

Master Thesis Project

DT7001 & DT7002 & ET7002

Slawomir Nowaczyk & Carlos Silla

Course Basics

30 credits course

- 20 weeks of full-time work
- 800 (!) hours of work (per person)

Web pages:

<https://tinyurl.com/HH-ITE-MSc>

<https://hh.se/student-web/content-a-z/thesis-information-for-students-at-school-of-information-technology.html>

http://caisr.hh.se/Student_projects

Goal

...provide training in **independent**
technological/scientific **research**
and **development** work within the
field of **Embedded and Intelligent**
Systems in Computer Science and
Engineering

Examiners

- Electronic Design
 - Pererik Andreasson
- Embedded Systems
 - Mahdi Fazeli
- Intelligent Systems
 - Eren Erdal Aksoy
 - Jens Lundström
 - **Carlos Silla**
 - **Slawomir Nowaczyk**

Learning Outcomes

- **Independently** search for solutions
- Use advanced methods of analysis and construction
- **Discuss** the international research and development
- **Assess** scientific papers
- **Relate** own work to international research
- **Present and defend** own work

Grading Criteria

[LINK](#)

- Overview and understanding of **needs** and **related** work
 - Highlight **weak and strong parts** in referenced works and how they **differ** from your own
- **Understanding** and **refinement** of problem/research questions
 - Identify methods **needed** to investigate the problem and answer the questions
- Method & setup of study/experiments to get & **evaluate** results
 - Define enough tests/measurements to get sufficient results and **evidence for conclusions**
- Solution of problem or answer of question and other results
 - Solve problems, create & evaluate feasible solutions, and **analyse the quality of results**
- Initiative, creativity, ambition, planning and organization
 - Use feedback from the supervisor for reflection, rather than asking for solutions
- Final oral presentation and final report
 - Results and the **conclusions** are clearly stated, discusses **different aspects** of the problem

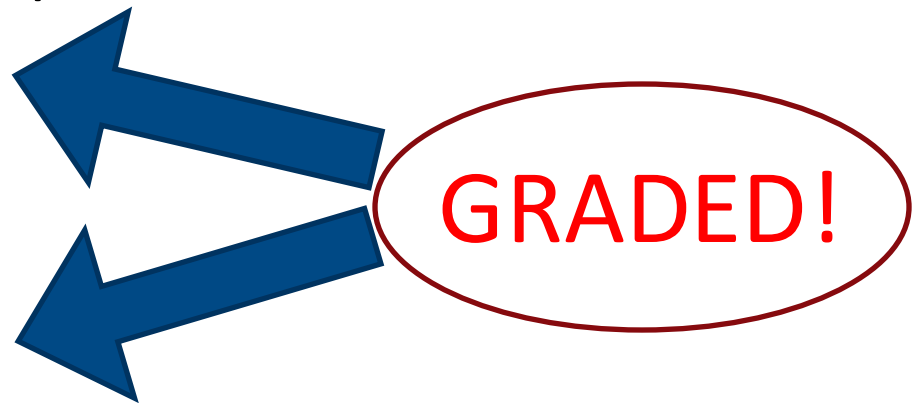
Core Requirements

- Understand the problem
 - **in context!**
- Formulate research question(s)
 - **novelty!**
- Develop a solution
 - **in context!**
- Evaluate the results
 - **rigorously!**
- Summarise the findings
 - **conclusions!**

Process

Process Overview

- Topic selection
 - until Monday, 28th of October, 12:00 noon
 - Mon 04.11 work starts – first supervisor meeting
- Project proposal defence
 - report December 8th, presentations in week 50&51
- Half-time seminar
 - middle of March
- Final seminar
 - end of May



Process Overview

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Deadlines for students starting in January

- Proposal report: Feb 3rd
- Half-time & Final: same

Topic Selection

(check prerequisites!)

- Look at the list of proposed topics
 - talk to supervisors to learn more
- Topics are mainly updated in September
 - so, there might still be new topics popping up
 - it is also possible to propose your own topic, e.g., with a company, but you need a supervisor at ITE
- Provide a ranking of three preferred topics
 - Monday, 28th of October, 12:00 noon ([GoogleForm](#))
 - you can also indicate your preferred partner (but no guarantees)

Course Registration

Once you have fulfilled these requirements

- and I get a confirmation from your supervisor:

1. Approved topic & possibly a teammate

2. Sufficient credits & course prerequisites

- 60 credits on the advanced level (or close to it...)

- show your LADOK transcript to the supervisor

- if credits are missing, they'll need to vouch for you

3. Plagiarism course certificate

- <https://academy.sitehost.iu.edu/index.html>



How to Recognize Plagiarism: Tutorials and Tests

- A quite comprehensive resource by Indiana University
 - “expect to spend about 2 hours learning from this instruction and taking Certification Tests”
- Designed for social sciences context, not engineering
 - but the core concepts are very similar
- The test is very structured and “mechanical”
 - learn their strict rules (e.g., seven-words-in-a-row, page nr) but also understand that many of these things are a little bit more nuanced

Crucially: in engineering, the “Parroted Paraphrase” is plagiarism

A Bad Example...

2.1.2 Clustering

Similar to Region growing, clustering relies on similarity criteria for subdivisions to be grouped. The simpler clustering techniques use a spatial similarity criterion such as the Manhattan distance or the Euclidean distance [9]. In [10] Euclidean clustering is used to find objects placed on a table in a robotic context. The segmentation was done after ground removal (removal of the table). Focusing the segmentation to certain regions of the point cloud the performance varied significantly depending on whether several objects of interest were included in that region or not, with better accuracy when only a single

1.3.2 Clustering

In Region growing [4], clustering depends on resemblance standards for subsections to be grouped. The more natural clustering techniques utilize a spatial standard suchlike the Euclidean distance [35] or the Manhattan distance[32]. In this paper [7], Euclidean clustering is utilized to discover objects set on a table in the robotic context. The segmentation was performed after the ground removal. Centring the segmentation to specific regions of point cloud the execution differed fundamentally relying upon whether numerous objects of interest was incorporated into the region or not, with superior accuracy when just a sole object of interest was incorporated.

**This has led to
a suspension...**

Proposal Defence

- Report deadline is 8th of December
 - for sending to the **examiner!** (another GoogleForm)
- Must be approved by the supervisor first
 - and you need time to incorporate their feedback
- So, a reasonable schedule is:
 - on 25th of November send report to the supervisor
 - around the 2nd of December you get feedback
 - you have a week to address the comments

Proposal Report

- Approximately five pages of text
 - please use the [provided LaTeX template](#)
- Report should cover three main aspects
 - problem formulation
 - literature review
 - project plan & management methodology
- Short proposal presentations in week 50
 - 10 minutes + 5 minutes for questions

Problem Formulation

- What you are going to do and **why**
- How will the result be **evaluated**
- Presented in a way that makes it clear what your intended **contribution** is
- Put the emphasis on the **novelty** of your work, not only on the task itself
- Do not focus too much on implementation

Literature Review

- You should discuss 5+ research papers
- Well-chosen, i.e., ones that really provide sufficient **coverage** of your main topic
- Provide **reasons** for including particular papers, clearly **relate** them to your project
- Discuss how your work will **extend** the solutions presented in the literature

Project Plan

- Present the **main** tasks to achieve the results
 - this should be more detailed than 5-6 broad phases
 - split your problem into meaningful **sub-problems**
 - including some form of **success criterion** for each!
- Provide order and the expected timeline
 - including dependencies across tasks, and conditions
- Try to keep it **realistic**
 - e.g., do not forget “report writing”
- Follow a “real” project methodology
 - preferably something agile

Fallback

- The plan is to be done by the end of May
 - but, of course, things don't always go as intended...
- A second chance will be just after summer
 - and third one sometime next December/January
- But regular supervision is only until May
 - expect to meet your supervisor every 1-2 weeks
 - during and after summer, maybe once a month
 - then, you have the right to work on your own for 1 more year but if you don't finish, you fail the course

**New thesis topic can be only done
in exceptional circumstances**

Master of Science

Supervision

- It is **not** instruction!
- Support, guide and tutor
- Keep regular meetings
- **Ask** questions!
- But be **independent**!
- Track the contributions in a group

Science

- Be clear about the **science** part of it, do not only focus on the engineering aspect
- What have you **learned** during the project?
- How can your findings benefit the **next person** trying to solve a similar problem?
- What are the **limits** of applicability for the solutions you have proposed?

Reasoning & Comprehension

- You need to **demonstrate** the ability to **reason** about both problems and solutions
- The learning outcomes and grading criteria focus a lot on **comprehension** skills
- Not enough to solve the stated problem, you need to **describe** and **evaluate** both your solution, as well as your methods

Conclusions

- When stating your **conclusions**, it is not enough to just describe **work done**
- You need to put your work in context
- Demonstrate the novelty in the project
 - where did you go beyond the state of the art
- Be clear about evaluation of your results
 - how good they are, why those methods were chosen, how to proceed next, lessons learned, ...

Scientific Publications

- A number of our theses result in papers
 - typically at a conference in a nice location :-)
- Scientifically, it could be done even more
 - often lack of time (both students & supervisors)
- Start thinking about it & planning early
- Scientific paper is good for your career
 - even if you are not planning an academic career
 - it is a way to distinguish oneself from “the crowd”

Course Materials

Useful Course Materials

- [Course syllabus](#)
- [Course description](#)
- [Grading criteria](#)

Report Writing

- Refer in text to all figures and tables
 - explain their purpose, not only what they show
- Provide full bibliography references
 - pick whichever style you prefer, but don't mix them
- Use clear and consistent notation in text
 - font for scalar and matrix, explain abbreviations, ...
- Use sections & subsections for readability
 - choose their titles and their contents carefully

Methodology

<https://llc.wrdsb.ca/learning/research-process>

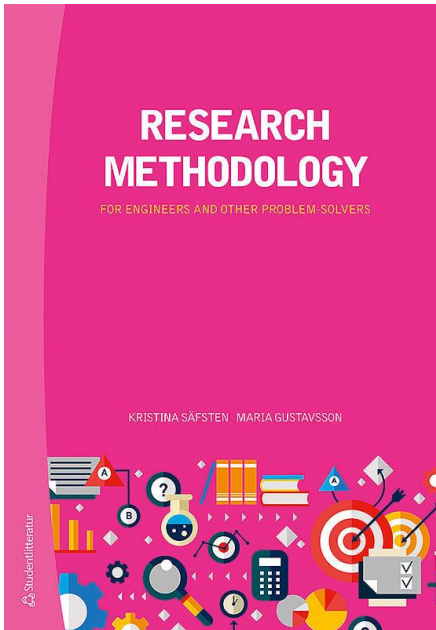


<https://www.cs.tufts.edu/~nr/pubs/eng-abstract.html>

Learning Technical Writing
Using the Engineering Method
A Handbook for Groups

Norman Ramsey
Tufts University

August 2016

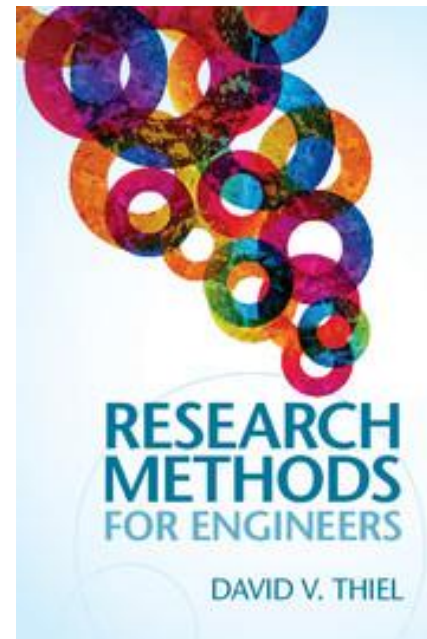


<https://issuu.com/smakprov/docs/9789144122304>

coursera

<https://www.coursera.org/learn/being-researcher>

<https://www.coursera.org/learn/research-methods>



<https://www.cambridge.org/core/books/research-methods-for-engineers/DD1A91B7C81C464EE764EFA89BF94AAB>

<https://www.hh.se/student-web/student-news/student-news/2023-09-13-how-you-can-use-ai-tools-in-your-studies.html>

Student

Student Ladok

Student email

Blackboard

Student news /

How you can use AI tools in your studies

- Great at shallow text improvement
 - terrible at rigorous reasoning and argument flow
- Please use them, but be *open* and *careful*

Questions?