Visit **gosocrative.com** and enter room name REQENG

Lecture starts at 13:15

You are welcome to share a short break with us and discuss/ask questions

– L10 –
Requirements Engineering Ethics
DAT232/DIT285 Advanced Requirements Engineering

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October 15, 2025

Outline

7. Please write **one thing that you liked** about this lecture and **one thing that you wished for**.

Hide Answers | Show Names | 1/23 Students Answered

Liked the tables, they gave a clear overview of different aspects. Would like for these type of quizzes to be relesed for studying after the lectures.

Outline

Learning Objectives

1. Explore touch points of RE and Ethics
2. How can RE help to manage Ethics of Engineering efforts?
3. Which aspects of Ethics must be considered when doing RE?

Learning Objectives

Game plan

- Panel style lecture
- Panelists:
  - Farnaz Fotrousi, expert in RE / User Feedback
  - Irum Inayat, expert in Responsible Software Engineering
  - Eric Knauss, expert in RE for AI-based perception systems
- Structure:
  1. Provide an example
  2. (optional) socrative questions to audience
  3. Discuss among panelists
  4. Take comments / questions from audience
  5. On to next panelist, Step 1

Outline

A new type of Systems: AI-based

- Non-deterministic
- Inherent Lack of Explainability
- Tendency to automate decision making

A new type of Systems: AI-based

Asimov's Law [Asimov, 1950]

1. A robot may not injure a human being or, through inaction, allow a human being to come to harm.
2. A robot must obey the orders given it by human beings except where such orders would conflict with the First Law.
3. A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.

Thoughts from automotive projects: → https://socrative.com, REQENG, Q1

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2. Difficult example: After a road closure, Police guides vehicles through a "forbidden" road. An automated vehicle (AV) may need to balance two orders: The road sign that forbids passage, and the hand wave of Police person.

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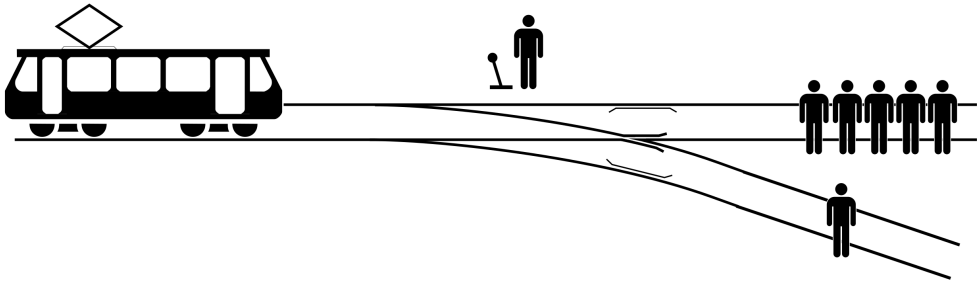
2. Difficult example: After a road closure, Police guides vehicles through a "forbidden" road. An automated vehicle (AV) may need to balance two orders: The road sign that forbids passage, and the hand wave of Police person.
3. Consider a brand with superior automated emergency breaking (AEB). They might be involved in more rear-end collisions. Would you buy that brand?

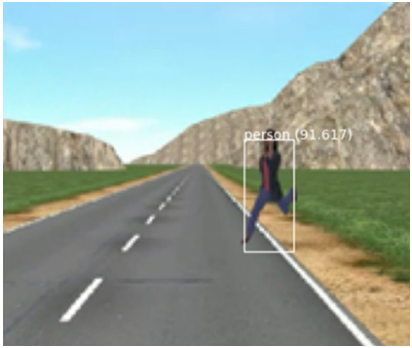
Trolley Problem of AVs



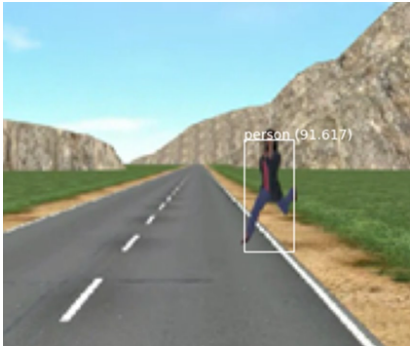
Taken from https://en.wikipedia.org/wiki/Trolley_problem

→ https://socrative.com, REQENG, Q2

Case: Automotive Perception



Read more about this example:
[Borg et al., 2023].
Figures taken from their github repository.



- How to train the perception system?
  - Collect sufficient amounts of data (common practice: x million km annotated driving data)
- Potential problems (example with Children)
  - Increased likelihood to suddenly cross street
  - Smaller → less pixels, easier to overlook
  - Much rarer to encounter at night → imbalanced data set

→ https://socrative.com, REQENG, Q3

Outline

Irum - Responsible Software Engineering

Remember the question on whether automated decision making changes responsibilities of engineers or operators?
I expect Irum to challenge that view to some extent.
Also, be prepared to answer → https://socrative.com, REQENG, Q4-6

Outline

Farnaz - User Feedback

Remember the learning goals?

1. Explore touch points of RE and Ethics
2. How can RE help to manage Ethics of Engineering efforts?
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I expect Farnaz to talk a bit more on (3).
Also, be prepared to answer → `https://socrative.com`, REQENG, Q7

Outline

So what...

(remember, you are/will be engineers)

Ethical Guidelines for Engineering (see for example American Society of Civil Engineers' Code of Ethics https://www.asce.org/career-growth/ethics/code-of-ethics)

Ethical Requirements for AI Systems

EU Ethical Guidelines for Trustworthy AI (reproduced from [Guizzardi et al., 2020])

1. Autonomy (respect for human dignity) e.g. Respect for a person's privacy and a requirement "Take a photo of someone only after her consent"
2. Beneficience (doing good to others)
3. Nonmaleficence (doing no harm to others) e.g. "Do not drive fast past a bystander" as a requirement of a self-driving car
4. Justice (treating others fairly)
5. Explicability (behaving transparently towards others)

These principles are often too abstract for concrete questions. RE to the rescue!

Ethical Requirements for AI Systems (ctd.)

But how to derive ethical requirements?
Current research topic. Some thoughts from a recent paper by [Guizzardi et al., 2020]:

- Critical concept Runtime Stakeholders, e.g. pedestrians are runtime stakeholders of a self-driving car.
- Consider value and risk for users and runtime stakeholders
- Introduce functional requirements that ensure that value is delivered and risks mitigated

Ethical Requirements for AI Systems (ctd.)

Example from [Guizzardi et al., 2020]

Principle	Possible Functional Requirement
Explicability towards passengers	engage in conversations to explain the route self-driving car is following and why.
Explicability towards nearby drivers, pedestrians and bystanders	signal on turns and changes of lane.
Respect for human dignity	stop in case self-driving car encounters a runtime stakeholder in need of assistance
Beneficience	let a nearby driver cut in front, also to notify traffic authorities of an accident.
Nonmaleficence	slow down in the presence of nearby pedestrians and bystanders, independently of any speed limits that might apply.
Justice	in the case of two lanes mergining into one, treat drivers from other lane fairly, rather than in a me-first manner.

Scary?

? If you ask me: No. Encouraging.

! You are the generation of engineers who can address these issues. Nobody is better equipped than you!

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→ `https://socrative.com`, REQENG, Q8

Todo

→ https://socrative.com, REQENG, Q9

- Create, submit, rehearse Project Presentation.
- Digital hall exam (Thu, 8:30 - 12:30): Room will be announced soon
- Deadlines
  - Project Presentation (Mon, Oct-20, 8:00am)
  - Release R3 (Mon, Oct-27, 8:00am)

References I

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Runaround.
In *I, Robot (The Isaac Asimov Collection ed.)*, page 40. Doubleday, New York City.
ISBN 978-0-385-42304-5.

Borg, M., Henriksson, J., Socha, K., Lennartsson, O., Lönegren, E. S., Bui, T., Tomaszewski, P., Sathyamoorthy, S. R., Brink, S., and Moghadam, M. H. (2023).
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Software Qual J, 31:335–403.

Guizzardi, R., Amaral, G., Guizzardi, G., and Mylopoulos, J. (2020).
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In Goutte, C. and Zhu, X., editors, *Advances in Artificial Intelligence. Canadian AI 2020.*, volume 12109 of *Lecture Notes in Computer Science*. Springer, Cham.