# 6ELEN018W - Applied Robotics
# Lecture 6: Roboethics: Ethical and Social Issues in Robotics

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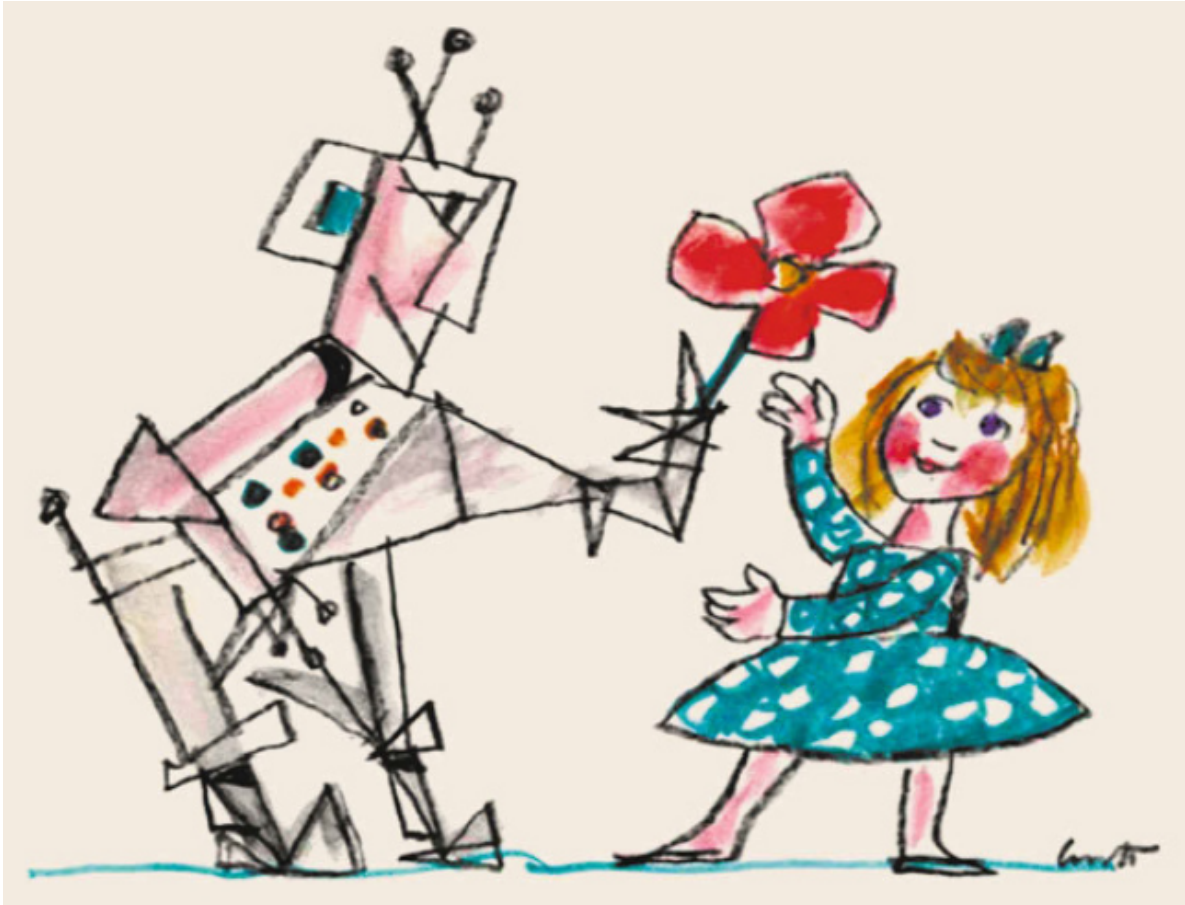
# Introduction to Robot Ethics and Social Issues



- Video Introduction

`http://handbookofrobotics.org/view-chapter/80/videodetails/775`

# What is Ethics?

There are many schools of thought to describe ethics.

- German philosopher Immanuel Kant (1788) characterised ethics as dealing with the question:

  "What should I do?"

# Robots: Social Issues and Ethics

Social Issues:

- Workers losing their jobs and income
- Economic consequences
- Legal rights of robots (as they become more advanced and intelligent)

Ethical Issues:

- Self driving cars:
  - Choosing to save the driver over pedestrians or other drivers, etc?
  - Who is to blame, the robot, the software developer, the manufacturer or the owner of the car?
- Robotic healthcare: who to blame (surgery failure, etc.)?
- Robots looking after elderly people: is this right as their quality of life is affected by removing human contact?
- Robots looking after children?
- Using robots in armies to kill human beings?

# Ethical Issues in Robotics (cont'd)

- Privacy Invasion
  - **Example:** Commercial drones equipped with advanced cameras for surveillance purposes.
  - **Issue:** Invasion of personal privacy as these devices can capture images and videos without consent, leading to concerns about unauthorised surveillance.
- Data Security: Protection of sensitive information collected by robots?
  - **Example:** Robots in healthcare collecting and storing patient data.
  - **Issue:** Concerns about the security and privacy of sensitive health information, as well as potential misuse or unauthorised access to this data.
- Bias in (AI) Algorithms
  - **Example:** Robots using facial recognition technology.
  - **Issue:** Potential bias in algorithms, leading to misidentification or discrimination, especially against certain ethnic groups due to the training data used

# Ethical Issues in Robotics (cont'd)

- Unequal Access - Educational Robots
  - **Example:** High-tech educational robots being available only in "wealthy" schools.
  - **Issue:** Unequal access to educational opportunities, contributing to limiting the potential for learning and skill development among students from lower-income backgrounds.

# Can Ethics be Fixed in Robots Using Metrics?

- Can we use traditional methods (or even AI) to fix ethics in robotics?
- Consider a problem which is considered "morally" obvious to a human.

**Example Problem:**
*A robot is walking to the post office to post a letter. It walks along a path by a river. Suddenly a child chases a duck which hops into the river. The child slips and falls into the water which is one metre deep. The child is in imminent danger of drowning. The robot is waterproof.*
*Should it enter the water and rescue the child or should it post the letter? If the child remains in the water he/she will be drown but the letter can be posted at any time, or perhaps the post office is closing soon.*

# Can Ethics be Fixed in Robots Using Metrics (cont'd)?

Use *Reinforcement Learning* principles based on rewards and penalties.

- Represent the value (utility) of a saved life compared to the value (utility) of the letter arriving 1 day late.
- We assign the value of the child's life to $+1,000,000$ and the value to the letter arriving on time $+1$.
- *Does this solve the problem?*
- Now assume that the robot is travelling to the post office driving a truck with a million and one letters each valued $+1$.
- The total value of posting the letters on time is $1,000,001$ which is greater than $1,000,000$ the value of saving the life of the child.

# Bad Robots and Good Robots