Home & Building Automation

Lecture 1
Introduction

whoami

- http://ulno.net, Ulrich Norbisrath
  email: replace http:// with ulno@
- **Adjunct Professor**
  - FH Upper Austria
- **Independent IoT Consultant/ Inventor**
- **PhD** from RWTH Aachen University: “Configuring eHome Systems”
- **Research:** Internet of Things, Story Driven Modeling, search support
- **Teaching:** H&B Automation, SE, Systems
- **International teaching and research experience:** USA, Germany, Austria, Estonia, Kazakhstan, Singapore, Indonesia, Brazil

Who are you?

- 5 min, write down something about the following (this needs later to be checked in in beginning of your portfolio):
  - Who are you, why are you studying Mobile Computing/Energy Informatics?
  - What do you expect from H&B Automation?
  - If you were in a team of 4 persons what would you bring to the table (strength and weaknesses)?
- Present first two.

Syllabus

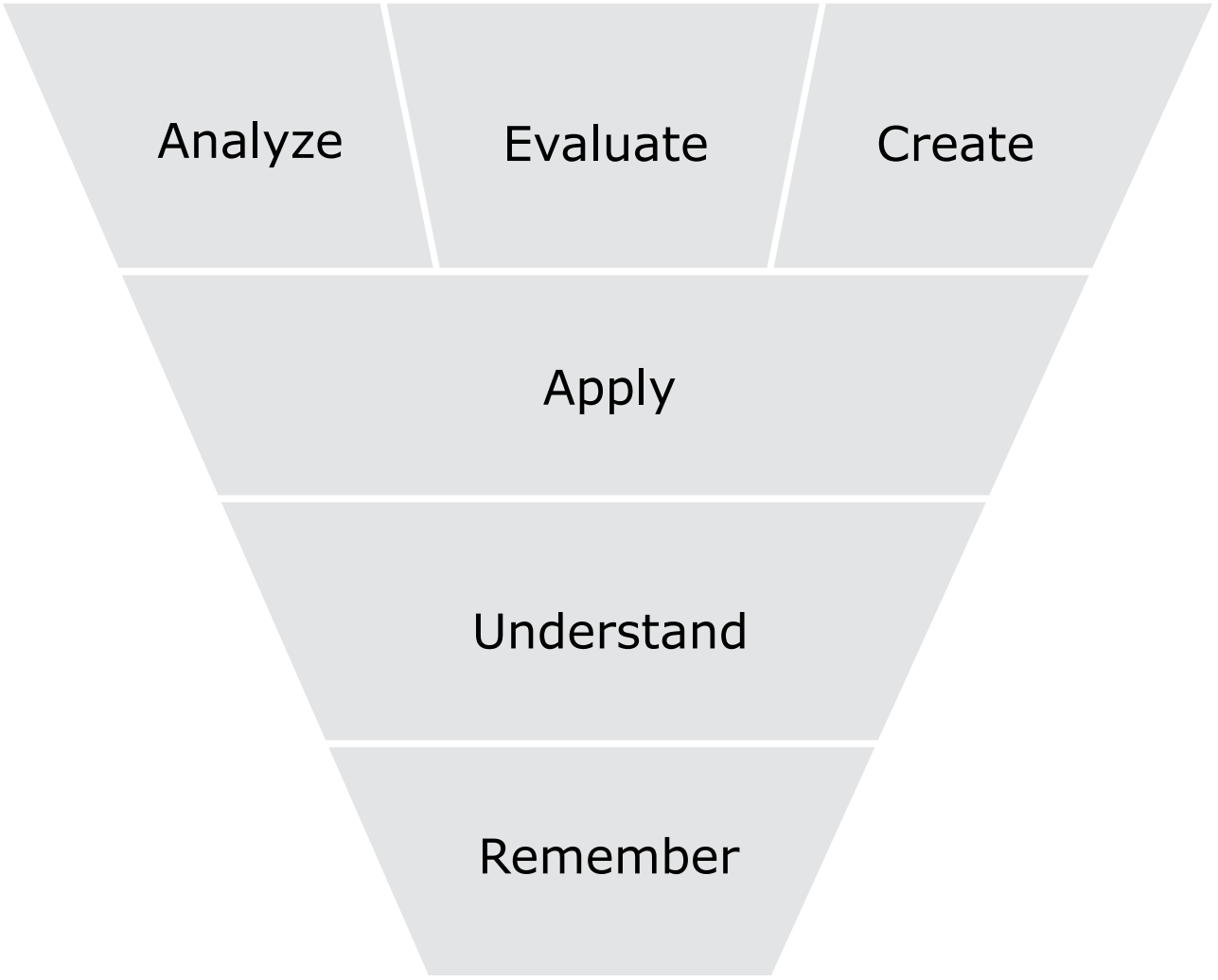
I don’t lecture!

But this is a lecture...

- … and you are lecturing right now!
- OK, sometimes, but …

- How do you learn best?
- You know Bloom’s Taxonomy of Learning?

Blooms Taxonomy of Learning



https://upload.wikimedia.org/wikipedia/commons/9/9e/BloomsCognitiveDomain.svg

There is a page in the Internet...

Show Time – Movies

To enable discussion afterwards make keywords regarding the following topics (also → portfolio + notes from discussion)

- scenarios and application domains
- technologies
- feasibility
  - what might be doable?
  - what not?
  - when?
- weirdness/crazyness (any concerns?)

  https://www.youtube.com/watch?v=EgDIYuBKXVY
  https://www.youtube.com/watch?v=gCuPx9shWT0
- (bonus feature: Like a Bosch)

Where is the killer app?

Version Management - git

- No binaries or dependencies into git.
- Create repository (one per team is enough) on github, bitbucket, or gitlab
- Check in often (also locally)
- Use mark-up (Markdown or restructured text) for documentation

Team Building

- 4-5 per team
- Create team name (Suggestion for name: merged initials)
- Create git repository
  - Creator give access to team members
  - Create sub-directories for team-member portfolios as well as subdirs with project1, project2, project3
  - Add default README.txt or README.rst files to sub folders
  - (push)
  - Every member checks in previous description and discussion and personal notes into personal folder
- Share contacts
- Allocate meeting time and modalities in week (at least 2 full extra days per week, and 4 days in project 3 week)
- Define how team is managed (what if someone falls behind or unreachable)

Project 1: Debate

- Goal: lead debate
- Topic: **Everybody should automate their home! True or False?**
- Teams: 1 pro, 2 con, 1 moderator team
- Two persons for con present in the discussion panel, two for pro
- One minute statement per panel presenter what your team stands for (has to be presented by one, time is strict 60-120 secs).
- Public discussion points need to be finalized tomorrow night.
- All material (resources/references) you find has to be made public (by tomorrow night)
- The logistics have to be visible in portfolios
- Small 15 minute practice discussion (needs to be recorded and published on YouTube, Dropbox, or Google Drive by Wednesday night, link shared and accessible by me)

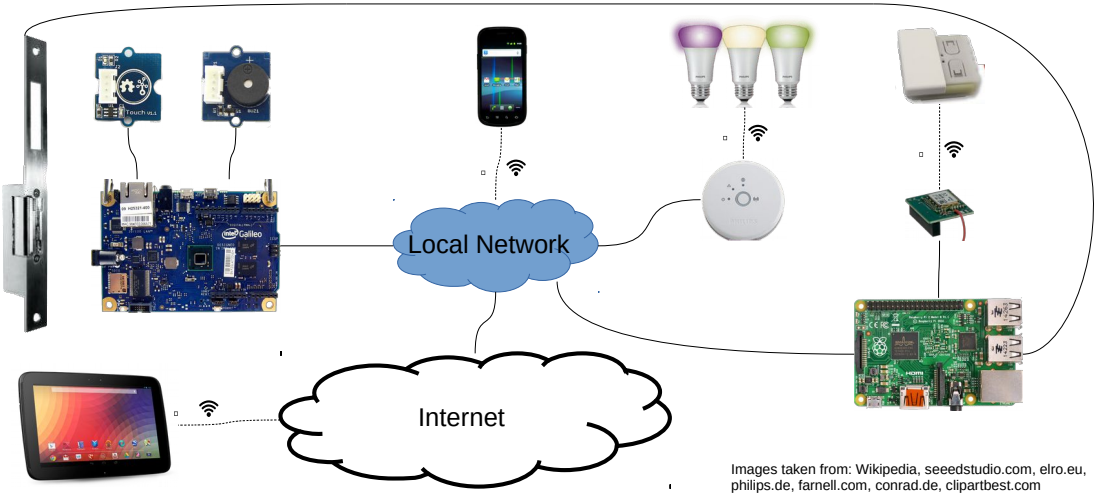
Internet of Things (IoT)

- What does the Internet of Things entail?
- Use phone or laptop to google about IoT, find and note down:
  - 3 domains (included areas)
  - 2 typical devices (appliance or controller)
- 3 minutes time
- discussion

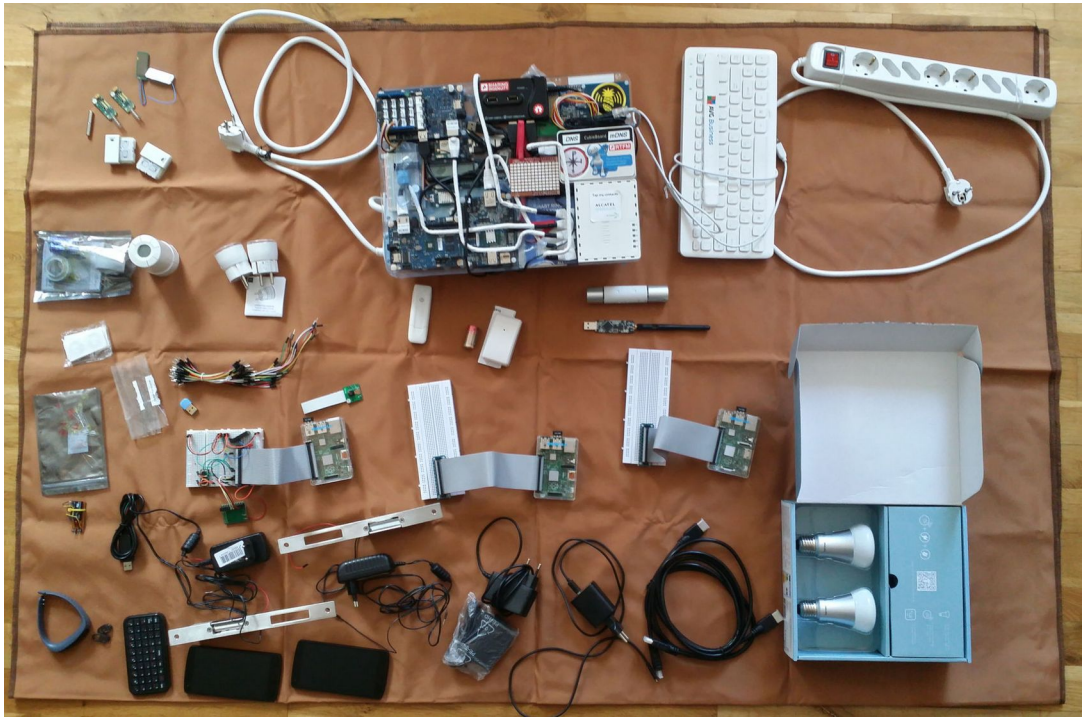
Internet of Things (IoT)

- **IoT Domains**
  - Ubiquitous Computing (Pervasive Computing)
  - Home automation
  - Urban Computing/Smart Cities
  - Embedded Computing
  - Actor/Sensor Networks
  - M2M Communication
  - Mobile Computing, Wearable Computing
  - Hacking/Making/Remixing
  - Big/Actionable Data

  →**Systems, Connectivity, Data**



Images taken from: Wikipedia, seeedstudio.com, elro.eu, philips.de, farnell.com, conrad.de, clipartbest.com



- **Devices and controllers**

Home and Building Automation

- What are the main problems? (Reference sources.)
- Why is it still not widely adopted (also look at historic problems)?
- Why is it getting more attractive today than ever?
- What role do frameworks and gateways play? Give examples!
- What is the role/problem of the cloud?
- Also note down scenarios and interesting applications you encounter!

- 30 minutes, google with neighbor, find articles, do keywords (devide and conquer in team)
- 10 minutes synthesize with team members (exchange more notes, rank your outcomes to the 5 most important findings)
- 30 minutes discussion

Hello World of IoT and H&B Automation
Let's Switch on a Light

- Small discussion in team how you will share information/learning (peer programming, team roles, central documentation, ...)
- Watch demo, take notes, questions
- Raspberry Pi IoTempower gateway (do an iot upgrade!)
- Switch led on one Wemos D1 Mini with sending mqtt command on pi
- Use button to switch led
- Get used to node-red
- Challenges:
  - use rgb-led (color picker in node-red on phone)
  - use rgb-leds (use front prefix in node-red)
  - analog light sensor, use gauge and graph in node-red
- Document/log: (important, next slide)

Building portfolio through logging and documentation

- Follow along and take notes when I demonstrate and while you experiment
- Replicate and note down problems and challenges
- Help neighbor(s), note down help you give and receive
- Consider having a team log (so work on two logs at the same time or have one dedicated person working on team-log, or curate your own later)
- Logs need ot be in portfolio
- Revisit log later and leave an opinion about your work, my work, the tasks, your team mates, ideas

Build a smart lock

- Use relais, 12V power supply, solenoid lock, Wemos D1 Mini, IoTempower, Node-Red
- Build a smart lock that you can unlock with a two button wired to two different wemos devices and from inside yout wifi with your phone
- Think and google about solutions, how could this securely unlocked via the internet?