SMART FARMING TECHNOLOGY SYSTEM

Aproject report submitted in partial fulfillment of the Academic requirements for the award of the Degree of

BACHELOR OF ENGINEERING
IN
INFORMATION TECHNOLOGY

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ABSTRACT

Our Smart Farming project aims at determining the most efficient soil moisture monitoring. The project also demonstrates the economic viability of an integrated system of production were water requirement and nutrients are kept optimum automatically. The system is designed to overcome the challenges of water wastage, nutrition deficit and leaching of nutrients. This system is controlled by Microcontroller and programmed using Energia Software. This proposed smart farming technology is environmentally friendly, efficient, cost effective and gives the farmer the power to control and monitor production in real time.

Contents

INTRODUCTION

1.1)Existing System

In the exisisting system, everything is to be done manually.The farmers are unaware of the actual requirements to the crop.Though the soil is wet, we cannot assure that all the parameters are balanced.So the users may be under the impression that the parameters are balanced , which is wrong and viceversa.

1.1.2) Disadvantages

This may result in wastage of water in some cases.And it may even wash of the soils top layer, resulting in leaching of nutrients to the plant. Finally it results in quality less agricultural products.
It requires skilled labour also.

1.2)Proposed System

Thus, we have come up with a project where everything is operated automatically using different technologies.This can be implemented using a micro controller,a motor and a screen to view the data and sensors. These sensors when placed in the soil, take the readings of the soil and let the users know about the soil condition. Whenever moisture content decreases below its threshold value a motor is automatically turned on and water is supplied to plants.

1.2.1) Advantages

It reduces the labour cost.The water levels are controlled automatically thus controlling the quality and quantity of the agricultural products.It is easy to implement and maintain.

SOFTWARE SPECIFICATIONS

Software Requirements

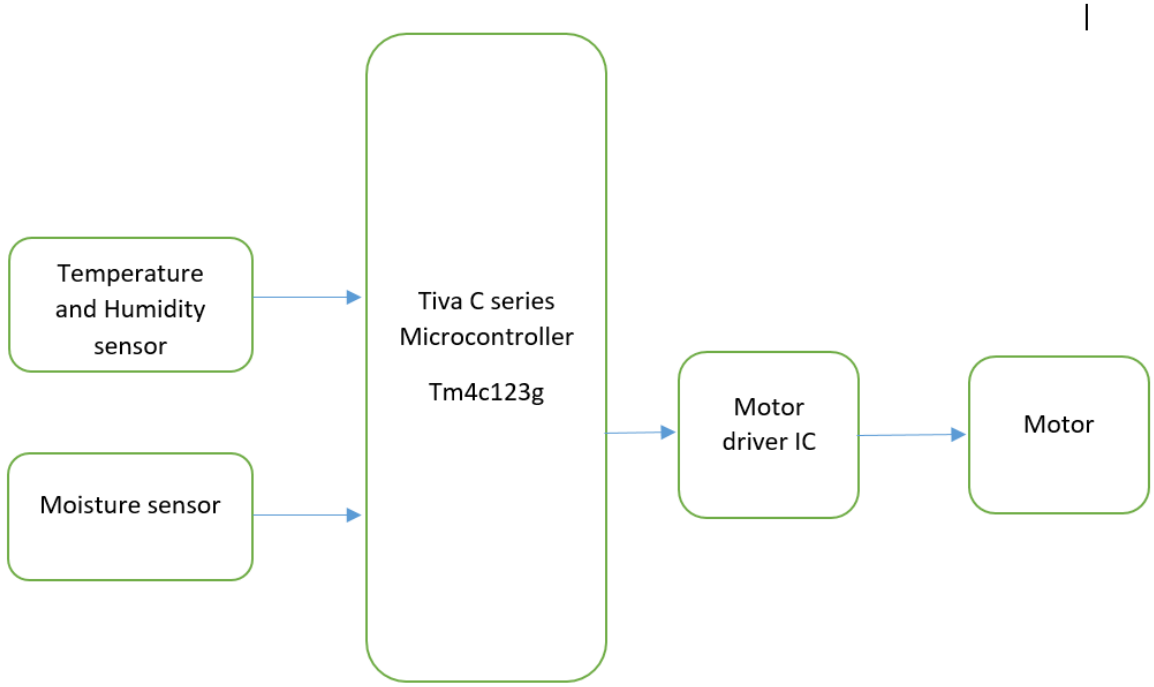
1. Energia
2. Tera term
3. Weka tool

Hardware Requirements

1. Launch pad tiva C seies-tm4c123g
2. Temperature and Humidity Sensor-DHT,tm1637
3. LED
4. Connecting Wires
5. Motor driver-ULN2003APG
6. Motor
7. Relay

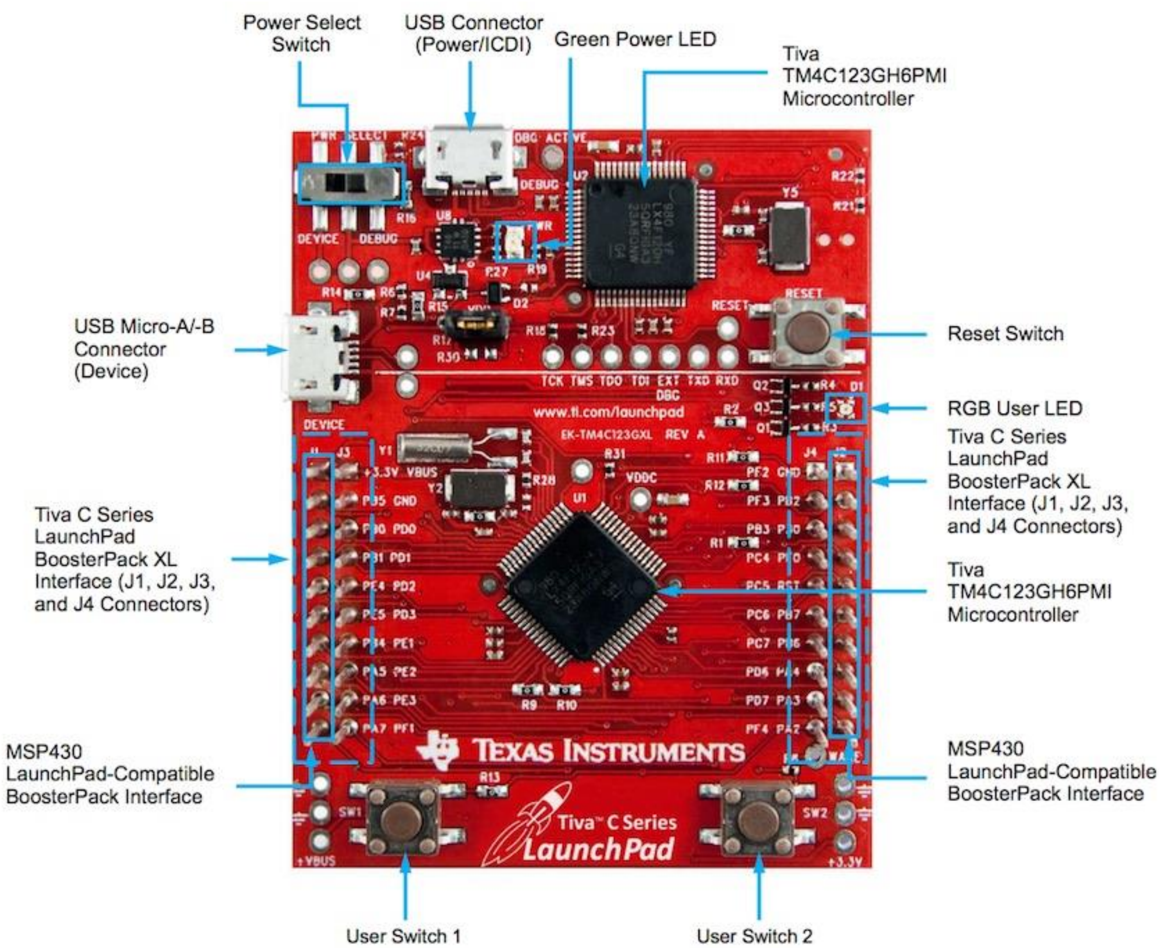
MODEL DESCRIPTION

DESIGN

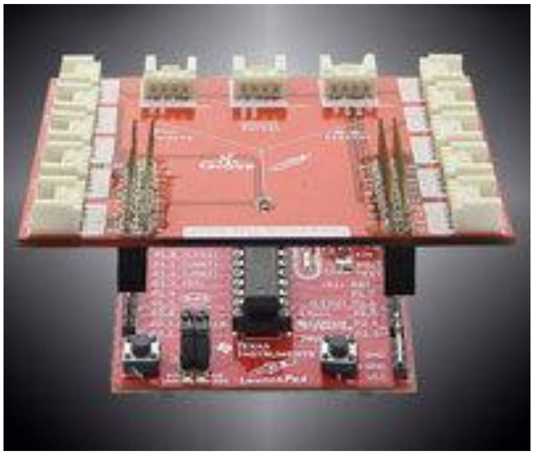


IMPLEMENTATION

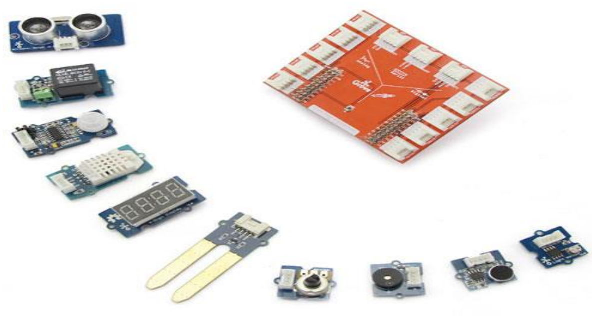
We are demonstrating this project using Tiva C series tm4c123g.The below diagram is the datasheet of Microcontroller.



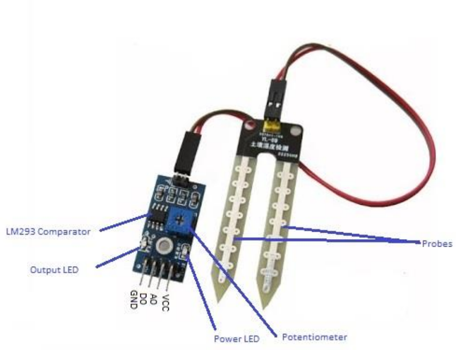
All the sensors which are required for the project are connected to the Grove, which is in turn connected to the microcontroller.The grove converts all the analog inputs into digital outputs.



The Grove Base BoosterPack is an expansion module that can plug on to the various LaunchPad development kits that TI offers. On the BoosterPack, there are 13 Grove connects, which feature a 4-pin standardized interface for enabling the user to easily connect with Seeed's offering of Grove modules.

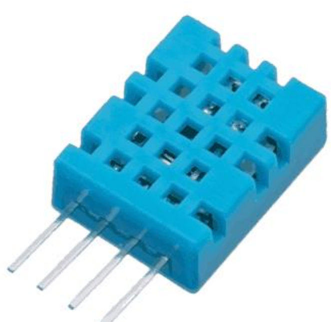


There are different sensors which come with the kit, but out of all only moisture sensor,temperature and humidity sensor and the display are used in our project.



The soil moisture sensor consists of two probes which are used to measure the volumetric content of water. The two probes allow the current to pass through the soil and then it gets the resistance value to measure the moisture value.

When there is more water, the soil will conduct more electricity which means that there will be less resistance. Therefore, the moisture level will be higher. Dry soil conducts electricity poorly, so when there will be less water, then the soil will conduct less electricity which means that there will be more resistance. Therefore, the moisture level will be lower.



DHT11 sensor measures and provides humidity and temperature values serially over a single wire.It can measure relative humidity in percentage (20 to 90% RH) and temperature in degree Celsius in the range of 0 to 50°C.It has 4 pins; one of which is used for data communication in serial form.

The wifi module, CC3100 wireless network processor BoosterPack plug-in module is a Internet-on-a-chip device for creating the IoT solution. The device proves a complete solution for adding WiFi to any microcontroller.

We can use the Blynk app to connect to the wifi module.In this app, the user can get all the required data of our project.We can use all the functionalities in order to view the data in different formats(graphs,meter,just a value and so on..).

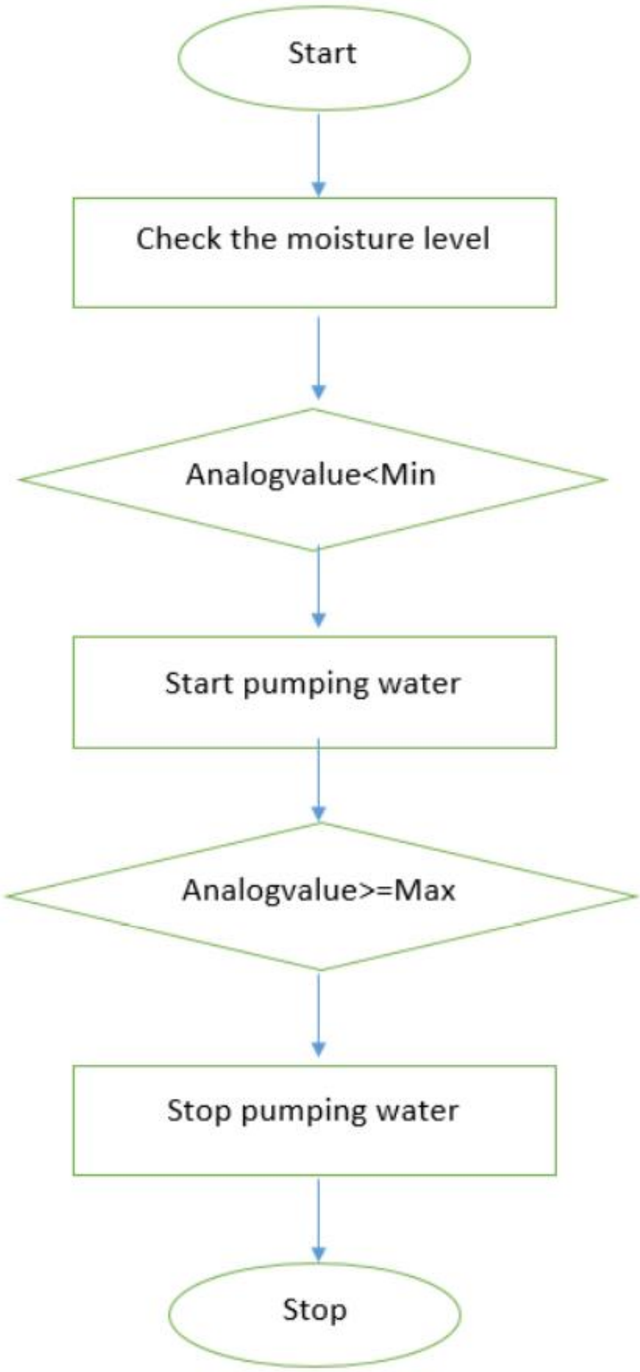
The most interesting part reveals here, that is to give the automation to the project, by connecting it to a motor.This is done in order to help the user to have automatic water suppy to his crops. We connect motor to a motor driver , and this inturn is connected to a grove pin.

We set a minimum and maximum threshold values for the moisture content parameter after a long study of the crop. When the moisture values lie in the range of minimum and maximum threshold, the crop is set to be having the balanced growth. When the analog value drops below the minimum threshold, the motor is set to be on.The motor is turned of automatically when the value touches the maximum threshold value.

Thus the automation.And this can be controlled by the user also.He gets all the readings when he gets connected to the project through the booster pack.He can manually control this too.

To view the values, we can use either tera term or serial monitor or your phone. And to get the graph for the values using Weka tool, which works on Data mining concepts.

Flow chart of our project:



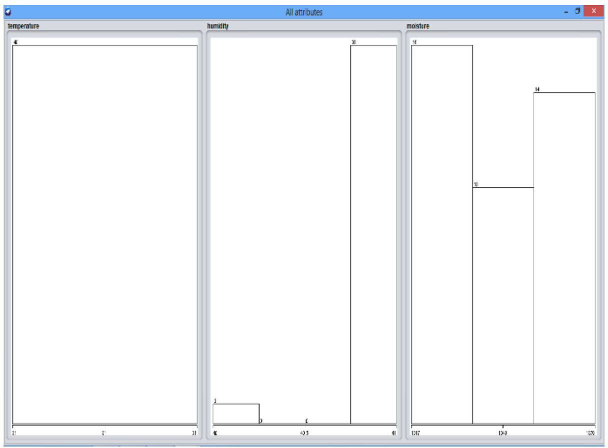
The flow of the project is briefly described in the above sketch.

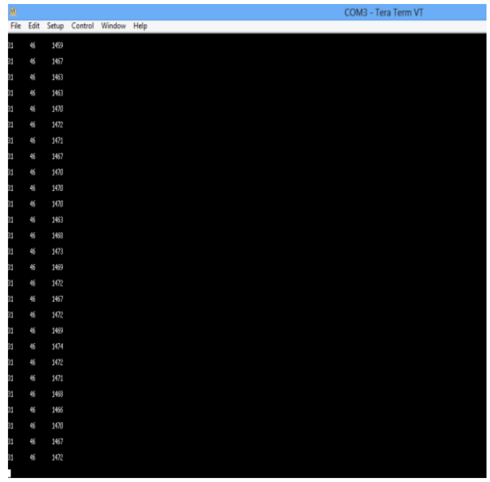
5.TESTING AND RESULTS

S.NO.	DESCRIPTION	EXPECTED RESULT	ACTUALRESULTS	STATUS
1.	Energia installation	Installation successful	FET not found error	No
2.	Energia installation	Installation successful	Installation successful	Yes
3.	Sensor readings	Actual values on sensors	Nothing has been displayed	No
4.	Sensor readings	Actual values on sensors	Actual values on sensors	Yes
5.	Displaying results in the form of graph using Weka	Graphs have been displayed separately for different parameters	Graphs have been displayed separately for different parameters	Yes
6.	Displaying sensor readings on users mobile.	Values should be displayed on users mobile	Connection failed	No
7.	Automation is done using motor	Water should be pumped into field	Motor failed to work	No
8.	Automation is done using motor	Water should be pumped into field	Water is pumped as per the requirement	Yes

9.	Displaying sensor readings on users mobile.	Values should be displayed on users mobile	Values should be displayed on users mobile	Yes

Screenshots of the Project:





CONCLUSION

This project is thus used to water the crop or plant automatically without the intervention of user.User is also provided another option to water manually as the readings are sent to his mobile.This project can also be applied in Weather monitoring system apart from smart farming system.

FUTURE SCOPE OF WORK

- We can extend this project using Wifi module using which the user can connect to his field at any improper timings.
- Smart Farming is key for the future of agriculture. Smart farming is farming management concept using modern technology to increase the quantity and quality of the agricultural products.Farmers in the 21st century have access to upcoming technologies, data management and IOT technologies by which they can improve the quality of crops.
- We can extend this project by introducing drones through which we can effectively monitor the field.
- By introducing pest controlling features, it becomes even more useful.

REFERENCES

- https://iotdunia.com/
- https://energia.nu/
- www.youtube.com
- Texas Instruments-Tiva tm4c123g data sheet

APPENDICES

A-CODE

```
#include "TM1637.h"
#include "DHT.h"
//#include "Blynk.h"
/* Macro Define */
#define CLK              39               /* 4-digital display clock pin */
#define DIO              38               /* 4-digital display data pin */
#define BLINK_LED        RED_LED          /* blink led */
#define TEMP_HUMI_PIN    24     /* pin of temperature&humidity sensor */
#define MOISTURE_PIN     26               /* pin of moisture sensor */
#define THRESHOLD_VALUE  2000
#define y 36/* threshold for watering the flowers */

#define ON               HIGH                    /* led on */
#define OFF              LOW                     /* led off */
#define _handle_led(x)    digitalWrite(BLINK_LED, x)
//#define BLYNK_DEBUG
//#define BLYNK_PRINT Serial /* handle led */
/* Global Varibles */
int analog_value = 0;                  /* varible to store the value coming from rotary angle sensor */
/* Global Varibles */
TM1637 tm1637(CLK, DIO);                 /* 4-digital display object */
DHT dht(TEMP_HUMI_PIN, DHT22);           /* temperature&humidity sensor object */
int8_t t_bits[2] = {0};                /* array to store the single bits of the temperature */
int8_t h_bits[2] = {0};
//char auth[] = "YourAuthToken";/* array to store the single bits of the humidity */

/* the setup() method runs once, when the sketch starts */
void setup()
```

```
{

    tm1637.init();                        /* initialize 4-digital display */
    tm1637.set(BRIGHT_TYPICAL);          /* set the brightness */
    tm1637.point(POINT_ON);              /* light the clock point ":" */

    dht.begin();                         /* initialize temperature humidity sensor */
 Serial.begin(9600);
    pinMode(RED_LED, OUTPUT);

    /* declare the red_led pin as an OUTPUT */

//Serial.begin(9600); // Set console baud
//delay(10);
//Blynk.begin(auth, wifi, "ssid", "pass");
}

/* the loop() method runs over and over again */
void loop() {
      int _temperature = dht.readTemperature();           /* read the temperature value from the sensor
*/    int _humidity = dht.readHumidity();                  /* read the humidity value from the sensor */
        analog_value = analogRead(MOISTURE_PIN);      /* read the value from the sensor */
  Serial.print(_temperature);
  Serial.print("\t");
  Serial.print(_humidity);
  Serial.print("\t");
  Serial.print(analog_value);
  Serial.println("\n");
              memset(t_bits, 0, 2);                                /* reset array when we use it */
    memset(h_bits, 0, 2);
       /* 4-digital-display [0,1] is used to display temperature */
```

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```
    t_bits[0] = _temperature % 10;
    _temperature /= 10;
    t_bits[1] = _temperature % 10;
      /* 4-digital-display [2,3] is used to display humidity */
    h_bits[0] = _humidity % 10;
    _humidity /= 10;
    h_bits[1] = _humidity % 10;
      /* show it */
    tm1637.display(1, t_bits[0]);
    tm1637.display(0, t_bits[1]);
      tm1637.display(3, h_bits[0]);
    tm1637.display(2, h_bits[1]);
        /* if the value is smaller than threshold, turn on led */
    if(analog_value < THRESHOLD_VALUE) {
        _handle_led(ON);
        digitalWrite(y,ON);



    } else {
        _handle_led(OFF);
        digitalWrite(y,OFF);
    }

     delay(1000);
  //   Blynk.run();
}
```

[Type here]