AUTOMATED SOIL TESTING SYSTEM FOR AGRICULTURE

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Introduction:
Automated soil testing device is an electronic device which can be used to measure
moisture, humidity, temperature values to ensure the fertility of soil in the field of agriculture to
select the suitable crop and also the type of fertilizer to be used. The ionic particles present in soil
sample are sensed by sensor and the output of sensor is processed by signal conditioning circuit.
The microcontroller is used to compare the pre-stored value with the actual values and the
measured values are displayed on LCD the wireless trans-receiver transmits the data to a remote
location or designated authority in the agriculture department for further analysis and
suggestions.

Automated soil testing device is a portable device which can be used either in
laboratories or on the identified spot selected for farming so that the farmer need not take the
pain of visiting the soil testing laborites which are normally located in district headquarters.
Automated soil testing device is a simple and user friendly device so that any person can test the
soil without the presence of an operator, it is an economical device and thus a common man can
easily afford it.

Nowadays, awareness about implementing technology for agricultural environment has
increased into the industries. Manual collection of data for desired factors can be sporadic, not
continuous and produce variations from incorrect measurement taking. This can cause difficulty
in controlling environmental important factors. Wireless distinct sensor node scan reduce time
and effort required for monitoring the environment.

Objective:
- Grouping of soil into classes relative to the nutrient level.
- Predicting the probability of getting profitable response to the fertilizers.
- To provide basis for fertilizers recommendation.
**Methodology:**

Hardware used: Arduino, LCD, zigbee, sensors  
Software used: Arduino IDE, Hyperterminal

**Transmitter**

![Schematic of Arduino Based System For Automated Soil Test](image)

**Receiver**

![Schematic of Arduino Based System For Automated Soil Test](image)

**Figure 1. Schematic of Arduino Based System For Automated Soil Test**

**Working Principle**

Whenever farmer wants to analyze the soil fertility, he leads to take the soil sample of about 150 gm and 60 ml of water should be added to the soil sample and allow the sample to settle down the sensor will be placed in the sample. Here copper electrodes are used as sensor which measure the ionic particles present in the soil and converts it into electrical signal. The electrical signal is amplified using signal conditioning and this amplified signal is send to microcontroller in the form of digital signal from ADC the microcontroller place a key role in processing data received from sensor, where it compare the data already pre-stored with the sensor output signal. The microcontroller after comparison gives the output and the values are displayed on the LCD display. The output not only provides the information on fertility present in the soil but also suggest crops to be grown on that soil. The wireless trans-receiver transmits
the data to a remote location or designated authority in the agriculture department for further analysis and suggestions.

4. Result and Conclusion

“Automated Soil Testing in Agriculture”, has been developed for soil testing of agricultural farm. The moisture content, humidity, temperature and pH values vary from one type of soil to others. The parameters of the soil are compared with pre-stored values received from agricultural department. The system also provides the information about the crops that can be grown in respective soils. Wireless communication system has been incorporated for interacting with the experts.

Scope for Future Work:

- Since the project is a prototype that was developed under some limitations and in short time, there are some tasks that should be done in the future and would develop the system to a more mature state.
- The most important and useful job that has to be done is the real field testing for extended time and with several sensor platforms and sensors deployed in fields. This will provide feedback that could be meaningful for the further development of the system and would include the user’s insights and real needs.
- Flood control
- Water usage audit of household, industrial sector and agriculture.
- Drying
- Weighing and sieving
- Best irrigation facility