Rules of Conduct for Autonomous Vehicles

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Industrial Design
Research topics

- Physical comfort through situation awareness (preventing motion sickness)
- Mental comfort (conveying information to users about what the vehicle sees, decides and will do)
- Ethics of autonomous vehicles
How should autonomous vehicles behave?

- Robot paradigm:
  - Autonomous cars are robots
  - The only difference being that we sit in them
- Behavioural rules for robots
  - Asimov’s 1st law of robotics (1942):
    - First law: “A robot may not injure a human being or, through inaction, allow a human being to come to harm”
Safety first: Accidents should be avoided at any rate

[Image of a safety sign: SAFETY FIRST, REPORT ALL ACCIDENTS NO MATTER HOW SMALL TO YOUR SUPERVISOR]
But does this give acceptable behaviour?
Asimov’s second Law of Robotics

- “A robot must obey the orders given to it by human beings, except where such orders would conflict with the First Law.”

Who decides?
“Extension of the Self” paradigm

- We act in the world
- Tools are extensions of the body
- Car is an extension of the self: tool for acting in the world
- People display different behaviours, rooted in personality
- Driving styles: self vs other-oriented
- Autonomous vehicle is an advanced extension of the self

- Prediction: People will differ with respect to expectations/requirements for driving styles of autonomous vehicles
Driving styles

- How do we want our vehicle to drive?
  Assertive vs defensive

- Implications for other road users
  Driving is a social activity > Politeness
Politeness research: “Would you brake”

Skater  Backpacker  Cyclist  Elderly lady  Mother and child

1,5   1,7   2,6   3,8   4,6

Low vulnerable  High vulnerable

1  5
Findings

- Effect of weather conditions
- Effect of vulnerability
- No all or none answers: differences between people
  Influence of driving style (inertia vs vulnerability)

- Interpretation:
  Differences between people for desired driving style
  Need for adjustable driving style for AVs
Design implications
A body language for AV

- How to express politeness
using LED arrays

Using thermochromic paint
Thanks for your interest

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Driving ethics 1: P. Lin - Trolley problem
Autonomous vehicles should be equipped with decision rules for minimizing damage.

Minimize damage for occupants? Minimize overall damage?
Driving ethics 2: P. Lin - Gridlock situations
What would an autonomous vehicle do?
Autonomous vehicles need discretionary judgement for exception handling: Know when they should break the rules