

# eAse-energy Automated sauna Experience

---

JOONAS ,TONI, JAYDEN, EDSON

# Motivation

## Social Problem

---

- Many people die in Sauna (Over staying, Hyperthermia, drunk and being unconsciousness, etc)
  - 30-40 deaths in Finland (1)

*Karmeaa löytö: Kuollut mies saunassa yli yön*

<http://www.helsinginuutiset.fi/artikkeli/290397-karmeaa-loyto-kuollut-mies-saunassa-yli-yon>

*Sauna contest leaves Russian dead and champion Finn in hospital*

<http://www.theguardian.com/world/2010/aug/08/sauna-championship-russian-dead>

*Man dies hours after collapsing*

<http://www.standard.co.uk/news/london/man-dies-hours-after-collapsing-at-gay-sauna-pleasuredrome-in-waterloo-10094827.html>

*Daughter discovers her father's charred remains inside a sauna:*

<http://www.dailymail.co.uk/news/article-2920220/Daughter-discovers-father-s-charred-remains-inside-sauna-timer-failed-turn-heat.html>

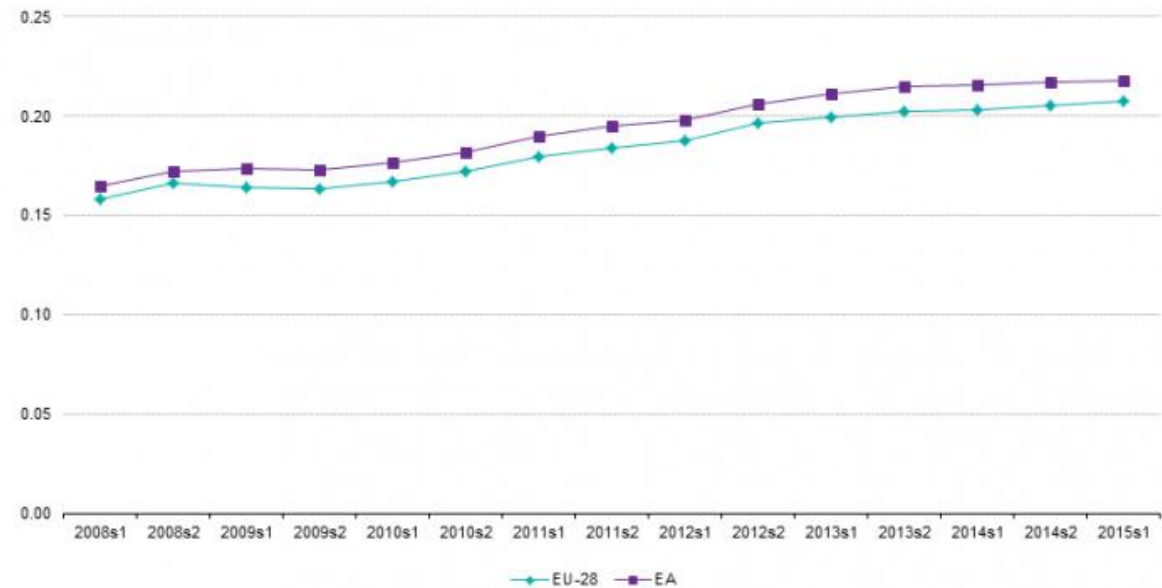
1. [http://www.stat.fi/til/ksyyt/2013/ksyyt\\_2013\\_2014-12-30\\_kat\\_005\\_en.html](http://www.stat.fi/til/ksyyt/2013/ksyyt_2013_2014-12-30_kat_005_en.html)

# Motivation

## Economic Problem

---

- Electric prices going up every year
- Global economy in poor condition
- Needs Saving than Spending.



Source: Eurostat (online data code: nrg\_pc\_204)

Evolution of EU-28 and EA electricity prices for household consumers  
[http://ec.europa.eu/eurostat/statistics-explained/index.php/Electricity\\_price\\_statistics](http://ec.europa.eu/eurostat/statistics-explained/index.php/Electricity_price_statistics)

# Solution

## eAse- energy Automated sauna Experience

---

- Triggers sauna (Turns the sauna on or off)
- desired target temperature
- Notifies when sauna is ready
- Motion detection based lighting (lights go on when there is movement and off if there is no movement for certain amount of time).

# Scenario 1:

Switch on the Sauna and notify the person

---

**Given** Switch on the Sauna automatically

**When** every Tuesday between 19-20.30

**Then** notifies the person via alarm when temperature in sauna room reaches 70c

**And** disable alarm automatically

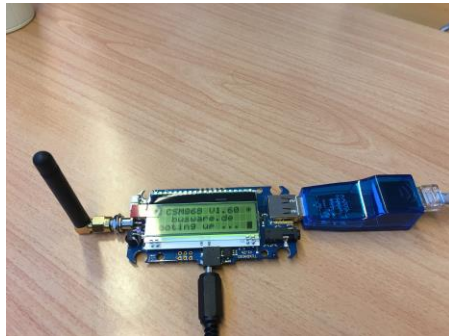
# eAse in Action

Turn on the Sauna Lights

USED PROJECTOR FOR DEMO PURPOSE

Controlled Devices:

- Stove
- Alarm



**TUXRADIO**  
(Debian/Linux,  
embedded)  
*Fhem Server*

every Tuesday between 19-20.30  
During Sauna if temp reaches over >75,  
switches off automatically and restarts when temp cools down to 70



**Homematic Switch  
Actuator, plug  
adapter**



- notifies the person via alarm when  
temperature in sauna room reaches 70c  
- disable alarm after 10 min



**Homematic Wireless  
temperature  
/Humidity sensor**

# Scenario 2:

Turn on the Sauna Lights

---

**Given** Sauna is Switched on

**When** Someone enters the Sauna room

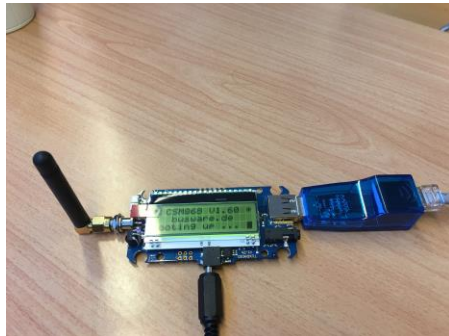
**Then** turn on the lights

# eAse in Action

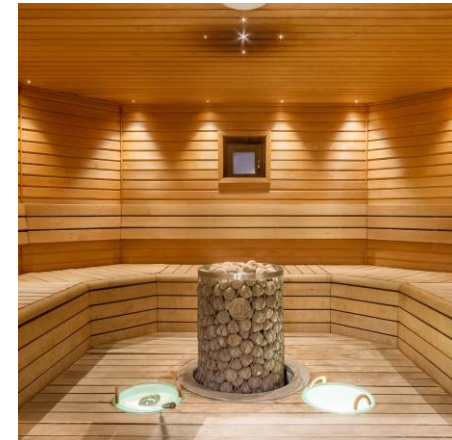
Turn on the Sauna Lights

USED PROJECTOR FOR DEMO PURPOSE

**Wireless Motion Detector**  
*HomeMatic 131776*



**TUXRADIO**  
(Debian/Linux,  
embedded)  
*Fhem Server*



**Controlled Devices:**  
Lights



# Technologies Used

---

**Automation server:** FHEM

**Server platform:** TuxRadio (Debian/Linux, embedded)

**Device protocol:** HomeMatic

**Used devices:**

- Temperature sensor
- Light bulb
- Motion detector
- Switches

# Energy and Cost Savings

Based on Scenario

---

where person uses the sauna 7 times a week for 1.5 h  
(1 h for warming the sauna to 80 °C and 0.5 h for the sauna session itself) every week during the year.

energy costs 0.12 €/kWh which is the average price of household electricity in Finland <sup>1)</sup>

- power of the stove is 6 kW
- lamp's power is 0.053 kW

1. <http://www.vattenfall.fi/fi/keskimaarainen-kulutus.htm>

# Energy and Cost Savings

Based on Scenario (1 and half hours per day)

	Assumptions	Normal Conditions	Assumptions	eAse Solution	Savings €€€€€
Stove	Without alarm the person would go to sauna 10 minutes later than with alarm and thus waste energy	6 kW * (1.5 h + 10/60 h waiting time) * 0.12 €/kWh * 52 weeks * 7 = 436.8 €/year		6 kW * 1.5 h * 0.12 €/kWh * 52 weeks * 7 = 393.12 €/year	44 €/year
Lights	Light is on during the heating phase and sauna session itself.	0.053 kW * (1.5 h + 10/60 h waiting time) * 0.12 €/kWh * 52 weeks * 7 = 3.86 €	motion detecting light is on for 22 minutes (two 4 minute cooldown breaks) during the whole session	0.053 kW * 22/60 h * 0.12 €/kWh * 52 weeks * 7 = 0.84€/year	3 €/year with one lamp

**Total Savings: 47€/year**  
**Energy Savings: ~392 kWh/year**  
**CO2: 181 kgCO2e**

1. <http://www.vattenfall.fi/fi/keskimaarainen-kulutus.htm>

# Benefits

minimize energy waste

Save sauna user

---

- Go to sauna immediately when it's ready
- Energy-efficient temperature for sauna is 70-80 °C
- Avoid turning lights all time

# Experience

---

- Teamwork- awesome
- learned a whole heck of about home automation
- Heck of fun to use projector as Sauna
- Motivated to install them server and install homeMatic devices to control devices and SAVE energy
- learned how to edit front end of them server.
- Thank you Prof. Dr. Jari Porras and Olaf Drögehorn
  
- Overall it was GREAT!!

# Experience

