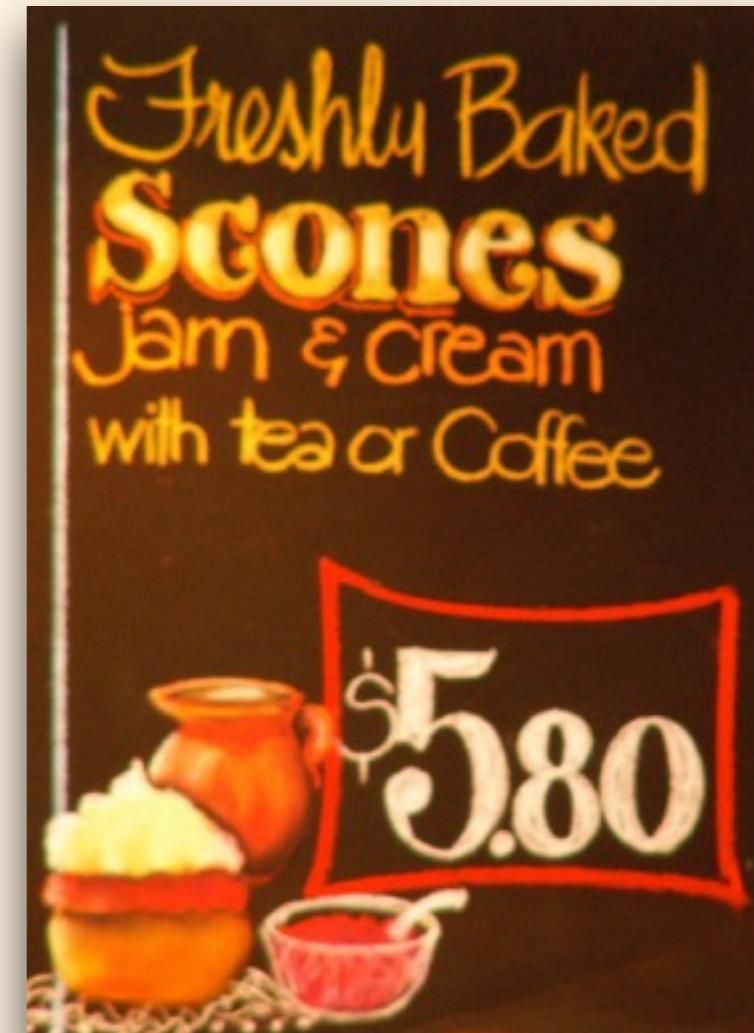
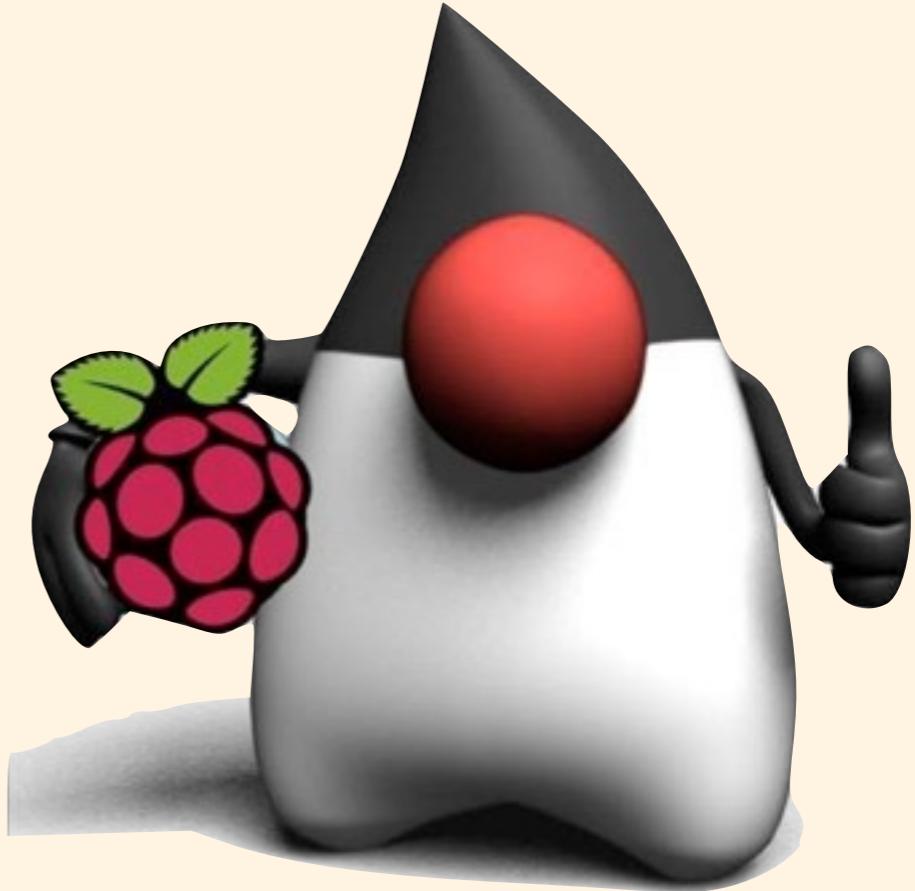


Coffee and Cakes

Embedded Java(FX)
on
Raspberry Pi

Jens Deters

NetBeans Day, Germany 1/2015



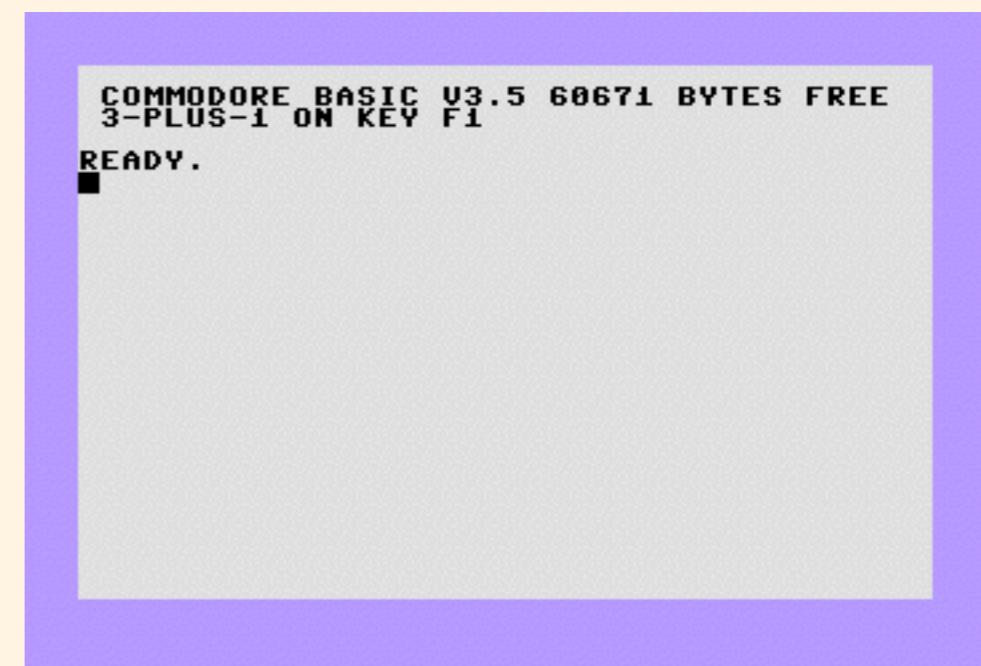
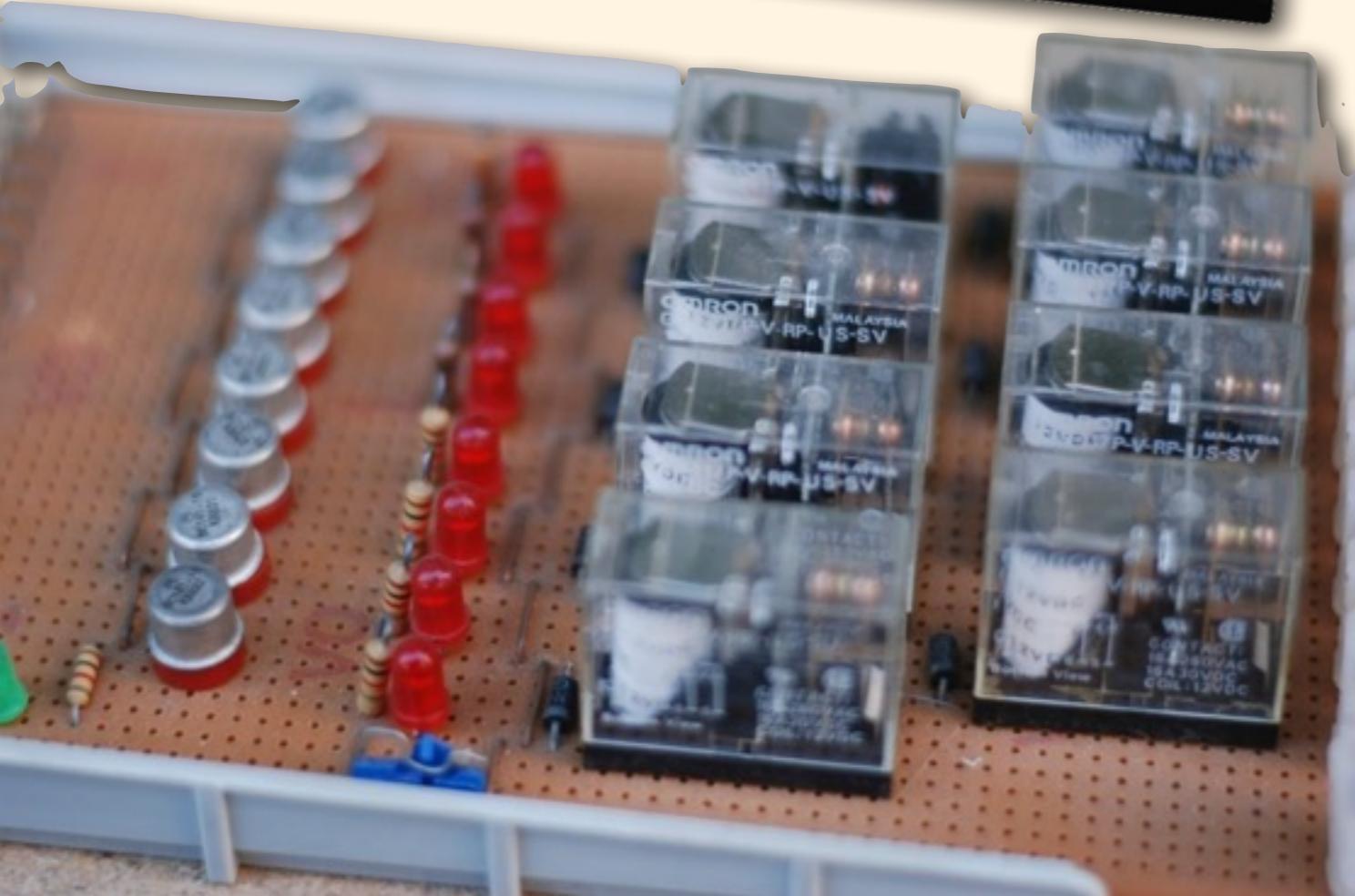


About ME



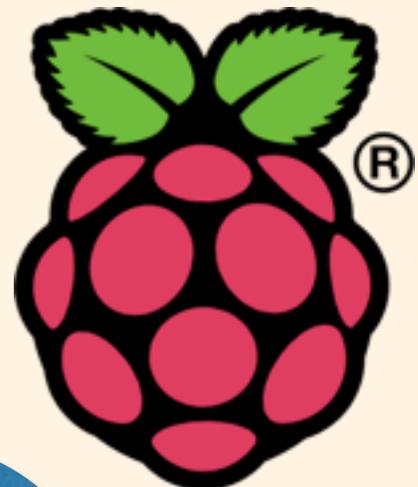
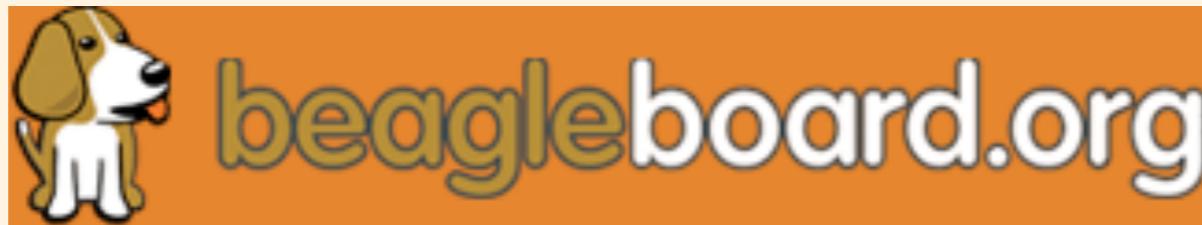
- **1984: Started with Home Computing**
- **15 years of IT experience in different roles**
- **NetBeans DreamTeam Member**
- **Husband and father of three AWESOME girls**

25 years ago...



READY.
POKE 56759,255
READY.
POKE 56577,255
READY.

... and today



the INTERNET of
+ THINGS



pandaboard.org



cubieboard
open arm box

Coffee

	Reg.	\$ 2.95	Lge.	\$ 3.30
Cappuccino				
Flat White		2.95		3.30
Latte		2.95		3.30
Caffe Mocha		3.30		3.75
Hot Chocolate		3.30		3.75
White Hot Chocolate		3.30		3.75
Black Coffee		2.40		2.85
Drip Coffee		2.40		2.85
Short Black		2.40		
Long Black (Double Shot)		2.70		3.00
Chai Latte		3.10		3.75
Tea	Mug	2.50	Pot	2.65
Extras: Soy milk, Ice Cream, Extra Shot				.50
Cream				.45
Flavour: Caramel, Vanilla, Hazelnut				.55
Macadamia Nut & Irish Cream				

The Coffee Table



JDK 8 for ARM

Product / File Description	File Size	Download
Linux ARM v6/v7 Hard Float ABI	76.67 MB	 jdk-8u33-linux-arm-vfp-hflt.tar.gz

+ <https://bitbucket.org/javafxports/arm/downloads/jdk-8u33-linux-arm-vfp-hflt.tar.gz>



Milk & Sugar

Wiring Pi

GPIO Interface library for the Raspberry Pi



The Pi4J Project

Connecting Java to the Raspberry Pi



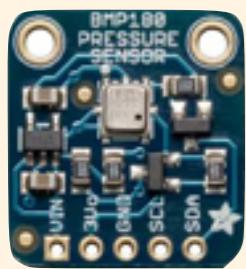
rc-switch

Arduino library to operate low cost 315 MHz / 433 MHz remote control devices



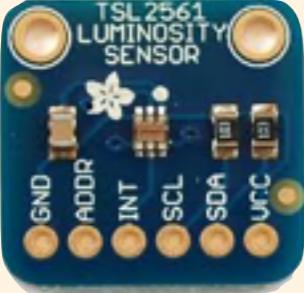
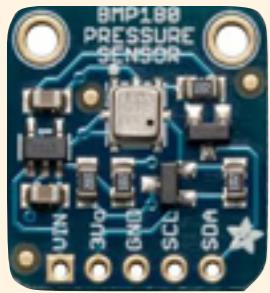
**CONTINENTAL
CHEESECAKES**
**BAKED
CHEESECAKES**
**SPECIALTY
CAKES**
MUDCAKE
TORTES
DESSERTS
PAVLOVAS
SAVOURIES





The coffee klatch

Sensors



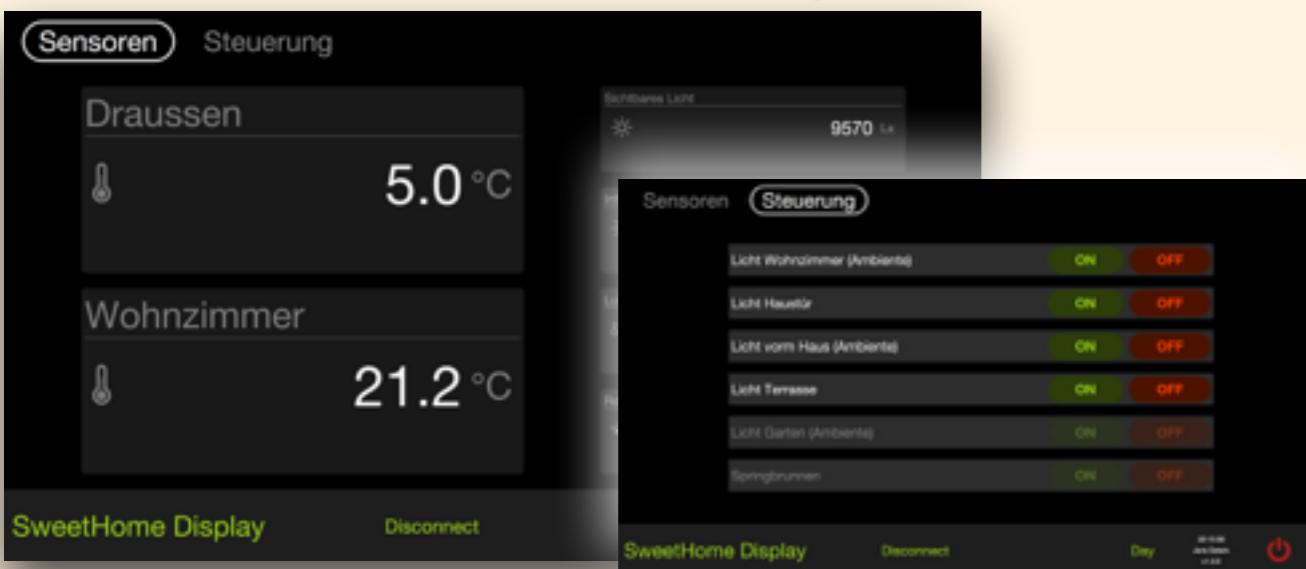
PUBLISH



SUBSCRIBE

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Clients



ON/OFF Switches

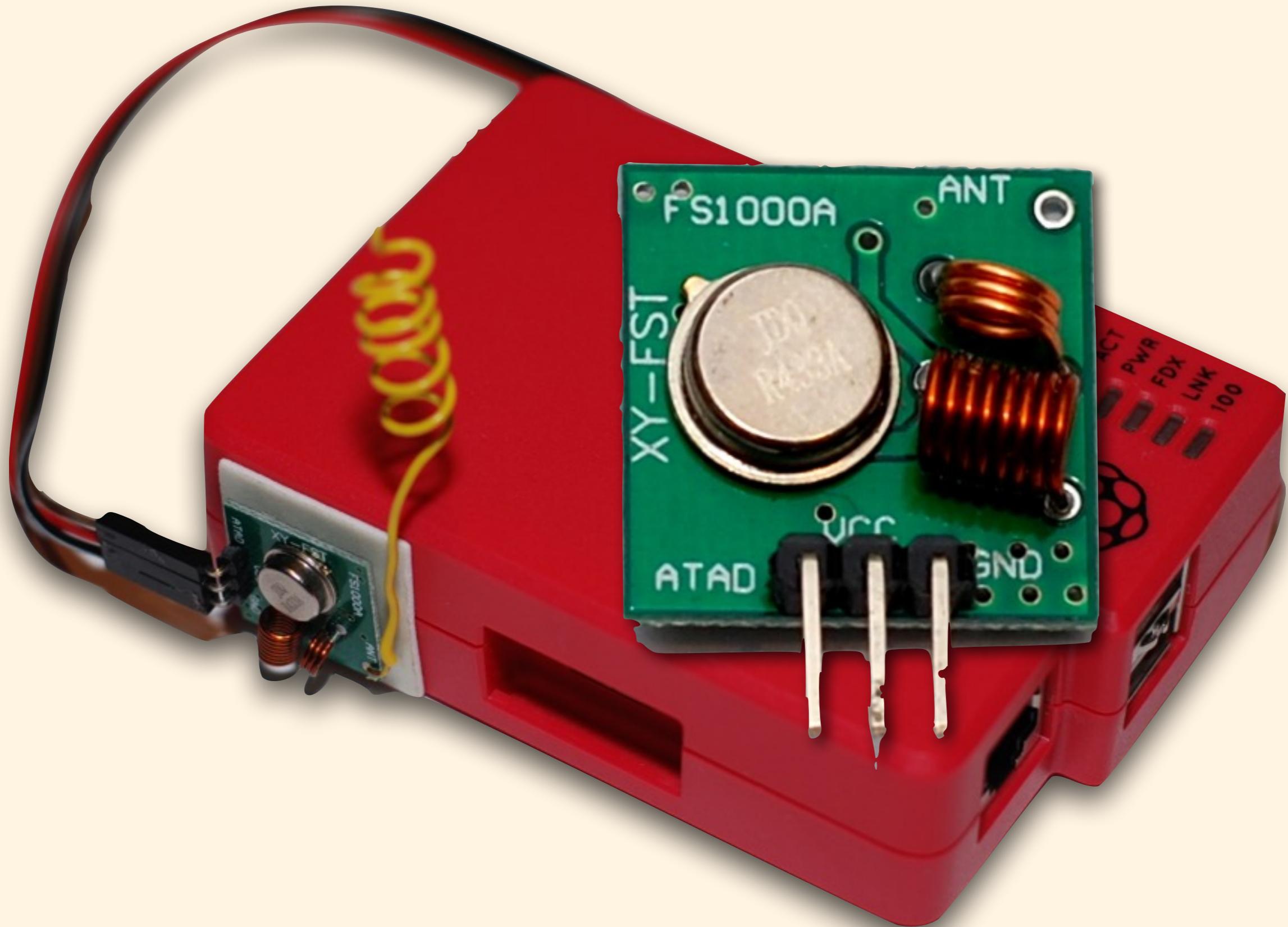


0100101000101
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Remote-Switch

Universal Remote Control

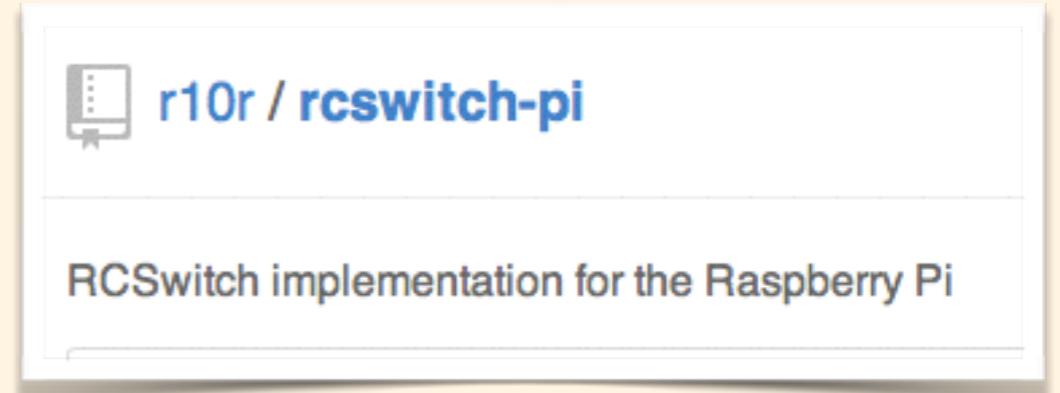


Radio-Controlled Switches



Send the coding

- Bit-Coding is send via GPIO pin to the Transmitter (bit-banging)
- The Java-Issue:
 - bit-banging is very timing relevant
 - could not be ensured with Java
- thus: C



send.cpp

```
#include "RCSwitch.h"
#include <stdlib.h>
#include <stdio.h>

int main(int argc, char *argv[])
{
    int PIN = 0;

    if (wiringPiSetup() == -1) return 1;
    RCSwitch mySwitch = RCSwitch();
    mySwitch.enableTransmit(PIN);

    if (argc==5)
    {
        char* houseCode = argv[1];
        int group = atoi(argv[2]);
        int device = atoi(argv[3]);
        int command = atoi(argv[4]);
        printf("sending: houseCode:%c group:%i device:%i command: %i\n", houseCode[0], group, device, command);
        switch(command) {
            case 1:
                mySwitch.switchOn(houseCode[0], group, device);
                break;
            case 0:
                mySwitch.switchOff(houseCode[0], group, device);
                break;
            default:
                printf("command[%i] is unsupported\n", command);
                return -1;
        }
    }
    else
    {
        printf(" Usage: ./send <houseCode> <groupCode> <deviceCode> <command>\n");
        printf(" Command is 0 for OFF and 1 for ON\n");
    }
}

return 0;
}
```

./send [houseCode] [group] [device] [command]

```

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<configuration>
<devices>
<device>
<houseCode>a</houseCode>
<groupId>1</groupId>
<deviceId>1</deviceId>
<name>Light Front Door</name>
<mqttTopic>devices/front/light/door</mqttTopic>
</device>
<device>
<houseCode>a</houseCode>
<groupId>1</groupId>
<deviceId>2</deviceId>
<name>Light Terrace</name>
<mqttTopic>devices/backyard/light/terrace</mqttTopic>
</device>
<device>
<houseCode>a</houseCode>
<groupId>1</groupId>
<deviceId>3</deviceId>
<name>Fountain</name>
<mqttTopic>devices/backyard/fountain</mqttTopic>
</device>
<device>
<houseCode>a</houseCode>
<groupId>1</groupId>
<deviceId>5</deviceId>
<name>Light Garden</name>
<mqttTopic>devices/backyard/light/garden</mqttTopic>
</device>
<device>
<houseCode>a</houseCode>
<groupId>1</groupId>
<deviceId>4</deviceId>
<name>Light Front Ambiente</name>
<mqttTopic>devices/front/light/ambiente</mqttTopic>
</device>
<device>
<houseCode>a</houseCode>
<groupId>1</groupId>
<deviceId>3</deviceId>
<name>Light Livingroom</name>
<mqttTopic>devices/livingroom/light/ambiente</mqttTopic>
</device>
</devices>
<mqttClientConfiguration>
<mqttClientId>SweethomeMQTTClientId</mqttClientId>
<mqttBrokerAddress>127.0.0.1</mqttBrokerAddress>
<mqttBrokerPort>1883</mqttBrokerPort>
<mqttMessagesBaseTopic>sweethome</mqttMessagesBaseTopic>
</mqttClientConfiguration>
</configuration>

```

SweetHomeHub

Lummerland — pi@sweethome: /opt — ssh — 137x29

```

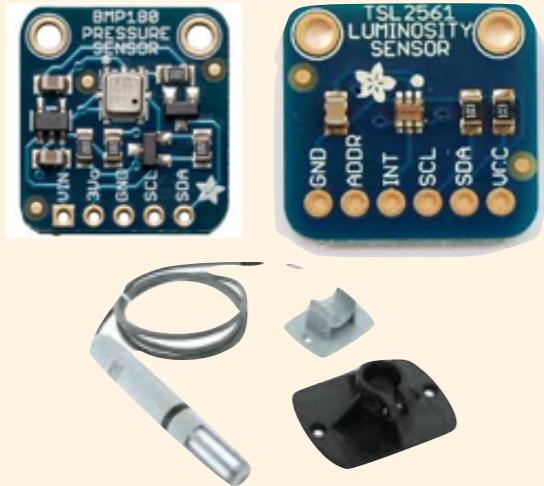
Starting SweetHome Mqtt-Receiver
INFO 2015-03-12 15:06:58,322 [Run] - Starting.
INFO 2015-03-12 15:06:58,389 [Configuration] - Loading configuration file: /home/pi/sweethomehub/sweethomehub-config.xml
INFO 2015-03-12 15:07:02,052 [MqttClientController] - Connect...
INFO 2015-03-12 15:07:02,060 [MqttClientController] - Connecting to: tcp://127.0.0.1:1883 with clientID: SweethomeMQTTClientId
INFO 2015-03-12 15:07:03,539 [MqttMessageReceiver] - -----
INFO 2015-03-12 15:07:03,549 [MqttMessageReceiver] - - MQTT Messages Receiver -
INFO 2015-03-12 15:07:03,555 [MqttMessageReceiver] - -----
INFO 2015-03-12 15:07:03,561 [MqttMessageReceiver] - Started.
INFO 2015-03-12 15:07:03,566 [MqttMessageReceiver] - Configured devices:
INFO 2015-03-12 15:07:03,596 [MqttMessageReceiver] - sweethome/devices/front/light/door
INFO 2015-03-12 15:07:03,602 [MqttMessageReceiver] - sweethome/devices/backyard/light/terrace
INFO 2015-03-12 15:07:03,607 [MqttMessageReceiver] - sweethome/devices/backyard/fountain
INFO 2015-03-12 15:07:03,613 [MqttMessageReceiver] - sweethome/devices/backyard/light/ambiente
INFO 2015-03-12 15:07:03,619 [MqttMessageReceiver] - sweethome/devices/front/light/ambiente
INFO 2015-03-12 15:07:03,624 [MqttMessageReceiver] - sweethome/devices/livingroom/light/ambiente
INFO 2015-03-12 15:07:03,630 [MqttMessageReceiver] - Send JSON commands to sweethome/devices/jsoncommand
INFO 2015-03-12 15:07:03,687 [MqttMessageReceiver] - Subscribed to devices base topic: sweethome/devices/#
INFO 2015-03-12 15:07:03,693 [MqttMessageReceiver] - Waiting for incoming requests...
INFO 2015-03-12 15:07:29,027 [MqttMessageReceiver] - Incoming message for topic 'sweethome/devices/livingroom/light/ambiente': ON
INFO 2015-03-12 15:07:29,043 [DeviceControl] - About to TURN_ON Light Livingroom (a 1 3)
INFO 2015-03-12 15:07:29,133 [Send] - Executing command: /home/pi/rcswitch-pi/send a 1 3 1
INFO 2015-03-12 15:07:29,723 [Send] - sending: houseCode:a group:1 device:3 command: 1
INFO 2015-03-12 15:07:32,907 [MqttMessageReceiver] - Incoming message for topic 'sweethome/devices/front/light/door': OFF
INFO 2015-03-12 15:07:32,915 [DeviceControl] - About to TURN_OFF Light Front Door (a 1 1)
INFO 2015-03-12 15:07:32,925 [Send] - Executing command: /home/pi/rcswitch-pi/send a 1 1 0
INFO 2015-03-12 15:07:33,448 [Send] - sending: houseCode:a group:1 device:1 command: 0

```

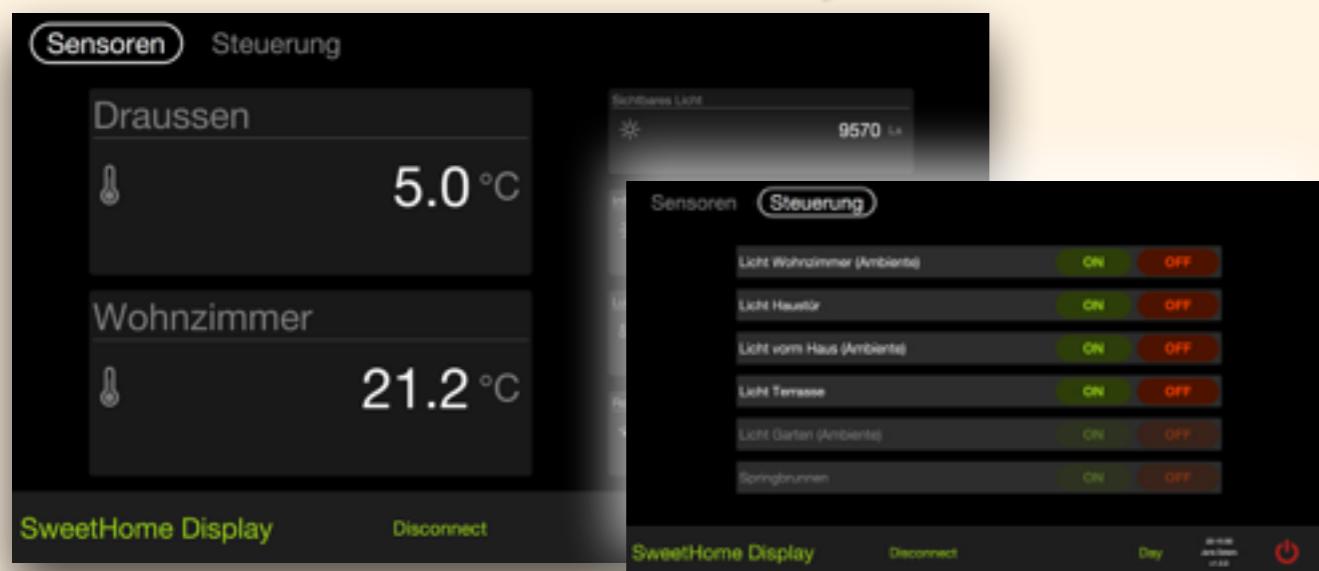


The coffee klatch

Sensors



Clients



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broker



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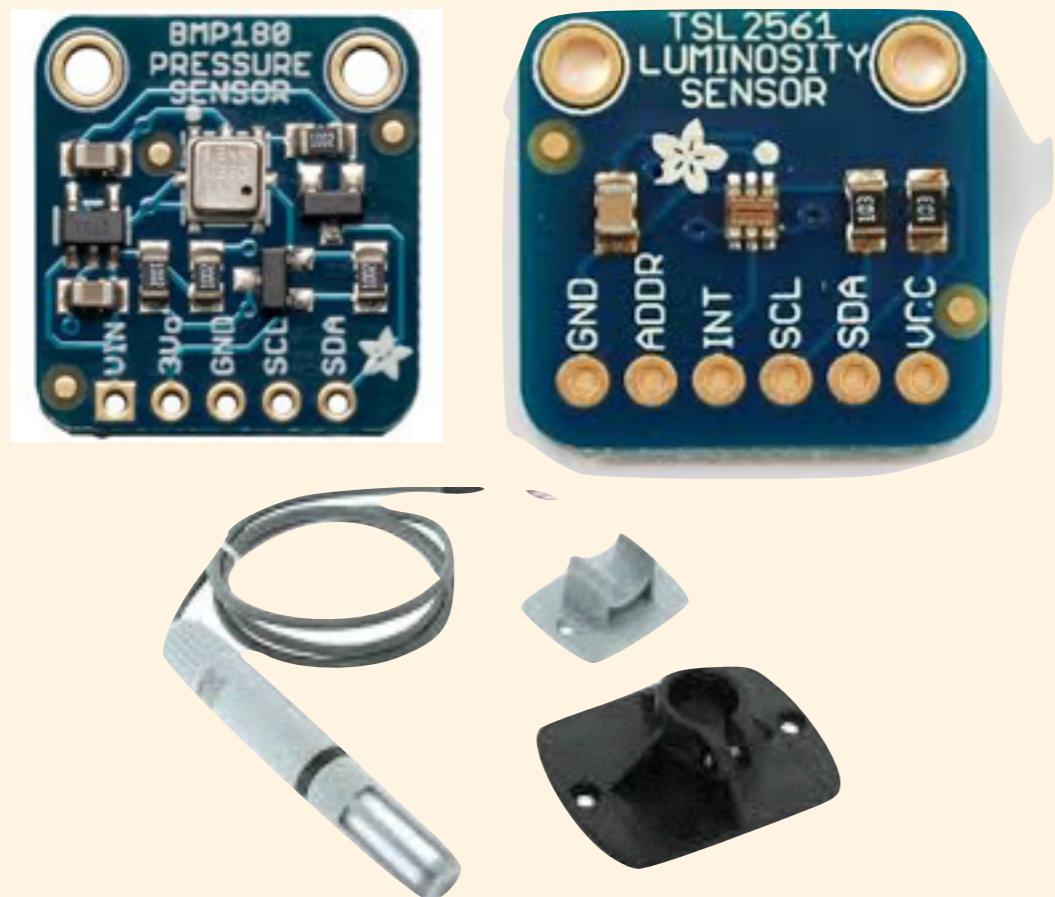
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ON/OFF Switches



Remote-Switch

Sensors



Temperature Indoor

Humidity Livingroom

Temperature Outdoor

Pressure Outdoor

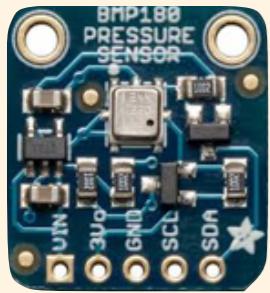
Altitude Outdoor

Lux Visible Outdoor

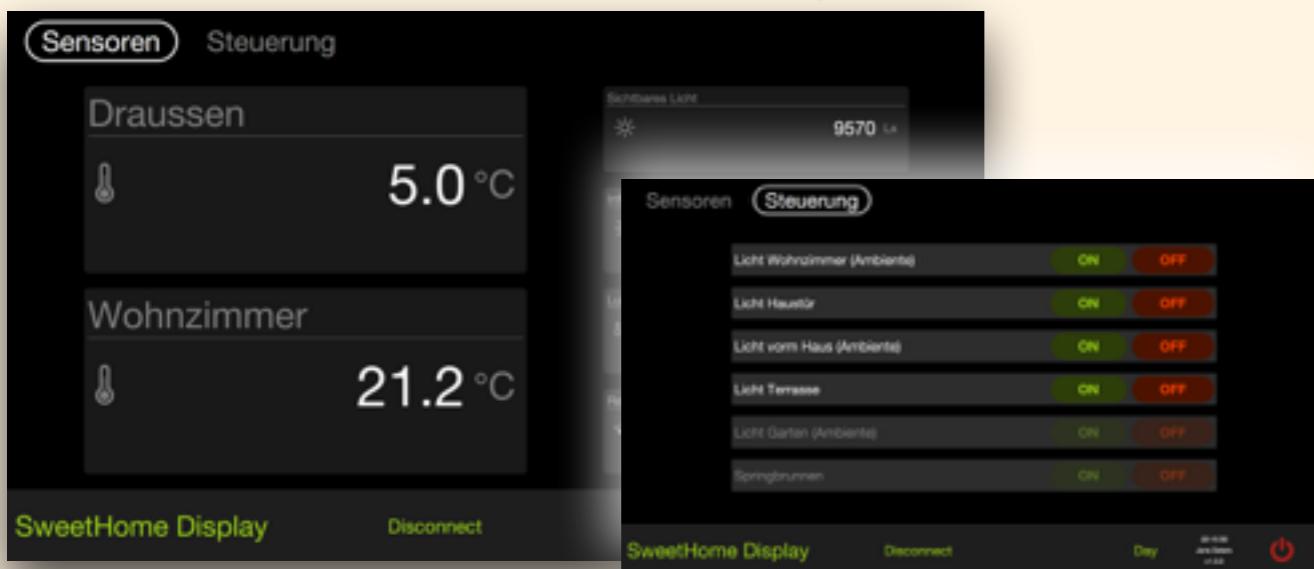
Lux Infrared Outdoor

The coffee klatch

Sensors



Clients



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ON/OFF Switches

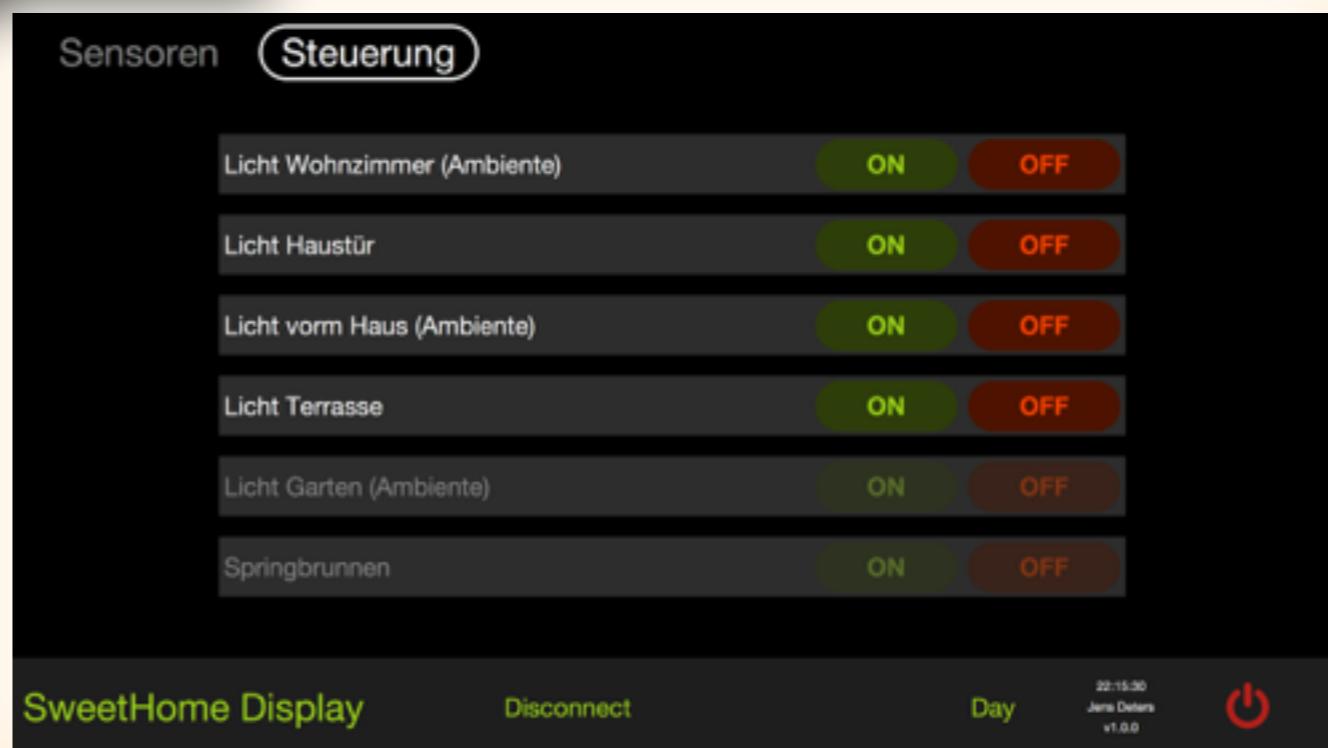
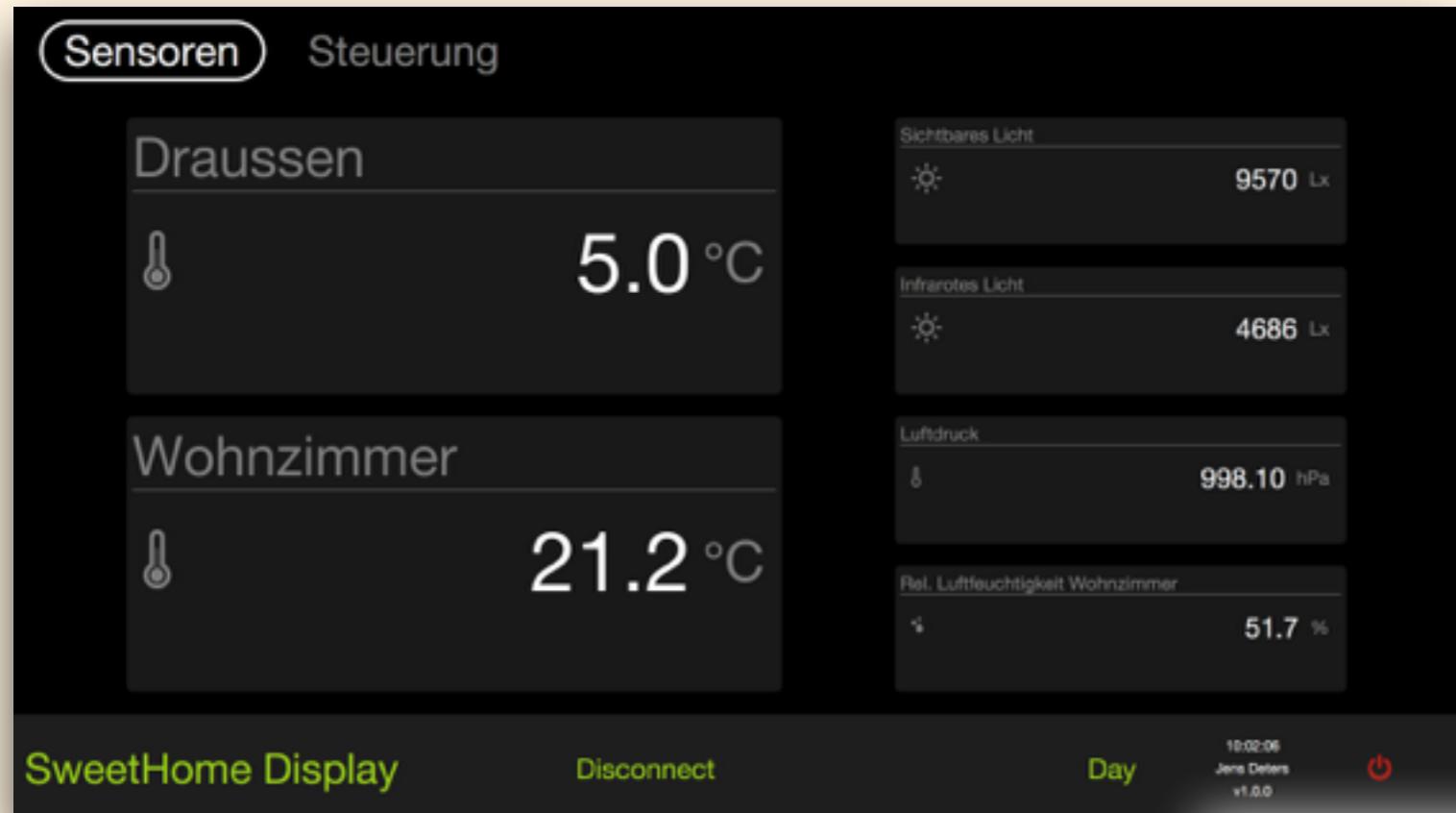


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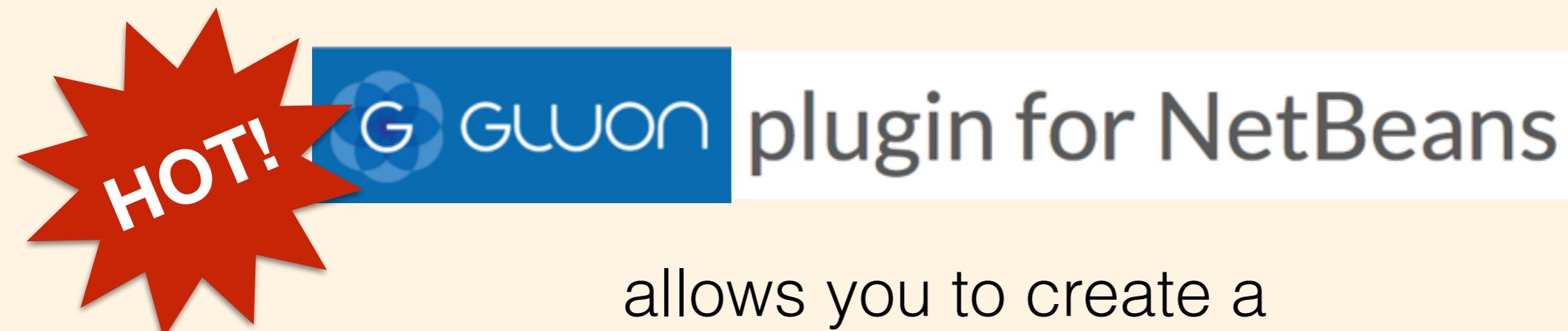


Remote-Switch

JavaFX Client



JavaFX on Mobiles



allows you to create a JavaFX Application and deploy it to Android and iOS devices

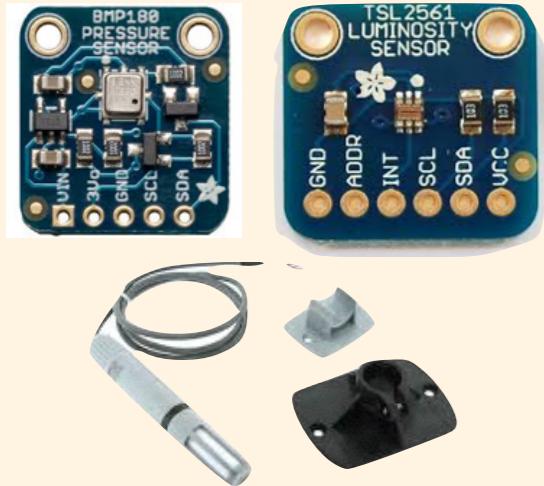


JavaFX Client

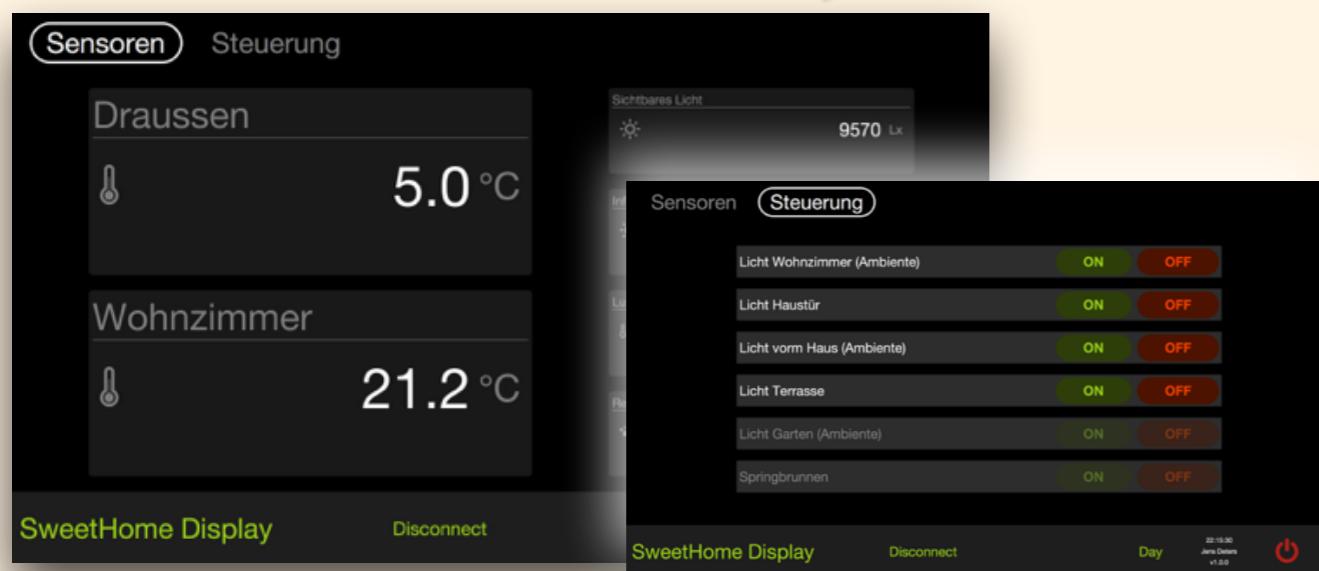


The coffee klatch

Sensors



Clients



mosquitto broker
MQTT^{ORG}

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ON/OFF Switches



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0101001010010
10010101001...



Remote-Switch

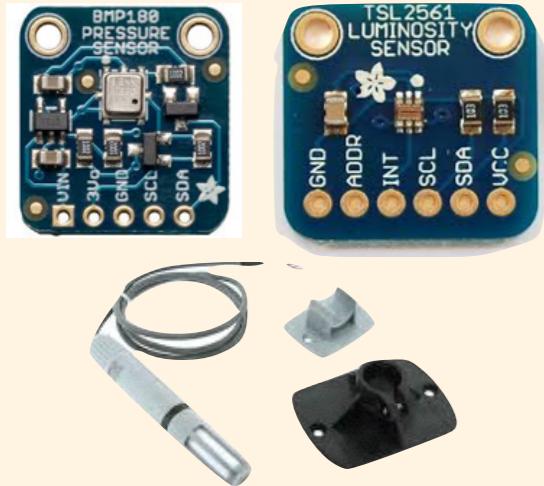
MQTT in Nutshell

- Message Queue Telemetry Transport
- Lightweight
- Publish/Subscribe
- Client/Broker
- QoS, Topic Wildcards, ...
- **OASIS Standard since October 2014**

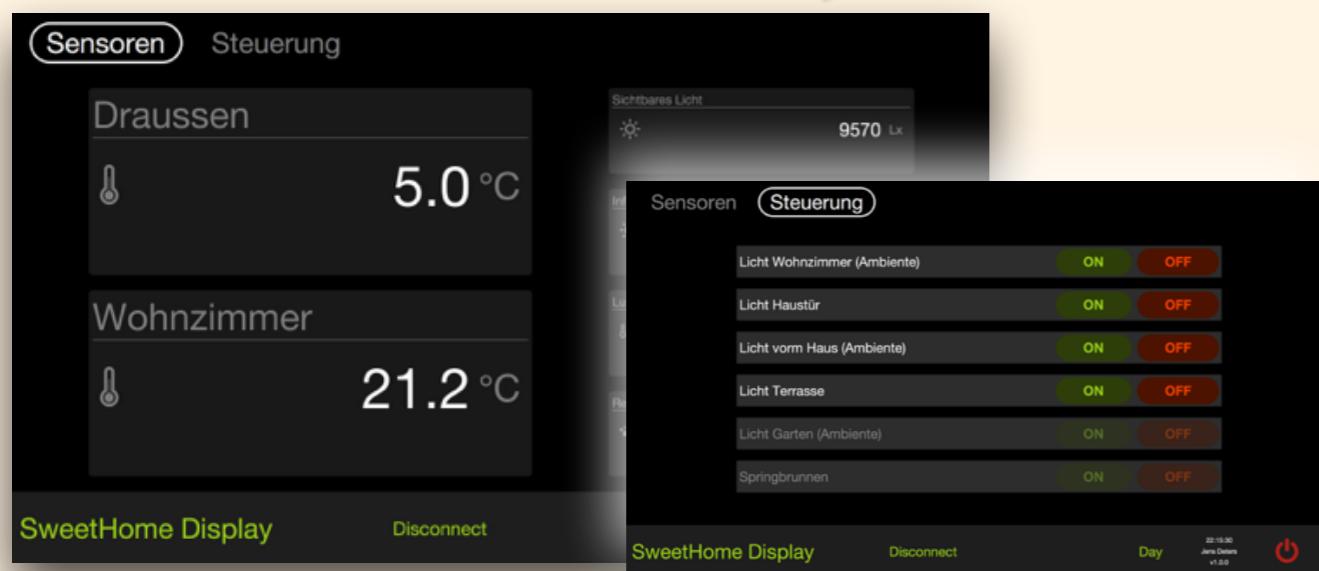


The coffee klatch

Sensors



Clients



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MQTT^{ORG}

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ON/OFF Switches



0100101000101
0101001010010
10010101001...



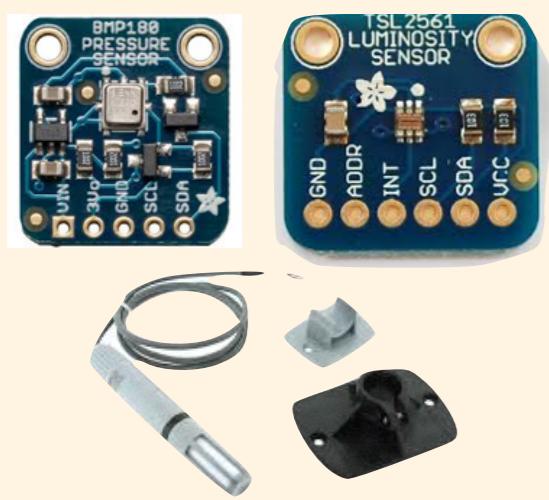
Remote-Switch

Devices



Light Terrace	devices/backyard/light/terrace
Light Backyard	devices/backyard/light/ambiente
Fountain Backyard	devices/backyard/fountain
Light Front Door	devices/front/light/door
Light Front Garden	devices/front/light/ambiente
Light Livingroom	devices/livingroom/light/ambiente
Command	devices/jsoncommand

Sensors

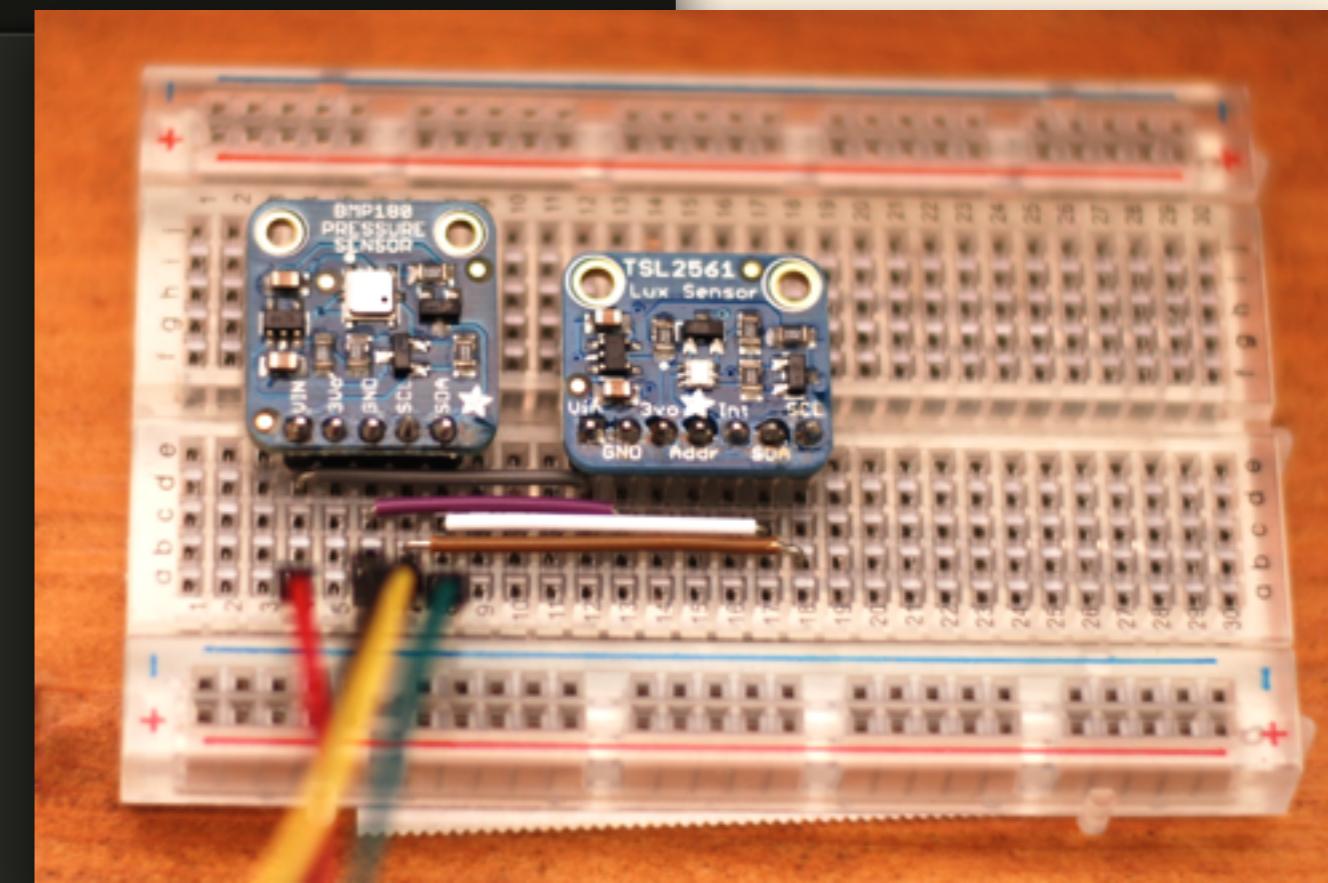


Temperature Indoor	sensors/indoor/temperature
Humidity Livingroom	sensors/indoor/humidity
Temperature Outdoor	sensors/outdoor/temperature
Pressure Outdoor	sensors/outdoor/pressure
Altitude Outdoor	sensors/outdoor/altitude
Lux Visible Outdoor	sensors/outdoor/lux
Lux Infrared Outdoor	sensors/outdoor/lux-ir

```

1 #!/usr/bin/python
2
3 import paho.mqtt.client as mqtt
4 import Adafruit_BMP.BMP085 as BMP085
5 import Adafruit_BMP.TSL2561 as TSL2561
6 from time import sleep
7
8
9 def on_connect(client, userdata, flags, rc):
10     print("Connected with result code "+str(rc))
11
12 mqttClient = mqtt.Client()
13 mqttClient.on_connect = on_connect
14
15 bmp180 = BMP085.BMP085(mode=BMP085.BMP085_ULTRAHIGHRES)
16 tsl2561 = TSL2561.TSL2561()
17
18 mqttClient.connect("sweethome", 1883, 60)
19 mqttClient.loop_start()
20
21 temperature_topic="sweethome/sensors/outdoor/temperature"
22 pressure_topic="sweethome/sensors/outdoor/pressure"
23 lux_topic="sweethome/sensors/outdoor/lux"
24 lur_ir_topic="sweethome/sensors/outdoor/lux-ir"
25
26 while True:
27     tsl2561.readData()
28     lux_visible = tsl2561.getVisible()
29     lux_ir = tsl2561.getInfrared()
30     temperature = bmp180.read_temperature()
31     pressure = int(bmp180.read_pressure())
32     mqttClient.publish(temperature_topic, temperature)
33     print 'published: {0:s} {1:0.1f} *C'.format(temperature_topic, temperature)
34     mqttClient.publish(pressure_topic, pressure)
35     print 'published: {0:s} {1:d} Pa'.format(pressure_topic, pressure)
36     mqttClient.publish(lux_topic, lux_visible)
37     print 'published: {0:s} {1:0.1f} lx'.format(lux_topic, lux_visible)
38     mqttClient.publish(lur_ir_topic, lux_ir)
39     print 'published: {0:s} {1:d} lx'.format(lur_ir_topic, lux_ir)
40     sleep(5)
41

```



Screen!

-dmS name Start as daemon: Screen session in detached mode.

```
pi@outdoor ~ $ crontab -l
```

```
@reboot screen -dmS publisher /home/pi/mqtt/publisher.py
```

```
pi@outdoor ~ $
```

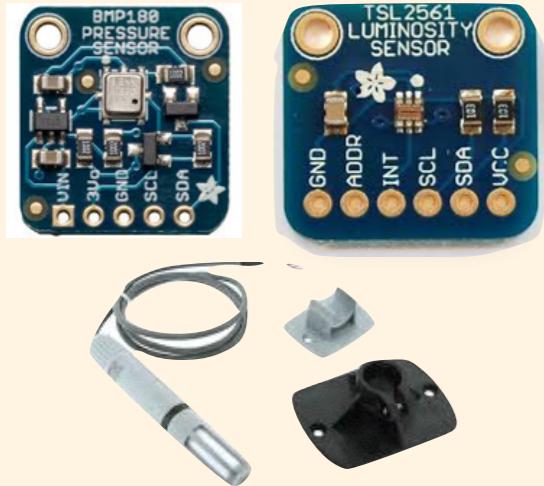
```
pi@outdoor ~ $
```

```
pi@outdoor ~ $ screen -r publisher  
[detached from 2086.publisher]
```

```
pi@outdoor ~ $
```

The coffee klatch

Sensors



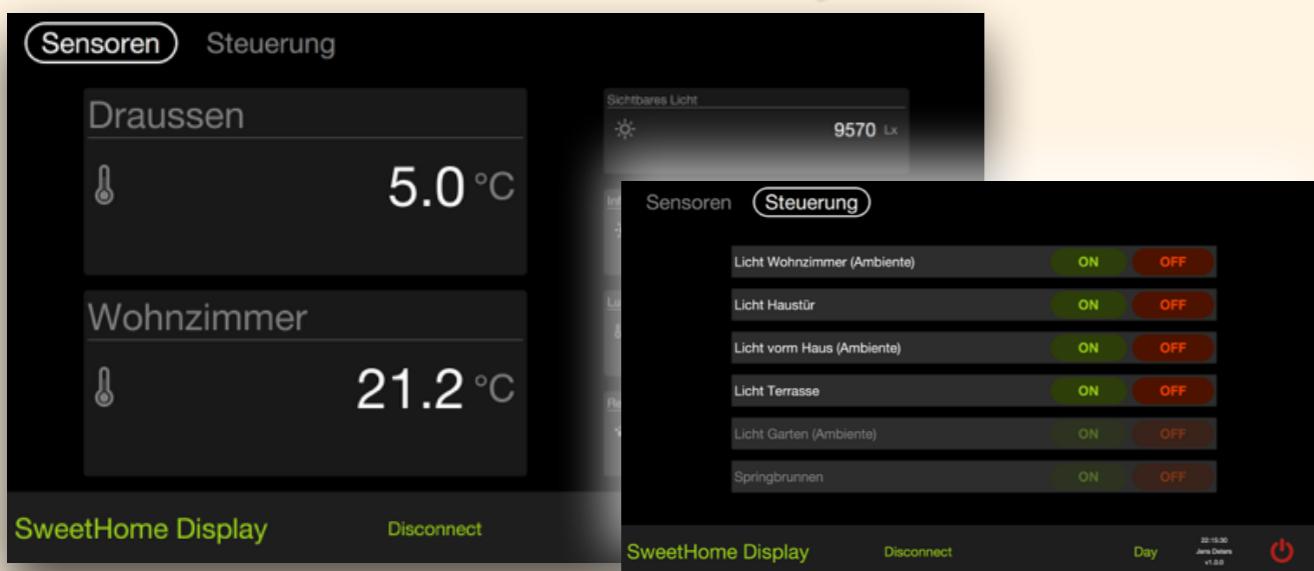
PUBLISH



SUBSCRIBE

PUBLISH

Clients



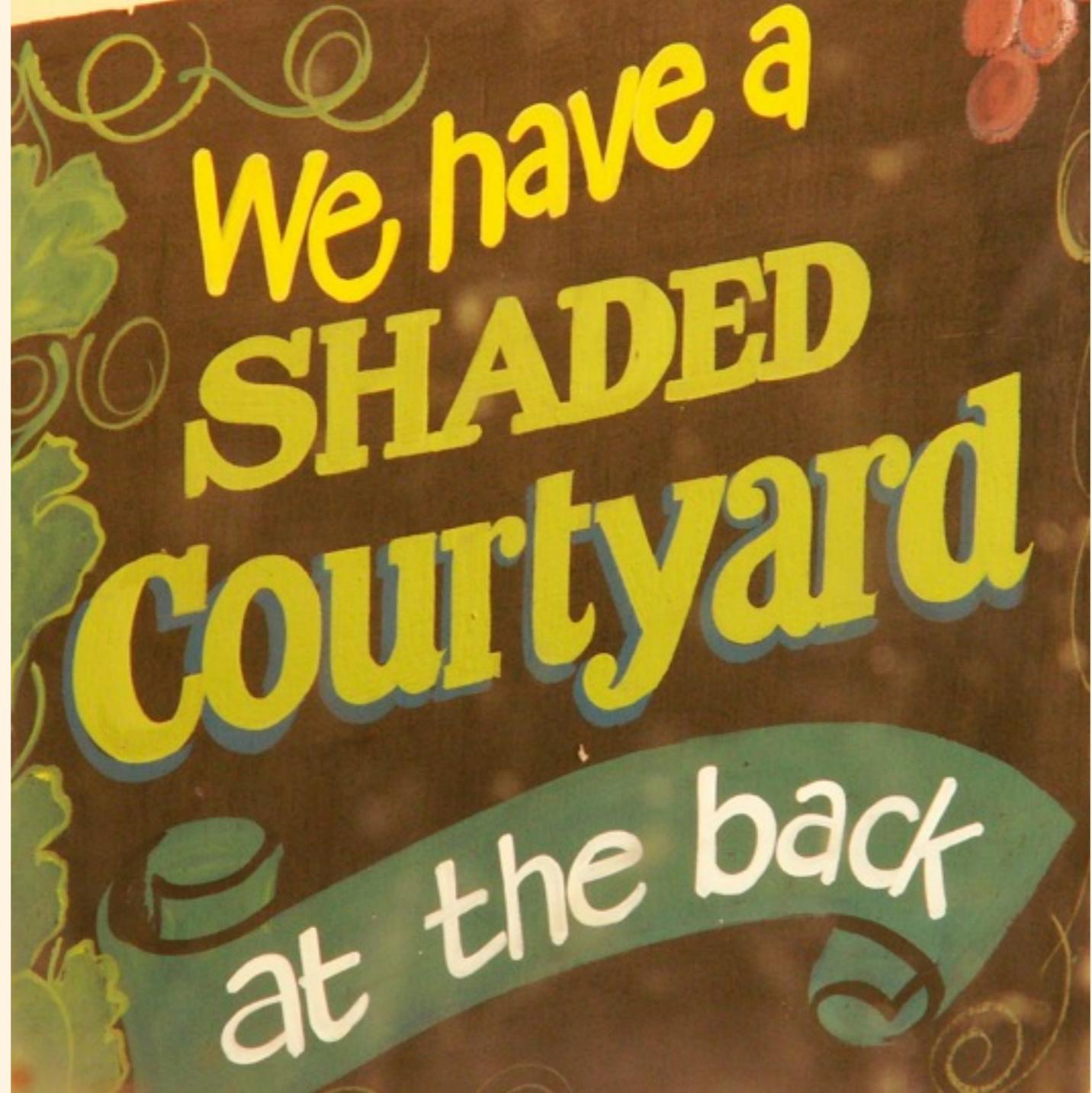
ON/OFF Switches



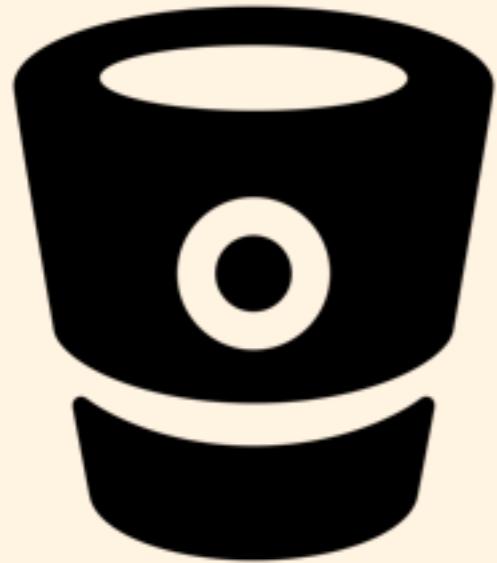
0100101000101
0101001010010
10010101001...



Remote-Switch



DEMO



Get the Code

<https://bitbucket.org/Jerady>

<https://bitbucket.org/Jerady/raspigpiocontrollerfx>

<https://bitbucket.org/Jerady/raspisteppermotorcontrollerfx>

<https://bitbucket.org/Jerady/sweethome>



Jens Deters

@jerady

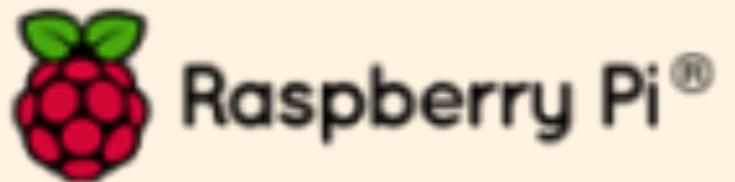
www.jensd.de

www.mqttfx.org

LINKS

- <http://www.raspberrypi.org>
- <https://bitbucket.org/javafxports/arm/downloads>
- <http://wiringpi.com>
- <http://pi4j.com>
- <https://code.google.com/p/rc-switch/>
- <https://github.com/r10r/rcswitch-pi>
- <http://intertecho.at>
- <http://www.mqttx.org>
- <http://www.gluonhq.com>

Annex



Raspberry Pi is a trademark of the Raspberry Pi Foundation
Java is a trademark of the Oracle Corporation

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