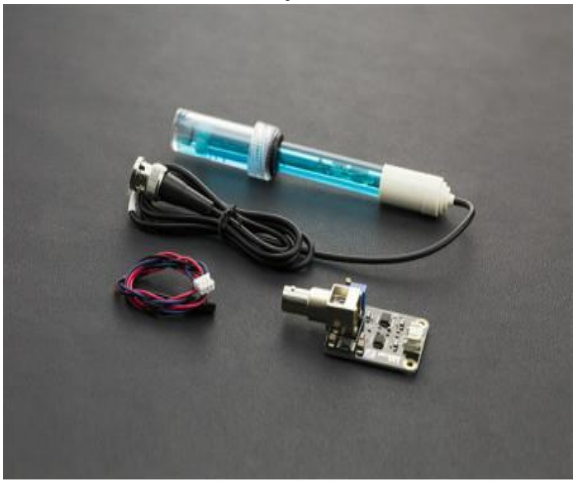


Fig.1 PH level sensor

TEMPERATURE SENSOR

Fig.2 Temperature sensor

A temperature sensor is a device, typically, a thermocouple or RTD that provides for temperature measurement through an electrical signal. A thermocouple (T/C) is made from two dissimilar metals that generate electrical voltage in direct proportion to changes in temperature. Only two standard copper wires are necessary to connect an RTD to an electrical circuit, however, these connecting wires are also subject to small changes in resistance based on surrounding temperature. For this reason an "extra" third hookup wire is built into most RTDs as a compensation wire to allow the controller or display unit to correct for these variations.

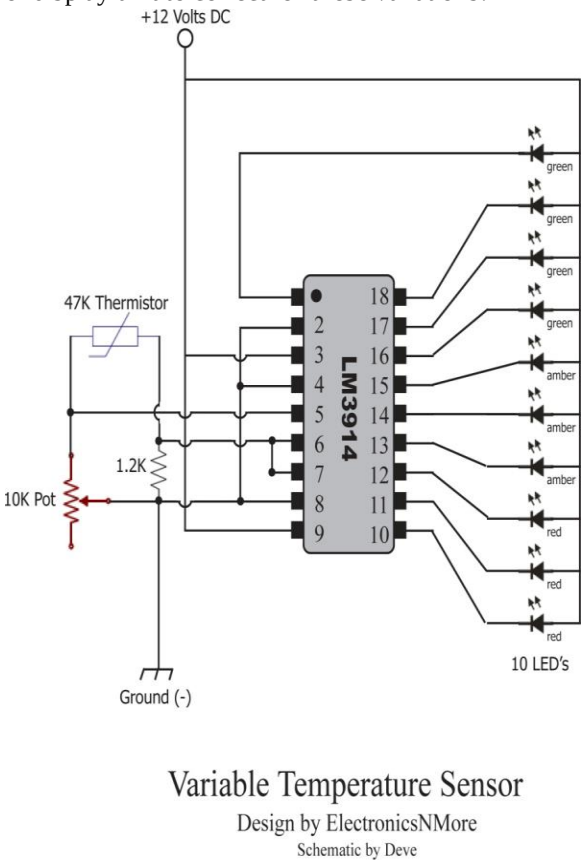


Fig.3Variable Temperature Sensor

HUMIDITY SENSOR

Fig.4Humidity Sensor

A humidity sensor (or hygrometer) senses, measures and reports both moisture and air temperature. The ratio of moisture in the air to the highest amount of moisture at a particular air temperature is called relative humidity. Relative humidity becomes an important factor, when looking for comfort.

- Coulometric: An electrolyte is formed by absorption of water resulting in a current level which is proportional to the moisture content in the air.
- Gravimetric: A drying agent is exposed to moist air, resulting in weight gain by the drying agent. The increased weight corresponds to the amount of moisture.
- Microwave/Infrared: A transmitted signal varies as the humidity increases. The attenuation is an indication of the moisture content in the medium.
- Accuracy: Every sensor has its own calibration curve, based on a 9 point system. It basically pitches the pros against the cons of the particular sensor.
- Linearity: It indicates the voltage deviation from the BFSL value and the measured output voltage value, converted to relative humidity.
- Reliability: The measurements often cause the sensor to fall out of sync. However for a sensor to be useful, it has to be provide reliable measurements.
- Repeatability: The measurements from a sensor, have to be so that they don't drift apart. Repeatability is the measurement of drift among measurements of a single quantity.
- Response time: Typically, the time taken by a sensor to rise to 66% (rise time) or fall to 33% (fall time) of maximum output voltage, is known as the response time.

PIC MICRO CONTROLLER

Fig.5 PIC Micro Controller

Embedded systems

Characteristics of an embedded system:

- It is usually used to perform specialized operations and it will repeat the same process.
- It is also used in real time operations because the performance will be changed simultaneously according to the input data changes.
- Once data is feed into the system then it will be perform according to the given duration.

Advantages:

- Low power consumption
- User friendly
- Enhanced performance

Wireless communication

It is simply wireless where the information is been transferred without the help of cables. The information will be transferred through radio waves from transmitter and receiver. Long distance communication can be achieved by the wireless networks.

Features

- The transmitted distance can be anywhere between a few meters and thousands of kilometers.
- It includes Bluetooth, headset, headphone, mouse, etc..,

Advantages

- Working Speed is high
- Constant connectivity

IV. CONCLUSION

We have provided detailed information about crops to the farmers through wireless communication. In addition to this, we have automated the water flow to the crops according to their moisture level. This project intimates economic growth of the crops. It helps the farmers to cultivate the crops based on the season. The crops details will be displayed to the farmers through mobile for their convenience.

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