

Smart Agriculture and Irrigation Monitoring System using IoT

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Abstract - IOT is a shared Network of objects where these objects interact through Internet. One of the important applications of IOT is Smart Agriculture. Smart Agriculture reduces wastage of water, fertilizers and increases the crop yield. Here a system is proposed to monitor crop-field using sensors for soil moisture, humidity and temperature. By monitoring these parameters the irrigation system can be automated if soil moisture is low. **Key Words:** Soil moisture sensor, IOT, Cloud networking. Internet of Things (IoT) plays a crucial role in smart agriculture. Smart farming is an emerging concept, because IoT sensors capable of providing information about their agriculture fields. The paper aims making use of evolving technology i.e. IoT and smart agriculture using automation. Monitoring environmental factors is the major factor to improve the yield of the efficient crops. The feature of this paper includes monitoring temperature and humidity in agricultural field through sensors using CC3200 single chip. Agriculture is the primary occupation in our country for ages. But now due to migration of people from rural to urban there is hindrance in agriculture. So to overcome this problem we go for smart agriculture techniques using IOT. This project includes various features like GPS based remote controlled monitoring, moisture & temperature sensing, intruders scaring, security, leaf wetness and proper irrigation facilities. It makes use of wireless sensor networks for noting the soil properties and environment factors continuously. Various sensor nodes are deployed at different locations in the farm. Controlling these parameters are through any remote device or internet services and the operations are performed by interfacing sensors, Wi-Fi, camera with microcontroller. This concept is created as a product and given to the capture images and send that pictures through MMS to farmers mobile using Wi-Fi.

Key Words: Sensors, GSM, Motor, pic controller, IOT

1. INTRODUCTION

Today due to global warming and the climate change we are facing with lot of environmental problems like unexpected floods, droughts, hurricanes, thunderstorms, soil erosions, water scarcity, etc. So the effective management of natural resources becomes very crucial. Now a day, there is limited manpower available to do farming related

activities. So automation of farming tasks is being done by smart devices connected to one another through the concept of internet of things. In this paper a smart irrigation system is introduced which can work totally automatically without any intervention of the farmer. Most of the times farmers are unaware about what fertilizers are to be used for higher crop yields.

The Agriculture Parameters are utilizing an IOT Technology and system availability that draw in these objects to assemble and deal information. "The IOT enables things selected recognized or potentially forced remotely crosswise over completed the process of existing configuration, manufacture open gateways for all the additional obvious merge of the substantial earth into PC based frameworks, in addition to acknowledging overhauled capacity, precision and cash interconnected favoured stance. Precisely when IOT is extended with sensors and actuators, the improvement modify into an occasion of the all the extra wide category of electronic physical structures, which in like manner incorporates headways, for instance, clever grids, splendid homes, canny moving and smart urban groups [1]. All is especially specific through its introduced figuring configuration anyway can interoperate within the current.

As the world is trending into new technologies and implementations it is a necessary goal to trend up in agriculture also. Many researches are done in the field of agriculture. Most projects signify the use of wireless sensor network collect data from different sensors deployed at various nodes and send it through the wireless protocol. The collected data provide the information about the various environmental factors. Monitoring the environmental factors is not the complete solution to increase the yield of crops. There are number of other factors that decrease the productivity to a greater extent. Hence automation must be implemented in agriculture to overcome these problems. So, in order to provide solution to all such problems, it is necessary to develop an integrated system which will take care of all factors affecting the productivity in every stage. But complete automation in agriculture is not achieved due to various issues. Though it is implemented in the research level it is not given to the farmers as a product to get benefitted from the resources. Hence this paper deals about developing smart agriculture using IOT and given to the farmers.

2. LITERATURE SURVEY

The existing method and one of the oldest ways in agriculture is the manual method of checking the parameters. In this method the farmers themselves verify all the parameters and calculate the readings. [1]It focuses on developing devices and tools to manage, display and alert the users using the advantages of a wireless sensor network system. [2]It aims at making agriculture smart using automation and IoT technologies. The highlighting features are smart GPS based remote controlled robot to perform tasks like weeding, spraying, moisture sensing, human detection and keeping vigilance. [3]The cloud computing devices that can create a whole computing system from sensors to tools that observe data from agricultural field images and from human actors on the ground and accurately feed the data into the repositories along with the location as GPS coordinates.[4]This idea proposes a novel methodology for smart farming by linking a smart sensing system and smart irrigator system through wireless communication technology.[5]It proposes a low cost and efficient wireless sensor network technique to acquire the soil moisture and temperature from various location of farm and as per the need of crop controller to take the decision whether the irrigation is enabled or not.[6]It proposes an idea about how automated irrigation system was developed to optimize water use for agricultural crops. In addition, a gateway unit handles sensor information.[7]The atmospheric conditions are monitored and controlled online by using Ethernet IEEE 802.3.The partial root zone drying process can be implemented to a maximum extent.[8]It is designed for IoT based monitoring system to analyze crop environment and the method to improve the efficiency of decision making by analyzing harvest statistics.[9]In this paper image processing is used as a tool to monitor the diseases on fruits during farming, right from plantation to harvesting. The variations are seen in color, texture and morphology. [10]In this paper, greenhouse is a building in which plants are grown in closed environment. It is used to maintain the optimal conditions of the environment, greenhouse management and data acquisition. The scenario of decreasing water tables, drying up of rivers and tanks, unpredictable environment present an urgent need of proper utilization of water. To cope up with this use of temperature and moisture sensors at suitable locations for monitoring of crops is implemented in.

An algorithm developed with threshold values of temperature and soil moisture can be programmed into micro controller based gateway to control water quantity. The system can be powered by Photo voltaic panels and can have duplex communication link based on cellular – Internet

interface that allow data inspection and irrigation scheduling to be programmed through web page. The technological development in open source software and hardware make it easy to develop the device which can make better monitoring and wireless sensor network made it possible to use in monitoring and control of green house parameter in precision agriculture. Ayush Kumar and al utilized IoT and picture handling to locate the supplement and mineral insufficiencies that influence the yield development.

3. SYSTEM OVERVIEW

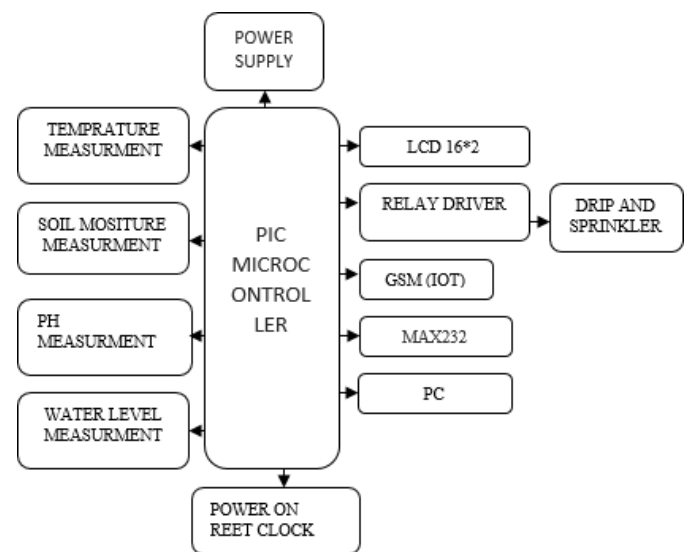


Figure: Block diagram

In the field section, various sensors are deployed in the field like temperature sensor, moisture sensor and PIR sensor. The data collected from these sensors are connected to the microcontroller through RS232. In control section, the received data is verified with the threshold values. If the data exceeds the threshold value the buzzer is switched ON and the LED starts to blink. This alarm is sent as a message to the farmer and automatically the power is switched OFF after sensing. The values are generated in the web page and the farmer gets the detailed description of the values. In manual mode, the user has to switch ON and OFF the microcontroller by pressing the button in the Android Application developed. This is done with the help of GSM Module.

Algorithm

A. Algorithm of parameter measurement system

- Step1:- start
- Step2 :- initilzed LCD display and GSM
- Step3:- water level measurement also temperature, humidity is sensed.
- Step4 :-soil moisture is sensed

Step5:- Ph level is sensed

B Algorithm of measurement for level of water in tank

Step1:- start

Step2:- level of water in tank is sensed

Step3:- If water level is low then motor is ON

C Algorithm of automatic dripping and sprinkler the water

Step1:- Start

Step2:- Temperature and humidity sensed

Step3:- It decides dripping of water or sprinkle the water

D Algorithm of automatic dripping of fertilizer

Step1:- start

Step2:- Ph value is sensed

Step3 :- According to ph value it decides fertilizer is to be used

Step4:- Drip the

Result And Discussion



Figure. Output displayed on Screen

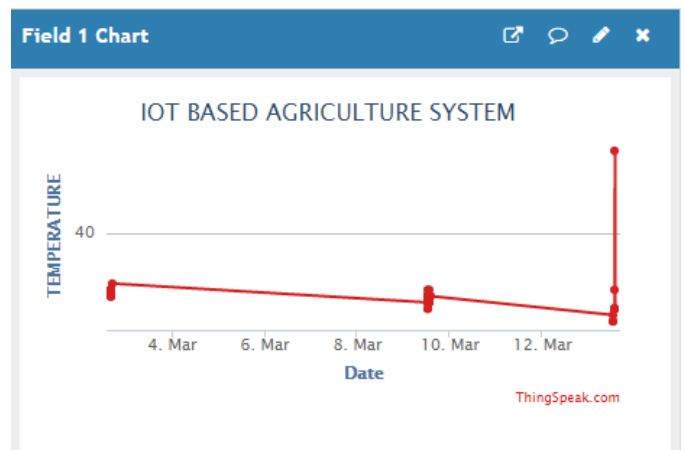
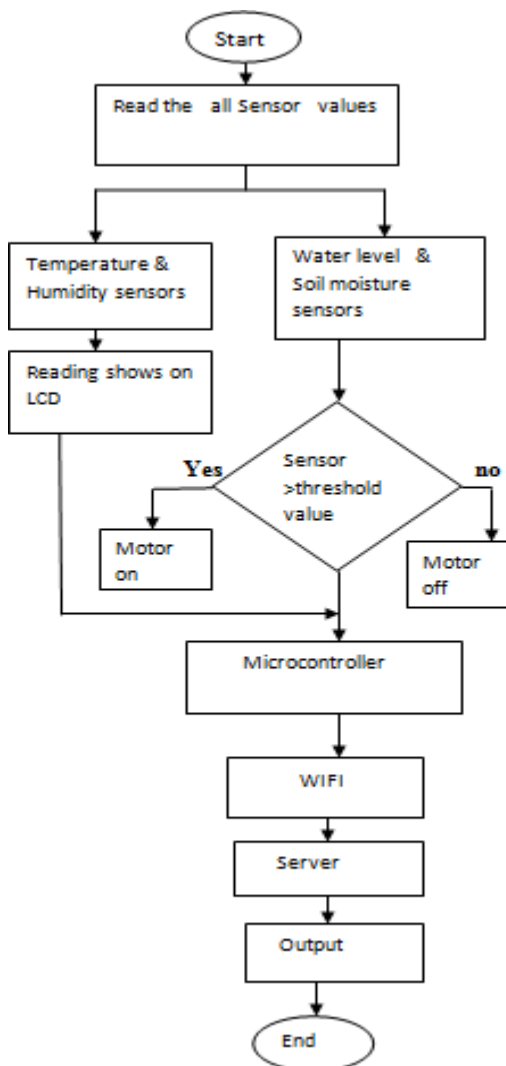


Chart -1: Temperature Measurement

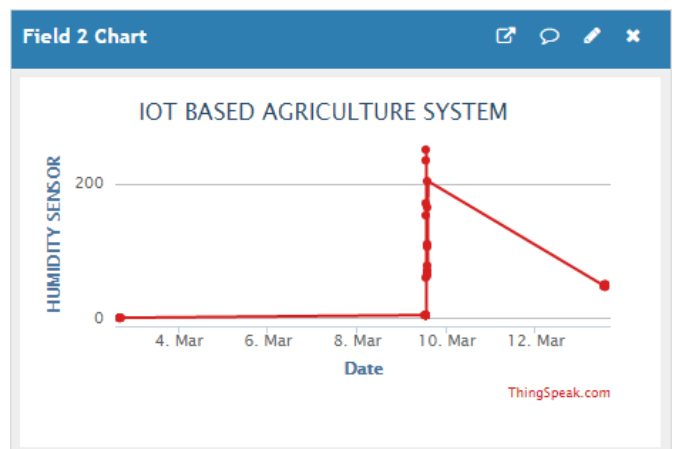


Chart-2: Humidity Measurement

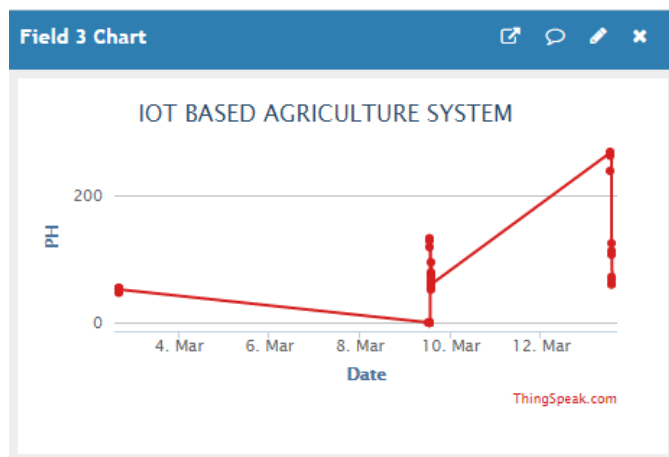


Chart-3: pH Measurement

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4. CONCLUSION

The sensors are successfully interfaced with PIC Microcontroller and wireless communication is achieved. All observations and experimental tests prove that this project is a complete solution to the field activities irrigation problems. Implementation of such a system in the field can definitely help to improve the yield of the crops and aids to manage the water resources effectively reducing the wastage.

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