

# Doctoral Training Seminar

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# Schedule & Requirements

- Meetings every two weeks (roughly)
  - Some exceptions
- Extra events and talks
  - Prof. Frans Coenen “You and Your PhD Supervisor”
  - Tutorials on latex, matlab, ...
- Requirements
  - Attend (inform Hannah Fosh about any justified absence)
  - Submit a review group report (1<sup>st</sup> semester)
  - Give short presentation (2<sup>nd</sup> semester)
  - Submit group report (2<sup>nd</sup> semester)

# DTS webpage

<http://www.csc.liv.ac.uk/~darek/dts.html>

- Links to:
  - Slides
  - Additional materials (articles, video, ...)
  - Links to our web pages
  - Forum (internal)

# What Is Research?

- Beyond Information Retrieval
- Stating hypothesis
- Searching for solutions

*see also COMP516: Research Methods in Computer Science*

# Who Is a Researcher?

- **Expert** in his/her (narrow) field
- **Producer/Contributor** to the field
- **Critical consumer** of the state-of-the-art
  - in general
  - in the wider area of specialization

Task 1: Introducing yourself

Task 2: My understanding of research across different levels:

- primary, high school, undergrads, MSc/Meng, PhD, beyond

# Personal Introduction

- Name
- Affiliation (department, university)
- Research group (group, position, supervisor)
- Research interests
- Current research (project(s))
- Research achievements (past) and plans (future)
- Personal details (neutral)

# Research groups, topics, types

- Economics and computation
  - Online mechanism design (T)
  - Add auctions and revenue optimisation (T+S)
  - Computing equilibria (T)
  - Bayesian estimation (T+S)
- Algorithms and complexity
  - Counting problems (T)
  - Vehicle efficiency (T+E)
  - Network simulation (T+S+E)
- Logic and computation
  - Control of micro aerial vehicles (T+E)
- Agents
  - Pattern recognition (T)
  - Knowledge sharing & management (T+E)
  - Dynamic location in semantic (T)
  - Norms in multi-agents systems (T)
  - Epistemic planning (T)
- Autonomous systems
  - UAV's (T+S)
  - Swarms (T+S)

**T: theory**

**S: simulations**

**E: experimental**

- Intelligence engineering & industrial automation
  - Control of electric motors (S+E)
  - Nuclear forensics (S+E)
  - Control of wind turbines (S+E)
  - Fast load demand side response (S)
  - Switch control (S+E)
  - Online monitoring (T+E)
- Solid State electronics
  - Nano structures (S+E)
- Technological plasma
  - Mathematical modelling of discharges (T+S)
  - Plasma catalysis (E)
- Communication (channel monitoring) (T+S)

## Task 3: Theoretical and experimental approaches

- Main advantages/disadvantages
- Which one is better?
- Is it possible to combine both?

# DTS Objectives

**D**iscovering, **T**raining and **S**trengthening:

- **Personal skills** related directly to **research**
  - curiosity, analytical thinking, coherency, logic, writing, ...
- **skills** related to ability of **Collaboration** (“collective intelligence”)
  - cross-area and interdisciplinary research collaboration
  - knowledge exchange (industry, society)
- **Social skills**
  - understanding the research community
  - being a part of this community (networking)

# How we proceed

- Listen to and discuss (also with experts):
  - Different ways of doing research in different areas
  - How to collaborate between group/departments or with industry
  - Knowledge exchange (society, industry)
- Simulate “large community” environment:
  - Communicate and discuss research in groups
  - Exchange good research practise/experience in the area
  - Practise social skills of being a part of community

# Diving into research area

- Selecting main research area
  - Supervisor (*have you got your main research area already?*)
- Choosing projects
  - Supervisor (*how often do you meet her/him?*)
  - Collaborators (*do you have some already?*)
  - Retrieving professional literature (*do you know what/where to check?*)
  - Inspiration from industry/society/other\_areas (*do you know what/where to check?*)
- Contributing to research
  - Team work with supervisor/collaborators (*how much time per week?*)
  - Individual work (*how much time per week?*)

# Swimming on the surface

- Research community
  - Broad community (conferences, journals)
  - Networking (talking to people, shared activities)
  - Close collaborators (from networking, shared some interests)
- Professional organisations:
  - Goals: coordinating and supporting activities
    - Digital libraries, venues, conferences, teaching materials, supplementary materials, groups of interests, job adds
  - List: ACM, IEEE, EATCS, ...

# “Publish or Perish” needs revision!

To accommodate “Collective Intelligence”

- Maintain your profile: web page, linking, professional email, professional services (blogs, twitter, forums), “internet popularity”
- Retrieve various kinds of Internet resources (forums, blogs, voice/video scientific resources, ...)
- Collaborate and stay in touch with researchers from your community
- Publish in appropriate and good quality venues (*have you already done so? do you know the names?*)
- Give talks at conferences, workshops, meetings (*have you already done so?*)

# Position your research

Group discussion:

(ask your supervisor, colleagues working in same area, check web pages):

- Your general research area
- How is research conducted in your area
- Top journals and conferences in your area
- Top groups and researchers in your area

# Email

- Types:
  - Institutional
  - Private
  - Professional
- Forename.Familyname@{liv.ac.uk; gmail.com, acm.org}

# Communicating Research

- Short (e.g., 3-4 min.)
- Not too many slides/video (1 slide/poster)
  - Sometimes even without media
  - Other non-verbal techniques for attracting and directing attention
- Top-down approach
- Not too “deep”
  - No more than 2-3 connected topics within the main lecture area
  - Coherence
  - Semantic – stories, metaphors, comparisons, ...
- Rather slow, very clear
  - Verbal training (modulation, tone, ...)

# Web page

- Have a look at web pages of groups and researchers in your area
- Think how your web page should look like
  - structure
  - most important points
  - range of information

# Web page cont.

- Institution layout or/and logo
- Intro (institution, group, supervisor(s)) with links
- Photo
- Useful links to
  - Research
  - Teaching materials
  - Professional orgs
  - Software tools
  - ...
- Links
  - About me / Personal
  - Research
    - Interests
    - Achievements/awards
    - Projects
    - Papers
    - Patents
    - Developments
    - Conference talks
  - Teaching
  - Professional activities
    - Memberships
    - Reviewing, editing, organizing
  - Contact info
    - Classical and modern

# Web page

You are supposed to finish your professional web page and make it accessible at the university domain before the meeting. Then you need to ask another DTP seminar participant to do peer-review of your web page, according to the following criteria:

- clear and intuitive framework for presented information
- level of details and appropriateness of information
- graphical layout and general attractiveness

See also the slides on our seminar web page:

<http://www.csc.liv.ac.uk/~darek/dts.html>

# Web page peer-review

- In return, you are supposed to serve as a peer-reviewer of the web page of your peer-reviewer.
- In order to do peer-review, you need to examine carefully the web page and prepare bullets for constructive discussion (try to be positive).
- The discussion in peer-reviewing pairs will take place during the seminar on 26 November. Please bring with you your notes regarding peer-review and laptop/tablet/printout of your web pages.

# Web page review - criteria

## General

- clear and intuitive framework for presented information
- coherence, sub-pages
- level of details and appropriateness of information
- graphical layout and general attractiveness

## Details:

- Institution layout or/and logo and affiliation, with links
- Use of sub-pages
- Coverage:
  - Research (interest, papers, achievements, projects/grants, patents, developments, conference/invited talks, etc.)
  - Teaching info and materials
  - Professional activities (reviewing, editing, organising, membership)
  - Other developments (e.g., Software tools)
  - ...
- Other (photo, media, use of priv info, etc.)

# Paper review

- Scope is important
  - Think about your group as editorial board of some specific venue (journal, conference, grant panel, ...)
  - Check available review services, e.g., EasyChair, Edas, ...
- Criteria are important
  - See next slide, feel free to add/remove criteria if justified
- Individual review and group summary and decision

# Paper review - criteria

- Confidence/expertise
- Relevance
- Write-up quality (language, structure, coherence, level of details)
- Technical correctness (math, methodology, software/hardware use, implementation, etc.)
- Importance of results (to research community)
- Impact of results (also to wider community/others)

# Homework

- Prepare short presentation (3 min.) with a slide (19 Nov)
- Choose a recent paper in your discipline for review (26 Nov)
- Create professional webpage (26 Nov)
- Get/give feedback about webpage : peer-review (26 Nov - 3 Dec)
- Send me your name and webpage link (3 Dec)
- Find information about:
  - Categorization of your research (e.g., ACM, IEEE, ...)
    - ACM: [http://en.wikipedia.org/wiki/ACM\\_Computing\\_Classification\\_System](http://en.wikipedia.org/wiki/ACM_Computing_Classification_System)
    - IEEE: <http://www.computer.org/portal/web/publications/acmtaxonomy>
    - CoRR: <http://arxiv.org/corr/subjectclasses>
    - “Funny”: <http://www.cs.cmu.edu/afs/cs/user/mootaz/ftp/html/research.html>
  - Research related topics (e.g., within categorization, from your research group, ...)
  - Appropriate venues – name, type (journal, proceedings), publisher, impact factor, hierarchy of venues (ranking)
  - Other resources in your field (blogs, forums, twitter, ...)

# 2<sup>nd</sup> Semester

- Plan of meetings:
  - February: 4, 25
  - March: 18
  - April: 22
  - May: 8 (FRIDAY!)
- Time: 3-5pm
- Venue: EEE 203

# Plan for 4<sup>th</sup> February

You are supposed to create a small group - typically between 4 and 6 people - to work on your research group project in this semester. Each group will have a tutor allocated.

Each group emails me, by February 11, group participants and the agreed topic.

The goals of the group research project are to:

- practise discussion and group collaboration on research topics
- learn and practise publication preparation process (in latex or word)
- practise preparation and delivering research talk

You are not supposed to produce a publishable paper (though I would not exclude this opportunity entirely), only practise skills that might be useful in your future research.

Your next official group meeting will be on February 25 – feel free to arrange other meetings.

Each group should have at least one device with Internet access.

# Last Year Group Project Topics

- Thz antenna using graphene in nano networks
- Smart homes:
  - smart windows
  - energy efficient communication
  - efficient electronic machines
- Computing methodologies: simulations, modelling
- Algorithms for image processing: An intricate analysis of real-time autofocus on microscopic systems
- Value based argumentation founded in auctioning mechanism

# Project Plan

- **February 25:**
  - paper initiated in repository (e.g., dropbox, DatAnywhere)
  - general framework with title, authors, abstract, objectives and some literature; main publishing venues identified (specific format may be required)
  - In progress: extensive literature review (share the workload, read, discuss); identification of challenges
- **March 18:**
  - challenges and the plan of addressing them are proposed and sketched in the paper
- **April 22:**
  - results (or detail methodology of obtaining them) are in progress, layout is improved (graphics, use of appropriate environments, etc.)
  - peer-review starts
- **May 8 (FRIDAY!):**
  - peer-review (summary)
  - 15 min. presentation