Intelligence and Autonomy in Robotics

The ShanghAI Lectures

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Introduction

Discussion and applications

Conclusion

Introduction

Introduction

Intelligence: ability to learn, reason and understand a certain reality.

Types of intelligence

- Linguistic
- Logical-mathematical
- Spatial
- Auditive
- Kinesthetic
- Emotional
- …

Introduction

Abilities of an **intelligent robot**:

- Social communication

- Large-scale processing

- Spatial control

- Precise and fluid movements

- Perception of emotions

Introduction

Automatic: works on its own and executes a process totally or partially without an intervention of an external agent.

Autonomous: has the capability and freedom to make decisions and take actions independently.

Discussion and applications

Discussion and applications

Multiple applications:

- Virtual assistants

- Domestic robots

- Social robots

Discussion and applications
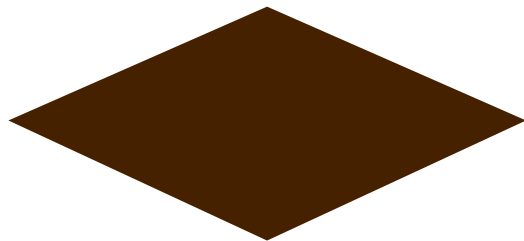
Maggie

Autonomous Driverless Vehicle

UC3M Humanoid

Discussion and applications

How is autonomy measured?

Discussion and applications

Levels of autonomy

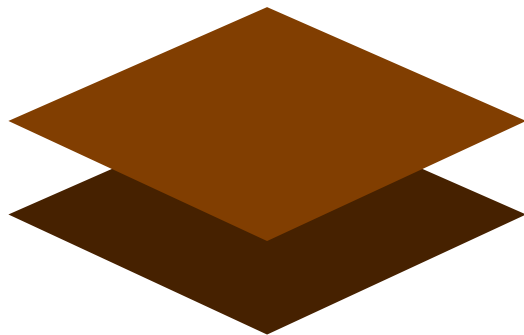**Driver** assistance, e.g., cruise and lane control

- Level 1

Discussion and applications

Levels of autonomy

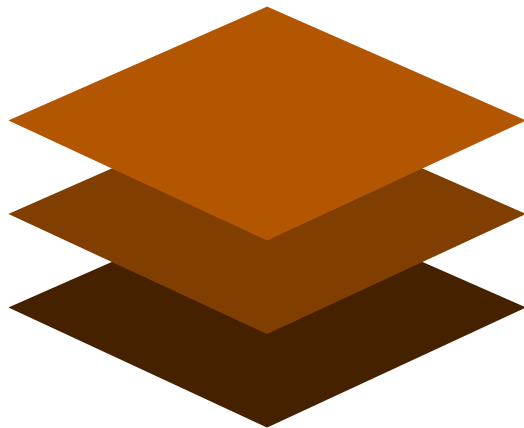**Partial automation.** The vehicle automates longitudinal and lateral movements

- Level 2

Discussion and applications
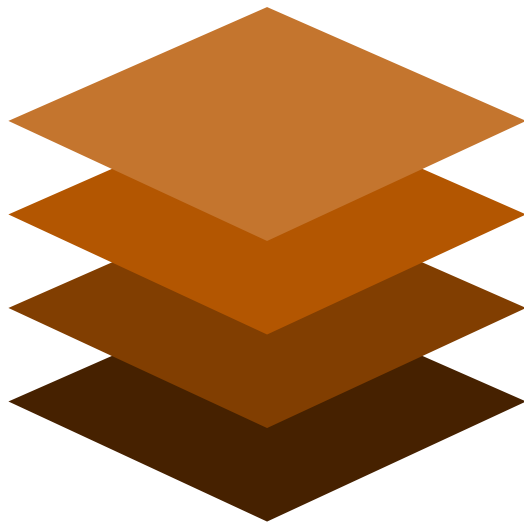
Levels of autonomy

Conditional automation. The vehicle is equipped to drive on its own except in the event of failure.

- Level 3

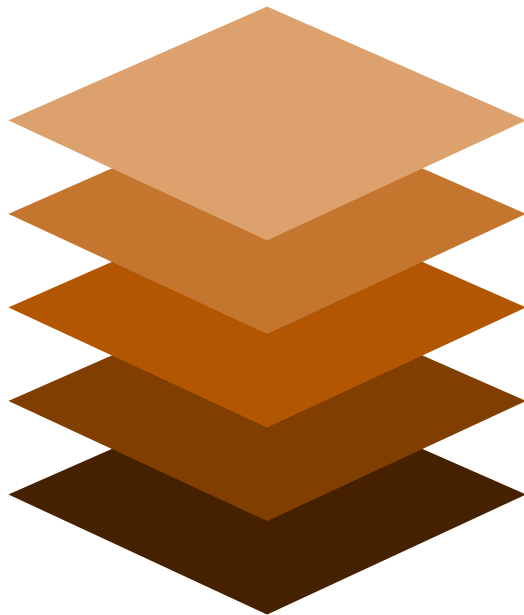# Discussion and applications

Levels of autonomy

- Level 4

  High automation. The vehicle does not need a drive, but it is limited to certain environments.

Discussion and applications

Levels of autonomy

- Level 5

  Total automation. The vehicle is completely autonomous and does not require the presence of a driver in any conditions.

Discussion and applications

Intelligent and autonomous robots as an
extension of human capabilities: exploration
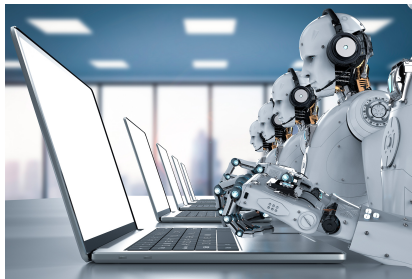robots, humanoid and social robots, …

… but, what is the **limit**?

Discussion and applications

What if robot intelligence is similar to human intelligence?
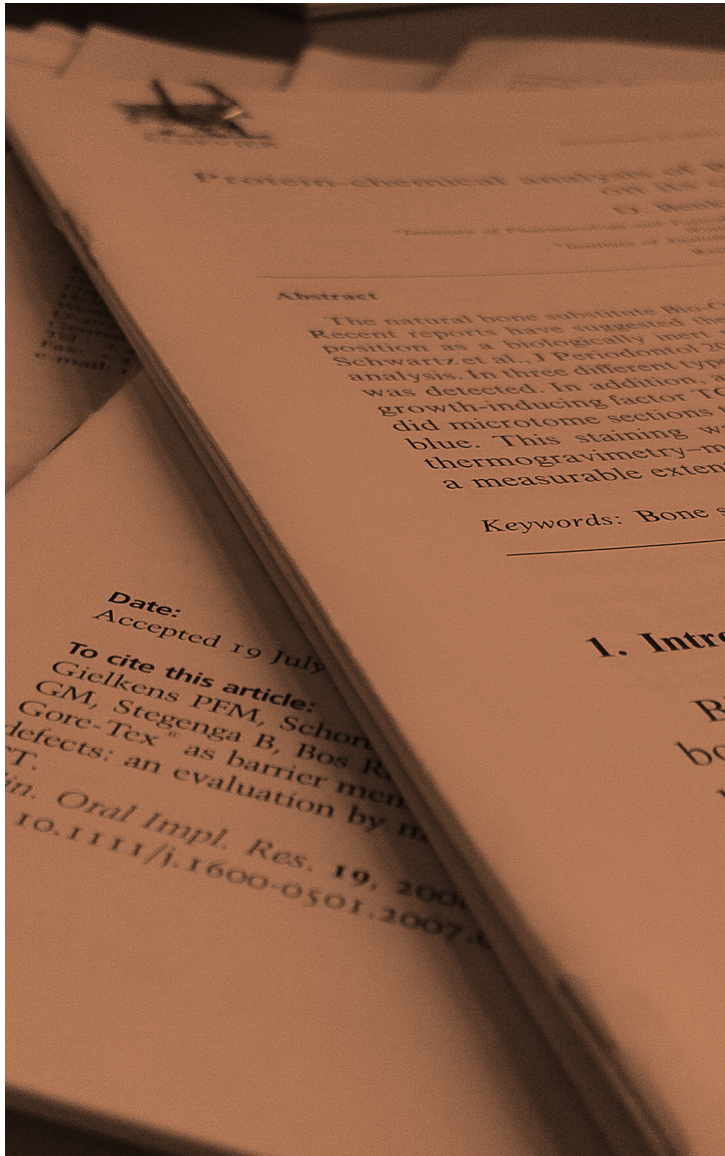
Identity theft

Interaction

Responsibility

Discussion and applications

Should robots be autonomous?

Conclusion
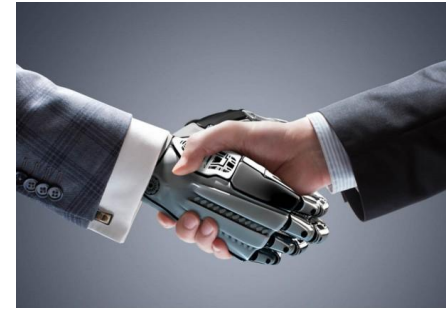
Conclusion

Safety   **Reliability**   **Ethics**

Thank you

Questions?

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