

# Smart Thermometer

Dominik Starzyk, Dawid Ilba, Elektronika 3 rok  
Wydział Informatyki Elektroniki i Telekomunikacji  
Akademia Górniczo-Hutnicza

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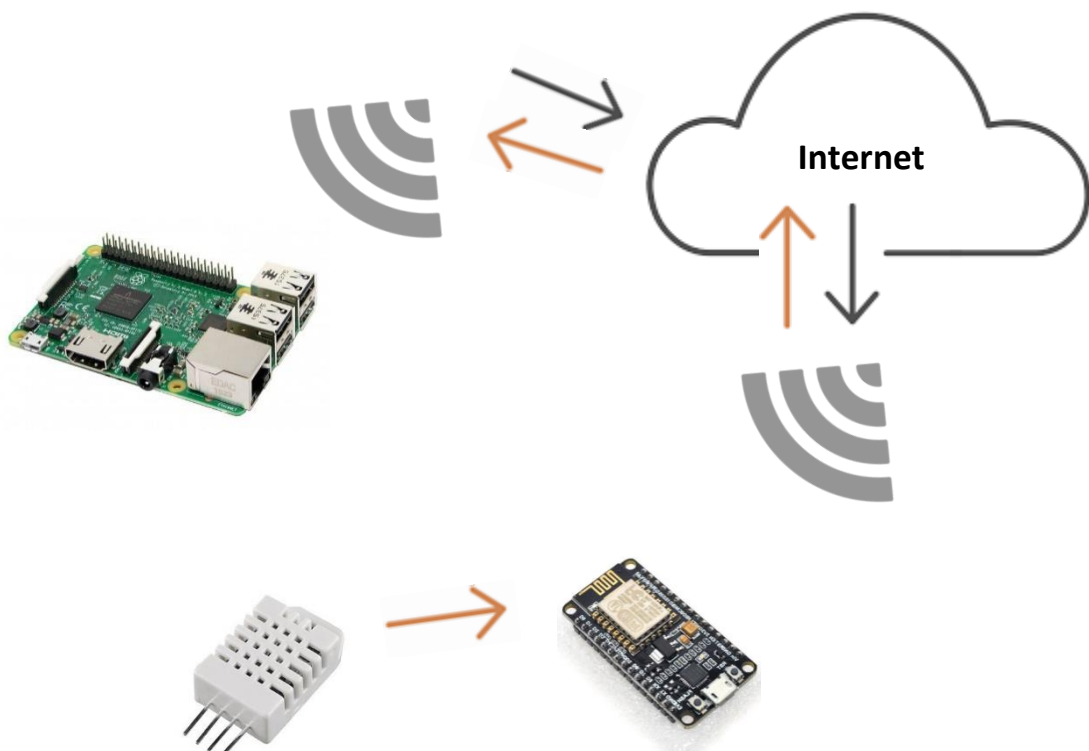
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## 1. Introduction

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Our idea is to create a wireless smart home thermometer based on relative humidity and temperature sensor DHT22 and wifi module ESP8266. Module and sensor will be powered by batteries. All will be controlled by Raspberry Pi 3B with preinstalled “Domoticz” application and connected with smartphone. It is a free software to configure and monitoring, home automatic systems. Simple and extensive GUI that can help to create and use our project.



## 2. Components

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- Raspberry Pi 3B
- DHT22 sensor
- ESP8266 WiFi module
- Power bank

### 3. Specification of customer requirements

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- Temperature measurement (from 10°C to 30°C  $\pm 1^\circ\text{C}$ .)
- Humidity sensor ( $\pm 3\%$ )
- Wireless connection
- Secure data transfer
- Power supply from battery

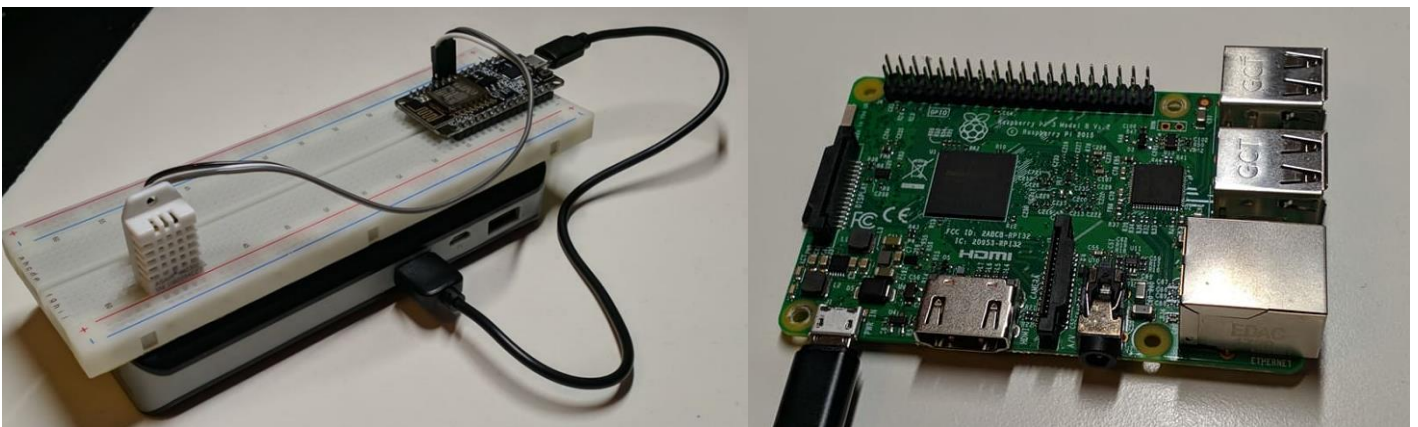
### 4. Functionality

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- Wireless temperature meter with an accuracy of  $\pm 0,5^\circ\text{C}$
- Wireless humidity sensor with an accuracy of  $\pm 2\%$
- The operating temperature of our thermometer is  $0^\circ\text{C}$  to  $45^\circ\text{C}$ .
- Low power consumption ( maximum power consumption of Raspberry is 12,5 Watts)
- Data is refreshed every 10 seconds, to which the customer has access from the application
- Additional weather forecast application (API Key)
- Email notification when humidity increases above 80%

### 5. Finished system

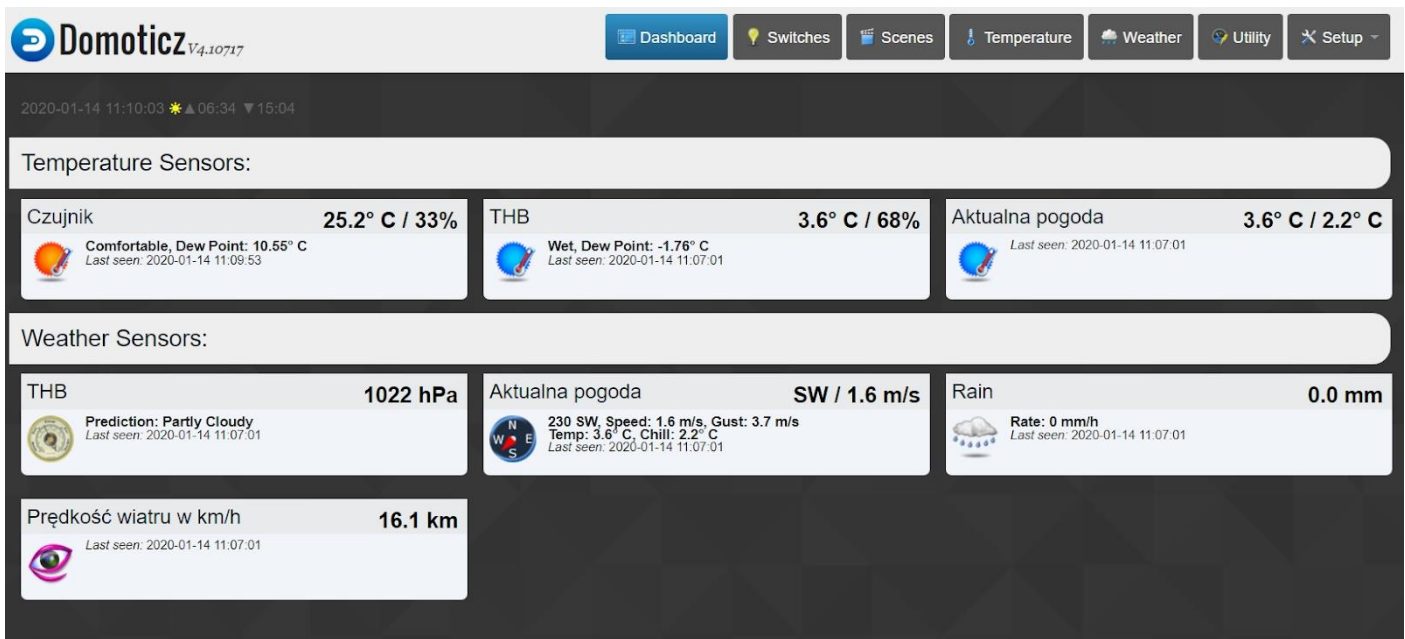
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That's how our system looks finished. Currently it's configured to Lab301 network. To configure it for your own network you must :

- Raspberry Pi : Set static IP address of Raspberry by editing dhcpd.conf file, and setting parameter "static routers" to IP address that your router gave raspberry. After doing this Domoticz is set on your network. Now you can try it, by searching in your web browser "Static IP raspberry:8080". 8080 <- Port of Domoticz
- ESP8266 : Just turn on device. After this it will generate its own WiFi called "ESP\_Easy\_0". Connect with this network, by giving a password : espconfig . Last step is to choice your home network, and connect with it. That's everything! Now everything is working in your house

## 6. Domoticz application



After searching in your web browser domoticz page ("Static IP raspberry:8080") you will see that. Our sensor is called "Czujnik" and you can monitor current temperature and humidity. You can also know actual weather, because we added additional forecast. Moreover, we set domoticz to send an email notification when humidity increases above 80%.

| DHT22 (idx: 7)   | 2020-01-14 11:21:23.865 |
|--|-------------------------|
| Uwaga, wilgotność względna powietrza wynosi ponad 80%! |                         |

Domoticz also has phone application, but unfortunately a free version is very limited, for example you must pay to have a sensor widget. We were using a free version for a while, and we think it's still usefull thing.

## 7. Why we chose Domoticz?




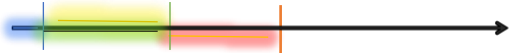
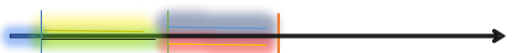


We was wondering what system would be the best to use in home automation. Finally, we chose Domoticz, because it's simple, stable and easy. OpenHAB would be also a good choice. We will certainly test it someday aswell.

## 8. Our sensor vs branded sensor

We want to compare our DIY sensor to branded sensor – Shelly H&T. For Shelly you must pay around 120 PLN, which has parameters comparable to our system. You can save over half the money, by choosing our sensor.

## 9. Timetable

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- Collect main components  
[DAWID DOMINIK] 
- Installing and configuring Domoticz on Raspberry  
[DAWID (4hrs)] 
- Connect on the breadboard ESP8266 and DHT22  
[DOMINIK (1hrs)] 
- Flash EspEasy on ESP8266 [DOMINIK (2hrs)] 
- Connect ESP with Domoticz  
[DAWID DOMINIK (2hrs)] 
- Check work and solve error or all kinds of inaccuracies  
[DAWID DOMINIK (1MD)] 
- Unplanned fixes  
[DAWID DOMINIK (1MD)] 
- Presentation [DAWID DOMINIK]