Survelliance and Controlling of Smart Agriculture System using IOT

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Abstract – Now-a-days agriculture is being automated in many ways as per the requirement. As there is need of automation in farms due to decrease in the strength of the farmers working in day by day life. The main reason for the agriculture farms is automated is because of the unseasonal rains, soil erosion, attack of the animals. The automation of agriculture can be done using IOT (Internet of things) with the help of sensors and RFID (Radio Frequency Identification) tags and readers as IOT is the most evolving technology in recent days. In this proposed system, helps farmers by providing various sensors like motion, image, gas (particularly methane), soil moisture sensors that sense the various parameters of the field. In addition, based on soil moisture values sensed, the motor will be ON/OFF as per the requirement and if any sensors captures any anomaly then an SMS is sent to the farmers mobile and an appropriate action is taken.

Index Terms – Agriculture, IOT, RFID.

1. INTRODUCTION

Agriculture plays the main role for the survival of a world. India is the sixth largest exporter of agricultural products worldwide. Many farmers are being threatened by the climate of not having rains, soil erosion, urbanisation for the crops then the crop has to die. So, a automated agriculture farm have to be owned by each farmer who have a cropland. Automation in agriculture helps the farmer in every way the farmer needs. The irrigated land is more used than a rain fed cropland. As the population is increasing day by day there is a need of using the water resources in a effective way then the water can be stored for the future use. This can be achieved by using IOT (Internet Of Things). IOT is a combination of sensors and a software to transfer the collected data by the sensors.

The sensors used in the development of a farm is mainly soil moisture, pH, humidity, temperature, etc., and in addition to these sensors, RIFD tags are used for the connectivity between the nodes which consists of sensors. Therefore, the water, health of the plant is to be in good condition for the best yield of the farm. In order to do it for agriculture we use sensors for the smart irrigation of the crop land. The detailed outline of the automation of the agriculture farm is explained in the literature survey, proposed system, implementation in which the model is the discussed, its corresponding results discussion and finally, the conclusion.

2. RELATED WORK

2.1.K.A. Patil and N.R. Kale proposed a paper in which the system consists of wireless and internet communications such as ubi sense mote and wingz (zigbee technology) to transmit the information of the farm to the farmer through SMS .

2.2.Soumil Heble, Ajay Kumar, K.V.V. Durga Prasad, Soumay Samirana,P.Rajyalaksmi, U.B.Desai proposed a paper in which the system has soil moisture, temperature,carbon dioxide concentration,humidity,illuminance and solar irradiance sensors to monitor the status of the farm .

2.3V.R.Balaji and M.Sudha proposed a paper in which the system derives power from sunlight using photo voltaic cells and the system doesn't uses electricity. The system uses soil moisture to sense the values and the motor acts according to the sensed values.

2.4.Mahammad Shareef Mekala proposed a system which consists of wireless and sensor network technologies to build a sustainable smart agriculture with cloud computing using IOT.The sensors used for this system are temperature,soil moisture and fertility.

3. PROPOSED MODELLING

The proposed consists of sensors like soil moisture, motion(PIR), gas(methane) and image sensors which are connected to the Arduino through wifi module.The description of the parts are given below:

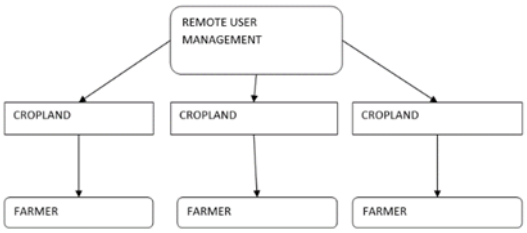

Figure-1:System Architecture

3.1.Arduino Uno: The board is equipped with sets of digital and analog input/output pins .The Arduino board may be interfaced

to various expansion boards and other circuits such as soil moisture, temperature, motion, humidity, image, proximity and gas sensors. It consists of a software via a type B USB cable. It retrieves the values from the sensors and transmits the sensed values to the farmer through SMS.

3.2.Soil moisture sensor:Soil moisture sensor is the most important sensor used for measuring the volumetric water content in soil .It help farmers to manage their water resources more efficiently . With the help of soil moisture conditions on their fields, farmers haves a knowledge of much water to be spent on the crop, they are also able to increase yields and the quality of the crop can be improved by managing resources according to soil moisture during critical plant growth stages

3.3.Gas sensor(methane MQ-5):The gas sensor particularly detects the presence of methane in the area.The sensor determines the gases present in the air with the help of their unique breakdown voltages and the concentration the particular gas is determined the current discharge of the sensor .

3.4.Motion sensor(PIR SENSOR): Passive Infrared sensor is an electronic sensor that measures infrared light emitted from objects in the field.It detects changes in the amount of IR radiation striking upon it ,if there is any change in the temperature and surface characteristics of the objects present in the range of the sensor.

3.5.Image sensor(OV7670 sensor):

The OV767O sensor is a low voltage CMOS image sensor that allows the functionality of a single-chip VGA camera and image processor in a small footprint package. The sensorgives full-frame, sub-sampled or windowed 8-bit images in a broad range of formats, managed through the Serial Camera Control Bus (SCCB) interface.It can operate with complete user control over image quality, formatting and output data transfer.

3.6.Wifi module(ESP8266):The module provides microcontrollers to connect to a Wifi network and establish connections to send the data sensed by the sensors such as soil moisture,humidity , pH,gas and temperature sensors.It has a maximum working voltage of 3.6V.It has a Inter Integrated Interface and Serial PheripheralInterface of serial communication protocol.

The system helps in keeping the moisture content in check and notify when a plant is infected or a poisonous gas is within its range. In our system Arduino works as the core part of the system. It process the program saved in it and the ESP8266 is responsible for the communication between Arduino and web page gateway. Soil moisture sensor sends the moisture content in soil. So, that we can give adequate water to plant. Image sensor is used to sense the condition of the plants. It sends the image of the plant to users mobile twice a month so that user can check the condition of plant without the need of going to field. It has motion sensor and gas sensor to detect the activity of motion and the poisonous gases in the plant range. If an anomaly is detected using sensors it sends information to the users mobile through the ESP8266 of Arduino.

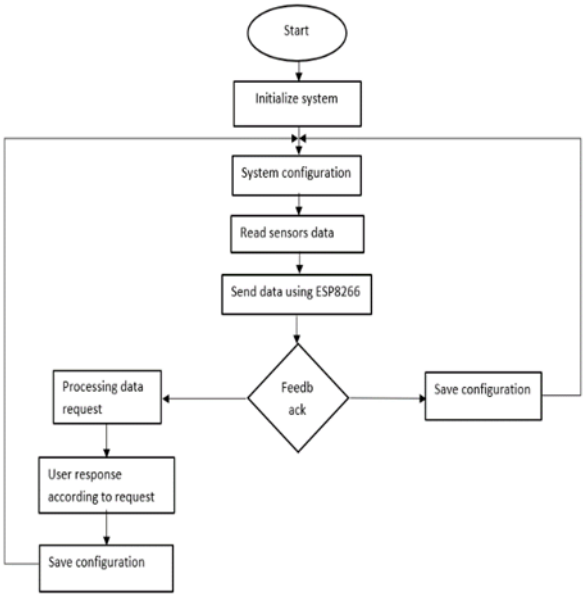

Figure-2:Flow Chart of the system

The algorithm used in the system are for the four sensors.They are:

Step-1:Start the system.

Step-2:Configuration of the modules begin.

Step-3:Sense the values from the sensors of the system.

Step-4:Feedback the system with the appropriate actions based on the sensed values.

Step-5:Stop the system.

In agriculture to get best results we need to have soil with good moisture content and environmental conditions. In this system soil moisture sensor collects soil data and sends it to Arduino board. Arduino process the data and checks whether the moisture value is below set limit. If it is below set limit it sends instruction to motor to turn ON for supply of water to crop and turns off after moisture in soil reaches the set limit. It also sends a notification to user when the motor is turned on and off. Other than soil moisture sensor there is image sensor, gas and motion sensor. Image sensor captures the image of the plant send it to user so that they can see the growth of the plant and check whether the plant is in perfect condition. If the is infected we can note the symptoms of plant and can find solution. Dangerous gases mainly methane from industries is poisonous for growth of plants so gas sensor is used to sense the various gases in air. It sense the gases through catalytic oxidation and

sends the data to Arduino. The data is processed and if harmful gases are present in the air it immediately notifies the user so that they can take necessary precautions. Motion sensor detects for the activity like rats and some other animals which feed on plants. If the motion is detected then the user is alarmed immediately to take care of the plants with the help of wifi-module.

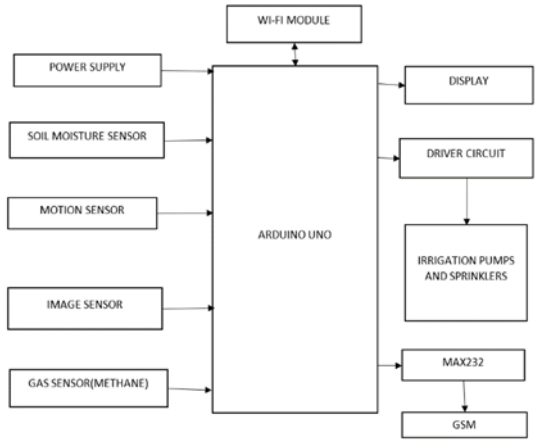

Figure-3:Block Diagram of the system

4. RESULTS AND DISSCUSSION

This process helps the farmers to keep an eye from the home also.The system can in two cases:

Case-1:In this case,only the soil moisture, motion and gas sensor will be in running as well as execution position and the image sensor will be in running position and executes based on the timer. The rest of the sensors will be working independently with their processes of execution to either ON or OFF ,checks for any gas and detects for any unwanted objects entry in the field.

Case-2:Here,all the sensors will be in running and execution position there by image sensor will be taking a snapshot of the plant once in two weeks using the timer and all the information the farm is sensed to the farmer through the cropfield.

5. CONCLUSION

Every day technology is updated in every field like industries, education, transport etc.. Since food is the most basic essential for living beings there is a need for agriculture to develop in technology to get high yield. This paper helps in advancing one step in agriculture by remote monitoring and sensing and getting updates. This method is also particularly useful for people researching in plants and would like to get image notifications and auto monitoring of the plants. So smart agriculture is very essential and can produce high yield of crops with less manual labor. In countries like India agriculture is the back bone of the country and people live on farming. To these countries smart agriculture is very useful and can affect the country and farmers in various ways.

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