CS 369: Introduction to Robotics

Prof. Thao Nguyen

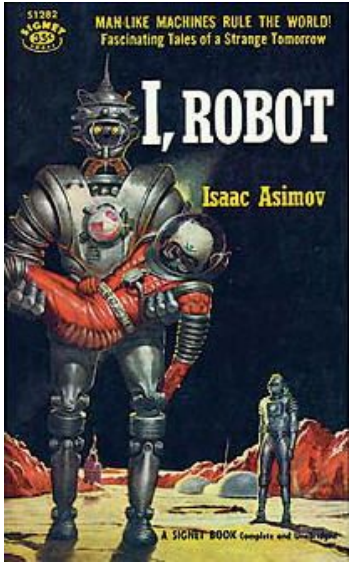
Spring 2026

HAVERFORD
COLLEGE

Outline for today

- Robot ethics

Three laws of robotics



Devised by science fiction author Isaac Asimov:

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 to 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.

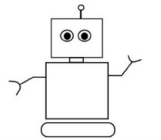
Wikipedia

Safety

- Safety zones
- Cobots
- Risk assessments
- Human interventions
- Transparency

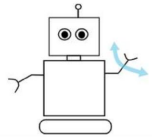
Transparency

Transparency **through** the robot



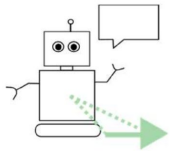
The robot is transparent by design without further action.

E.g., gripper indicates the capability of gripping.



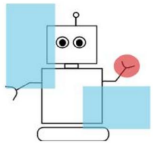
The robot is inherently transparent through its own actions.

E.g., by moving a certain way to indicate intent.



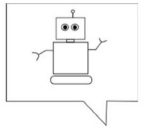
The robot makes itself transparent.

E.g., through speech or projections.



The robot is made transparent through external explanations in place.

E.g., by a visual overlay projected onto the robot.



The robot is made transparent through external explanations.

E.g., the researcher provides verbal or textual explanations.

Transparency **on** the robot

[Survey of How to Convey Transparency in Co-Located HRI]

Privacy and security

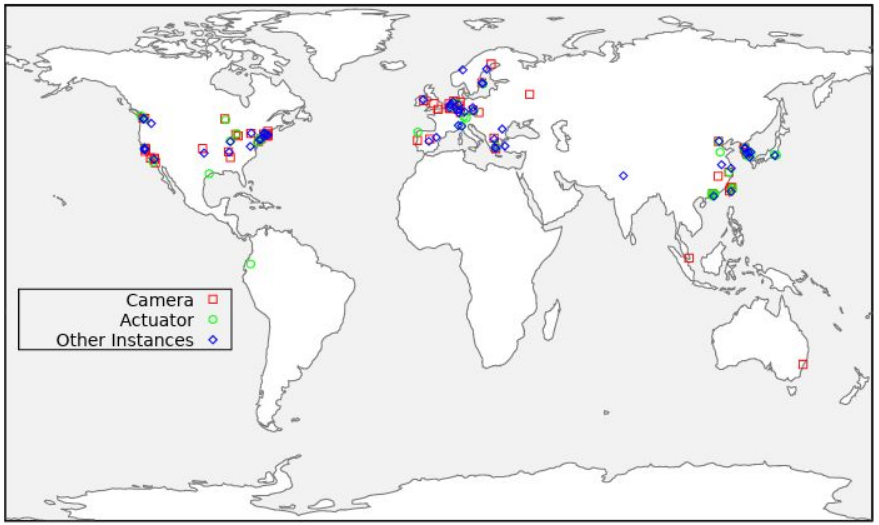


Fig. 1: Approximate locations (slightly jittered to show multiple points) of identified ROS masters across all scans. Red indicates a host that showed evidence of publishing camera information. Blue indicates a host that showed evidence of a robot that could be actuated. Other hosts are in green.

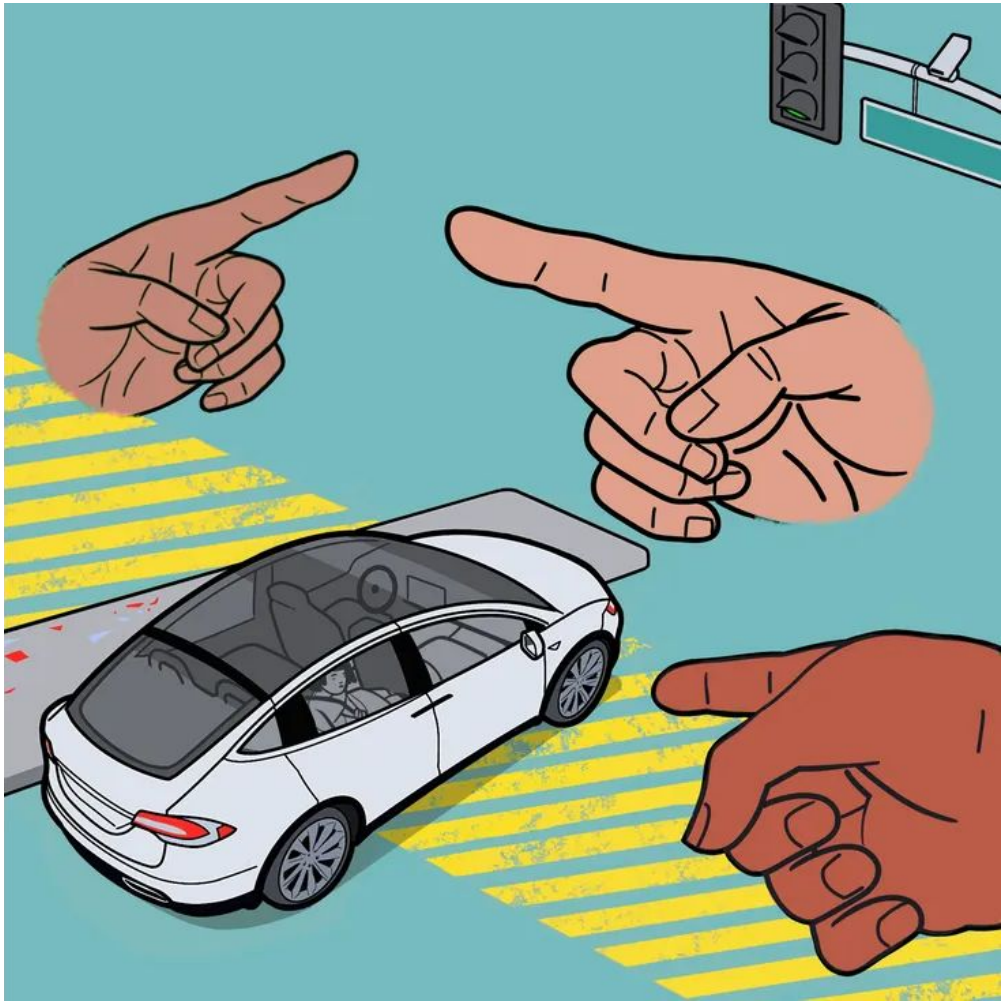
A View of Security in Robotics Research

Labor displacement

- 4 D’s of Robotization: Dull, Dirty, Dangerous, and Dear
- Worker retraining and education

Moxi – Diligent Robotics

Accountability



Will We Blame Self-Driving Cars?