

“SMART SENSOR BASED SOIL MONITORING SYSTEM”

Prof. P.P.Chaudhari¹, Pradip I.Gite², Sumit D.Humbe³,

¹*ME (E&TC) Lecture, Sandip Foundation, SIEM, Nasik, Maharashtra, India.*

²³*B.E (E&TC) Student, Sandip Foundation, SIEM, Nasik, Maharashtra, India.*

ABSTRACT

Development of agriculture using technology will be very much useful in cultivation. For a new agricultural area, without knowing or monitoring the important parameters of the soil, cultivation will be difficult and so the farmers suffer financial losses. This project thesis provides a brief overview of the soil monitoring system using sensors. Various soil sensors are used to measure moisture and PH value. The information from the sensors in the soil is sent to the GSM module through AVR microcontroller. Thus this advanced technology helps the farmers to know the accurate parameters of the soil thus making the soil testing procedure easier.

Keywords-: AVR microcontroller Atmega328, PH Electrode, Moisture sensor, GSM module

1. INTRODUCTION

Soil monitoring is an essential process which is needed for agriculture. 26% of the Earth's surface is exposed as land. Almost all humanity lives on the terrestrial, solid Earth comprised of bedrock and the weathered bedrock called soil. Soil is a mixture of inorganic mineral particles and organic matter of varying size and composition. The particles make up about 50 % of the soil's volume. Pores containing air and water occupy the remaining volume. The important parameters needed to be measured in the soil are moisture and PH value. At olden days, the farmers used to see the soil and will cultivate the required crop so the parameters are not accurately known to them to test the soil. Then after the soil testing laboratories are used to test the features of soil in which many tedious processes takes place to measure each parameter of the soil. After that many real time projects for autonomous soil monitoring purpose were done using probe systems and wired sensors. The data transmitted through GSM, and other technologies. The recent invention for soil monitoring is the four wheel rover which is a robot that has complex implementation that needs to incorporate a suspension design and high cost. To overcome the disadvantages of this rover, a smart sensor based soil monitoring application “SMART AGRO” is developed for the ease of measuring soil features. The system is used to measure the important parameters of soil such as moisture and PH value using sensors which is suitable for all types of soil. These soil sensors can be used at multilayers and multi points of the soil. The data collected is transmitted to the user's using GSM module. The AVR microcontroller is used to interface the sensors with the GSM module. By knowing the features of soil, the cultivation of crops can be made easier and efficient.

2. LITERATURE SURVEY

Author[1]Patrick M. Piper, Jacob S. Vogel, Matthew T. Fahrenkrug, Shannan J. McNamee, Quang N. Pham, Gregory C. Lewin. This paper presents an autonomous soil monitoring robot to monitor the features of soil thus expediting data collection and reducing labor. This system uses Steven's Hydra probe to measure the parameters. Hence this probe delivery can be used under certain depth of soil. This system does not provide any information about facing the obstacles. Navigation of this robot is done using GPS sensor and wheel encoders. However this robot has several disadvantages because of complex physical design, high cost of implementation,

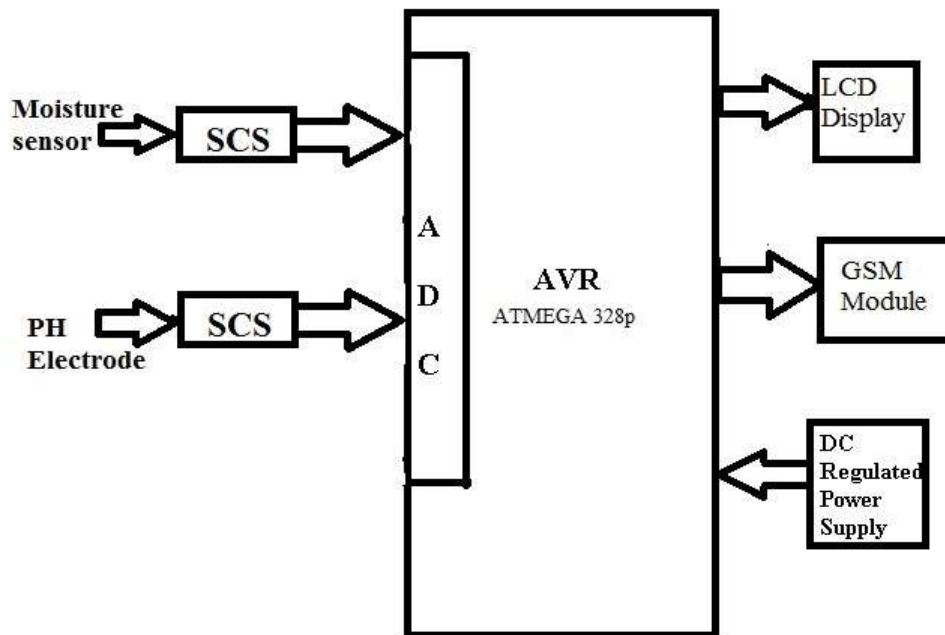
more weight and need of external memory for storage. For implementing this four-wheeled rover we need to incorporate a suspension design. Author [2] G. V. Satyanarayana, SD.Mazaruddin. This paper presents the soil monitoring system using wireless sensor networks. Here either GPRS or GSM technology is used as central node to measure the temperature, humidity and moisture in the soil. The sensed parameters are sent to ARM processor and then to Zigbee module. The user checks the information from the central node through the PC. This system can be used for all types of soil. This system is not portable, not suitable for all types of weather conditions and implementation is quite complex.

3. PROPOSED SYSTEM

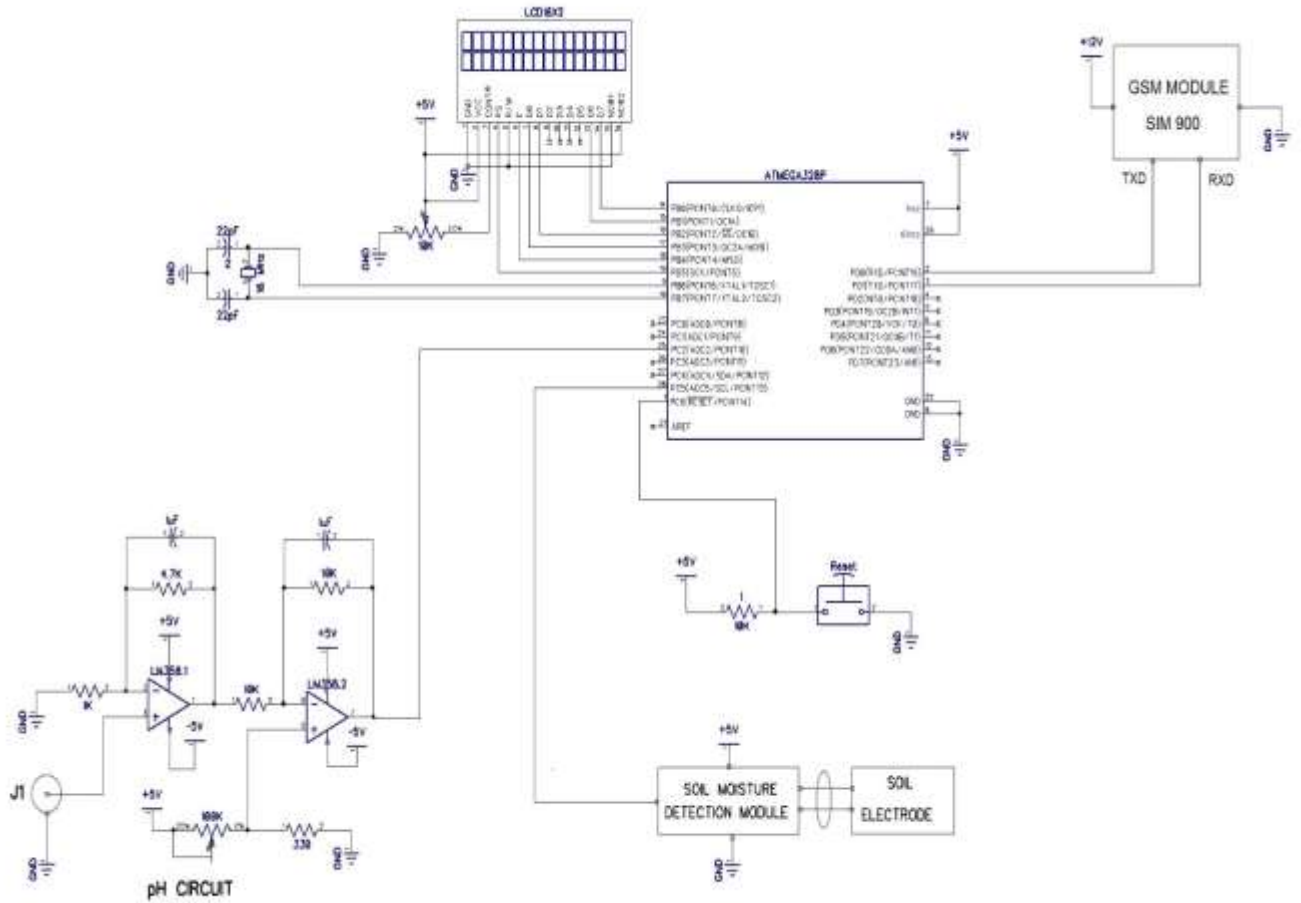
In this work we propose monitoring of various soil parameters using sensor networks. To overcome the problems caused by these expensive soil monitoring robots, a smart sensor based soil monitoring system have been proposed. This design replaces the probe system with the wireless sensor based detector which has to be buried underground. The various sensors used sense the soil and acquire data. This data is sent to mobile using GSM technology. Thus this system is economical, easy to implement and very much useful for farmers.

4. SYSTEM ARCHITECTURE

4.1 BLOCK DIAGRAM



4.2 circuit Diagram



Circuit Diagram- Smart sensor based soil monitoring system

5. SYSTEM REQUIREMENT SPECIFICATION

5.1 SOFTWARE REQUIREMENTS

- Arduino IDE
- Dip Trace

5.2 HARDWARE REQUIREMENTS

- AVR Microcontroller (ATmega328).
- Moisture Sensor
- LCD Display

- PH Electrode
- GSM Module

6. TECHNICAL SPECIFICATIONS

6.1 ADVANTAGES

- Reliable
- Economical System
- Detail Nature of Soil can be achieve

7. CONCLUSIONS

This approach for measuring the soil parameters is used for the efficient plant growth. The results obtained from the measurement have shown that the system performance is quite reliable and accurate. The important parameters of the soil such as moisture and PH value are checked by the respective sensors. The coding for all these sensors used is dumped in AVR microcontroller. The implementation is made easier thus this system is economic. The measured parameters are transmitted to the User using GSM. Each parameter is viewed by separate sensors.

8. ACKNOWLEDGEMENT

I take this opportunity to express my heart-felt gratitude to my guide, Prof.P.P.Chaudhari for his constant encouragement, able guidance and support throughout the course of this semester.

I take this opportunity to thank Head of Department, Department of Electronics and Telecommunication Engineering, Prof.D.P.Patil and express my gratitude towards my parents, friends for the completion of my work.

I sincerely thanks Prof.M.P.Ray, Principal, Sandip Institute of Engineering and Management, Nashik, for his advice and support during the course of my work.

9. REFERENCES

- [1] Patrick M. Piper, Jacob S. Vogel, Matthew T. Fahrenkrug, Shannan J. McNamee, Quang N. Pham and Gregory C. Lewin, "Designing an Autonomous Soil Monitoring Robot", IEEE Conference- 2015
- [2] Ke-Tao Chen, Hai-Hui Zhang, Ting-Ting Wu and Jin Hu, "Design of Monitoring System for Multilayer Soil Temperature and Moisture Based on WSN", IEEE Conference-2014
- [3] Prof C.H. Chavan and P.V Karande, "Wireless Monitoring of Soil Moisture, Temperature & Humidity Using Zigbee in Agriculture",IJETT-2014
- [4] Kay Smarsly, "Agricultural ecosystem monitoring based on autonomous sensor systems", IEEE Conference-2013
- [5] www.wikipidia.com
- [6] <http://www.atmel.com/devices/atmega328.aspx>