

Magnus Almgren, Marina Papatriantafilou

DAT300: LECTURE 1

ADMINISTRATIVE DETAILS

Support Team

- Examiners
 - Magnus Almgren
 - Vincenzo Gulisano
 - Olaf Landsiedel
 - Marina Papatriantafilou
- Course Support Team
 - Charalampos Stylianopoulos
 - Valentin Tudor
 - + others depending on project expertise

Details on web page:

<http://www.cse.chalmers.se/edu/course/DAT300/>

Course Slots

- Tuesdays (08-) 09-10, EDIT 3364
- Thursdays 13-15, EL 43
- Some exceptions though:
 - Thu Sep 8: 08—10 in EDIT 3364
 - Thu Oct 20: 13-15 in Fysikhuset FL71
 - Tue Oct 4? Students busy? → afternoon?

Check regularly web page for up-to-date info:
<http://www.cse.chalmers.se/edu/course/DAT300/>



Presentations

- Olaf Landsiedel: Internet of Things, Sensor networks
- Philippas Tsigas: Energy Aware Computing
- Vincenzo Gulisano: Data Streaming
- Valentin Tudor: Privacy in the Smart Grid
- Viktor Botev: detecting critical events through Advanced Metering Infrastructure
- Mikel Iturbe: security of critical infrastructures
- Stefan Lundberg (Chalmers): Power Systems (2 parts)
- Tentatively 1-2 more Chalmers teachers from complementary disciplines
- Joris van Rooij, Gothenburg Energy; "Advanced Metering Infrastructure"
- Rikard Bodforss: water plants

plus presentations by you



Produkter och priser

Projekt och etableringar

Kundservice

Sök

VINN STARTPLATSER TILL LILLA OCH MELLAN GÖTEBORGSVARVET!



Logga in

Mina energisidor

Ok

Vad kan vi hjälpa dig med?

- > Har du frågor om fakturan?
- > Vill du ha e-faktura?
- > Vill du göra felanmälan?
- > Dags att flytta?
- > Lediga jobb
- > Vill du köpa el?

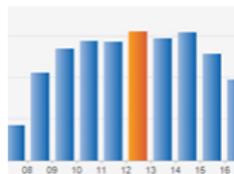
Som Västsveriges ledande energiföretag erbjuder vi **el, elnät, fjärrvärme** och **gas**.



Bra Miljöval

> När du vill minska din miljöpåverkan

Nu har du genom vårt erbjudande Fjärrvärme märkt med Bra Miljöval möjlighet att ytterligare markera att du vill minska din miljöpåverkan.



> Följ din elanvändning på timnivå

Genom den kostnadsfria tjänsten "Din elanvändning" kan du nu följa din elförbrukning per månad, dygn eller timma



> GoBiGas - en biogassatsning för ett hållbart Göteborg

Här ska vi producera biogas genom förgasning av skogsråvara. Se filmerna och läs mer om projektet här.



> Dags att teckna nytt elavtal?

Hos DinEl kan du sätta ihop ditt eget avtal, efter dina egna preferenser och boendesituation.

Nyheter & pressreleaser

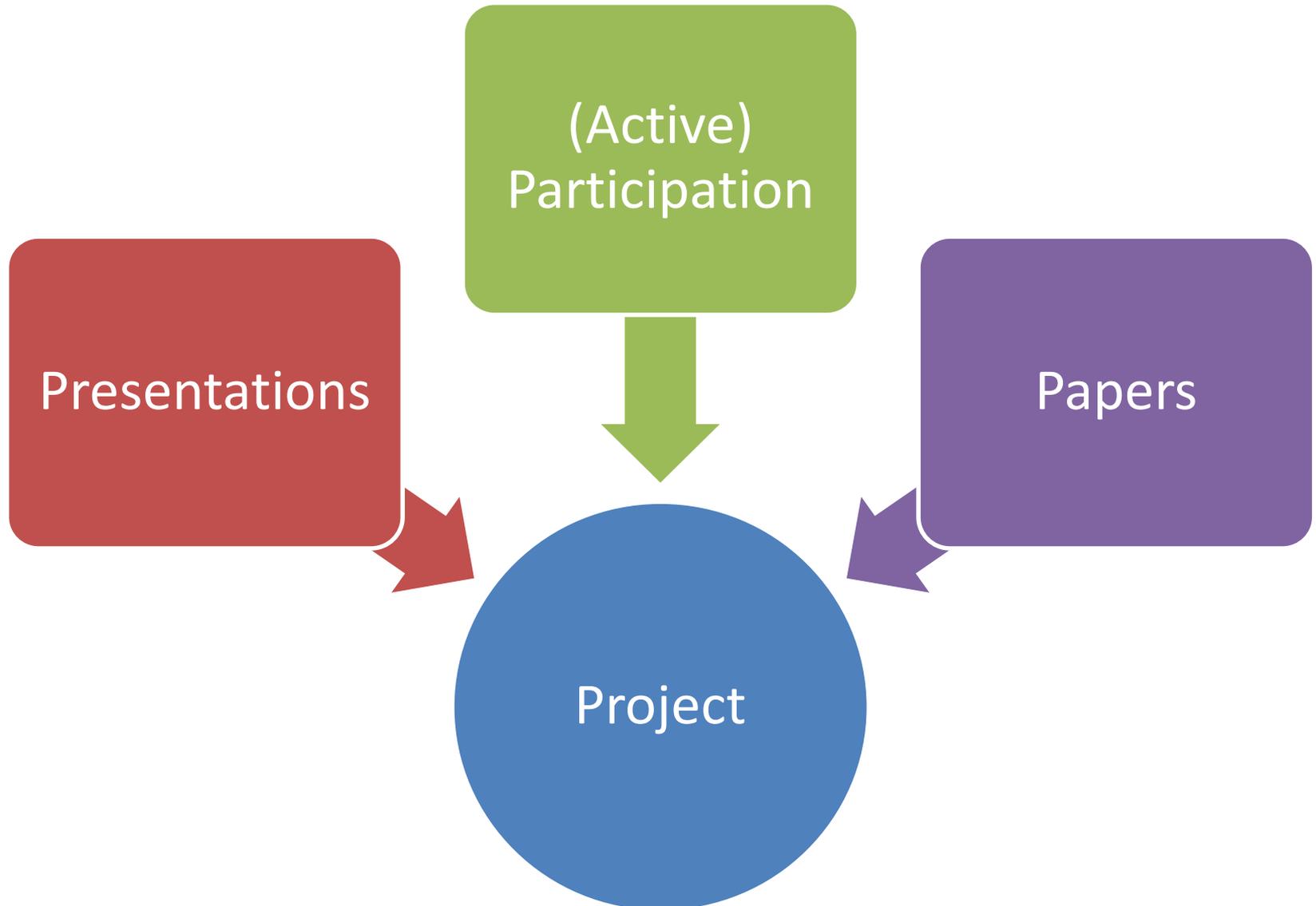
[> Fler nyheter](#)

- 2013-02-27 > Information om rivning och ombyggnation av Rosenlundverket
- 2013-02-26 > Vinnare av EM-biljetter i februari
- 2013-02-26 > Göteborg Energi deltar i nationellt forskningsprogram inom elkraftteknik

Avbrottsinformation

- > Elnät
- > Fjärrvärme
- > Fjärrkyla
- > Gas

Passing the course



Passing the course

- Major activity: Project
 - Faculty & Industry presentations to give breadth
 - Choosing papers to read to support project work
 - Training in presentation of complex ideas
 - Team work
 - Actively listening and discussing other people's ideas

Passing the course

- Seminars & Reading papers
 - Reading list
 - Each group chooses a topic (preferably in relation to their project)
 - Find two papers (approved by us) in the topic.
Easier paper → take an additional one.
 - Choose one to be read by all.
 - All people in the course should read these common papers.
 - Presentation
 - Each group presents their topic
 - having more than one paper makes the presentation interesting for all
 - Another team actively prepares questions to “oppose”
 - All other actively participates in the paper discussion.

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Idea

- Understand complex ideas
- Go into depth in the paper
- Explain to your peers

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Mandatory Participation

The active participation is important for the presentations, so we have mandatory lectures. If you miss lectures (or are late), we will ask you to read additional articles and write a report.

Passing the course

- Projects
 - Write (**individually**) one page how the articles you read relate to your chosen project
 - Give us a planning report (schedule, resources, goals)
 - Successfully complete project
 - Written report + demo & Presentation
- Other reporting
 - Every week, write a **short** summary of what your team has done and if you **need our help.** → **BOX**

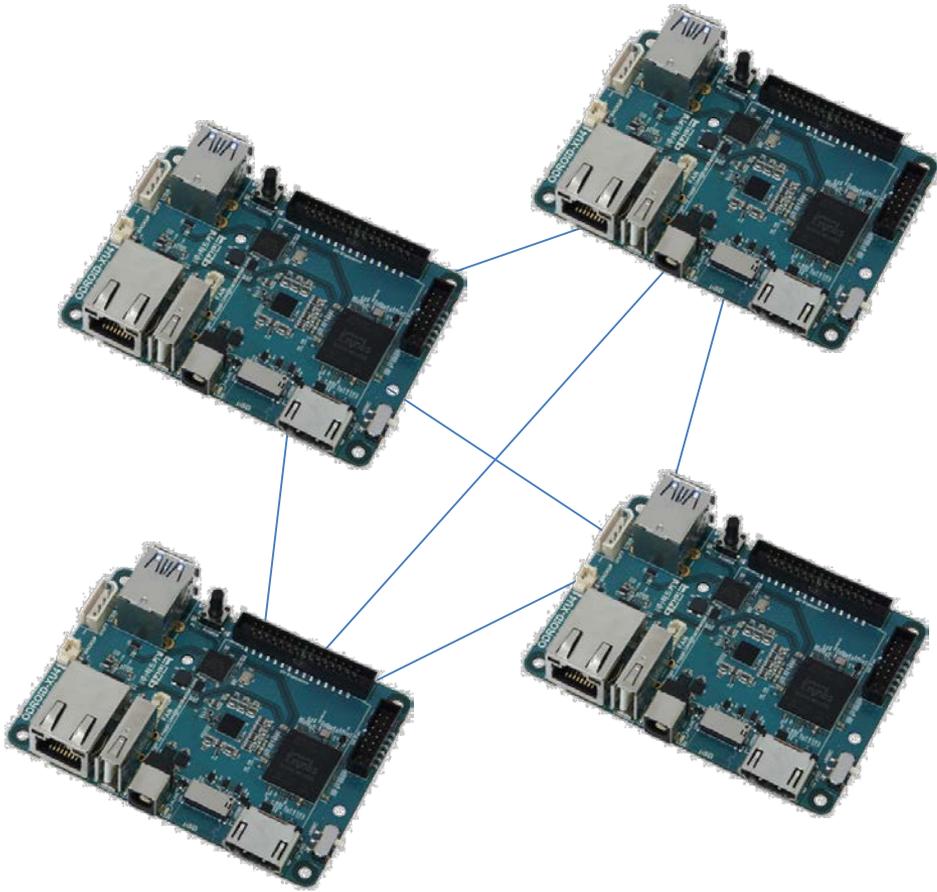
Your grade

- Your grade will depend on
 - Completed project and its quality
 - Project report
 - Individual summary
 - Presentation
 - Being discussion leader (“opponent”)
 - Active participation in lectures and presentations

Paper and Projects

- Suggestions on the home page
 - <http://www.cse.chalmers.se/edu/course/DAT300/papers.html>
 - Github repository
 - Video of former project presentation (next week) as an example

Comparison of open-source big data analysis tools on single-board devices



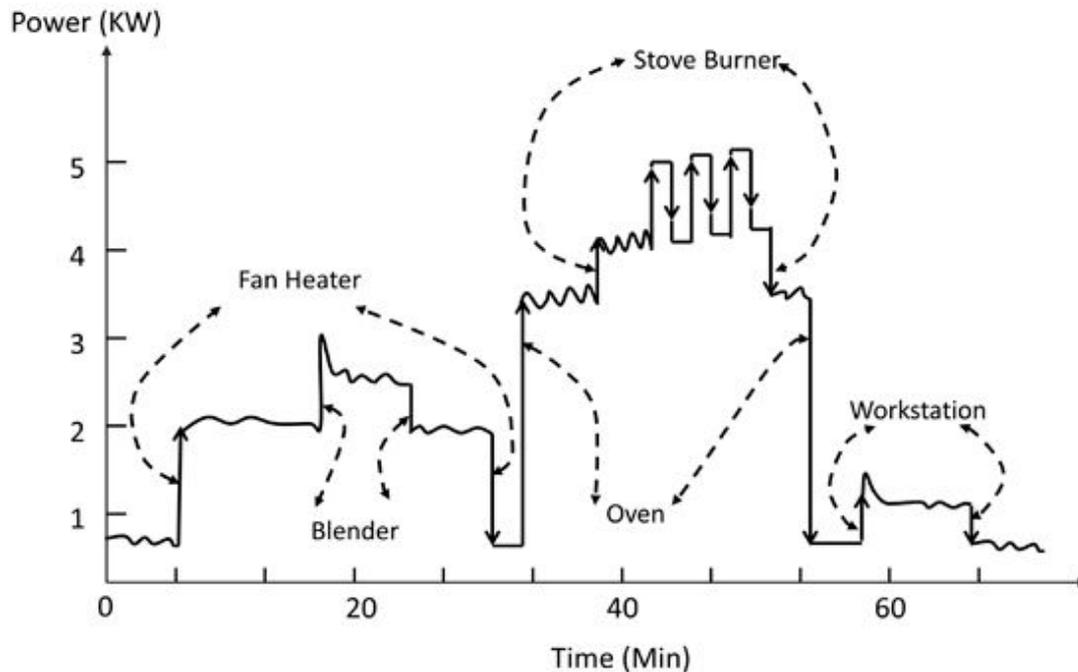
- Given a small network of single-board devices and a benchmark analysis application (focusing on AMI data) study and compare:
- Memory, CPU and network footprints "at rest" for popular frameworks such as Apache Storm, Apache Spark and Apache Flink
- Memory, CPU and network footprints and latency for a benchmark application and different injection loads

Protocol Parser for protocols



- Cyberphysical systems communicate, but many times through protocols that a security mechanism such as an IDS cannot understand.
- Choose a protocol, collect data, and build a parser using open source tools to feed it into other security mechanisms.

Using a NILM toolkit



- Understanding the behavior of appliances is important.
- There are algorithms to take an energy trace to find the appliances in it.
- Investigate what behaviors can be detected
 - Compare user behavior across fridges
 - Find older / newer models
 - Find inefficient ones

Project ideas (1):

A simple demand response service

- Build on a communication node, eg on an ARM-based platform, capable to **interface with off-the-shelf** equipment , to
 - monitor consumption and **control** electrical appliances
- implement intelligent **scheduling** algorithms that
 - Can reduce peaks/meet constraints
 - Can possibly allow for cooperation between communication nodes in a way that reduces the total energy consumption of the system



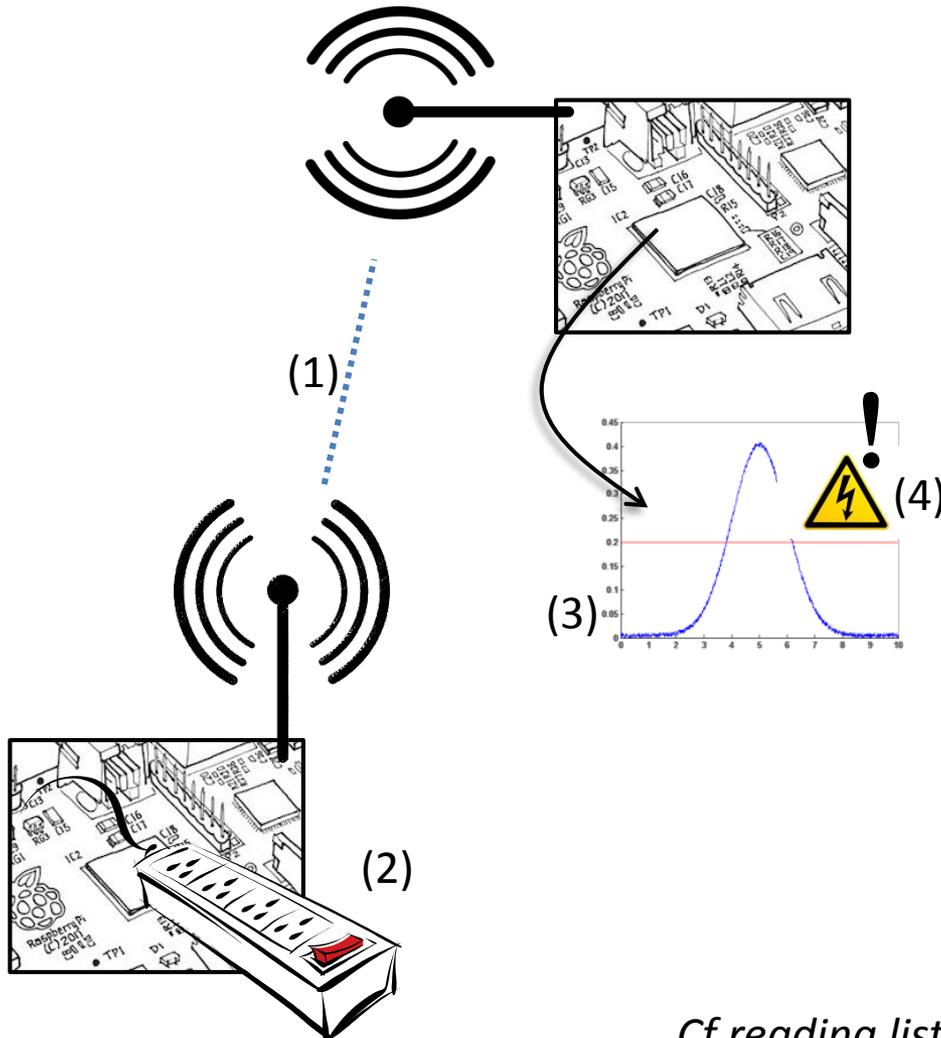
... to eg ARM-platform



cf reading list on Adaptiveness & resources

Project ideas (2)

Online monitoring of energy consumption



1. on ZigBee (or other protocol) network
2. Forward energy consumption readings
3. Process information with **Stream Processing Engine**
4. Generate “alarms”

Example

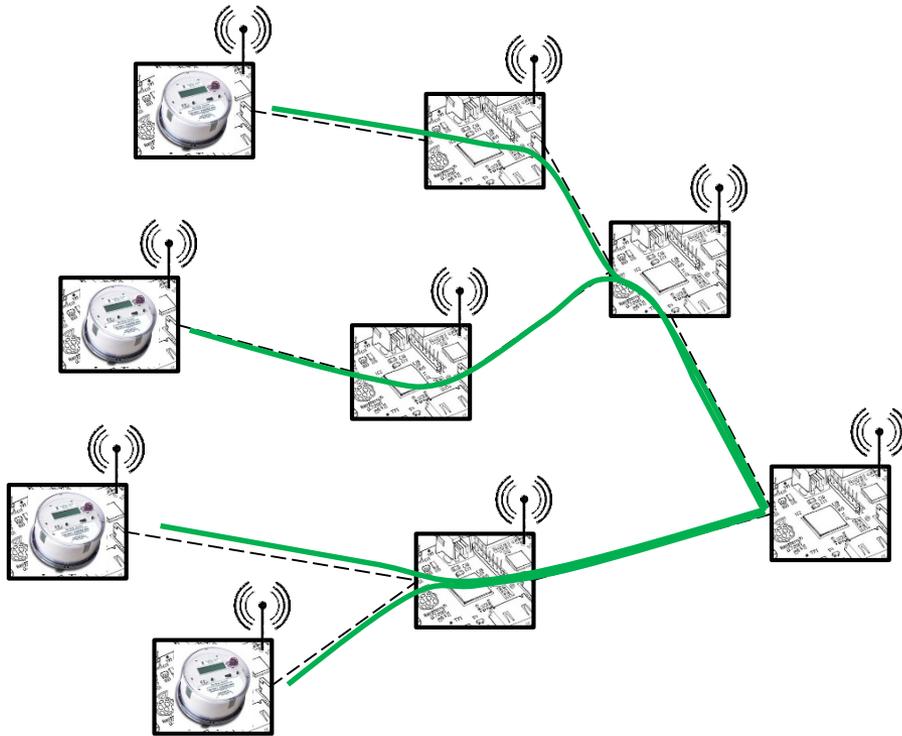
- send an “alarm” message each time the last hour average consumption exceeds a threshold.

Cf reading list on streaming

Project ideas (3)

Simulation and in-network aggregation of smart meters data

1. On ZigBee (or other comm-protocol) network
2. Simulate smart meters readings (various models)
3. Aggregate information in the hierarchical topology with **distributed Stream Processing Engine**



Cf reading list on streaming aggregation

Projects, ideas continued

1. Online processing of smart grids' data.

1. Security applications in the context of smart grids demand for online data processing in order to spot threats in a real-time fashion. This project explores how processing paradigms such as data streaming can be leveraged in this context.

2. Smart grid data gathering networks

1. What kind of data gathering networks in Smart Grids are possible with today's technology, such as embedded platforms (ie Raspberry Pi), wireless antennas (ie Zigbee) and open-source hardware (ie Arduino)? How can consumers get and process data from their own smart meters in order to change their behavior?

3. Visualizing data for the smart grid

1. How can data from the smart grid best be visualized and what patterns can be determined? Use tools such as [Spotfire](#), [Gephi](#), and your programming skills.

<http://www.cse.chalmers.se/edu/course/DAT300/projects.html>

Projects, ideas continued

4. Intrusion detection for the smart grid

- How can a de facto IDS such as snort be adapted for protocols found in the smart grid. This project is about understanding snort rules and how these can be adapted to DLMS/COSEM or MBUS traffic.

5. Smart grid data correlated with other sources

- Many government agencies and other organizations provide open datasets. How can such datasets be used to extend our understanding of energy consumption, or other patterns in the smart grid datasets? One source for open data is found at the [hack for Sweden site](#).

6. New services in the smart grid

- What services would be useful for consumers and companies to have in the smart grid? Are the data available sufficient to create such services? See for example [the following service](#) from E.On to save energy.

Problems

- Too many courses this period?
 - → Possible to postpone project execution but need to participate on lectures
- Missing students
 - Pär Svedberg?
 - Ce Li?