Welcome to …

TDTS11 (Computer Networks and Internet Protocols)

… IT program students

TDDE35 (Large-scale Systems Distributed Systems and Networks)

… U program students

TDTS04 (Computer Networking and Distributed Systems)

… well, the rest of you ☺

Andrei Gurtov, Professor
https://www.ida.liu.se/~andgu38/

Niklas Carlsson, Senior Associate Professor
https://www.ida.liu.se/~nikca89/

Welcome to …

TDTS11 (Computer Networks and Internet Protocols)

… IT program students

TDDE35 (Large-scale Systems Distributed Systems and Networks)

… U program students

TDTS04 (Computer Networking and Distributed Systems)

… well, the rest of you ☺

Andrei Gurtov, Professor
https://www.ida.liu.se/~andgu38/

Niklas Carlsson, Senior Associate Professor
https://www.ida.liu.se/~nikca89/

Welcome to …

TDTS11 (Computer Networks and Internet Protocols)

… IT program students

TDDE35 (Large-scale Systems Distributed Systems and Networks)

… U program students

TDTS04 (Computer Networking and Distributed Systems)

… well, the rest of you ☺

Andrei Gurtov, Professor
https://www.ida.liu.se/~andgu38/

Niklas Carlsson, Senior Associate Professor
https://www.ida.liu.se/~nikca89/

Welcome to …

TDTS11 (Computer Networks and Internet Protocols)

… IT program students

TDDE35 (Large-scale Systems Distributed Systems and Networks)

… U program students

TDTS04 (Computer Networking and Distributed Systems)

… well, the rest of you ☺

Andrei Gurtov, Professor
https://www.ida.liu.se/~andgu38/

Niklas Carlsson, Senior Associate Professor
https://www.ida.liu.se/~nikca89/

People During vt1

Andrei

Niklas

Nikolaos

- Examiner TDTS04/11 + lecturer
  - Andrei Gurtov, Professor
  - Research area: Networking, network security, cloud computing, future Internet architectures, 6G, ...
- Examiner TDDE35 + lecturer
  - Niklas Carlsson, Senior Associate Professor
  - Research area: Security, privacy, multimedia systems, networking, internet measurements, performance evaluation of distributed systems and networks, sports analytics, ...
- Lecturer
  - Nikolaos Pappas, Associate Professor (Docent)
  - Research area: Semantic wireless communications, age of information, stochastic modelling and performance analysis of communication networks, wireless energy harvesting networks, ...
- Lab assistants TDTS04
  - Suleman Khan (suleman.khan@liu.se), PhD Student
  - Mohammad Borhani (mohammad.borhani@liu.se), PhD Student
- Lab assistant TDTS11
  - Gurjot Singh (gurjot.singh@liu.se), PostDoc
- Lab assistant TDDE35
  - No labs/assignments during vt1
  - During vt2: Minxing + Sheyda (PhD students)
- Director of studies
  - Patrick Lambrix

A few words about the lecturers

Air and Ground Information Security Group

Andrei Gurtov, professor

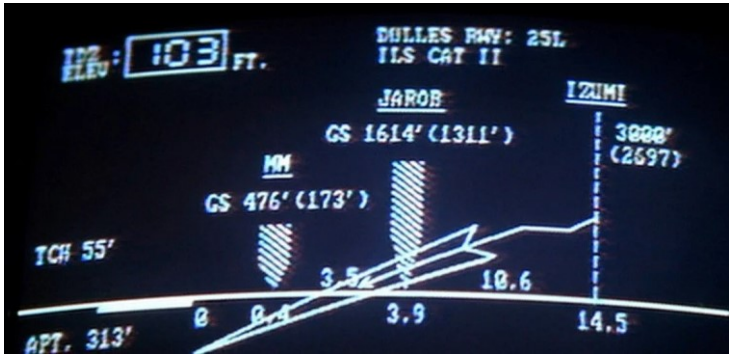
Air and Ground Information Security

AEGIS Group led by Prof. Andrei Gurtov

2 PhDs, 1 postdoc, master students
World top 1% scientist by research.com
Chair, IEEE Sweden Section

Cybersecurity of transport and Industrial Internet

Secure Remote Drone ID standard
AI-based intrusion detection for data link
Lightweight security for legacy and future aircraft
Training Air Traffic Controllers with a simulator



Landing hack/Die Hard 2

Detecting vulnerable Industrial devices
Scalable and secure LAN-as-a-service
Open-source development of Host Identity Protocol
6G and SatCom

ETHER

Co-funded by the European Union

Communications for Networked Intelligent Systems Group

Nikolaos Pappas

Associate professor, docent

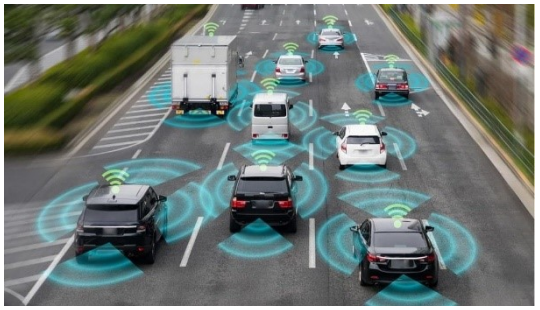
Swedish Research Council

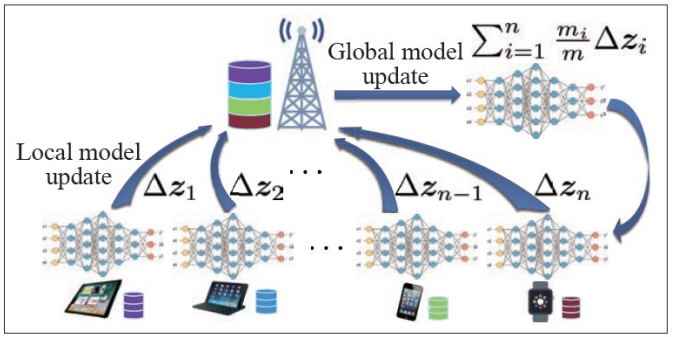
ELLIIT

Excellence Center at Linköping – Lund in Information Technology

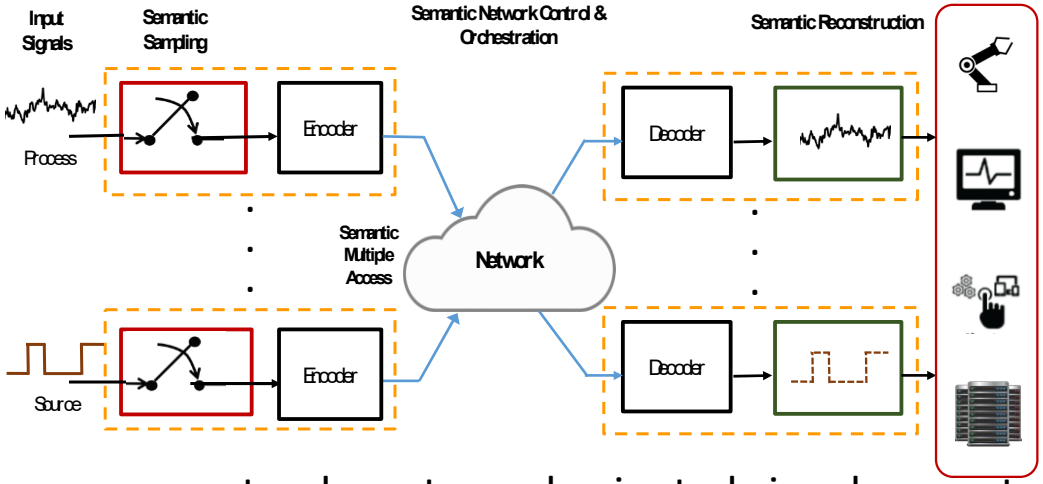
CENIIT

Emerging wireless ecosystem in 5G and beyond



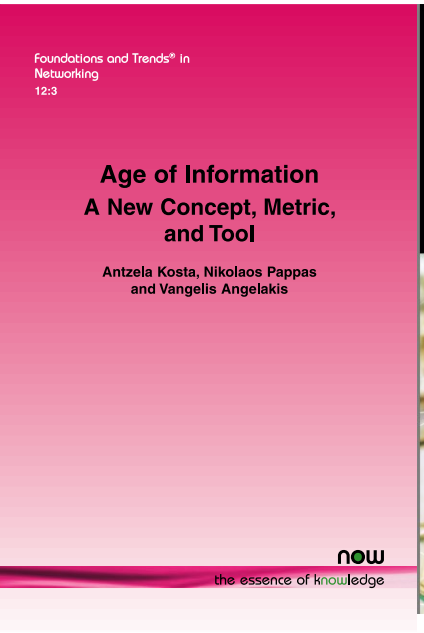


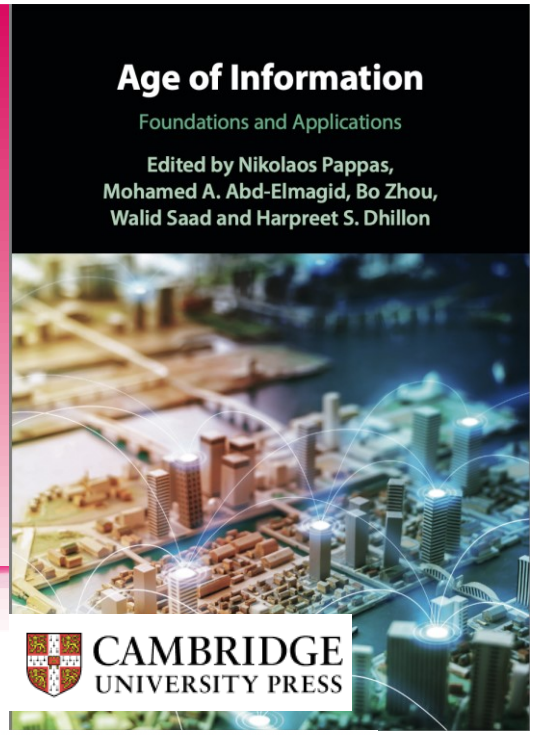
Towards Goal-oriented Semantic Communication

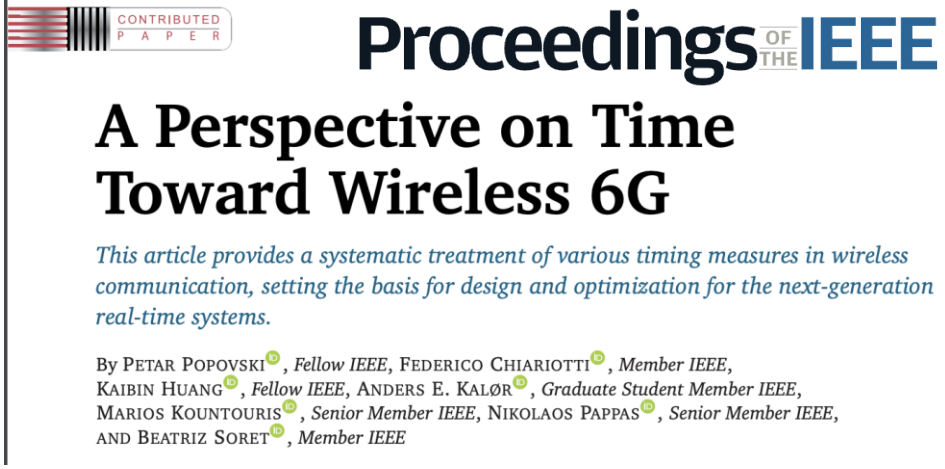


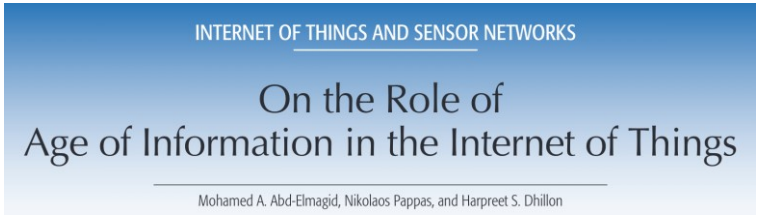
- Communication process extends up to goal-oriented signal reconstruction and information exploitation
- A monitored signal: a physical phenomenon/event distributed in space and evolving in time
- Key semantic operations - Prioritize information and the goal-driven representation of it

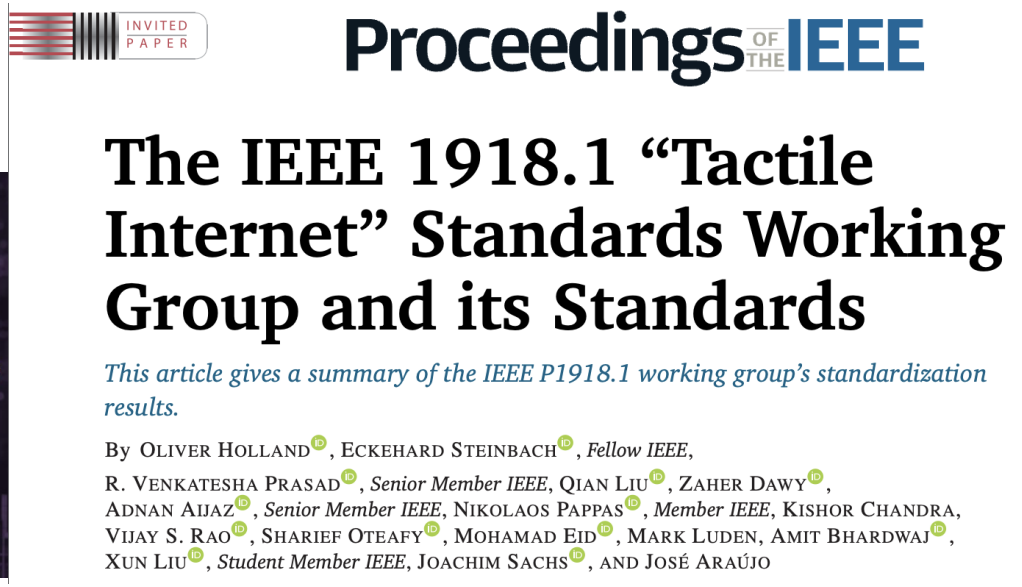
High Impact Publications











National and international collaboration

香港中文大學
The Chinese University of Hong Kong

AALBORG UNIVERSITY
DENMARK

Aalto University

UNIVERSITY
OF OULU

UPPSALA
UNIVERSITET

LUND UNIVERSITY

SINGAPORE UNIVERSITY OF
TECHNOLOGY AND DESIGN

UNIVERSITÉ DU
LUXEMBOURG

Security and Networks Group

Niklas Carlsson, senior associate professor

Research group overview

Group leader: Niklas Carlsson (Senior Associate Professor)

Interest/aims: Provide system insights and solutions that help deliver tomorrow's services both effectively and securely

Methodologies: E.g., measurement, mathematical modeling, optimization, system design, real-world experiments, data analytics, statistical methods

Current team


Niklas


Minh-Ha


Alireza


David


Karol


Carl Magnus


August


Sheyda


Minxing

Incoming/upcoming hiring: Ethan (RA) + Somiya (starts PhD 2024), Postdoc (starts 2024)

Research group overview

Group leader: Niklas Carlsson (Senior Associate Professor)

Interest/aims: Provide system insights and solutions that help deliver tomorrow's services both effectively and securely

Methodologies: E.g., measurement, mathematical modeling, optimization, system design, real-world experiments, data analytics, statistical methods

Current team


Niklas

Minh-Ha

Alireza


David

Karol


Carl Magnus


August


Sheyda

Minxing

Incoming/upcoming hiring: Ethan (RA) + Somiya (starts PhD 2024), Postdoc (starts 2024)

Current example topics/questions

Network security


Tomorrow's streaming

DL + privacy/security

Characterization, analytics, modeling

Research group overview

Group leader: Niklas Carlsson (Senior Associate Professor)

Interest/aims: Provide system insights and solutions that help deliver tomorrow's services both effectively and securely

Methodologies: E.g., measurement, mathematical modeling, optimization, system design, real-world experiments, data analytics, statistical methods

Current team


Niklas

Minh-Ha

Alireza


David

Karol


Carl Magnus


August


Sheyda

Minxing

Incoming/upcoming hiring: Ethan (RA) + Somiya (starts PhD 2024), Postdoc (starts 2024)

Current example topics/questions

Research group overview

Group leader: Niklas Carlsson (Senior Associate Professor)

Interest/aims: Provide system insights and solutions that help deliver tomorrow's services both effectively and securely

Methodologies: E.g., measurement, mathematical modeling, optimization, system design, real-world experiments, data analytics, statistical methods

Current team


Niklas

Minh-Ha

Alireza


David

Karol


Carl Magnus


August


Sheyda

Minxing

Incoming/upcoming hiring: Ethan (RA) + Somiya (starts PhD 2024), Postdoc (starts 2024)

Current example topics/questions

Network security


Tomorrow's streaming

DL + privacy/security

Characterization, analytics, modeling

Research group overview

Group leader: Niklas Carlsson (Senior Associate Professor)

Interest/aims: Provide system insights and solutions that help deliver tomorrow's services both effectively and securely

Methodologies: E.g., measurement, mathematical modeling, optimization, system design, real-world experiments, data analytics, statistical methods

Current team


Niklas

Minh-Ha

Alireza

David

Karol

Carl Magnus

August

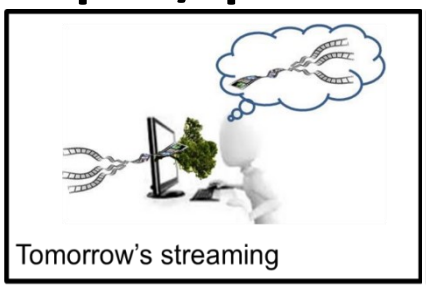

Sheyda

Minxing

Incoming/upcoming hiring: Ethan (RA) + Somiya (starts PhD 2024), Postdoc (starts 2024)

Current example topics/questions

Network security


Tomorrow's streaming

DL + privacy/security

Characterization, analytics, modeling

Research group overview

Group leader: Niklas Carlsson (Senior Associate Professor)

Interest/aims: Provide system insights and solutions that help deliver tomorrow's services both effectively and securely

Methodologies: E.g., measurement, mathematical modeling, optimization, system design, real-world experiments, data analytics, statistical methods

Current team


Niklas

Minh-Ha

Alireza

David

Karol

Carl Magnus

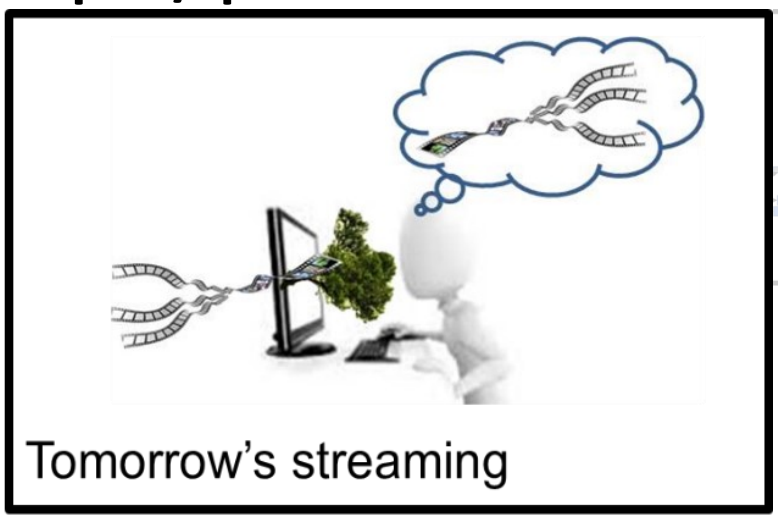
August


Sheyda

Minxing

Incoming/upcoming hiring: Ethan (RA) + Somiya (starts PhD 2024), Postdoc (starts 2024)

Current example topics/questions



Research group overview

Group leader: Niklas Carlsson (Senior Associate Professor)

Interest/aims: Provide system insights and solutions that help deliver tomorrow's services both effectively and securely

Methodologies: E.g., measurement, mathematical modeling, optimization, system design, real-world experiments, data analytics, statistical methods

Current team


Niklas

Minh-Ha

Alireza

David

Karol

Carl Magnus

August

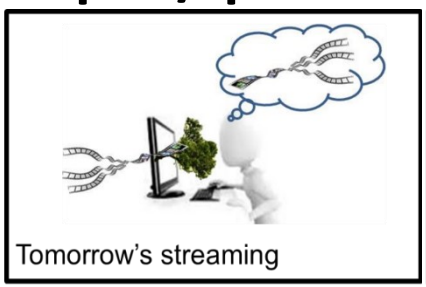

Sheyda

Minxing

Incoming/upcoming hiring: Ethan (RA) + Somiya (starts PhD 2024), Postdoc (starts 2024)

Current example topics/questions

Network security


Tomorrow's streaming

DL + privacy/security

Characterization, analytics, modeling

Research group overview

Group leader: Niklas Carlsson (Senior Associate Professor)

Interest/aims: Provide system insights and solutions that help deliver tomorrow's services both effectively and securely

Methodologies: E.g., measurement, mathematical modeling, optimization, system design, real-world experiments, data analytics, statistical methods

Current team


Niklas


Minh-Ha

Alireza

David


Karol

Carl Magnus

August

Sheyda

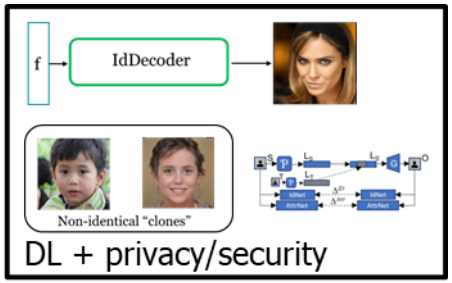

Minxing

Incoming/upcoming hiring: Ethan (RA) + Somiya (starts PhD 2024), Postdoc (starts 2024)

Current example topics/questions

Network security

Tomorrow's streaming



DL + privacy/security

Characterization, analytics, modeling

Research group overview

Group leader: Niklas Carlsson (Senior Associate Professor)

Interest/aims: Provide system insights and solutions that help deliver tomorrow's services both effectively and securely

Methodologies: E.g., measurement, mathematical modeling, optimization, system design, real-world experiments, data analytics, statistical methods

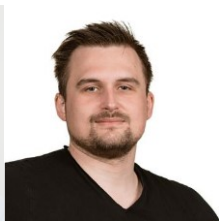
Current team


Niklas


Minh-Ha

Alireza

David


Karol

Carl Magnus

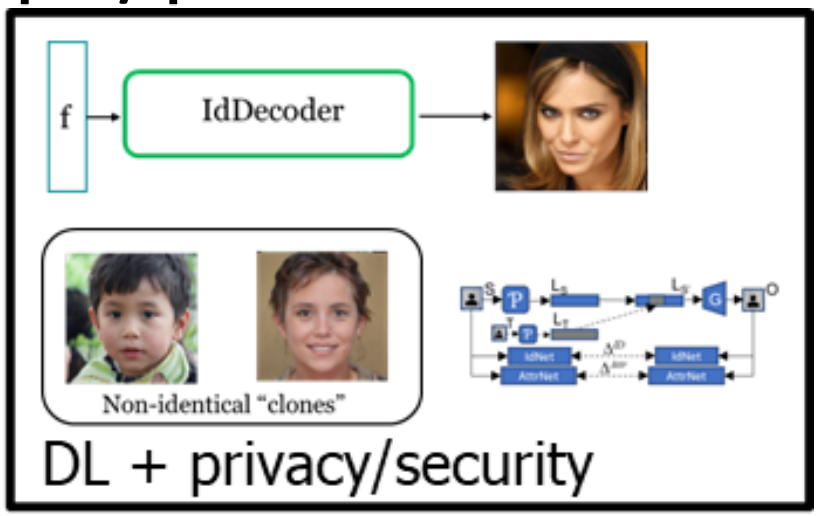
August

Sheyda


Minxing

Incoming/upcoming hiring: Ethan (RA) + Somiya (starts PhD 2024), Postdoc (starts 2024)

Current example topics/questions



Research group overview

Group leader: Niklas Carlsson (Senior Associate Professor)

Interest/aims: Provide system insights and solutions that help deliver tomorrow's services both effectively and securely

Methodologies: E.g., measurement, mathematical modeling, optimization, system design, real-world experiments, data analytics, statistical methods

Current team


Niklas


Minh-Ha

Alireza

David


Karol

Carl Magnus

August

Sheyda

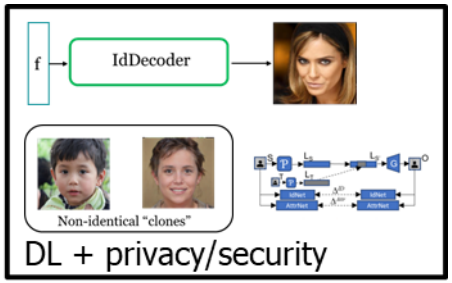

Minxing

Incoming/upcoming hiring: Ethan (RA) + Somiya (starts PhD 2024), Postdoc (starts 2024)

Current example topics/questions

Network security

Tomorrow's streaming



DL + privacy/security

Characterization, analytics, modeling

Research group overview

Group leader: Niklas Carlsson (Senior Associate Professor)

Interest/aims: Provide system insights and solutions that help deliver tomorrow's services both effectively and securely

Methodologies: E.g., measurement, mathematical modeling, optimization, system design, real-world experiments, data analytics, statistical methods

Current team


Niklas

Minh-Ha


Alireza

David

Karol

Carl Magnus

August

Sheyda

Minxing

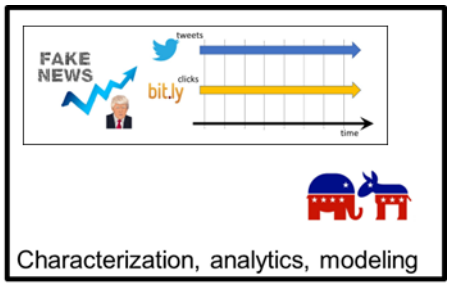
Incoming/upcoming hiring: Ethan (RA) + Somiya (starts PhD 2024), Postdoc (starts 2024)

Current example topics/questions

Network security

Tomorrow's streaming

DL + privacy/security



Characterization, analytics, modeling

Research group overview

Group leader: Niklas Carlsson (Senior Associate Professor)

Interest/aims: Provide system insights and solutions that help deliver tomorrow's services both effectively and securely

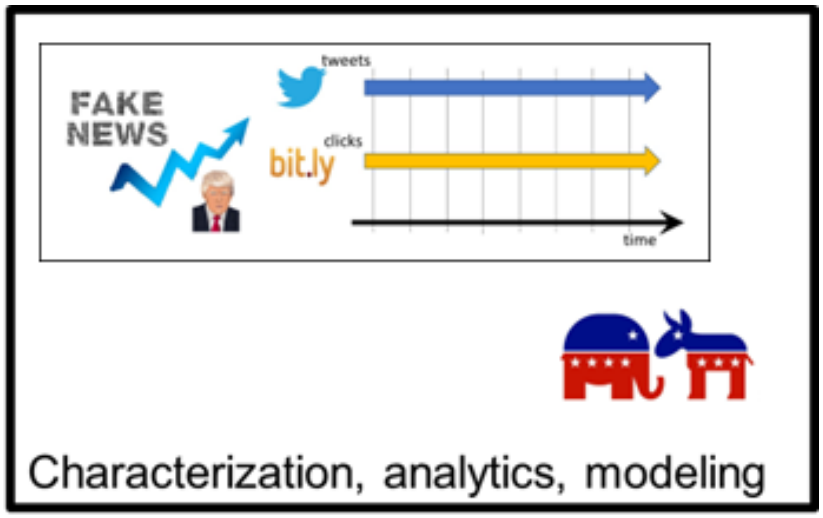
Methodologies: E.g., measurement, mathematical modeling, optimization, system design, real-world experiments, data analytics, statistical methods

Current team

Niklas Minh-Ha Alireza David Karol Carl Magnus August Sheyda Minxing

Incoming/upcoming hiring: Ethan (RA) + Somiya (starts PhD 2024), Postdoc (starts 2024)

Current example topics/questions



Research group overview

Group leader: Niklas Carlsson (Senior Associate Professor)

Interest/aims: Provide system insights and solutions that help deliver tomorrow's services both effectively and securely

Methodologies: E.g., measurement, mathematical modeling, optimization, system design, real-world experiments, data analytics, statistical methods

Current team


Niklas

Minh-Ha


Alireza

David

Karol

Carl Magnus

August

Sheyda

Minxing

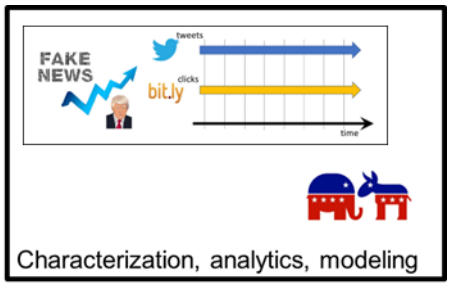
Incoming/upcoming hiring: Ethan (RA) + Somiya (starts PhD 2024), Postdoc (starts 2024)

Current example topics/questions

Network security

Tomorrow's streaming

DL + privacy/security



Characterization, analytics, modeling

Research group overview

Group leader: Niklas Carlsson (Senior Associate Professor)

Interest/aims: Provide system insights and solutions that help deliver tomorrow's services both effectively and securely

Methodologies: E.g., measurement, mathematical modeling, optimization, system design, real-world experiments, data analytics, statistical methods

Current team


Niklas


Minh-Ha

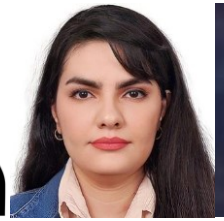

Alireza


David


Karol


Carl Magnus


August

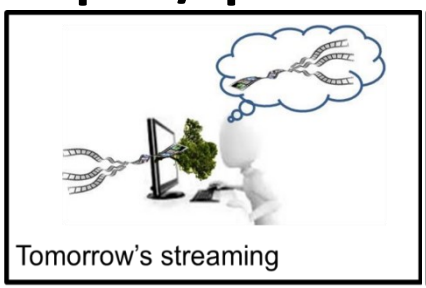

Sheyda

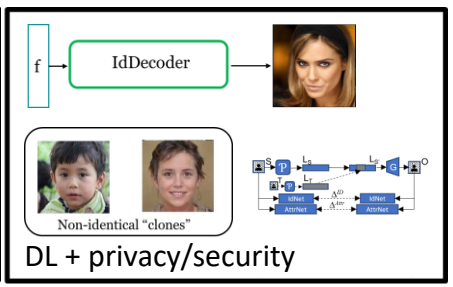

Minxing

Incoming/upcoming hiring: Ethan (RA) + Somiya (starts PhD 2024), Postdoc (starts 2024)

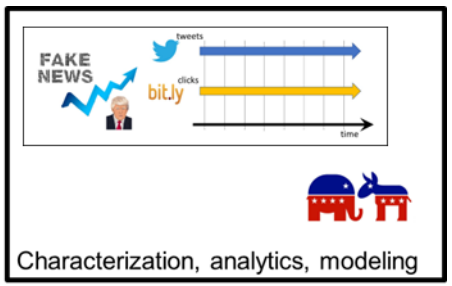
Current example topics/questions

Network security


Tomorrow's streaming



DL + privacy/security



Characterization, analytics, modeling


Sports Analytics Group

Patrick Lambrix, professor

Niklas Carlsson, senior associate professor

Sports Analytics

Examples

- Player performance (e.g., goal importance)
- Player roles, player combinations, and strategies
- Game and season outcome prediction

LINHAC: Linköping Hockey Analytics Conference

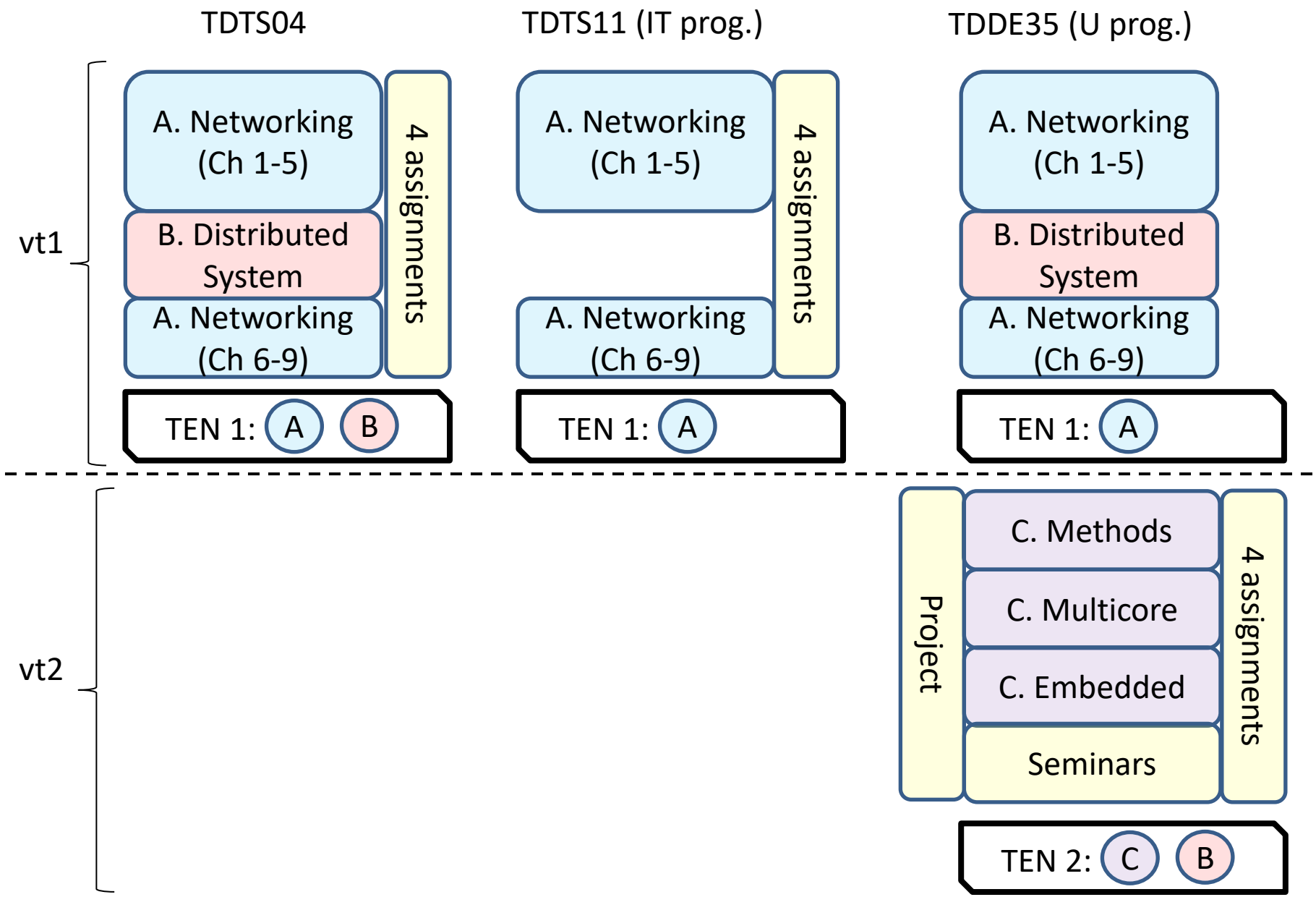
Back to the course …

English

- The courses will be given in English …
- Many reasons, including (but not limited to):
  - Terminology mostly in English
  - Google and the literature will give you **many more** and **much better** answers …
  - Much better lecture quality … especially with good book + slides in English
  - (+ **many** more reasons, including availability to exchange students)

❑ Great opportunity to practice

  ❑ Understanding is the focus (not your language skills ...)


TDTS04
TDTS11 (IT prog.)
TDDE35 (U prog.)
vt1
A. Networking (Ch 1-5)
B. Distributed System
A. Networking (Ch 6-9)
4 assignments
TEN 1: A B
A. Networking (Ch 1-5)
A. Networking (Ch 6-9)
4 assignments
TEN 1: A
A. Networking (Ch 1-5)
B. Distributed System
A. Networking (Ch 6-9)
TEN 1: A
vt2
Project
C. Methods
C. Multicore
C. Embedded
Seminars
4 assignments
TEN 2: C B

Course Overview(s)

- Written exam
  - Grads: 'fail', 3, 4, 5.
- Four (4) mandatory lab assignments
  - Must pass all assignments
  - Thirteen (13) or eight (8) lab opportunities
  - Register on webreg. (Deadline for TDTS04/11 on Thursday!!)
  - TDTS04/11: One (1) optional assignment
    - Up to 4 bonus marks for exam
- Seventeen (17) or thirteen (13) lectures
  - Twelve (12) network "focus" [all groups]
  - Four (4) distributed systems "focus" [TDTS04 + TDDE35]
  - + Last lecture with some exam preparation [based on examiner]
- See your respective websites for more information ...

Strongly suggest attending lectures

- Opportunity to ask questions!
- Demos of protocol animations
- Learn/know which parts/slides important for exam
- Sample exam questions and solutions
- Explanatory real-world examples
- Organize yourself for chapter progress/labs
- But can also watch recorded lectures (e.g., textbook or Andrei's)

Lecture Videos and Slides

- Andrei's recorded lectures from a similar course are available here
  - https://liuonline-my.sharepoint.com/:f:/g/personal/andgu38_liu_se/Eh1nFrZCvgZCqOO9p2hyWzsBSOQ--TXgPqxkb_lZsBmixg?e=nypWek
- Videos and other materials from book authors are available here
  - https://gaia.cs.umass.edu/kurose_ross/lectures.php
  - https://gaia.cs.umass.edu/kurose_ross/online_lectures.htm

Lecturers' Wish List

- Buy/rent and read the textbook
  - Very good textbook, written by highly regarded researchers in the field
  - No time to cover everything during lectures
  - Read the corresponding chapter before the lecture!
- Work hard
  - Pay attention during lectures
  - Make sure you **understand** the material
  - Start assignments early (some will take time)
  - Ask questions during class + discuss with peers
- Follow deadlines

Kick starting science ...

What do you have in the future?

How do we build services that are …

Efficient

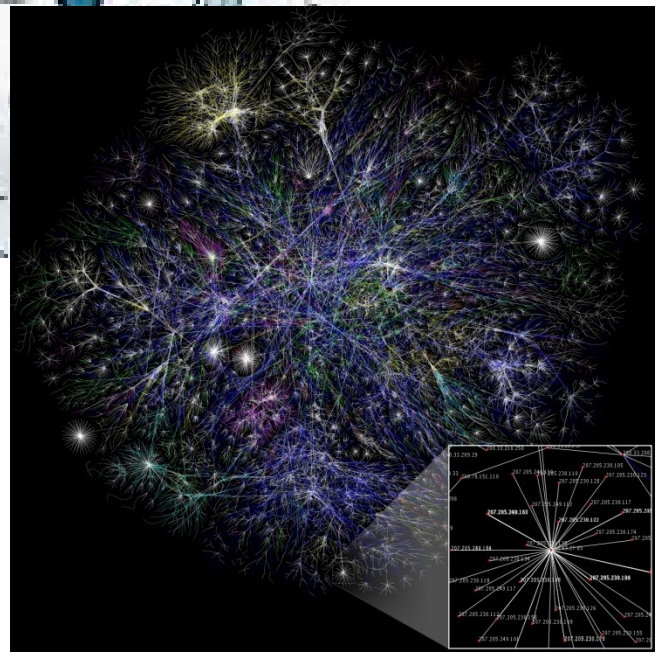
Secure

Reliable

Basic example problems include …

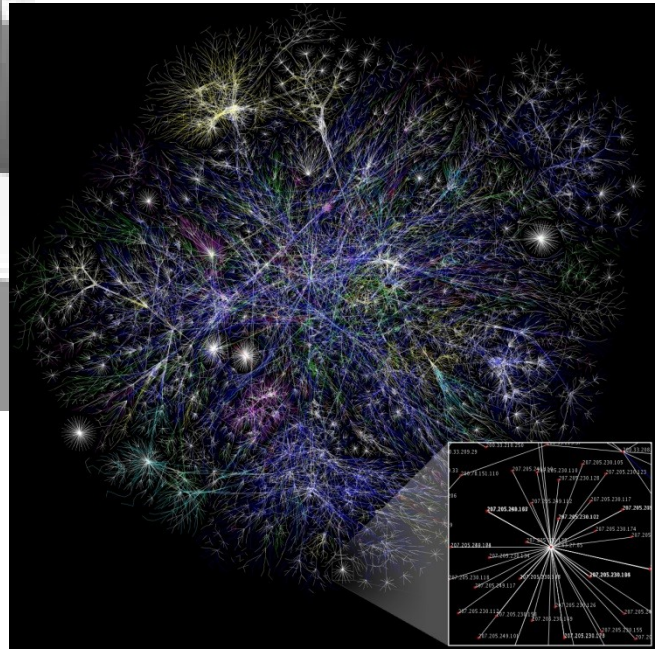
How do we communicate with a machine across the world?

How do we find out who to talk to?



How can we trust that we talk to the right machine/organization?

How do we find a path?



How do we **avoid sending too much** for the receiver and network to handle?

What happens at our machine? Inside the network? Along the path?

What to expect? (What will be covered?)

- Design principles for computer networks
  - Conceptual view of Internet architecture
- Design, resource, and performance tradeoffs
  - General working knowledge of protocols/applications
  - Detailed knowledge of selected protocols/applications
  - Some practical hands-on experience
- Glimpse into the future of the Internet
  - Emerging trends and technologies

So let’s start the course …