

Design & Implementation of Soil Analyzer by means of Internet of Things.

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Abstract— Soil testing is a valuable tool for farmer as it determines the inputs required for efficient and economic production. The proposed Project is used to determine the nutrient quantity of soil. As we Know all the nutrients present in the soil but what amount of nutrients available in that particular field we can't figure out. For that in this project we can use the test bench to recognise the type of soil and which as well as how much nutrient value required taking good crop. But to measure the amount of nutrient available in the soil we are going to design device or instrument which gives us proper reading of micronutrient. Till now portable devices are available, which are used to measure the Electrical conductivity as well as pH value. But the device which is we going to design it will not only used to measure the EC and pH but also here we get the measurement of other parameter like iron nitrogen etc.

Index Terms—EC sensor, pH sensor, IoT

• INTRODUCTION

Indian wealth is chiefly based on crop growing; immobile we are not capable to build most constructive, saleable & sustainable utilize of ground profits. The major motive is the require of information concerning the soil psychoanalysis for the growth of crops. Soil study is a valuable tool for farmer as it determines the inputs required for efficient & economic production [1].

To design a good sampling plan for soil and water testing, one needs to consider the basic facts related to soil formation and water cycling. For both soil and water, we are dealing with complex systems, where biological, chemical and physical factors all interact. Also, soil and water are interconnected, and farming practices affect both soil and water quality.

Hence here is a necessitate for topsoil study to be prepared for farmers. According to Agriculture academia review, crisis like sterility of topsoil is growing day by day as of overload of fertiliser. Topography often affects how much erosion has taken place. Soils on top of hills or on steep side slopes tend to be thinner, or more eroded than those on the slopes, and at the bottom or "toe" of a slope, one can find zones of soil accumulation. Management, along with topography will also affect how much erosion has, and is continuing to take place. The thinner, or more eroded soils will often be lower in organic matter, since they have lost their topsoil layer. The clays in the subsoil layers are then on the top. A field that is "patchy" in color will probably have had some erosion historically.

Biological processes that affect soil have historically been determined by the native or natural vegetation. Soils that form under forests are very different than those that have formed in grassland regions. Much of the soil in the great plains was formed when the region was covered by prairie grasses. This soil is very fertile, and rich in organic matter compared to soils of other regions. The deep grass roots added organic matter to a depth of several feet in some cases, leading to the formation of the rich, dark soils that have made Kansas the "breadbasket" of the world. Tillage, and planting of annual crops on these soils has halted this addition of organic matter, but reduced tillage and adding perennial crops into the rotation can help maintain the organic matter that is left.

LITERATURE SURVEY

[1] "Remote sensing dynamic monitoring of ecosystem service value of soil conservation with time series data". Xiaohe Gu, Wei Guo, Yancang Wang 2014.

This paper presents Soil conservation is one of important ecological service functions of ecosystem, which is benefit for improve ecological environment and realize economy Sustainable development. The soil conservation functions of ecosystem mainly include maintaining soil fertility, reducing waterway silt-up and protecting topsoil.

[2] “Spatial Decision Analysis on Soil Erosion Control Measures Research Based on GIS”.Xueyan Sui Chen Lin Shenglu Zhou 2012.

Soil erosion causes the loss of soil resources, the degradation of land fertility and the deterioration of regional ecological environment. Supported by the Geographical Information System (GIS).Geographical Information System and Global Positioning System) technology and the spatial modelling functions are adopted to build a soil erosion control research.

[3] “Extracting Geographic Knowledge from Sensor Intervention Data Using Spatial Association Rules”.Huan Liu, AnirudhKondaveeti 2011. Largenetworks of sensors are used to detect intrusionsand provide security at the borders of the United States. Sensor signals are used to detect possible intrusions such as illegal immigration traffic in drugs, weapons, and smuggled goods at specific targeted geographic locations.

[4] “Optimization of spatial sampling schemes and elements for estimating farmland area”.Dong Zhaoxia , Wang Di, Zhou Qingbo, Chen Zhongxin 2014.

Geographic Information Systems (GIS) and classic sampling methods were applied as the study method in order to make an optimization on spatial sampling scheme and elements for crop planting areas estimation. This study adopted the Moran command in ARCGIS to calculate the global spatial autocorrelation.

PROPOSED SYSTEM

The planned scheme is worn to conclude the nutrient measure of topsoil. Since we recognize the nutrients available within the topsoil except what quantity of nutrients present within the exacting ground we can't sum up. In support of the plan we can utilize the analysis counter to distinguish the sort of topsoil is superior to raise the yield. On origin of learning it conclude, there were 3 types of soil and they are as

follows (i)black soil,(ii) alluvial soil, (iii)red soil. Each soil has unusual micro nutrient. But to compute the sum of nutrient presented in the topsoil we are departing to devise mechanism or apparatus which give us suitable evaluation of micro nutrient.

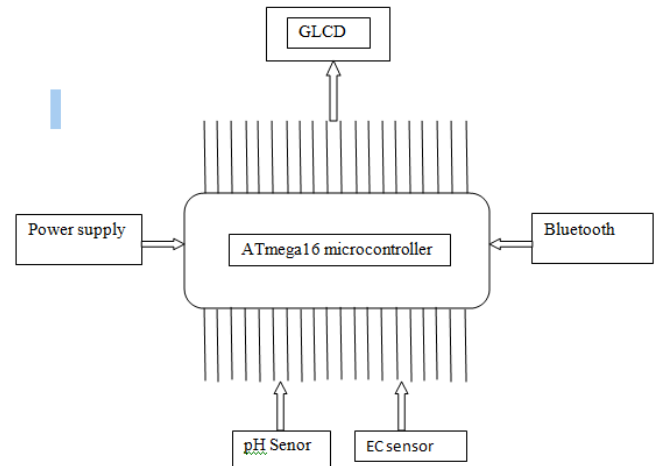


Figure 1. System's Architecture.

Microcontroller: Microcontrollers are used in automatically controlled products and devices, such as automobile engine control systems, implantable medical devices, remote controls, office machines, appliances, power tools, toys and other embedded systems. By reducing the size and cost compared to a design that uses a separate microprocessor, memory, and input/output devices, microcontrollers make it economical to digitally control even more devices and processes. Mixed signal microcontrollers are common, integrating analog components needed to control non-digital electronic systems

EC Sensor:

Measures the ability of the soil solution to conduct electricity and is expressed in decisiemens per meter (dS/m, which is equivalent to mmhos/cm). Because pure water is a poor conductor of electricity, increases in soluble salts result in proportional increases in the solution EC. The standard procedure for salinity testing is to measure EC of a solution extracted from a soil wetted to a “saturation paste.” According to U.S. Salinity Laboratory Staff (1954), a saline soil has an EC of the saturated paste extract of more than 4 dS/m, a value that corresponds to approximately 40 mmol salts per liter. Crops vary in their tolerance to salinity and some may be adversely affected at ECs less than 4 dS/m. Salt tolerances are known for common crops. For example, peach is sensitive, whereas cotton is more salt tolerant (Maas, 1990). Beets and asparagus are very tolerant of salinity.

pH Sensor: The quantitative information provided by the pH value expresses the degree of the

activity of an acid or base in terms of hydrogen ion activity. The pH value of a substance is directly related to the ratio of the hydrogen ion [H⁺] and the hydroxyl ion [OH⁻] concentrations. If the H⁺ concentration is greater than OH⁻, the material is acidic; i.e., the pH value is less than 7. If the OH⁻ concentration is greater than H⁺, the material is basic, with a pH value greater than 7. If equal amounts of H⁺ and OH⁻ ions are present, the material is neutral, with a pH of 7. Acids and bases have free hydrogen and hydroxyl ions, respectively. The relationship between hydrogen ions and hydroxyl ions in a given solution is constant for a given set of conditions, either one can be determined by knowing the other.

Bluetooth: Bluetooth is a standard wire-replacement communications protocol primarily designed for low-power consumption, with a short range based on low-cost transceiver microchips in each device.

Mobile Application: A mobile application software or mobile app is an application software designed to run on mobile devices such as smartphones and tablet computers. Most such devices are sold with several apps bundled as pre-installed software, such as a web browser, email client, calendar, mapping program, and an app for buying music or other media or more apps. Some pre-installed apps can be removed by an ordinary uninstall process, thus leaving more storage space for desired ones. Where the software does not allow this, some devices can be rooted to eliminate the undesired apps.

Conclusion

Top Soil demanding is normally perform by feasible lab that pact a modify of test, aim cluster of compound & natural resources. Among with assist of planned scheme each customer & farmer can straightforwardly send the farm figures to attendant & acquire suggestion for enhanced fertilization. This will lead to vast no. of facts compilation & superior plan towards rural people.

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