Smart Prepaid Water Meter

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Chapter 1

File Index

1.1 File List

Here is a list of all files with brief descriptions:

Chapter 2

File Documentation

2.1 Waterflow.cpp File Reference

```
#include <ESP8266WiFi.h>
#include <FirebaseESP8266.h>
#include <ThingSpeak.h>
#include <Wire.h>
#include <LiquidCrystal_I2C.h>
```

Macros

- #define FIREBASE_HOST ¨https://meter-123-default-rtdb.firebaseio.com¨

  Firebase database URL.
- #define FIREBASE_AUTH ¨AIzaSyCXkVM3-W_BwztwNDrtU-05PGyac8pQEQA¨

  Firebase authentication token.
- #define WIFI_SSID ¨RussiaN¨

  WiFi network SSID.
- #define WIFI_PASSWORD ¨mlakalakanji¨

  WiFi network password.
- #define LED_BUILTIN 16

  Built-in LED pin.
- #define SENSOR D4

  Flow sensor input pin.
- #define relay D5

  Relay control pin.

Functions

- LiquidCrystal_I2C lcd (0x27, 16, 2)
- void IRAM_ATTR pulseCounter ()

  Interrupt service routine for counting pulses from the flow sensor.
- void setup ()

  Initializes the setup of the smart water meter.
- void loop ()

  The main loop of the smart water meter.

Variables

- const char * host = ¨api.thingspeak.com¨

  ThingSpeak server URL.
- const char * writeAPIKey = ¨25W83PHHY4AVXOOO¨

  ThingSpeak write API key.
- unsigned long chanID = 2146181

  ThingSpeak channel ID.
- FirebaseData firebaseData
- WiFiClient client
- long currentMillis = 0

  Current time in milliseconds.
- long previousMillis = 0

  Previous time in milliseconds.
- int interval = 1000

  Time interval for flow rate calculations in milliseconds.
- boolean ledState = LOW

  State of the built-in LED.
- float calibrationFactor = 4.5

  Calibration factor for flow sensor.
- volatile byte pulseCount

  Count of pulses from the flow sensor.
- byte pulse1Sec = 0

  Number of pulses in the last second.
- float flowRate

  Current flow rate in liters per minute.
- unsigned long flowMilliLitres

  Flow in milliliters during the interval.
- unsigned int totalMilliLitres

  Total flow in milliliters.
- float flowLitres

  Flow in liters during the interval.
- float totalLitres

  Total flow in liters.
- float remainingWater

  Remaining water quantity.
- int userSignal

  User-defined signal for valve control.
- float token

  Recharge token quantity.
- String previousRecharge = ""

  Previous recharge token value from the database.
- String previousSignal = ""

  Previous user signal value from the database.

2.1.1 Macro Definition Documentation

2.1.1.1 FIREBASE_AUTH

```
#define FIREBASE_AUTH ¨AIzaSyCXkVM3-W_BwztwNDrtU-05PGyac8pQEQA¨
```

Firebase authentication token.

2.1.1.2 FIREBASE_HOST

```
#define FIREBASE_HOST ¨https://meter-123-default-rtdb.firebaseio.com¨
```

Firebase database URL.

2.1.1.3 LED_BUILTIN

```
#define LED_BUILTIN 16
```

Built-in LED pin.

2.1.1.4 relay

```
#define relay D5
```

Relay control pin.

2.1.1.5 SENSOR

```
#define SENSOR D4
```

Flow sensor input pin.

2.1.1.6 WIFI_PASSWORD

```
#define WIFI_PASSWORD ¨mlakalakanji¨
```

WiFi network password.

2.1.1.7 WIFI_SSID

```
#define WIFI_SSID ¨RussiaN¨
```

WiFi network SSID.

2.1.2 Function Documentation

2.1.2.1 lcd()

```
LiquidCrystal_I2C lcd (
            0x27 ,
            16 ,
            2  )
```

2.1.2.2 loop()

```
void loop ( )
```

The main loop of the smart water meter.

This function is called repeatedly in an infinite loop. It retrieves data from the Firebase database, controls the valve, measures the flow rate and volume of water, and updates the data in the Firebase database and ThingSpeak.

2.1.2.3 pulseCounter()

```
void IRAM_ATTR pulseCounter ( )
```

Interrupt service routine for counting pulses from the flow sensor.

2.1.2.4 setup()

```
void setup ( )
```

Initializes the setup of the smart water meter.

This function is called once when the microcontroller starts. It initializes the LCD, pins, variables, interrupts, WiFi connection, and establishes a connection with the Firebase database.

2.1.3 Variable Documentation

2.1.3.1 calibrationFactor

```
float calibrationFactor = 4.5
```

Calibration factor for flow sensor.

2.1.3.2 chanID

```
unsigned long chanID = 2146181
```

ThingSpeak channel ID.

2.1.3.3 client

```
WiFiClient client
```

2.1.3.4 currentMillis

```
long currentMillis = 0
```

Current time in milliseconds.

2.1.3.5 firebaseData

```
FirebaseData firebaseData
```

2.1.3.6 flowLitres

```
float flowLitres
```

Flow in liters during the interval.

2.1.3.7 flowMilliLitres

```
unsigned long flowMilliLitres
```

Flow in milliliters during the interval.

2.1.3.8 flowRate

```
float flowRate
```

Current flow rate in liters per minute.

2.1.3.9 host

```
const char* host = ¨api.thingspeak.com¨
```

ThingSpeak server URL.

2.1.3.10 interval

```
int interval = 1000
```

Time interval for flow rate calculations in milliseconds.

2.1.3.11 ledState

```
boolean ledState = LOW
```

State of the built-in LED.

2.1.3.12 previousMillis

```
long previousMillis = 0
```

Previous time in milliseconds.

2.1.3.13 previousRecharge

```
String previousRecharge = ¨¨
```

Previous recharge token value from the database.

2.1.3.14 previousSignal

```
String previousSignal = ¨¨
```

Previous user signal value from the database.

2.1.3.15 pulse1Sec

```
byte pulse1Sec = 0
```

Number of pulses in the last second.

2.1.3.16 pulseCount

```
volatile byte pulseCount
```

Count of pulses from the flow sensor.

2.1.3.17 remainingWater

```
float remainingWater
```

Remaining water quantity.

2.1.3.18 token

```
float token
```

Recharge token quantity.

2.1.3.19 totalLitres

```
float totalLitres
```

Total flow in liters.

2.1.3.20 totalMilliLitres

```
unsigned int totalMilliLitres
```

Total flow in milliliters.

2.1.3.21 userSignal

```
int userSignal
```

User-defined signal for valve control.

2.1.3.22 writeAPIKey

```
const char* writeAPIKey = ¨25W83PHHY4AVXOOO¨
```

ThingSpeak write API key.