Remote Monitoring and Control System with Automatic Irrigation System and Soil Monitoring System using GSM-Bluetooth and NPK Nutrients detection in Soil for cotton crop

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Abstract - From the past few years, automatic irrigation system has seen a steep growth in terms of technology. At present the simple and economical technology address the key issues in irrigation .This paper gives us a clear view of the systems that are based on existing technologies and proposed an economical and an automatic irrigation system that is generic , which is based on wireless sensors using GSM-Bluetooth as the irrigation system controller and we use an Arduino soil moisture sensor for the automatic measurement of the moisture content of the soil.measurement of N (nitrogen), P (phosphorus) and K (potassium) contents of soil is mandatory to decide how much extra nutrients are to be added in the soil to increase crop fertility. This improves the quality of the soil which in turn yields a good quality crop. In the work fiber optic based color sensor has been constructed to determine N, P, and K values in the soil sample. It determines the NPK values of the soil as high low or medium. The sensor probe with proper signaling circuits is built to detect the less component of the soil. Aim is to develop a wireless three level controlled smart irrigation system to provide irrigation system which is automatic for the plants which help in saving water and money. The main objective is to apply the system for improvement of health of the soil and hence the plant via NPK sensors.

*Keywords***:** *arduino, Bluetooth, GSM, soil moisture sensor, cotton, NPK detection*

1. INTRODUCTION

Irrigation is known to be the duplicate watering for land or soil.this process can be used for the cultivation of agricultural crop when there is no proper rainfall in the district the crop is being cultivated in.this reduces the manual work and makes it easier for the people by reducing their work.This is done with wireless moisture sensors that communicate with the smart irrigation controls and help inform the system whether or not the landscape is in need of water.In today's world, everything is about 'smart' technology, we all pile our lives with smart devices that range from smart phones ,smart watches, smart sunglasses to even smart bathrooms.The opportunity to save dramatically, have better control and be more eco-friendly while maintaining a lush and beautiful landscape are just a few of the advantages a smart irrigation system provides and would make a wonderful addition to any home.All this advancement is for our best as smart devices decrease waste as increase efficiency that maximizes capabilities while minimizing the cost for us. An automated irrigation system is necessary for our homes because it keeps the landscape properly irrigated on a constant and automated schedule so that a homeowner doesn't have to keep a constant check on when the crop has to be irrigated. The irrigation now has gotten to be more sophisticated and more economical with smart irrigation techniques like this. An automated irrigation system was previously based on the Bluetooth system to use in the agricultural crops. The Bluetooth acts as a wireless radio communication between the farmer's smartphone .the Bluetooth is preferred widely between the farmers because it is cost efficient and most of the farmers can afford tithe GSM here is used to remotely monitor and control the devices via the farmer's smartphone by sending and receiving SMS via the GSM network.Bluetooth is used for the same purpose but it is limited to a range of few meters say about 30 metres.Bluetooth can be used for communicating with the devices thereby eliminating the network usage cost. The motor pumps and fans are controlled by the sensor and the other appliances are controlled by the Bluetooth and GSM network via SMS.The cotton plant needs Nitrogen (N) at quantity twice when compared to Phosphorus (P) and Potassium (K). in a ratio of 20-10-10 fertilizer. A common fertilization schedule applied by many people who grow cotton is adding 200 kg of N-P-K 20-10-10 per hectare Cotton is one of the most important crop of India.Cotton in India provides jobs to about 6 lakh farmers and about 40 - 50 million people have jobs in cotton trade and its processing.

Crop Season

The cotton sowing season in india differs with time and is probably between early april or may in the northern parts of India and is ususally late in South India depending on the monsoon season in India. Cotton is a Kharif crop in the major parts of the county Punjab, Haryana, Rajasthan, Uttar Pradesh, Madhya Pradesh, Gujarat, Maharashtra and parts of Andhra Pradesh and Karnataka. In summer sowings in Tamil Nadu are done during February-March. The plantation of cotton in the rice fields of Andhra Pradesh and Tamil Nadu extent from the second half of December to the middle of January.

Irrigation Scheduling

Depending on the fact about the climate and the crop period cotton requires between 70mm and 1200 mm.the water need is less during the starting 60 to 70 days.cotton is usually irrigated through cotton furrow or alternate furrow method which saves water.In recent times drip irrigation is common in South india now a days and in low water retention soils between 4 and 13 light irrigations should be required.

2. PROPOSED SYSTEM

In the system that is proposed here we use GSM and Bluetooth that is interfaced with the main controller chip. We also use the soil monitoring system that is an incorporation of a controller, display, keypad, buzzer and moisture sensor board. This method helps improve the quality of the soil which in turn yields a good quality crop. The present work fiber optic based color sensor has been developed to determine N, P, and K values of the soil sample. In this the colorimetric measurement of aqueous solution of soil is carried out. The color sensor is based on the principle of absorption which is absorption of color by solution. The colour sensor helps in determining the N, P and K amounts as high, medium, low, or none.

2.1 TEMPERATURE SENSOR

Temperature sensor The LM35 series are precision integrated-circuit temperature sensors of a small size, which has the output voltage linearly proportional to the Celsius (Centigrade) temperature. It is low cost and small size sensor. Its temperature range is -55° to +150°C

## 2.2 SOIL MONITORING SYSTEM

The system is fusion of a controller, power supply unit, LCD display, keypad, buzzer, LED indicators and moisture sensor. The central part of system consists of PIC18F452 microcontroller which is powered up by 5V power supply.Power supply circuit is made up of various elements ,which are: a crystal oscillator of 4MHz clock frequency, a reset switch, a LED indicator and two capacitors of 22pF each which are used to filter the noise. PIC microcontroller is favored over other controllers for its various bright features such as its high performance.

2.3 DETECTION OF NPK NUTRIENTS IN SOIL
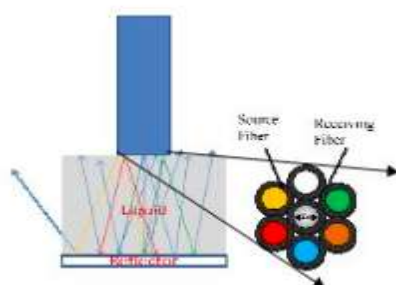
A good soil testing system is one that finds out the existing soil nutrients and one that provides us with the nutrient needs of the soil. The main objective of the optical NPK sensors is based on interaction between incident light and soil surface properties, such that the characteristics of the reflected light will differ due to the soil's physical and chemical properties. Laser induced Florescence Spectroscopy or Near Infrared Spectroscopy. These optical methods can be trusted to be giving us precise values, but they are time consuming and are high of cost.

2.4 SYSTEM ARCHITECTURE
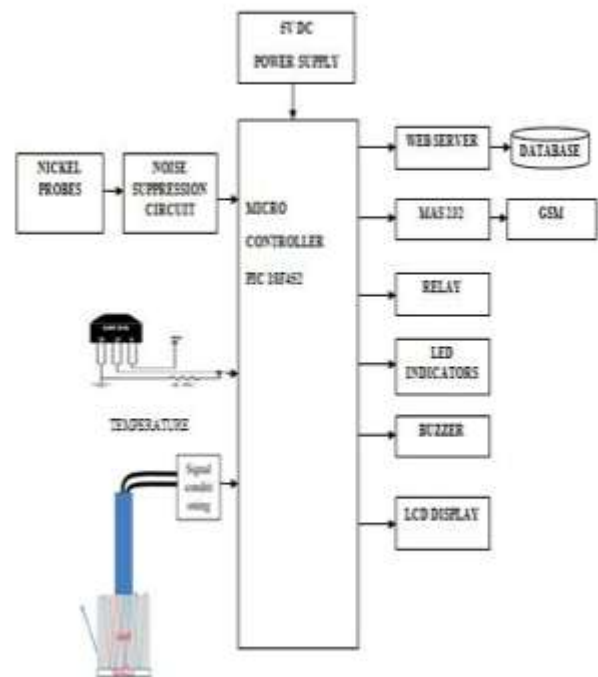
3. CONCLUSIONS

The advantage of using this method is to reduce human involvement and still ensure proper irrigation. The project uses an 8051 series microcontroller which it receives the input signal of varying moisture condition of the soil .The GSM here is used to remotely monitor and control the devices via the farmer's smartphone by sending and receiving SMS via the GSM network. Bluetooth is used for the same purpose but it is limited to a range of few meters say about 30 metres. Along with the temperature and fertilizers for cotton the project is very effective for the farmers .In the project fiber optic based color sensor has been constructed to determine N, P, and K values in the soil sample. It determines the NPK values of the soil as high low or medium.The sensor probe with proper signaling circuits is built to detect the less component of the soil. The aim of the project is to develop a wireless three level controlled smart irrigation system to provide irrigation system which is automatic for the plants which help in saving water and money. All this advancement is

for our best as smart devices decrease waste as increase efficiency that maximizes capabilities while minimizing the cost for us. Thus, the project brings in all the requirements for agriculture of cotton crop.

It describes about the fertilizers added in the soil. One can properly select the fertilizer quantity to be used for reducing the deficiency in the soil at a particular field.The main aim is to detect moisture humidity and temperature using sensors. Which is also cost efficient and time consuming is less.The system helps minimizing the overall watering and crops production cost .This system used for cultivation of agricultural products and plants in the area where there is water scarcity. It is adjustable according to the changing environment. we have develop a wireless three level controlled smart irrigation system to provide irrigation system which is automatic for the plants which help in saving water and money. Thus, by using this project we can predict the agricultural conditions.

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