Implementation of IOT & LabVIEW for Restrained Flooding system

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Abstract: Objective of this proposed system is to provide IoT based involuntary flooding system with soil nutrient measurement. It uses an MSP 432 controller which is programmed to regulate the entire system. Soil moisture sensor used for measure the moisture level of the soil if the moisture level is below the predefined level then the motor is automatically on then it reaches the desired level then the motor is automatically off. Then the soil nutrient like potassium, phosphorous and nitrate are measured by using TCS230 color sensor. This will help to reduce water wastage, reduce human effort, and increase plant life time. Outputs are simulated using Energia for MSP432 & simple layout design using Labview

Keywords : MSP432 controller, IoT, Labview, FC 28 sensor

I. INTRODUCTION

Today’s world agriculture plays an important role for protection of food because from our beginning of the day to the end of the day food is an essential one for all living things that foods are produced by the farmers. Farmers are meeting many problems for production of crops, in that problems water and fertilizer are important consideration in the agricultural fields. Because many farming states affected by drought problem because of change of the monsoon. So before we affected by those kind of problems we take prevention action for facing this water shortage problem by using automatic irrigation system. Automatic irrigation is done by using soil moisture sensor [1][2][8]. Water not only a big issue, now a day many factories dumped chemical waste to the river water that change pH level of the water. Mostly farmers are depended on the river water for agriculture. When we irrigate that water to the plant that change the pH value of the soil but soil nutrient change happened by the farmers. Farmers use more fertilizer for crop growth that changes the nutrient level of the soil. Researchers develop different methods to find the soil nutrients. 1. Electrochemical method in this method sensor consist of two electrodes ISE and ISFET ion selective membrane is placed on top of the insulating layer of FET, so the threshold voltage of ISFET is chemically modulated and measured voltage is related to concentration of the targeted ions[5]. In optical method optical light passes through the soil sample then the reflected light varies according to its soil properties [15]. So “IoT based automatic irrigation system with soil nutrient measurement” is developed for increasing crop yield, reduce the manual labor, and reduce much amount of water usage and save money.

II. SYSTEM ARCHITECTURE

MSP 432 Controller is heart of this project. It controls entire system of our project, the data from the soil moisture sensor, color sensor, temperature sensor, and pH sensor are sending to the WiFi module through the MSP 432controller. 5V power supply is provided for entire system. The data from the sensors collected by using ESP8266 WiFi module then the data send to the user mobile and it is received by user mobile

III. HARDWARE USAGE

A. MSP 432 Controller

This Texas controller board has a GUI that permits the user to type in the preferred strokes per minute. Operating voltage of this board is 5V. It has 14 digital input output pin and 6 analog pins. It uses AES256 encryption standard with flash memory (256 KB)

B. Soil Moisture Sensor

The type of soil moisture sensor used here is FC28 that is a special type of moisture sensor especially used in conjunction with IoT. This sensor is suitable for ADC and has an inbuilt potentiometer circuit that can provide an excellent output when threshold changes. The resistant value quill be very high for dry soil.

Fig.1 FC 28 sensor with MSP432 interfacing
D. TCS230 Color Sensor

The TCS230 color sensor works by shining a white light at an object and then recording the reflected color. It can also record the intensity of the reflection through red green and blue color filter. The array of photodiodes can be easily connected with the MSP board and from the typical frequency generated due to the response from light we can set color. When we focus on real time applications with MSP series then the optimum choice for this color sensor would be TCS425 sensor.

E. ESP8266 WIFI Module

The ESP8266 Wifi Module is suitable to connect MSP432 with internet through TCP/IP protocol integrated stack .It requires a simple booster pack to link MSP432 with server.

IV. IMPLEMENTATION

Here we have used two combinations of hive and drones. MSP432 is a hive and MSP430 is a drone mode controller.MSP432 will synchronize and receive figures whereas MSP430 is attached with DHT11 sensor and soil moisture sensor to monitor changes in the humidity conditions. So MSP 430 will be positioned in the field. MSP 432 combines Zigbee Module to get all the received data from MSP430 & uploaded to the net using ESP8266 Wifi module.

Table- I: Comparison with other flooding methods

<table>
<thead>
<tr>
<th>Prevailing system</th>
<th>Projected system</th>
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<tbody>
<tr>
<td>Very old pump based sprinkling</td>
<td>Every parts are diagnosed using sensor nodes</td>
</tr>
<tr>
<td>Function of needed parts are not checked</td>
<td>Data uploaded simultaneously to check part performance</td>
</tr>
<tr>
<td>Periodic working system</td>
<td>Hive and the drone controller establish a wireless connection through Zigbee modules</td>
</tr>
<tr>
<td>Physical flooding technique</td>
<td>Flooding is done after getting facts received from sensors</td>
</tr>
</tbody>
</table>

Fig.2 ESP8266 WIFI module

Fig.3 MSP controller setup

A. Procedure to create hardware setup

• Create Hive node controller as MSP432 and drone as MSP430
• Position MSP432 as shown in above figure 4 to collect both data from DHT 11 and SOM
• Use Energia codes to create an internet connection between MSP432 and ESP8266 module and ensure serial communication is established. Zigbee protocol is used for converse among controllers.

The hardware setup of the project. Sensors collect the data from the environment then send to the MSP 432 controller is shown in Fig 4. This hardware system works according to the program. The program uploaded to the MSP432 by using Energia software. Output of the project is shown in the serial monitor by using Energia software.

B. Results and Discussion

By putting the known value level of moisture content material, here flooding is supervised and measured with LabVIEW software and the output received from sensor figures are exhibited through IoT module. DHI1 and moisture are given as inputs . The energy from above said sensors is fed to MSP432 it is sent to LabVIEW. This paper involves how to control the pumping nature of motor in a self fashion using combination of MSP432 & Labview. A simple layout using AT switches, input and output pumps with four tubes are designed to monitor the level of flooding. The front pane design is shown in fig. 7.
The results are analyzed by taking two sensors. These sensors were kept to measure the moisture content so that flooding can be removed at intermediate stage. The moisture sensors as depicted in fig 4 was used to find the nature of flooding required. Here two sensors particularly one for recording dry soil moisture and second one was kept at irrigated soil. Sensor 1 kept for humid provides a value of 83% at the start and started decreasing. Sensor 2 kept for watered (irrigated) provides a value of 91% at the start and started decreasing for a measurement taken for one hour. The values are shown in Table I.

Table II provides us a statistical outcome that when time increases the sensor value drops that clearly depicts the period in the field where the water sprayers could be turned off at right time using MSP432 controller. Through IoT the output values from the sensors are transmitted to the web and monitored remotely.

Similarly a layout design for monitoring the content of water in tanks was tested using Labview. This is shown in figure 8. This can regulate self triggering of pumping water and for testing we have used two pumps and four tube outlets to find the water content in diverse tanks. A simple auto switch is enabled to provide status on the screen.

### Table II. Sensor readings comparison over moist & Irrigated Soil

<table>
<thead>
<tr>
<th>Measuring time</th>
<th>Sensor 1 (Humid Soil)</th>
<th>Sensor 2 (Watered Soil)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3:00 PM</td>
<td>83</td>
<td>91</td>
</tr>
<tr>
<td>3:20 PM</td>
<td>71</td>
<td>90</td>
</tr>
<tr>
<td>3:30 PM</td>
<td>69</td>
<td>84</td>
</tr>
<tr>
<td>4:00 PM</td>
<td>63</td>
<td>81</td>
</tr>
<tr>
<td>4:10 PM</td>
<td>62</td>
<td>81</td>
</tr>
</tbody>
</table>

Graphical representation of sensors as shown in figure 9 for a particular time period provides us the evident nature that content of humid soil nearly maintained at 83% for 20 mins and the curve is a solid exponential decreasing output. For Sensor 2 the values provide us a detail that it was kept in high watered (flooded) soil at the start. So we can reduce the sprayers and provide restrained flooding when the sensor reading reaches 90% itself.

**V. CONCLUSION**

These systems reduce the wastage of water during the irrigation and reduce the much amount of fertilizer usage. Over fertilization reduce the plant lifetime, so the measurement of soil nutrient increases the plant lifetime as well as reduce the use of over fertilizer. DHT 11 sensor provided a value of Humidity38% and similarly pH sensor provided a variation from 6.4 to 7.5. This paper creates a modern design technique of observing and governing the moisture level of soil by means of IoT & LabVIEW. Inorder to provide smart flooding the farmer can be given a simple access to control the tubes placed in flooded field so that self flooding at required time can be measured. This feasible solution is designed with two pumps using Labview as discussed in the above figures.

**REFERENCES**

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