UNIVERSITY OF DAR ES SALAAM

COLLEGE OF INFORMATION AND COMMUNNICATION TECHNOLOGY (CoICT)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CS 498 FINAL YEAR PROJECT I

PROJECT TITLE: PLANT SOIL MOISTURE AND PH LEVEL NOTIFIER

Project Report in Partial Fulfilment for the Award of Bachelor of Science in Computer Engineering and Information Technology

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CHAPTER ONE: INTRODUCTION

1.0 Background

Plants growth depends on various factors including Soil moisture as well as Soil Ph. so as to ensure proper plant growth, it becomes difficult to monitor soil Ph. and moisture manually each time especially when location of where plants found is far away from the farmer.

Agriculture is defined as science or practice of farming, including cultivation of soil for the growth of crops and rearing of animals to provide food, wool and other products. Agriculture is important aspect for living beings since it forms the basis for food security, in order to get better crops, the most important thing that should be in land include accurate fertilizer, better irrigation facilities and best method of cultivation. Adequate amount of fertilizer can help plants to produce better yield and quantity to meet the needs of world economy that is raising need of food and its production.

Among problems facing Agriculture Industry in Tanzania is climatic changes, climatic change may destruct farmers plan towards irrigation the way he/she manage crops, if farmer plans to irrigate his/her crops after one week and his farm is located far from where he/she live, excessive sunlight may result to drying of plant. When there is rainfall and the farmer is not alerted about it he/she can waste time and cost for going to farm area so as to irrigate or supplying water at the farm.

There is need of automatic system that will notify the farmer about any climatic change, level of moisture and Ph. level in soil so as he/she can take required action and system should perform automatic control if necessary, towards yielding better crops. These actions are equipped by using microcontroller system from which it receives data from sensors which located on farm and send them to microcontroller which is linked with web app and GSM for providing notification and control mechanism. These systems are powered by Atmega328 microcontroller which is connected to Ph. sensor, moisture sensor, LCD display module, Rain sensor, wind sensor depending on type of irrigation, GSM module and web app for checking past records and controlling mechanism.

1.1 **Statement of the Problem**

Climatic change is one challenge facing agriculture industry in Tanzania, climatic change destroy farmers plan of managing his/her farm once he/she is far away from the farm, increase in temperature on the site would result into drying of crops once the farmer is not notified but if farmer is notified he/she should provide necessary action towards managing his/her farm.

Currently to know the state in the farm, farmer has to go physically to check, manage and control various items in farm so as to get better crops. The farmer can use weather location the place he lives to predict weather condition of the site if he lives near the farm but if farm is too far from where he lives, he can't predict weather condition, he supposed to go to site area and checking various parameters.

This project solves that issue by developing microcontroller-based system for notifying, monitoring and controlling various parameters on farm using sensors and SMS so as to get better crops, save costs and time.

1.2 Main Objective

The main object of this project is designing and implementing microcontroller-based system that notify, monitor and control soil and weather state in farm using sensors, SMS and web technology.

1.3 Specific Objectives

- To capture data by using sensors on soil and other weather states.
- To design electronic circuit for notifying, monitoring and controlling soil parameters.
- To simulate circuit.
- To integrate sensors, LCD, GSM and web with microcontroller.
- To display data records for certain time on web app.
- To control soil parameter by using GSM
- To notify user once some parameter changed above and below specific limit.
- To automatic control moisture in the soil.
- To display values of parameter in farm.
- To make a system that is understandable and easy to be used by farmers.

1.4 Project Significance

The system helps to save time and cost for the farmer who do not go to the farm frequently so as to supply water and regulate other parameter, farmer has to go to the farm if necessary, in few cases like pumps failure, water in tank has finished and regulation of Ph. which can't be controlled automatic.

1.5 Scope and Limitations

The system will notify, monitor and control weather condition in place where plant is cultivated to the farmer who perform food cultivation. At future times future there are other scope that can be used with this work to improve the efficiency and effectiveness of the system. The idea of using IOT for irrigation can be implemented with this system. Other activities in farming such as cattle management, fire detection and climate control can be introduced with this system.

- Limitation:
    - Control using SMS may delay to reach the user compared by the one performed by web app.
    - The system should be used in areas experiencing low amount of rainfall.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

This section includes review on researches and projects that are previously conducted and implemented related to Soil moisture and Ph. level notifier, on research done include the way previous projects implement and technology used on their implementation.

2.2 SMART AGRICULTURE TO MEASURE HUMIDITY, TEMPERATURE, MOISTURE, PH AND NUTRIENTS VALUES OF SOIL USING IoT

This system helps farmers to get required information and relative data to monitor the plant's growth by use of INTERNET OF THINGS (IoT) which connects different sensors, actuators and other embedded devices to provide quality crops based on soil nutrients level and its moisture content along with Ph. factor, also been maintained. Hence in this system all these parameters are detected and controlled by with help of micro controller. Humidity sensor used to detect the moisture content where colour sensor is used to determine the percentage of soil nutrients (N_2, P4 and K). it will analyse soil nutrients content present on soil at real time and Ph. sensor is used to determine the Ph. value of the soil. Monitoring of this to provide proper fertility to the soil depending upon the soil nutrients. GSM is used to display the information to the farmers. Thus, it reduces the growing of husk in terms of wastage and there by getting good quality and health crops.

2.3 PLANT MOISTURE AND Ph. SENSING ALARM USING 8051

This system is done by using 8051 microcontroller-based system that makes use of soil moisture sensor along with ph. value sensor to constantly check for these values. Plants need water as well as good soil (ph. rich) to ensure proper plant growth. It becomes difficult to monitor these things manually each time to ensure proper growth and any ignorance may lead to bad plant health or plant decay/death. The system microcontroller ensures the plant gets proper moisture and ph. by continuously monitoring for it. It also displays this on a display screen for user to monitor. Also, the system is equipped with an alarm which sounds a buzz in case the values fall below a certain limit which may be bad for plant health. Thus, the system ensures proper plant health using soil moisture and ph. sensing.

2.4 SOIL MOISTURE MONITORING SYSTEM USING WIRELESS SENSOR NETWORK

The response monitoring system measure the moisture of the soil, compare it with the desired values given by the user and generate alert if soil moisture goes below desired value. It helps in problems related to growing of crops in which irrigation is required at irregular interval. It is also helpful in monitoring of soil moisture in golf fields for fields. Irrigation water management practices could greatly benefit by the knowledge of moisture in the soil. To determine the soil moisture, we have designed and developed a nickel probes-based soil moisture sensor and a response monitoring system. By knowing the moisture value, we can estimate when to water and how much to water the fields so that there is no over-watering or wilting of crops. These practices will increase crop yield, improve quality of crops, conserve water resources, save energy, and decrease fertilizer supplies.

2.5 AUTOMATIC PLANT WATERING SYSTEM

This system considered to sense dryness of the soil and in the end switch on the electric pump to begin the supply of water and switch off the pump on every occasion enough water is provided. The Materials used are: Transistor 548, Resistor 1k, Variable resistor 47kΩ, Diode 1N4007, Relay 5v, LED, DC converter, Circuit board, Probes, AC water pump, Water reservoir. In this study, there is no real implementation it is only on circuit and information about how the system should work.

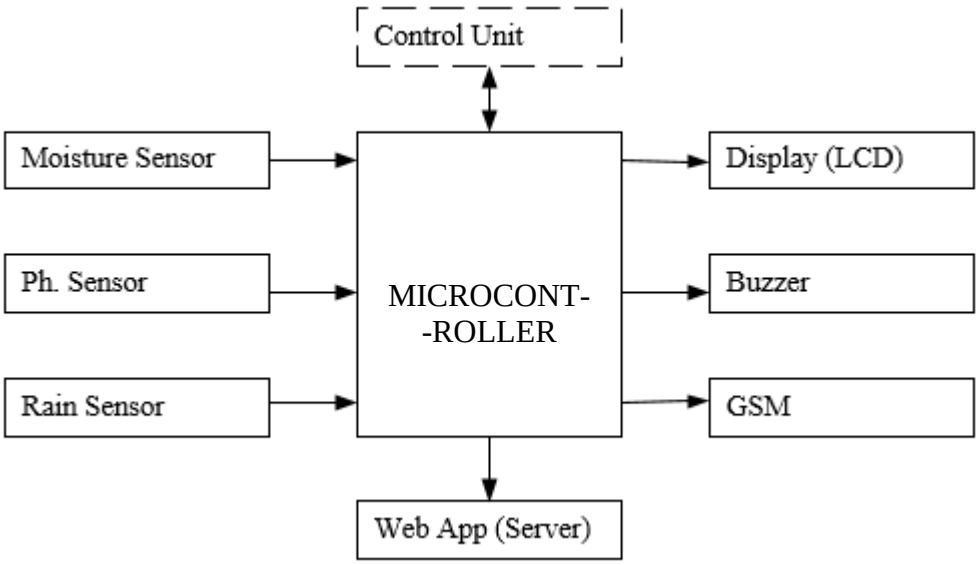
2.5 CONCLUSION

The project “Plant moisture and PH level Notifier” aims to sense and detect amount of moisture in soil depending on reference values set by the user, detect Ph. level in soil, sense rainfall and sense wind (if irrigation depends on wind) then sends data to Arduino microcontroller which is the link with GSM for sending notification by means of SMS to the user, Web page for managing and predicting weather state according to previous records, LCD display for displaying values for the one stay in the farm and Buzzer for equipping alarm mechanism on the farm once variation and moisture in soil vary.

CHAPTER 3: METHODOLOGY

3.1 INTRODUCTION

The complete system will be as illustrated on block diagram below;



PH SENSOR:

- Used for recording value of PH of soil and send it to micro controller.

MOISTURE SENSOR:

- For measuring amount of moisture in soil and send value to micro controller.

RAIN SENSOR:

- For checking whether there is rain or not on specific day.

WEB APP:

- For receiving data from microcontroller and manipulating them.

GSM:

- For sending SMS to the user, performing control action and connecting to internet.

BUZZER:

- For alarm when there is abnormal variation of parameters.

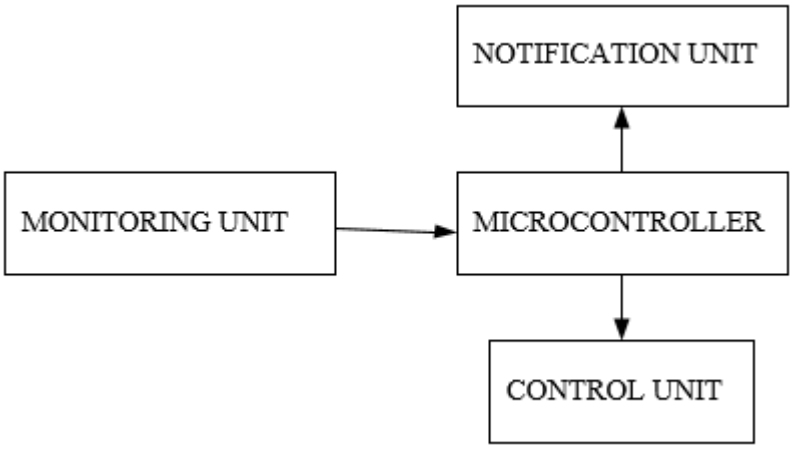
DISPLAY (LCD):

- For displaying values in the farm.

CONTROL UNIT:

- Systems which are responsible on control actions.

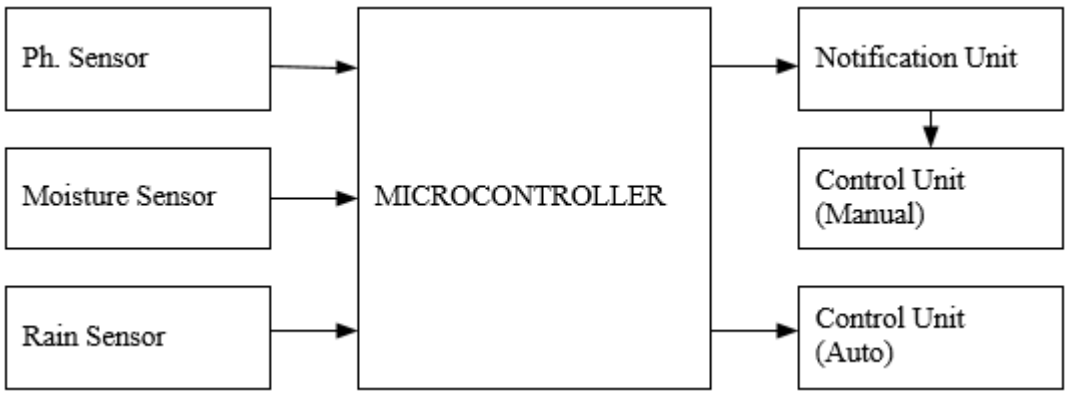
System consists of monitoring part, notification part and control part as described in figure below;



3.1.1 MONITORING UNIT

This part involves sensing process which is done by sensors (Rain sensor, Ph. sensor, Moisture sensor) and send data to microcontroller, through comparator circuit microcomputer will compare values sent by sensor with reference value and determine action to be followed.

After passing on comparator circuit those values which goes beyond reference values signal is sent to notification unit and control unit (Auto), user can also perform control after receiving notification as shown in figure below;

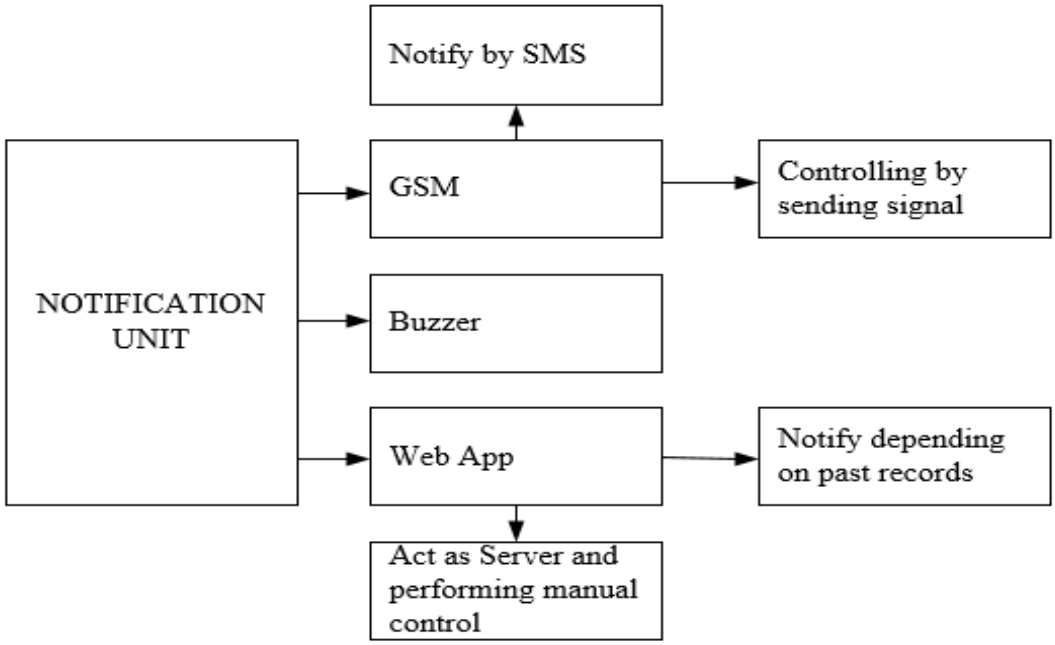


3.1.2 NOTIFICATION UNIT

Notification unit include devices and processes of performing notification, if values sent by sensors id beyond reference value signals are sent to notification unit which consists GSM for

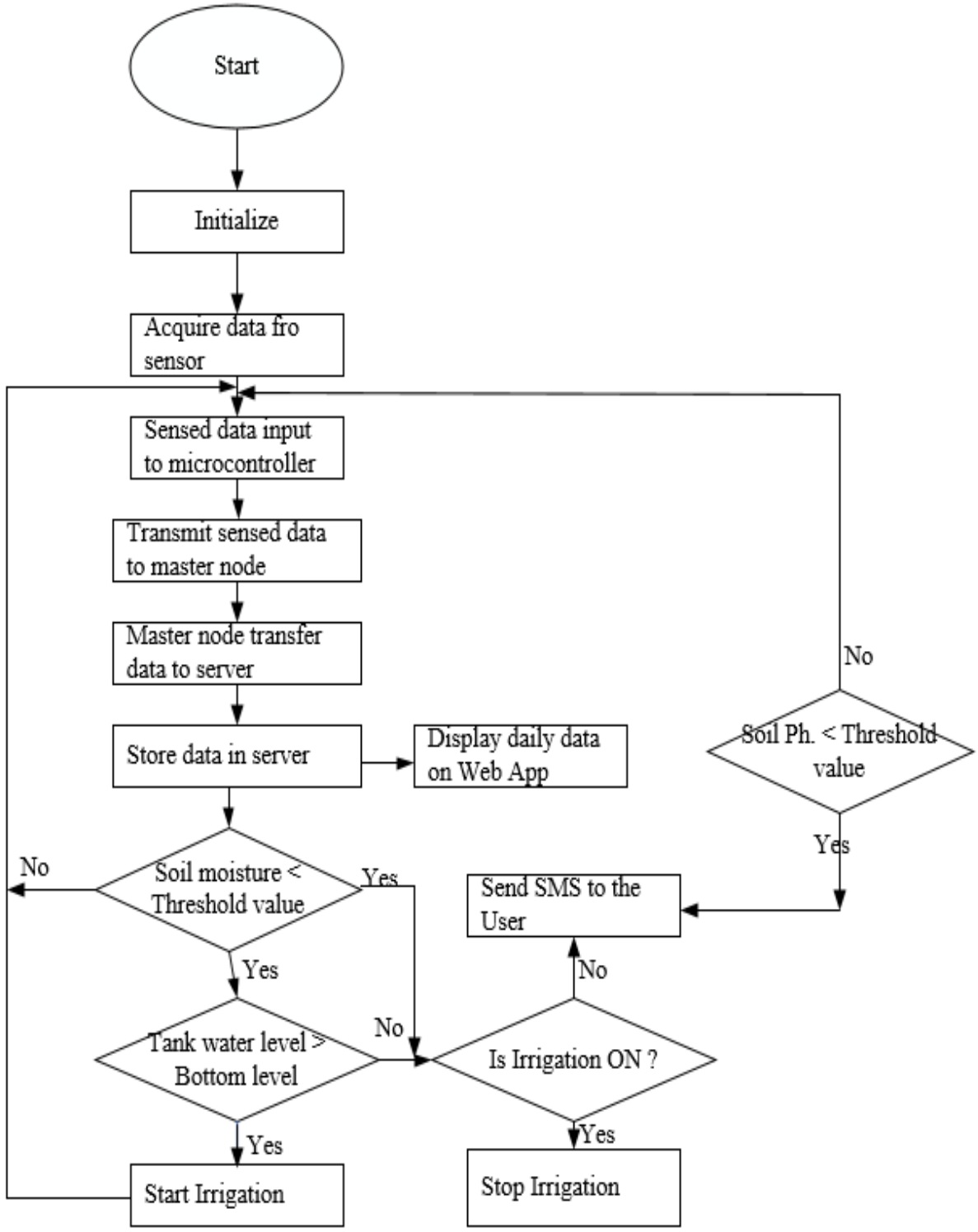
performing two functions, notifying and controlling mechanism. Other part on notification unit is alarm system which is done through buzzer once measured values goes beyond reference values, and last part is Web App which used as notification and control device.

Processes are as illustrated below:



3.2 PROCESS FLOW CHART

The process flow chart is as illustrated below:



REFERENCES.

International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249 – 8958 (Online), Volume-9 Issue-5, June 2020

https://www.researchgate.net/publication/276417195_DESIGN_AND_DEVELOPMENT_OF_SOIL_MOISTURE_SENSOR_AND_RESPONSE_MONITORING_SYSTEM