GROUP 1

ILLUMIN-IT

HOME AUTOMATION CODE CAMP

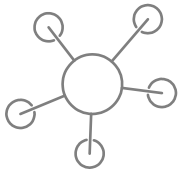
HELLO!

We are ILLUMIN-IT

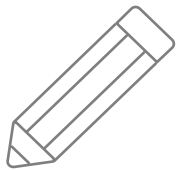
Furkat, Al-Hussein, Kristian & Marcel
PERCCOM Cohort 4

Code Camp Team Members

Furkat Gofurov



Al-Hussein Jasim



Kristian Kouros

Marcel Villanueva

1.

INTRODUCTION

Here we go!

WHEN THERE IS **NO SUN**, WHAT DO YOU DO ?

YOU CREATE ONE!

BIG CONCEPT

Maximize the use of natural light with a responsive smart lighting solution

SO WHAT MOTIVATED US TO PURSUE THIS IDEA?

Aside from saving energy consumption and electricity cost, the group found out the positive effects of natural lights for the mind and the health especially for work spaces.

2.

DEVICES & TECHNOLOGIES

Home automation
toys for the big boys!

Devices

- PIRI Motion Detector is a pyroelectric sensor that measures IR.
- Every time it detects a distortion on the infrared values it is triggered and sends a notification.

Devices

- The FS20 Dimmer Sensor is a receiver to control the operation of different devices.
- The communication with the server is done through RF channels.

Devices

- The FS20 Twilight Sensor serves to measure the light intensity by changing its resistance with set threshold.
- It is mostly designed for outdoor environments.

Devices

- The DHS Home Manager is the brain of our home automation system. It is a Linux-based server, with a protective case and 2 RF module antennas.
- You can access the FHEM interface using DHS.

Devices

- FHEM is a home automation server written in Perl to set up complex control tasks using home automation devices.

3.

PROOF OF CONCEPT

Shout out to
PERCCOM
Cohort 4! <3

Project Schedule & Timeline

TUESDAY

(a) Meeting & Ideation

(b) Connect all the hardware devices to the server

SUCCESS INDICATOR:

☒ Properly register all devices and solve all hardware issues

WEDNESDAY

(a) Get started with the software part

(b) Testing scenarios and measurements

(c) Debugging and follow through

SUCCESS INDICATOR:

☒ Finalize tech implementation

THURSDAY

(a) Compile and collect documentation contents

(b) Polish details for the wiki

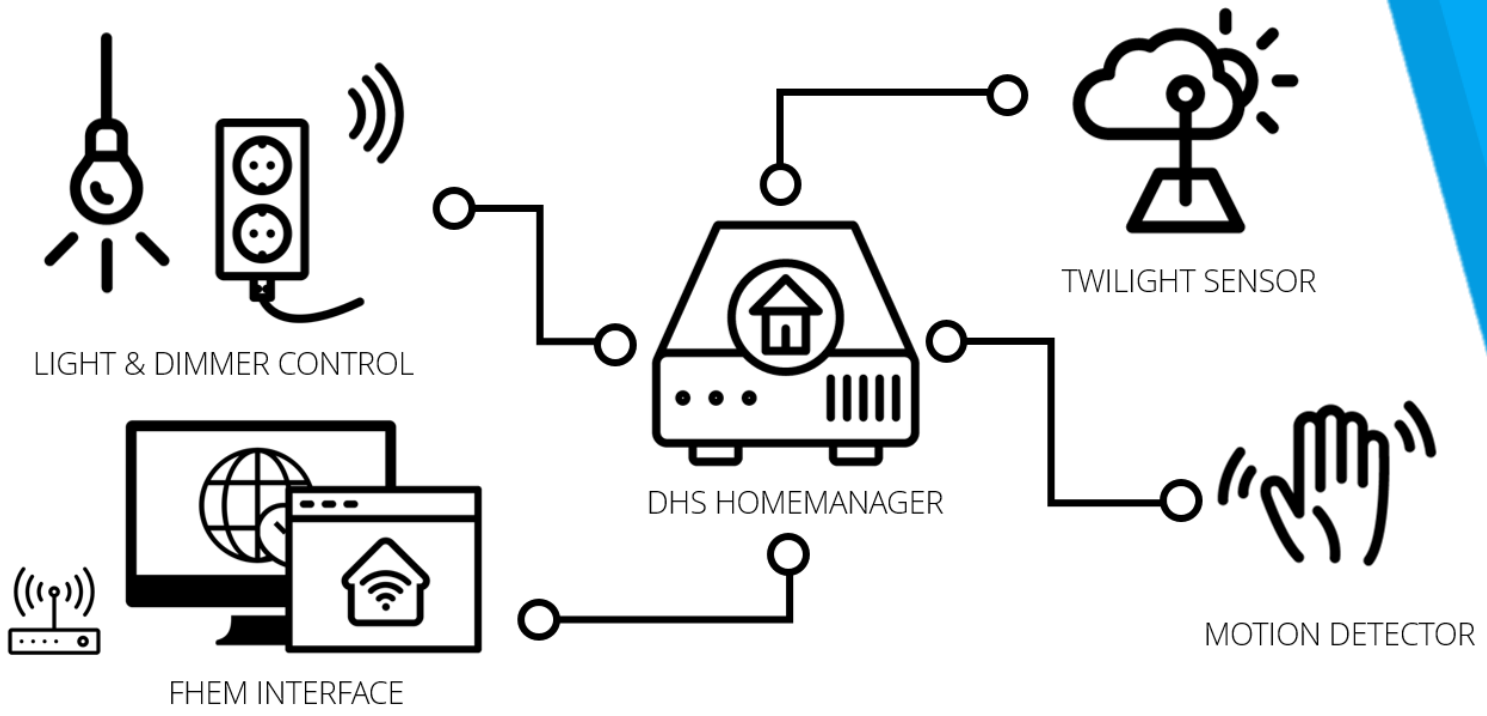
(c) Prepare slides for the presentation and poster

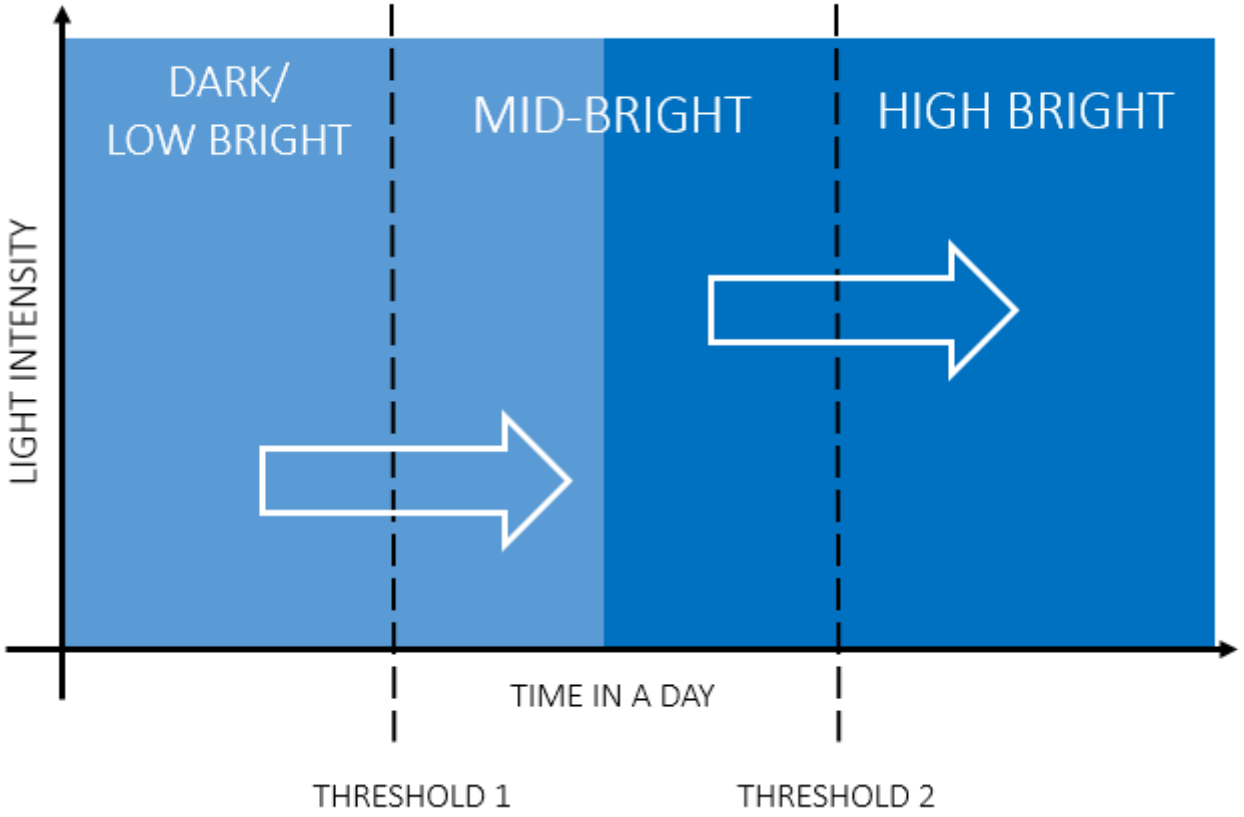
(d) Gather test user data

SUCCESS INDICATOR:

☒ Done and ready for the presentation

System Diagram





Twilight Sensor Threshold Settings

Scripts for the Motion Detector & Twilight Sensor

Logic control for the Motion Detector and Twilight Sensors

```
define lamp_move4 notify moveGroup1 {

if ((ReadingsVal ("twi1Group1", "state","") eq "off" ) && (ReadingsVal ("twi2Group1", "state","") eq "off" )) {fhem "set lamp1 dim100%"}

if ((ReadingsVal ("twi1Group1", "state","") eq "on" ) && (ReadingsVal ("twi2Group1", "state","") eq "off" )) {fhem "set lamp1 dim50%"}

if ((ReadingsVal ("twi1Group1", "state","") eq "on" ) && (ReadingsVal ("twi2Group1", "state","") eq "on" )) {fhem "set lamp1 dim18%"}

}



define lamp_thr1 notify tw1Group1 {

if ((ReadingsVal ("twi1Group1", "state","") eq "off" ) && (ReadingsVal ("twi2Group1", "state","") eq "off"  )
&& (ReadingsVal ("moveGroup1", "state","") eq "on")) {fhem "set lamp1 dim100%"}

if ((ReadingsVal ("twi1Group1", "state","") eq "on" ) && (ReadingsVal ("twi2Group1", "state","") eq "off" )
&& (ReadingsVal ("moveGroup1", "state","") eq "on" )) {fhem "set lamp1 dim50%"}

if ((ReadingsVal ("twi1Group1", "state","") eq "on" ) && (ReadingsVal ("twi2Group1", "state","") eq "on" )
&& (ReadingsVal ("moveGroup1", "state","") eq "on" )) {fhem "set lamp1 dim18%"}

}

define lamp_thr2 notify tw2Group1 {

if ((ReadingsVal ("twi1Group1", "state","") eq "off" ) && (ReadingsVal ("twi2Group1", "state","") eq "off"  )
&& (ReadingsVal ("moveGroup1", "state","") eq "on")) {fhem "set lamp1 dim100%"}

if ((ReadingsVal ("twi1Group1", "state","") eq "on" ) && (ReadingsVal ("twi2Group1", "state","") eq "off" )
&& (ReadingsVal ("moveGroup1", "state","") eq "on"  )) {fhem "set lamp1 dim50%"}

if ((ReadingsVal ("twi1Group1", "state","") eq "on" ) && (ReadingsVal ("twi2Group1", "state","") eq "on" )
&& (ReadingsVal ("moveGroup1", "state","") eq "on"  )) {fhem "set lamp1 dim18%"}

}


define lamp_alone notify moveGroup1 {

if (ReadingsVal ("moveGroup1", "state","") eq "off" ) {fhem "set lamp1 on-old-for-timer 120"}

}
```

Scripts for the Motion Detector & Twilight Sensor

if { □

check ☀ ☀ set 💡 100%
check 🌤 ☀ set 💡 50%
check 🌤 🌤 set 💡 20% }

else- if { ! □
set 💡-off 🕒 -2 mins }

TIME FOR A DEMO

Whoa! Sounds so legit, aren't you proud?

“

It is a good idea but you need to apply it in places with more than one bulb so that the effect is [more] visible.

David,
BS Computer Science
LUT student

“

I like the idea of minimizing an energy consumption in the rooms, where we spend most of our time. The problem here for me is cost of the devices implemented, it would be great if you could implement cheaper devices and save more energy!

Sarah,
MS Mechanical Engineering
LUT student

“

If I had this system back home I would like to have more control over it and I wouldn’t like my lights dimmed at 10 % when it might not really be necessary.

Jeff,
An exchange student from Taiwan
LUT student

“

It's an awesome idea since it's an optimal solution for exploiting the natural light, also you could add more features by setting modes, studying mode, resting etc.

Daniyal,
PERCCOM Cohort 4
LUT student

4.

LOOKING FORWARD: OPPORTUNITIES

Are you ready to paint the whole town GREEN?

HOW DO WE PROMOTE SUSTAINABILTY?

- Save energy using automatic turn on with presence/ movement detector.
- Dim and control light intensity with the corresponding natural light outside.
- Improve productivity and well-being of people in rooms.

100€

Savings in electric bill

1,685 kWH

Total power consumption saving

900kgCO_2

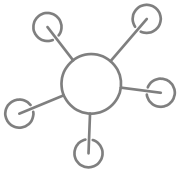
Carbon footprint reduction

*for 30 40-W light bulbs per year

5.

HOME AUTOMATION PROTOCOLS

I kinda hated these things back in France.



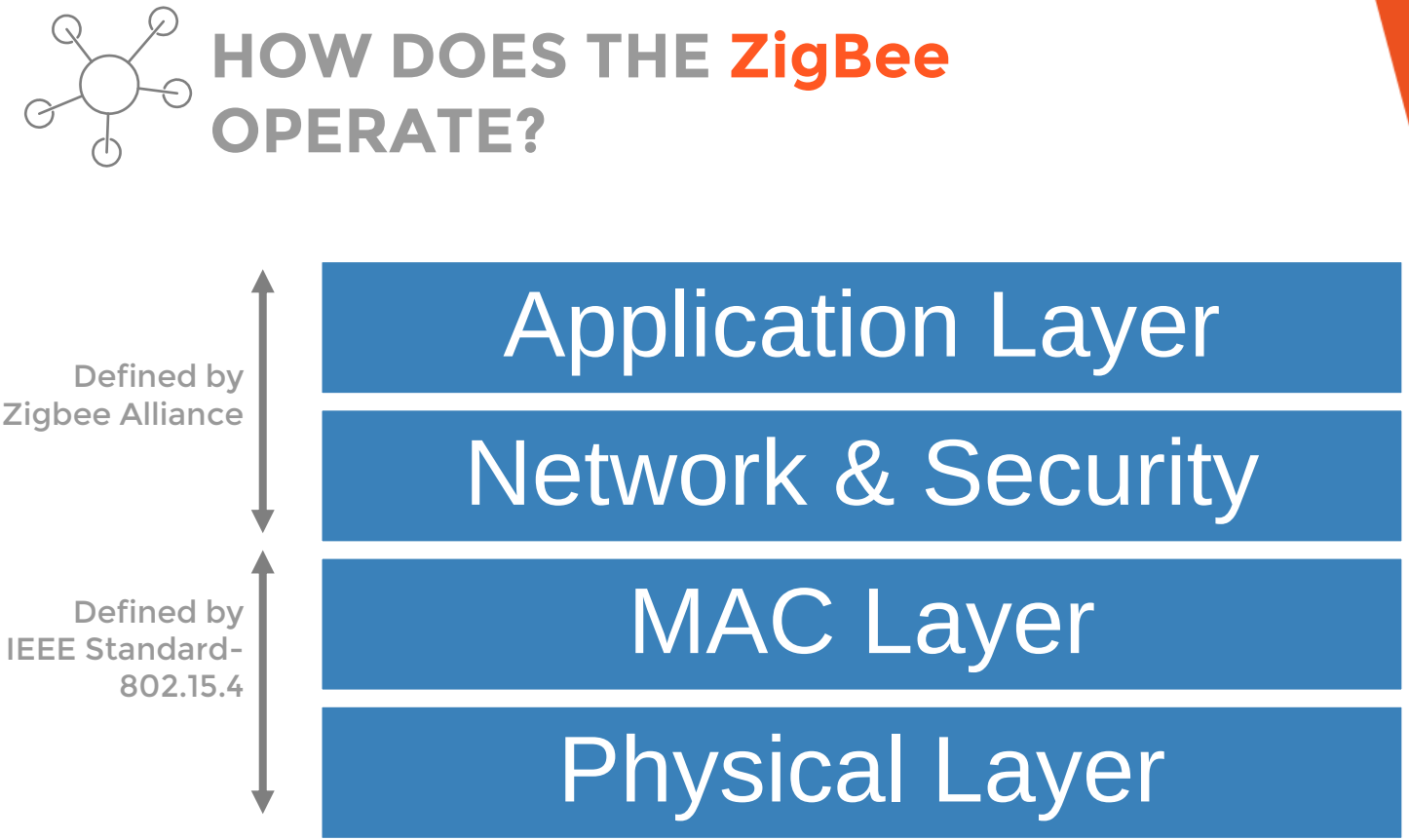
WHAT IS ZigBee PROTOCOL?

- It is an established set of specification for WPAN.
- ZigBee is an emerging standardized protocol for Ultra Low Power WPAN.
- It is targeted at RF applications which requires low data rate, long battery life, & secured networking.

HOW DOES THE ZigBee OPERATE?

- Designed for wireless controls & sensors, it operates in PAN and device networks.
- It provides connectivity between small packet devices.
- It can usually control lights, switches, thermostats & appliances.

HOW DOES THE ZigBee OPERATE?



WHY USE ZigBee PROTOCOL?

ADVANTAGES VS. DISADVANTAGES

WHICH COMPANIES ARE INCLUDED IN THE ZigBee ALLIANCE?

ZigBee™ Alliance
Wireless Control That Simply Works

Chipcon

ember

Launched by Motorola
freescale
semiconductor

MOTOROLA

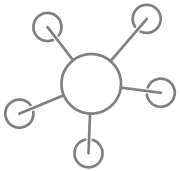
PHILIPS

MITSUBISHI ELECTRIC
Changes for the Better

SAMSUNG

CABA
Continental Automated Buildings Association

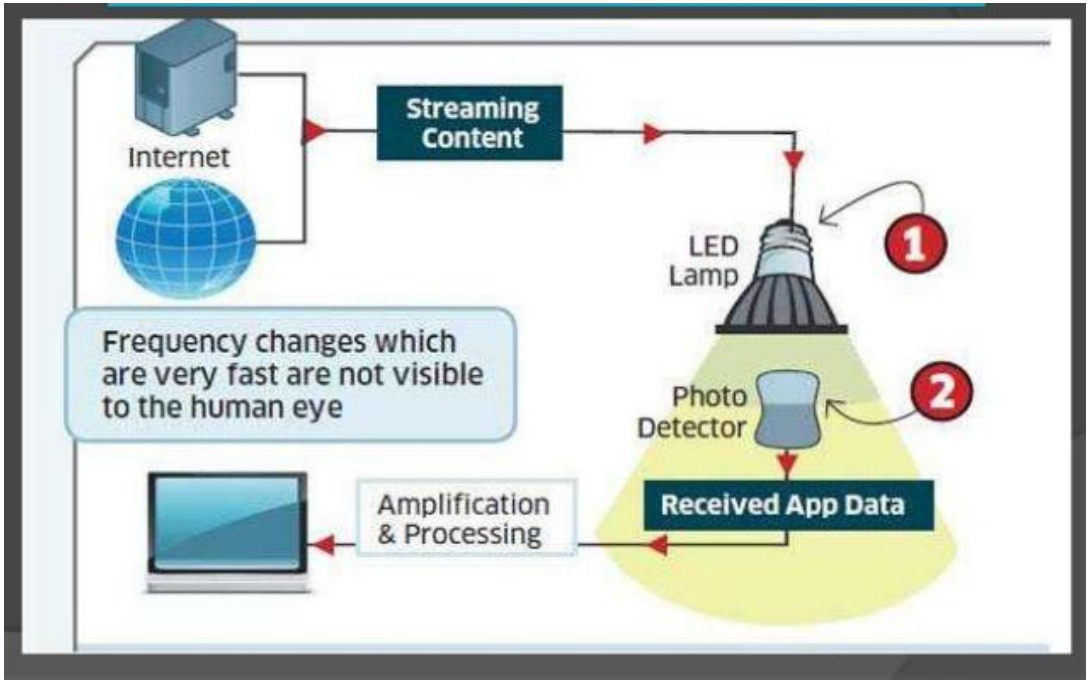
Honeywell



WHAT IS LIGHT FIDELITY (Li-Fi) PROTOCOL?

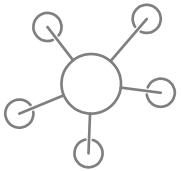
- Li-Fi is a wireless optical newtork technology protocol that uses light-emitting diodes (LEDs) for data transmission.
- Li-Fi bulbs are outfitted with chip that modulates the light imperceptibility for optical data transmission.
- Data is transmitted and received using photoreceptors.

HOW DOES LIGHT FIDELITY (Li-Fi) WORK?



LIGHT FIDELITY (Li-Fi) VS Wi-Fi

- Li-Fi is cheaper than Wi-Fi, it also has less ecological impact.
- Compared to Wi-Fi, there is no need to license Li-Fi when using transciever-fitted lamps.
- It is also secured because communication in optical wave does not pass through walls.



WHAT ARE THE ADVANTAGES OF LIGHT FIDELITY (Li-Fi) ?

- It can solve problems related to the insufficient radio signal bandwidths.
- High data transmission rates are up to 10Gbps.
- It might have high installation cost, but is low on implementaiton and maintenance.

Imagine a world where every light bulb can practically serve as a Wi-Fi hotspot. It will lead to a cleaner, greener, safer and brighter future.

Poster

Do you want to save money?

Do you want to help save the earth?

It make$ €ents!

The future is here and it's BRIGHT!

Wait no more!

Light up your world with responsive lighting solution for smart rooms from Illumin-IT

Save up to 100 Euros* per year

Scan me for details

This is your NEXT

*30Bulbs each 40W

THANKS!

Any questions?