**A Novel Model for Optimization of Resource  
Utilization in Smart Agriculture System  
Using IoT (SMAIoT)**

**Alternative Title:**

IoT based Smart Farming Future Agriculture

**Aim:**

The mainstay of the project is to monitor the different values of the soil and to correct the value by adding necessary ingredients to achieve the desired value for crops.

**Introduction:**

In this concept use onsite sensors that sense different parameters, such as soil moisture, air moisture, air quality, air temperature, soil temperature, solar radiation, wind speed, wind direction, rain detection, etc. and send all data to their server or cloud for processing . use this data for crop irrigation, fertilization, and pesticide usage prediction, which produce good quality yield at a low cost. One of them is smart irrigation, which processes real-time sensors data from fields and acts accordingly to save maximum water during irrigation. The second module is smart fertigation, which calculates fertilizers requirement and injects, it during irrigation in an optimized manner. All modules have interfaces to communicate with each other and use other data. Many controllers, such as Arduino, ESP32 cam and NodeMCU, will use to provide interfacing with different sensors and actuators. Soil pH is very vital for all life on agriculture. For a farmer, knowing how much of soil pH (Potential of Hydrogen) is very important. By detecting of the soil pH, it will be easier for a farmer to decide for certain agriculture plants.one of the important aims at develop an automatic soil pH detecting system for Farmer to visualize the soil pH demand and pH sensor will decide also whether or not to drain nutrients. IoT helps to accessinformation and make major decision making process bygetting different values from sensors. The main objective of this paper is to build a tool that allowsreal-time control of the pH level of a specific solution or productusing the Internet of Things (IoT) concept. Specifically, this tool is made of an Esp node that is connected to both a designedmobile app and a physical device using the internet. This appallows the user to choose either automatic or manualcontrol modes.

**Existing System:**

Existing System has many protocol/message formats available for commercially available IoT sensors. Different vendors/solution providers use different protocols to communicate. Therefore, it is difficult to achieve interoperability. Auto fertigation system costs are too high even for implementing in small farms. Then manually farmer fertigation the minerals (like that NPK)f or the soil. The manual operation take more time and consume the man power high and then using arduino and Gsm module used to communicate between former and controller.

**Proposed System:**

In order to control and monitoring system is designed and implemented using IoTconcept. The system consists of which includes all sensors, PCB, MCU with communication hardware, and low-level protocols. Arduino, Esp 32 cam, Node MCU, different sensors used in this framework with their controllers, actuators, etc. which is the control element in the system which gets the current value .In the auto-controlling mode, thesystem will behave as a feedback control scheme where theuser will be requested to specify the desired pH value. If thevalue of the pH is changed, due to an external disturbance,pumps will inject more of the acidic or alkaline solution asneeded. The quantity added will be based on the readings ofthe sensor to fix the value .Besides, if the user selects the manual control status, he shouldset the amounts of acidic and alkaline solutions in eachpumping process. Accordingly, if the user chooses the acidicsolution button, the pump is going to pump a specific amountof the acidic solution for one time only. The ESP32cam also collects other data for monitoring and bird/animal scaring.

**BLOCK DIAGRAM**

IoT server and monitoring

ESP 8266 -12E

Lora /NRF

Lora /NRF

Mobile app

Rain sensor

Temperature and air sensor

Arduino mega

Soil moisture sensor

Pressure

Flow sensor

Light sensor

PH sensor

PC

Ultrasonic

Power supply board

Relayboards and actuators

**Requirements:**

**Hardware Requirements:**

* **Arduino mega**
* **ESP8266**
* **ESP 32 cam**
* **Ultrasonic sensor**
* **Adapters**
* **Ph sensor**
* **Rain sensor**
* **Lcd display**
* **Gas sensor**
* **Soil moisture sensor**
* **Temperature sensor**
* **Relay channel 4**
* **Power supply board**
* **Dc water pump-3**
* **Water Flow sensor**

**Software Requirements:**

* **Language: c, c++**
* **Compiler: arduino IDE**

**Conclusion:**

This article contains the resultof the smart irrigation module, which is proven best thanall other irrigation methods. In future work, we will implement the proposed modules on real farm fields to improveproductivity with optimal resource utilization and validate itwith simulated output, whichshows the effectiveness of thisframework in the agriculture domain.