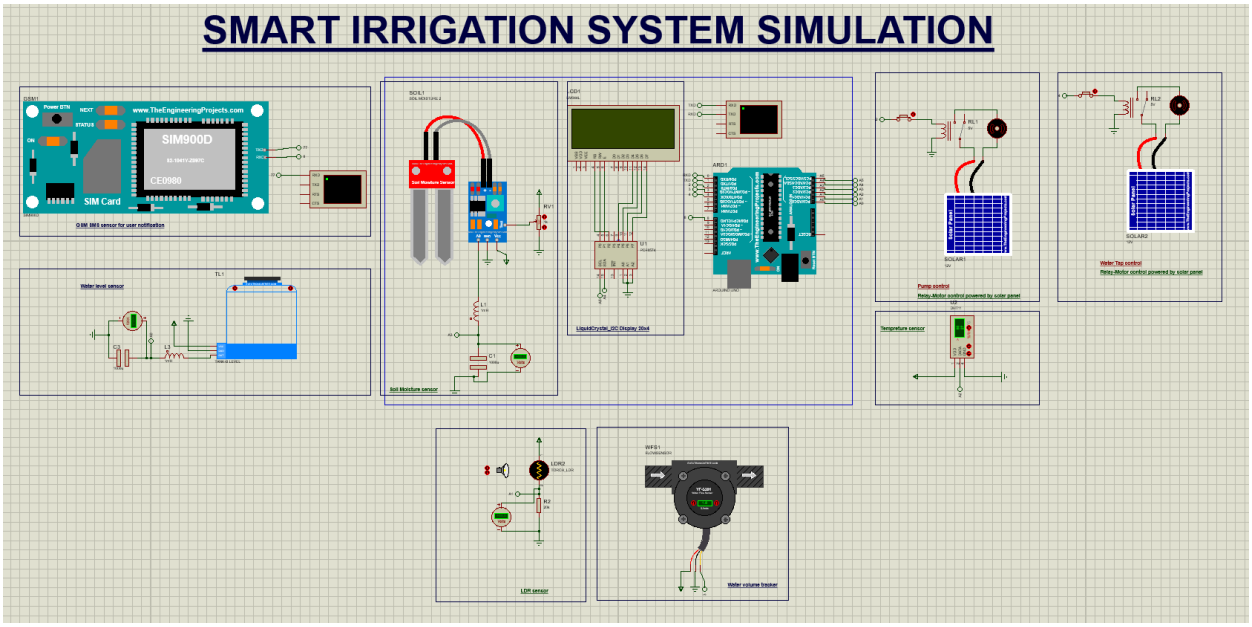

- **CODE for the project used**

```
/*************************************************************
 * SMART IRRIGATION SYSTEM
 * BLYNK + COMPIM + GSM + LCD + FLOW SENSOR
 *************************************************************/

#include "DHT.h"
#include <Wire.h>
#include <LiquidCrystal_I2C.h>
#include <SoftwareSerial.h>

/* ===== BLYNK DEFINITIONS ===== */
#define BLYNK_TEMPLATE_ID   "TMPL_DUMMY_001"
#define BLYNK_TEMPLATE_NAME "Smart Irrigation System"
#define BLYNK_PRINT Serial
#include <BlynkSimpleSerialBLE.h>     //

char auth[] = "8ZuushPo8bqyojvg0l4UBeAOQcGEzacw";

/* ===== VIRTUAL PIN ASSIGNMENTS ===== */
#define VPIN_IRRIGATION_SWITCH   V4
#define VPIN_REFILL_SWITCH       V3

#define VPIN_TEMPERATURE_DISPLAY V0
#define VPIN_TANK_DISPLAY        V1
#define VPIN_SOIL_DISPLAY        V2

/* ===== PIN DEFINITIONS ===== */
#define DHTPIN A2
#define DHTTYPE DHT11
```

```
#define LDR_PIN A1
#define WATER_LEVEL_PIN A0
#define SOIL_MOISTURE_PIN A3

#define IRRIGATION_MOTOR 4
#define TANK_FILL_MOTOR 2

#define GSM_RX_PIN 7
#define GSM_TX_PIN 8

const byte outPin = 3;   // Flow sensor output pin

/* ===== FLOW SENSOR VARIABLES ===== */
volatile unsigned long pulseCount = 0;
unsigned long totalPulses = 0;
double totalLitres = 0;

/* ===== CONTROL VARIABLES FROM BLYNK ===== */
bool irrigationEnable = true;   // Blynk ON/OFF
bool refillEnable = true;       // Blynk ON/OFF

/* ===== THRESHOLDS ===== */
const int DRY_SOIL = 500;
const int LOW_WATER_TANK = 300;
const int LOW_LIGHT = 400;
const float MAX_TEMP = 30.0;

/* ===== GSM ===== */
#define PHONE_NUMBER "+1234567890"
SoftwareSerial gsm(GSM_RX_PIN, GSM_TX_PIN);

/* ===== OBJECTS ===== */
DHT dht(DHTPIN, DHTTYPE);
LiquidCrystal_I2C lcd(0x20, 20, 4);   // LCD address

/* ===== SMS FLAGS ===== */
int sms1 = 1;
int sms2 = 1;
int sms3 = 1;

/* ===== FLOW SENSOR ISR ===== */
void pulseISR() {
  pulseCount++;
  totalPulses++;
}

/* ===== SEND SMS FUNCTION ===== */
void sendSMS(String message) {
  gsm.println("AT+CMGS=\"" PHONE_NUMBER "\"");
  gsm.println(message);
  delay(100);
  gsm.write(26);  // CTRL + Z
  delay(200);
}

/* ===== BLYNK SWITCH HANDLERS ===== */
BLYNK_WRITE(VPIN_IRRIGATION_SWITCH) {
  irrigationEnable = param.asInt();   // 1 = ON, 0 = OFF
}

BLYNK_WRITE(VPIN_REFILL_SWITCH) {
  refillEnable = param.asInt();       // 1 = ON, 0 = OFF
}

/* ================================================ */
```

```
/* ==================== SETUP ==================== */
/* ================================================ */
void setup() {
  pinMode(IRRIGATION_MOTOR, OUTPUT);
  pinMode(TANK_FILL_MOTOR, OUTPUT);
  pinMode(outPin, INPUT);

  digitalWrite(IRRIGATION_MOTOR, LOW);
  digitalWrite(TANK_FILL_MOTOR, LOW);

  Serial.begin(9600);
  gsm.begin(9600);
  dht.begin();

  /* ===== BLYNK START ===== */
  Blynk.begin(Serial, auth);
  Blynk.run();

  /* ===== LCD INIT ===== */
  lcd.init();
  lcd.backlight();
  lcd.setCursor(0, 0);
  lcd.print("Smart Irrigation");
  lcd.setCursor(0, 1);
  lcd.print("System Loading...");
  delay(500);
  lcd.clear();

  /* ===== FLOW SENSOR INTERRUPT ===== */
  attachInterrupt(digitalPinToInterrupt(outPin), pulseISR, RISING);

  /* ===== GSM INIT ===== */
  gsm.println("AT");
  delay(300);
  gsm.println("AT+CMGF=1");
  delay(300);
}

/* ================================================ */
/* ==================== LOOP ==================== */
/* ================================================ */
void loop() {
  /* ===== RUN BLYNK ===== */
  Blynk.run();

  /* ===== READ SENSORS ===== */
  float temp = dht.readTemperature();
  int lightLevel = analogRead(LDR_PIN);
  int waterLevel = analogRead(WATER_LEVEL_PIN);
  int soilMoisture = analogRead(SOIL_MOISTURE_PIN);

 /* ===== TANK REFILL LOGIC ===== */
  if (waterLevel < LOW_WATER_TANK && refillEnable) {
    if (sms1 == 1) {
      sendSMS("WARNING: Low Water Tank Level!");
      sms1 = 0;
    }
    digitalWrite(TANK_FILL_MOTOR, HIGH);
  } else {
    sms1 = 1;
    digitalWrite(TANK_FILL_MOTOR, LOW);
  }

  /* ===== FLOW CALCULATION ===== */
  static unsigned long lastMillis = 0;
```

```
  unsigned long now = millis();

  if (now - lastMillis >= 100) {
    noInterrupts();
    unsigned long count = pulseCount;
    pulseCount = 0;
    unsigned long total = totalPulses;
    interrupts();

    totalLitres = total / 450.0;
    lastMillis = now;
  }

  /* ===== IRRIGATION LOGIC ===== */
  bool watering = false;

  if (soilMoisture > DRY_SOIL &&
      temp < MAX_TEMP &&
      lightLevel < LOW_LIGHT &&
      irrigationEnable) {

    digitalWrite(IRRIGATION_MOTOR, HIGH);

    if (sms2 == 1) {
      sendSMS("Pump ON - Irrigation Started");
      sms2 = 0;
      sms3 = 1;
    }
    watering = true;
  } else {
    digitalWrite(IRRIGATION_MOTOR, LOW);
    sms2 = 1;

    if (sms3 == 1) {
      sendSMS("Pump OFF. Water Used: " + String(totalLitres, 2) + " L");
      sms3 = 0;
    }
    totalLitres = 0;
  }

  /* ===== LCD DISPLAY ===== */
  lcd.setCursor(0, 0);
  lcd.print("T:"); lcd.print(temp, 1); lcd.print("C   ");

  lcd.setCursor(10, 0);
  lcd.print("L:"); lcd.print(lightLevel); lcd.print("   ");

  lcd.setCursor(0, 1);
  lcd.print("Soil:"); lcd.print(soilMoisture); lcd.print("   ");

  lcd.setCursor(10, 1);
  lcd.print("Tank:"); lcd.print(waterLevel); lcd.print("   ");

  lcd.setCursor(0, 2);
  lcd.print("Irrig Motor: ");
  lcd.print(watering ? "ON " : "OFF");

  lcd.setCursor(0, 3);
  lcd.print("Refill Motor:");
  lcd.print((waterLevel < LOW_WATER_TANK && refillEnable) ? "ON " : "OFF");

  /* ===== SEND DATA TO BLYNK ===== */
  Blynk.virtualWrite(VPIN_TEMPERATURE_DISPLAY, temp);
  Blynk.virtualWrite(VPIN_TANK_DISPLAY, waterLevel);
  Blynk.virtualWrite(VPIN_SOIL_DISPLAY, soilMoisture);
```

```
225.
226.   /* ===== DEBUG ===== */
227.   Serial.print("Temp: "); Serial.print(temp);
228.   Serial.print(" | Soil: "); Serial.print(soilMoisture);
229.   Serial.print(" | Tank: "); Serial.print(waterLevel);
230.   Serial.print(" | Total: "); Serial.print(totalLitres, 2);
231.   Serial.println(" L");
232.
233.   /* ===== RUN BLYNK ===== */
234.   Blynk.run();
235.
236. }
237.
```