NRI: FND: **CRAFTING QUALITY LAW AND POLICY FOR ROBOTICS**

Award ID# 2024872, year 2

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Knowledge gap: Law and Policy

Law and policy experts don’t know robotics/AI, which leads to tech-blind policy

- Does not account for what robots can (and cannot) do

This is exacerbated by tech people over-anthropomorphising robots

- Relating to human capabilities (to help a lay audience understand)
- Or to sell their product

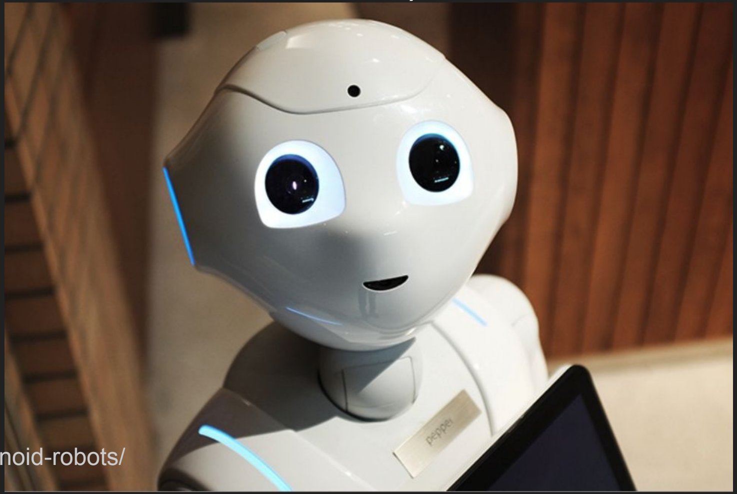

Image: https://theenterpriseworld.com/future-of-humanoid-robots/

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Knowledge gap: Law and Policy

Example: Current sidewalk robot legislation is primarily focused on size and weight, not around safety, potential privacy problems, liability

- *On the practicalities of Robots in Public Spaces,* Cindy Grimm and Kristen Thomasen, We Robot 2021 (draft)

Knowledge gap: Law and Policy

Example: Law/policy that gives robotics/AI system the same status as an individual (leaving the company not responsible)

- *The Legal Construction of Black Boxes,* Ryan Calo, Elizabeth Kumar, Andrew Selbst, and Suresh Venkatasubramanian, We Robot 2021 (draft)

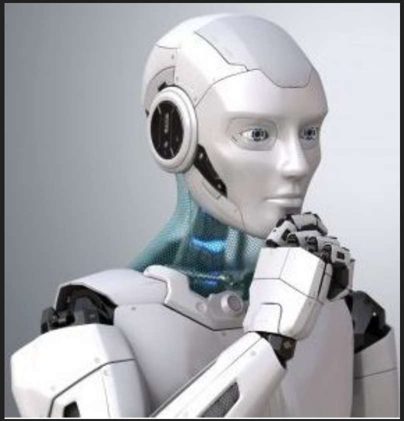

Image: https://blogs.3ds.com/northamerica/future-robots-and-ensuring-human-safety/

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Knowledge Gap, Roboticists

Roboticists don't know law and policy

- Design decisions can make a tech more (or less) prone to liability
- Similar for privacy laws

Robots deployed in the real world need to meet existing (and upcoming) regulations

- Occupational Health and Safety (OSHA)
- Decisions made early on in design may, again, make it harder to get regulatory approval

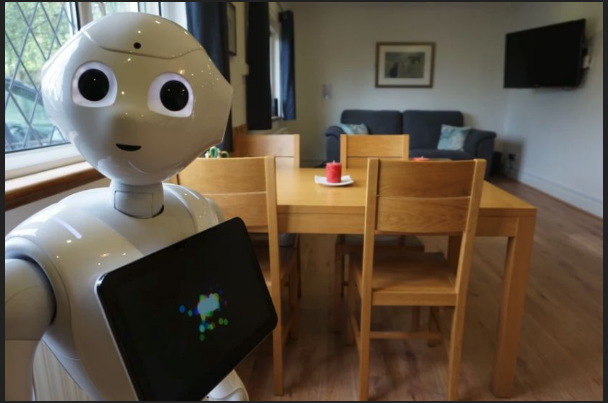

Image: https://robothouse.herts.ac.uk/access/

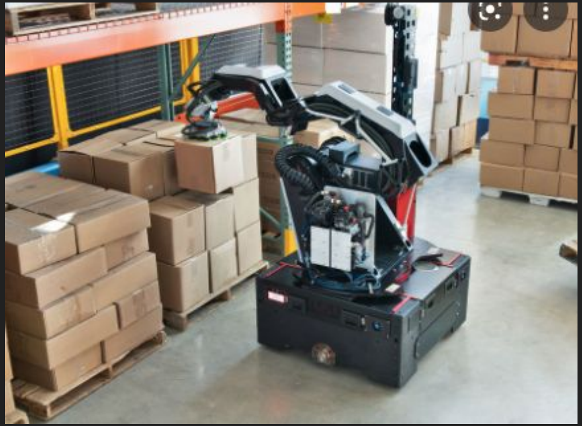

Image: https://www.theverge.com/2021/3/29/22349978/boston-dynamics-stretch-robot-warehouse-logistics

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Knowledge Gap, Roboticists

Example: A robot driving a car is NOT the same as a robotic car

- *How should the law think about robots,* Neil M. Richards, William D. Smart, We Robot 2012 (draft)

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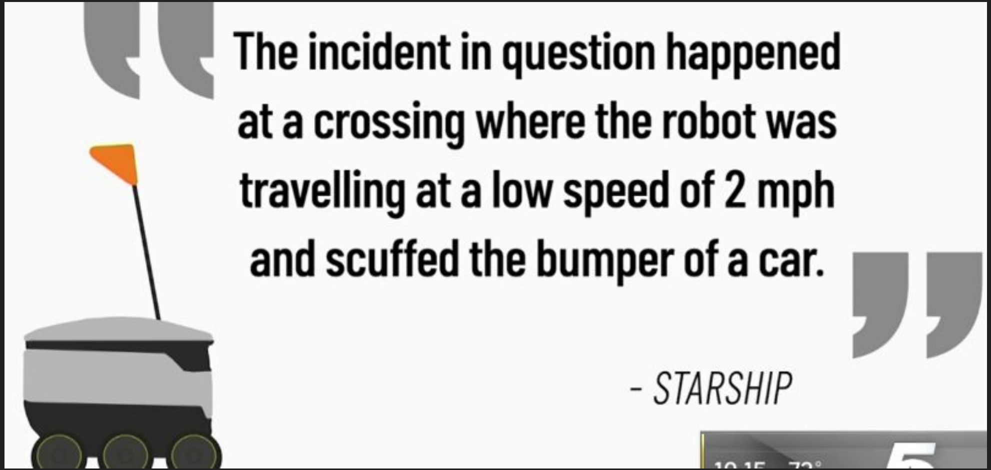
Knowledge Gap, Roboticists

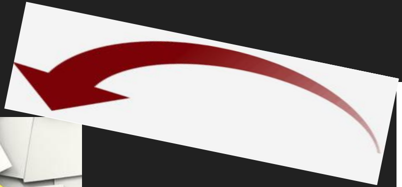
Sidewalk robot examples:

- Robot crushed by train:
- https://twitter.com/WeeklyRobotics/status/1499289460680404994

- Car damaged by sidewalk robot:
- https://www.nbcdfw.com/news/nbc-5-responds/nbc-5-responds-what-happens-if-youre-in-a-crash-with-a-robot/2442345/



Challenge: Bridge the Knowledge Gap



Reason properly about

- Robot capabilities
- Types of failures

… NOT teach them about how the technology works

Structured conversations

- Policies match robot capabilities
- Consequences of technology accounted for early (self-regulation)

Basic understanding

- How historical context, existing law, plus exemplars combine in new laws and policies
- How technology choice can influence subsequent law and policy

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Approach: Three components

Experiences with existing technologies (eg snapchat, maps)

+

Interactive experiences

- Capabilities
- Limitations

Case law approach

- Mix-and-match policies, technologies
- Case law structure
  - Policies
  - Technologies

Narrative-based examples

- Historical context of court examples
- Essence of Tort law (who is responsible and how is that established)
- Highlights of OSHA etc regulations

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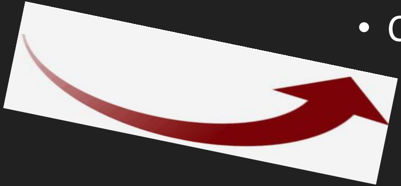

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IM: Hypotheses

- Hypothesis 1: **Interactive**, hands-on activities paired with real-world experiences are effective at enabling non-technical people to reason properly about robot capabilities.
  - Hypothesis 1a: Reasoning correctly about robot capabilities and potential failures does not require a deep technological understanding of the underlying mechanisms
  - Hypothesis 1b: People's experiences with everyday technology can be leveraged to "ground" reasoning about robot capabilities
- Hypothesis 2: **Narrative** examples in law are sufficient for extending reasoning to new situations.
  - Hypothesis 2a: Narrative exemplars are more effective than fact-based exemplars
- Hypothesis 3: **Language** choice (eg, detects versus sees) can reduce the tendency to anthropomorphize robots

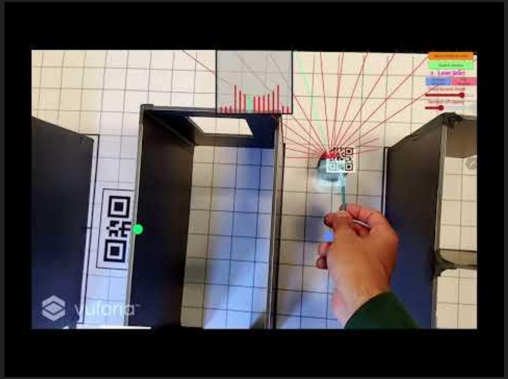
IM: Evaluation

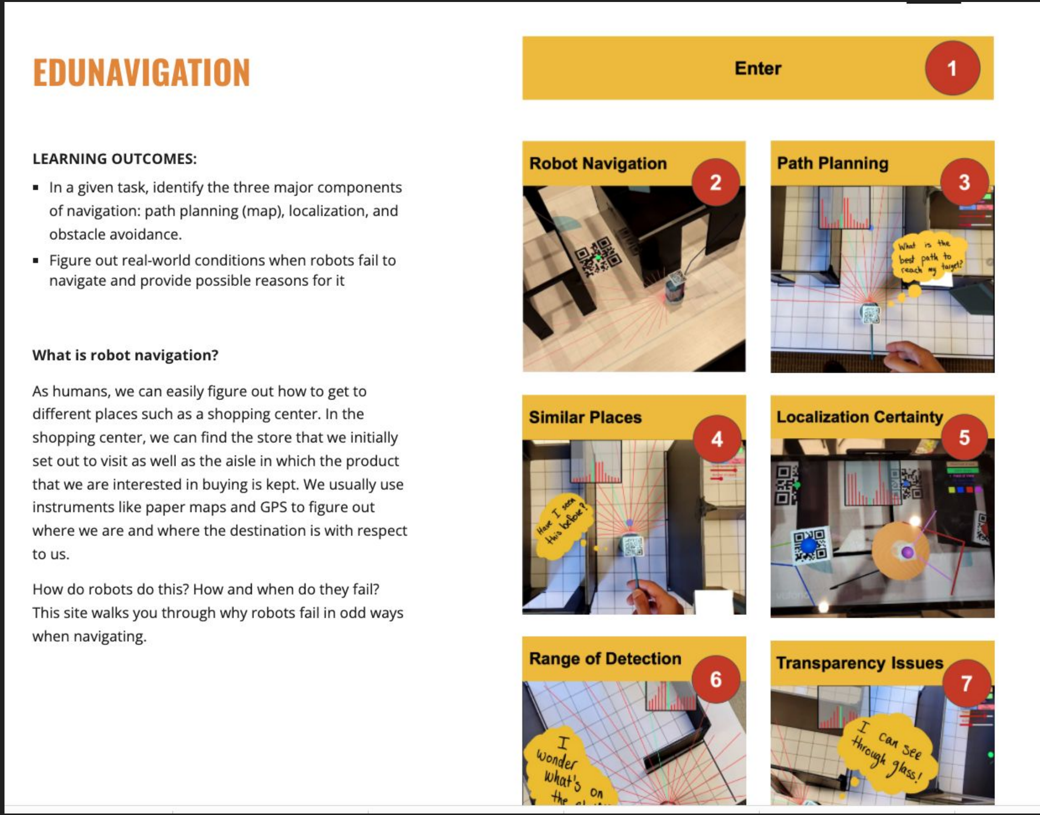
- Hypothesis **Evaluation**:
  - Quantitative measurement of effectiveness of scaffolding material, interactive experiences
    - Ability to correctly assess robotic capabilities/failures in novel cases
  - Quantitative measurement of effectiveness of scaffolding material, narrative examples
    - Ability to effectively extend narrative examples to new scenarios

- Overall evaluation
  - Qualitative assessment of case studies by law and technology experts

Interactives: Navigation - Hospital Model

- Interactive exercises for each topic with specific reasoning objectives
- Study: Web-page + video versus in-person interactive





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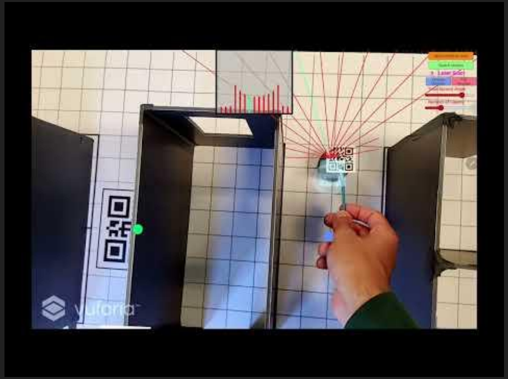

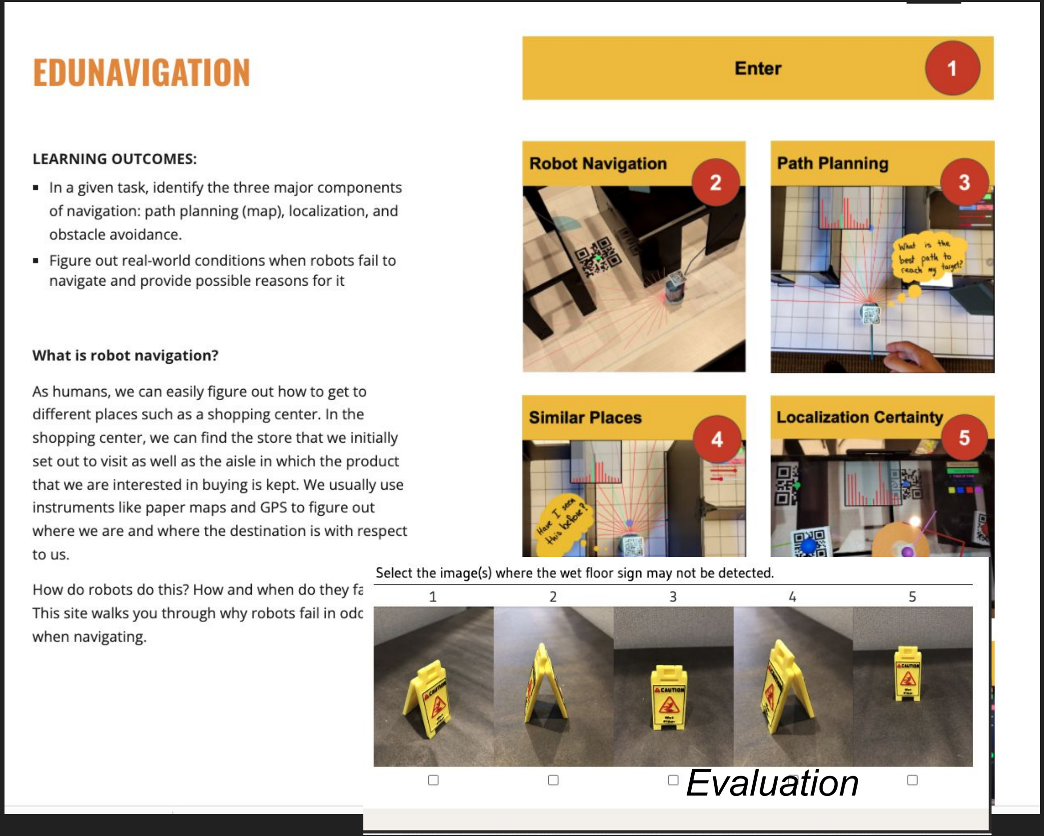

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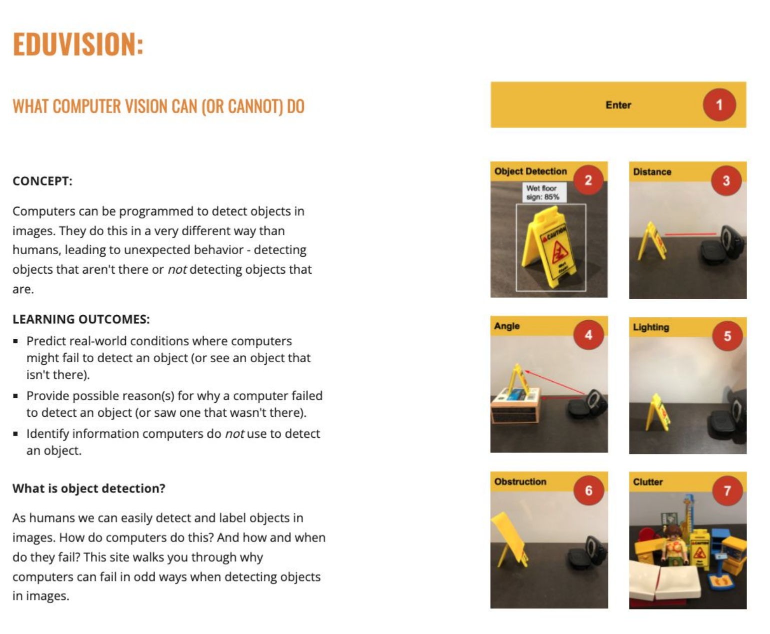
Interactive experiences: EDUVision

- How robots detect objects in images
- Common failures (lighting, angle, distance, occlusion, clutter)



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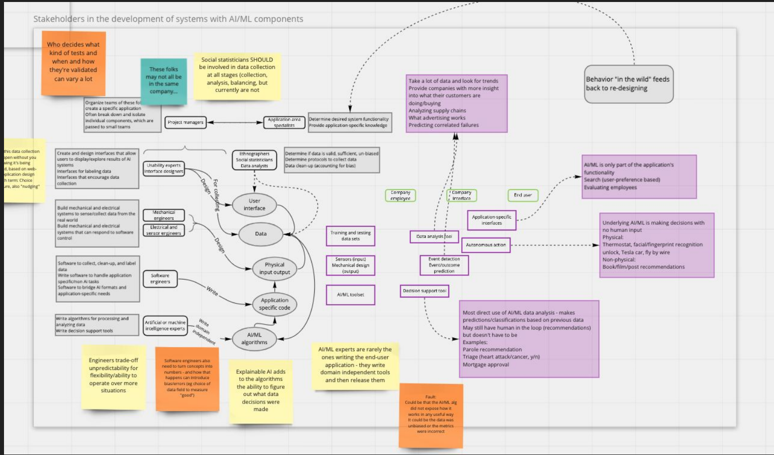
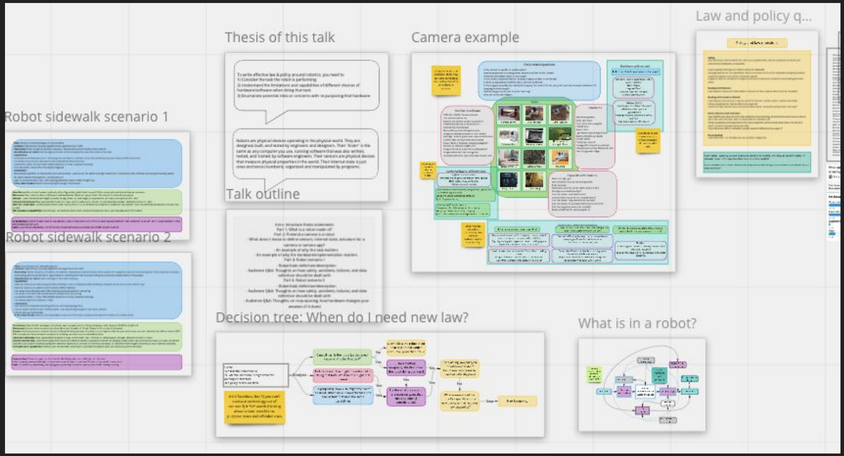
Case studies: Sidewalk robots

- WeRobot 2021 paper: On the Practicalities of Robots in Public Spaces (Cindy Grimm and Kristen Thomasen)
- British Columbia Law Institute: AI & Tort law
  - Miro diagrams of how robot/AI systems are assembled
  - Miro diagrams of how design decisions affect systems
- Narrative explanation of robot tech and how it impacts law & policy





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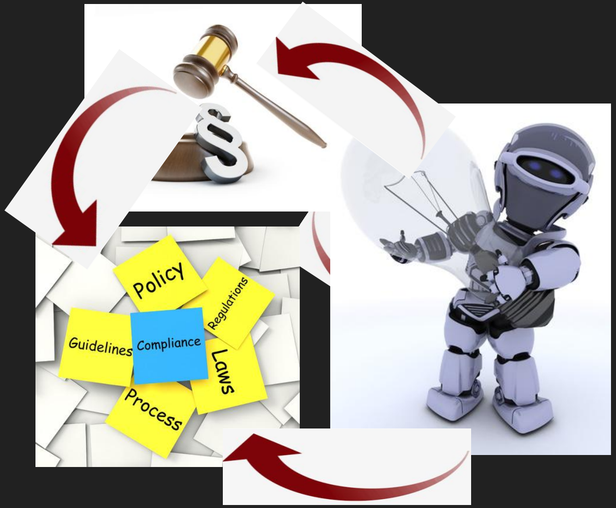
Crafting Quality Law and Policy for Robotics



Scientific Impact

- Framework for establishing effective communication between law and policy and technology experts

Broader Impact

- Law and policy around robotics that align with technological capabilities
- Designing robotics research agendas in the context of the public and society

Tangible outcomes

- Interactive materials for law and policy workshops/courses
- Narrative examples for a robotics course module
- Case study framework for developing new law and policy
- Case studies, evaluation materials, design framework

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Acknowledgements

Team

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  - Marisa Hudspeth ’22, Osman Celikok ’22, Waldo Abu Al-Afia ’23
- Dr. Cindy Grimm (PI) and Dr. William Smart (Co-PI)
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- Ruth West (PI)
  - Hannah Helgesen ‘21
  - Ian Afflerbach ‘22
  - Jessica McCurry ‘22

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