SafeDomoticHome

Project for Internet of Things course, 2022-23 ed.

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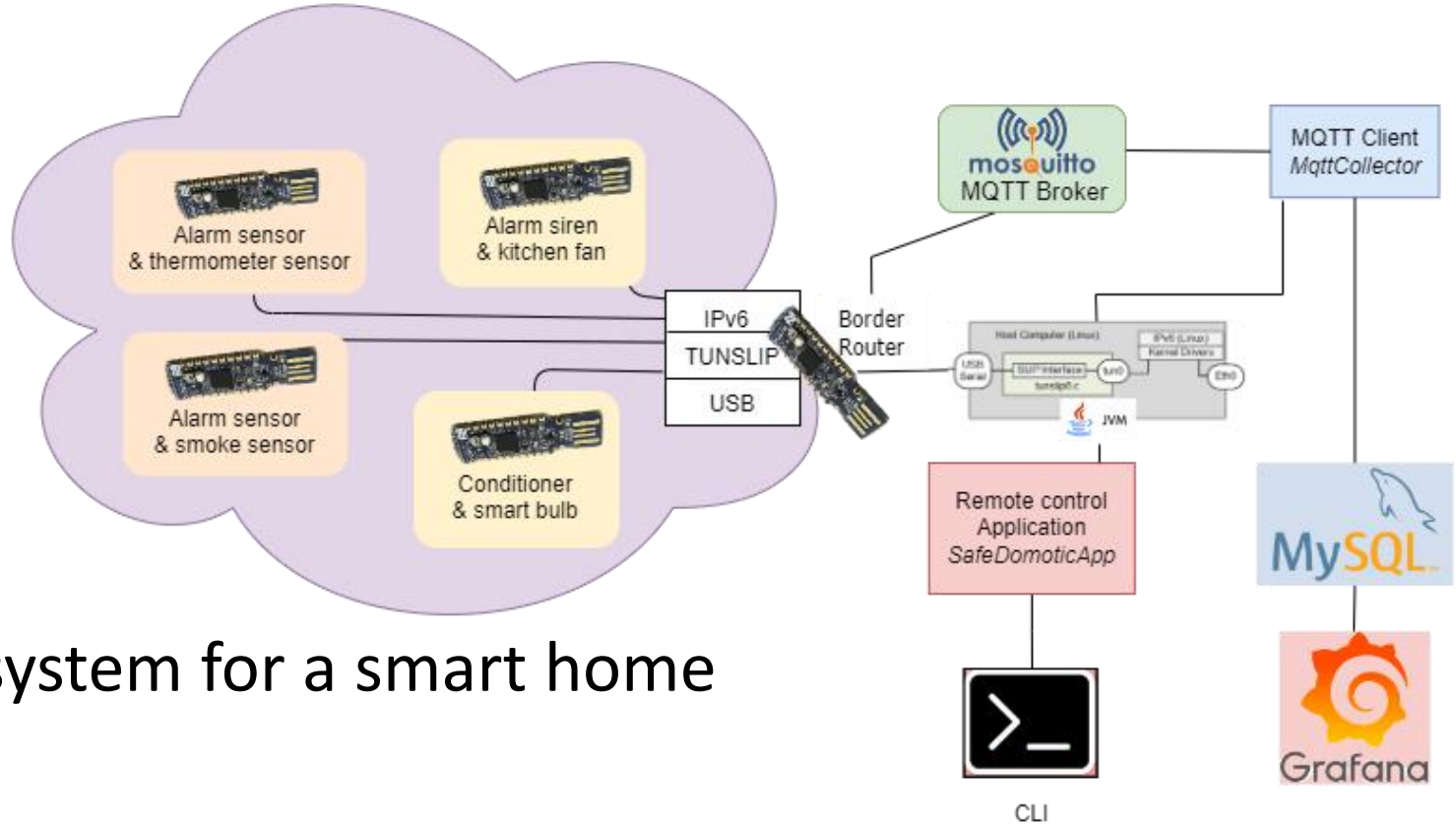
Introduction



- IoT telemetry and control system for a smart home
- Home equipped with:
  - Alarm sensor
  - Temperature sensor
  - VOC sensor to measure % of cooking fumes
  - Conditioner, alarm siren and smart bulb as actuators
  - Fan on the kitchen hob automatically triggered

nrf52840 deployment

1. Flash BR code onto the nrf52840 dongle (if necessary). In a new terminal (n.1):

```
osboxes@osboxes:~$ docker start -ai fervent_sutherland
user@osboxes:~/contiki-ng$ cd IotSafeDomoticHome-main/
user@osboxes:~/contiki-ng/IoTSafeDomoticHome-main$ ./flashBR.sh
```

2. Deploy the BR dongle as first USB device

```
user@osboxes:~/contiki-ng/IoTSafeDomoticHome-main$ ./deployBR.sh
```

3. Flash MQTT and CoAP C source code on the other motes (if necessary). In a new terminal (n.2):

```
osboxes@osboxes:~$ docker start -ai jolly_rubin
user@osboxes:~/contiki-ng$ cd IotSafeDomoticHome-main/
user@osboxes:~/contiki-ng/IoTSafeDomoticHome-main$ ./flashTemperature.sh
user@osboxes:~/contiki-ng/IoTSafeDomoticHome-main$ ./flashVoc.sh
user@osboxes:~/contiki-ng/IoTSafeDomoticHome-main$ ./flashConditionerLight.sh
user@osboxes:~/contiki-ng/IoTSafeDomoticHome-main$ ./flashSirenFan.sh
```

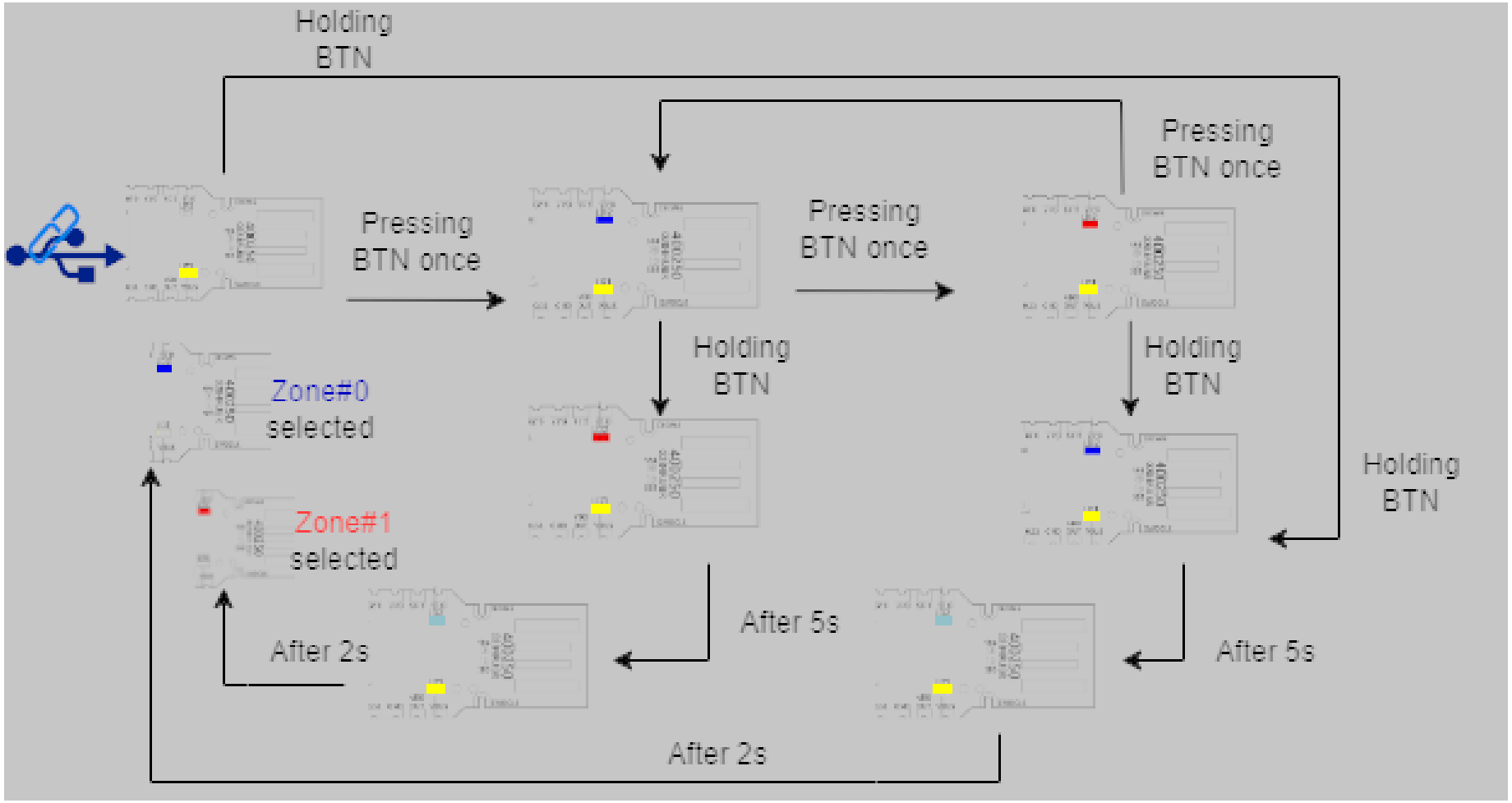
nrf52840 deployment (2)

4. Execute the Java Application *statical-coap-discovery* (if necessary). In a new nerminal (n.3):

```
osboxes@osboxes:~$ cd contiki-ng/IoTSafeDomoticHome-main/
osboxes@osboxes:~/contiki-ng/IoTSafeDomoticHome-main$ ./startStaticCoap.sh
```

5. Connect the flashed nrf52840 dongles to USB hub

Alarm zone selection

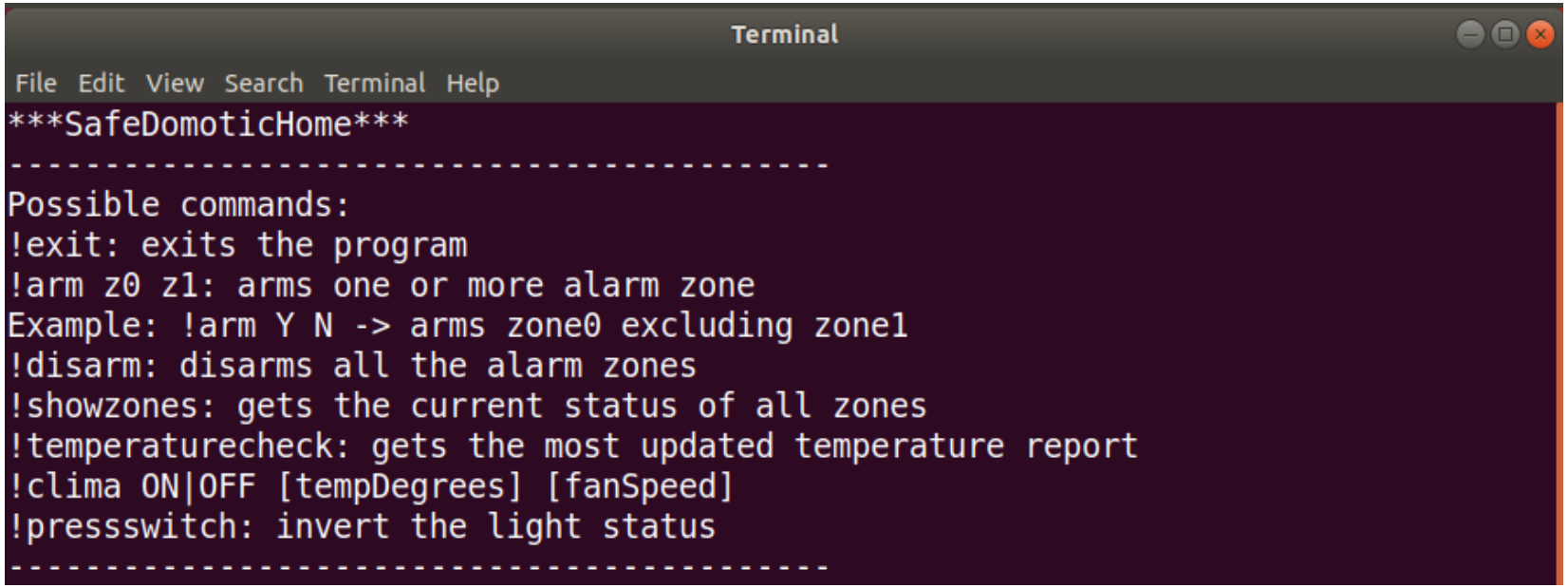


Launching *SafeDomoticApp*

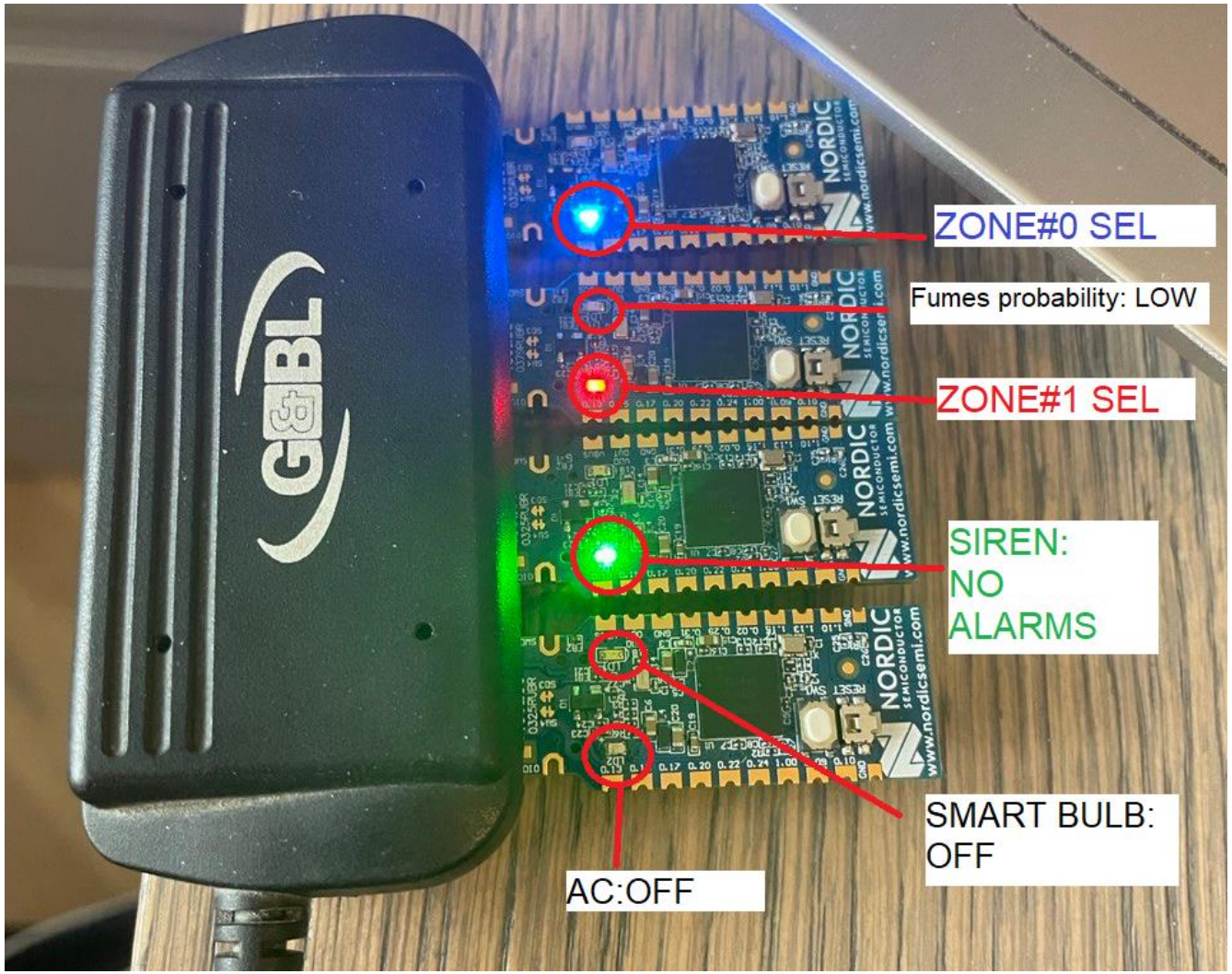
To compile and run the Java Application, type:

```
osboxes@osboxes:~/contiki-ng/IoTSafeDomoticHome-main$ ./startApp.sh
```

After that, a CLI will show up in a new window listing all the available commands:



LEDs legend



- In the picture we have the LEDs status right before the launch of the Java Application

Demo: Arming/disarming the alarm

- By pressing the button on the MQTT alarm sensor, you can increase the opening probability. MIN VALUE = 0% MAX VALUE = 80%
- To see information about that, in the «jolly_rubin» container:

```
user@osboxes:~/contiki-ng/IoTSafeDomoticHome-main$ cd mqtt-network/
user@osboxes:~/contiki-ng/IoTSafeDomoticHome-main/mqtt-network$ make login TARGET=nrf52840 BOARD=dongle PORT=/dev/ttyACM1
rlwrap ../../tools/serial-io/serialdump -b115200 /dev/ttyACM1
connecting to /dev/ttyACM1 [OK]
[INFO: door_sensor] Opening probability changed to: 80
[INFO: door_sensor] Opening probability changed to: 0
[INFO: door_sensor] Opening probability changed to: 20
[INFO: door_sensor] Opening probability changed to: 40
[INFO: door_sensor] Opening probability changed to: 60
```

Demo: acting with the bulb

Demo: acting with the AC

Demo: trigger the kitchen fan

- By holding the button on the MQTT kitchen sensor, you can dramatically increase the cooking fumes percentage. The correspondent yellow LED will turn on.
- The actions made by the smart fan in the kitchen could be observed in the Grafana Dashboard together with some other summary information.
- http://localhost:3000 -> SafeDomoticHome Grafana dashboard

Demo: trigger the kitchen fan (2)

- **<15%: good**
  yellow led OFF
- **between 15 % and 22%:**
  fan speed = 1
- **between 22% and 30%:**
  fan speed = 2
- **>30%: critical level**.
  fan speed = MAX (3)