#include <Arduino.h>

#include<SoftwareSerial.h>//Header for GSM Module

#include <LiquidCrystal.h>//Header for LCD Display

#include "HardwareSerial.h"

#include "RTC.h"

#include "SD.h"

File file;

RTC\_TIMETYPE t;

SoftwareSerial mySerial(0,1);//Object and pin declaration of GSM Module

LiquidCrystal lcd(7, 6, 5, 4, 3, 2);//Object and pin declarations of LCD

/\*

\* LCD RS pin to digital pin 7

\* LCD Enable pin to digital pin 6

\* LCD D4 pin to digital pin 5

\* LCD D5 pin to digital pin 4

\* LCD D6 pin to digital pin 3

\* LCD D7 pin to digital pin 2

\* LCD R/W pin to ground

\* 10K resistor:

\* ends to +5V and ground

\* wiper to LCD VO pin (pin 3)

\*/

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

int sm = A0;//Asign input variable and pin for Soil Moisture Sensor

int ldr = A1;//Asign input variable and pin for Light Sensor

int hm = A2;//Asign input variable and pin for Humidity Sensor

int temp = A3;//Asign input variable and pin for Temperature Sensor

//Variables declaration

int smValue,ldrValue,hmValue,tempValue,lightValue,soilValue;

float hmVoltage,relativeHm,tempVoltage,degreesC,degreesF;

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

void setup() // this setup code here is to run once:

{

lcd.begin(20, 4);//Declaration of LCD size and begin the LCD

mySerial.begin(9600);//Start the Serial Communication between GSM and GR-Kaede

Serial.begin(9600);//Start the Serial Monitor

pinMode(sm, INPUT);//Assign Soil Moisture Sensor as Input

pinMode(ldr, INPUT);//Assign Light Sensor as Input

pinMode(hm, INPUT);//Assign Humidity Sensor as Input

pinMode(temp, INPUT);//Assign Temperature Sensor as Input

pinMode(PIN\_LED0, OUTPUT); // for SD access

pinMode(PIN\_LED1, OUTPUT); // for File access

pinMode(PIN\_LED2, OUTPUT); // for File write access

pinMode(PIN\_LED3, OUTPUT);

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

lcd.clear();//Clear the LCD

lcd.setCursor(0, 0);//Set the cursor to origin point

lcd.print(" SMART AGRICULTURE ");//To print SMART AGRICULTURE in LCD

lcd.setCursor(0, 1);//Set the cursor to next row

lcd.print(" SYSTEM ");//TO print SYSTEM in LCD

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

rtc\_init();

t.year = 15;

t.mon = 10;

t.day = 25;

t.weekday = RTC\_WEEK\_SUNDAY;

t.hour = 16;

t.min = 31;

t.second = 0;

rtc\_set\_time(&t);

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

if (!SD.begin()) {

while (1)

; // error

} else {

digitalWrite(PIN\_LED0, HIGH); // Success to access SD.

}

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

if (SD.exists("myData.csv")) {

SD.remove("myData.csv");

}

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

File file = SD.open("myData.csv", FILE\_WRITE);

if (file) {

//Write

file.println(",,SMART, AGRICULTURE ,SYSTEM,,");

file.println("DATE, TIME, SOIL MOISTURE, LIGHT INTEN., HUMIDITY, TEMP.('C), TEMP.('F)");

file.close();

digitalWrite(PIN\_LED1, HIGH); // Success to open file.

} else {

while (1)

;//Error in opening file

}

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

}

void loop() // put your main code here, to run repeatedly:

{

static unsigned long currenttime, oldtime = 0;

static unsigned long starttime = millis();

currenttime = millis() - starttime;

if ((currenttime - oldtime) >= 2000) //@1sec

{

digitalWrite(PIN\_LED2, HIGH); // blink LED

File file = SD.open("myData.csv", FILE\_WRITE);

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

rtc\_get\_time(&t);

file.println();

file.print(t.day);

file.print('/');

file.print(t.mon);

file.print('/');

file.print(t.year);

file.print(',');

file.print(t.hour);

file.print(':');

file.print(t.min);

file.print(':');

file.print(t.second);

file.print(",");

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

soilValue = analogRead(sm);//Get analog values of Soil Moisture Sensor

smValue = soilValue-24;//Displaying reading within 1000 in LCD

ldrValue = analogRead(ldr);//Get analog values of Light Sensor

lightValue = (ldrValue+200)/10;//Displaying values within 100 in LCD

hmVoltage = (hmValue/1023.0)\*5.0; // Convert hmValue to voltage (5V circuit)

relativeHm = ((hmVoltage+0.958)/0.0307); // Convert voltage to relative humidity

tempValue = analogRead(temp);//Get analog values of Temperature Sensor

degreesC = (tempValue / 10)+17;//Convert millivolts to Celsius

degreesF = degreesC \* 1.8 + 32;//Convert Celsius to Fahrenheit

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

//Soil Moisture Sensor Details

file.print(smValue);

file.print(',');

//Serial.print("Soil Moisture : ");//Print "Soil Moisture : " in Serial Monitor

lcd.setCursor(0, 2);//Set the cursor in LCD to 2nd row 4th Column

lcd.print(" SM:");//To print "SM:" in LCD display

lcd.setCursor(5, 2);//Set the cursor in LCD to 2nd row 8th Column

lcd.print(smValue);//Display the Soil moisture level in LCD

//Serial.print(smValue);//Display the Soil moisture level in Serial Monitor

//Light Sensor Details

file.print(lightValue);

file.print(',');

//Serial.print("| Light : ");//Print "Light : " in Serial Monitor

lcd.setCursor(0, 3);//Set the cursor in LCD to 3rd row 0th Column

lcd.print(" L :");

lcd.setCursor(5, 3);//Set the cursor in LCD to 3rd row 2nd Column

lcd.print(lightValue);

//Serial.print(lightValue);//Display the Light Intensity level in Serial Monitor

//Humidity Sensor Details

file.print(relativeHm);

file.print(',');

//Serial.print("% | Humidity : ");//Print "Humidity : " in Serial Monitor

lcd.setCursor(9, 3);//Set the cursor in LCD to 3rd row 5th Column

lcd.print("HM:");

lcd.setCursor(13, 3);//Set the cursor in LCD to 3rd row 8th Column

lcd.print(relativeHm);

//Serial.print(relativeHm); //Display the Humidity level in Serial Monitor

//Temperature Sensor Details

file.print(degreesC);

file.print(',');

file.print(degreesF);

file.print(',');

//Serial.print("% | Temperature : ");//Print "Temperature : " in Serial Monitor

lcd.setCursor(9, 2);//Set the cursor in LCD to 2nd row 11th Column

lcd.print(" T:");

lcd.setCursor(13, 2);//Set the cursor in LCD to 2nd row 14th Column

lcd.print(degreesC);

//Serial.print(degreesC);//Display the Temperature - Celsius in Serial Monitor

//Serial.print("C ");

//Serial.print(degreesF);//Display the Temperature - Fahrenheit in Serial Monitor

//Serial.println("F ");

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

file.close();

digitalWrite(PIN\_LED2, LOW);

oldtime = currenttime;

}

}

void checkConditions()

{

if(smValue < 300 && (int)relativeHm > 20)//Check soil and air moisture is below 70%

{

if((int)degreesC > 20 && lightValue > 25)//Do not required to feed at night time

{

sendMessage();

}

}

}

void sendMessage()

{

mySerial.println("AT+CMGF=1"); //Sets the GSM Module in Text Mode

delay(500); // Delay of 500 milli seconds or 1/2 second

mySerial.println("AT+CMGS=\"+919688755885\"\r"); //Declaring Mobile number with Country code

delay(500);

mySerial.print(" Soil Moisture : ");

mySerial.print(smValue);

mySerial.print(" % ");

mySerial.println(" Light Level : ");

mySerial.print(ldrValue);

mySerial.print(" % ");

mySerial.println(" Humidity : ");

mySerial.print(hmValue);

mySerial.print(" % ");

mySerial.println(" Temperature : ");

mySerial.print(tempValue);

delay(100);

mySerial.println("1\x1A");// ASCII code of CTRL+Z

delay(500);

}