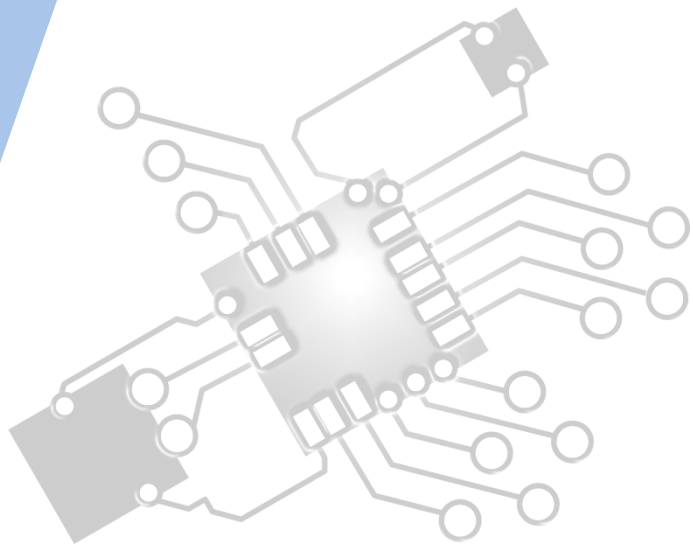
Control Systems

IB Computer Science



Content developed by
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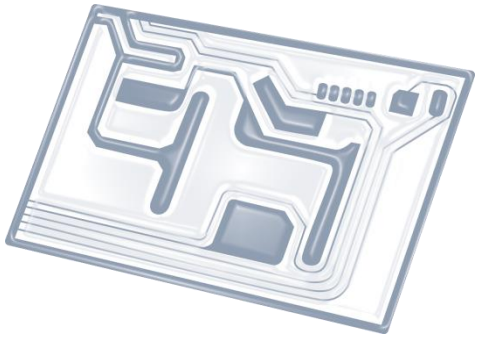
HL Topics 1-7, D1-4



1: System design

2: Computer Organisation

3: Networks

4: Computational thinking

5: Abstract data structures

6: Resource management

7: Control

D: OOP

HL only 7 Overview

Centralized control systems

7.1.1 Discuss a range of control systems

7.1.2 Outline the uses of microprocessors and sensor input in control systems

7.1.3 Evaluate different input devices for the collection of data in specified situations

7.1.4 Explain the relationship between a sensor, the processor and an output transducer

7.1.5 Describe the role of feedback in a control system

7.1.6 Discuss the social impacts and ethical considerations associated with the use of embedded systems

Distributed systems

7.1.7 Compare a centrally controlled system with a distributed system

7.1.8 Outline the role of autonomous agents acting within a larger system

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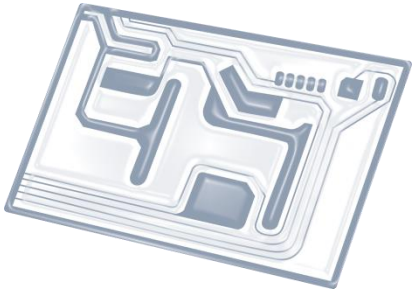
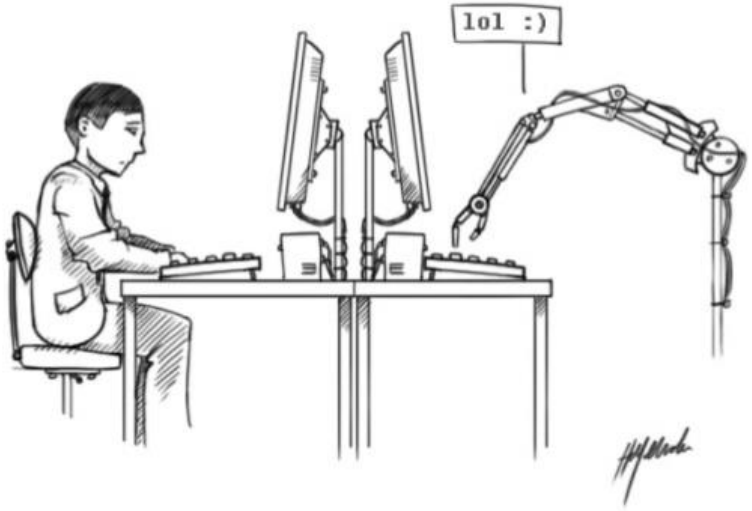


Topic 7.1.8

Outline the role of **autonomous agents** acting within a larger system

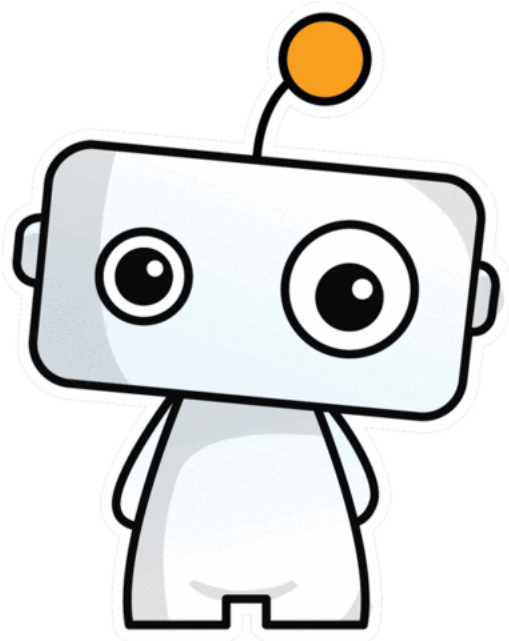
Definition: Autonomous agent

Intelligent agents are **software entities** that carry out some set of operations **on behalf of a user** or another program with **some degree of independence** or **autonomy**, and in so doing, employ some knowledge or representation of the user's goals or desires (*IBM definition*)



Features of Autonomous agent

A. Autonomy
B. Reactive behaviour
C. Concurrency/sociality
D. Persistence



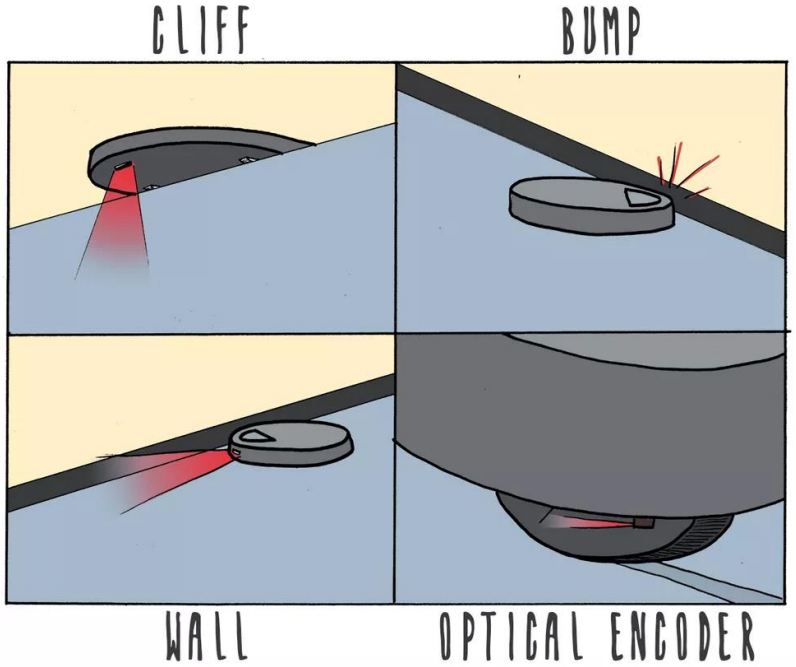
A. Autonomy

Agents activate alone for a task and are note invoked for a task.

Agents can **select the task themselves** (based on priorities or goal-directed search) without human intervention.

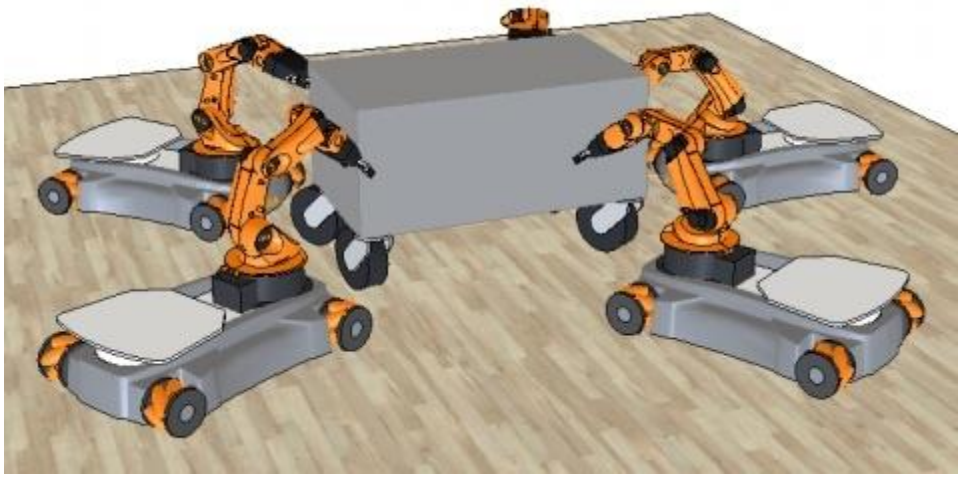
B. Reactive behaviour

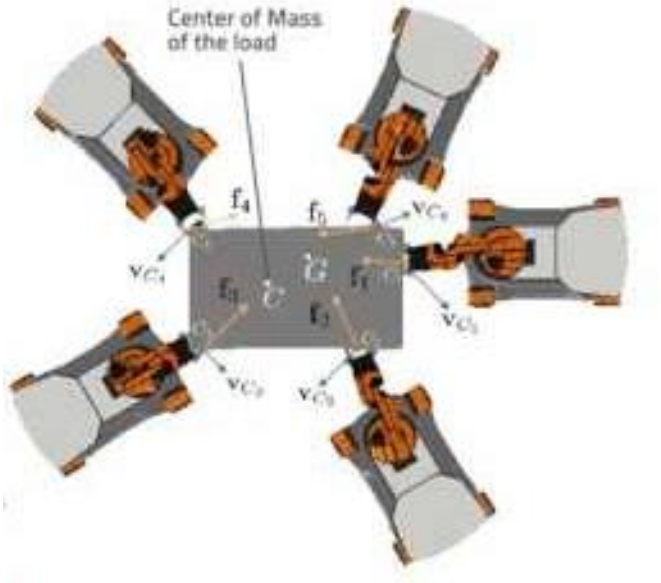
Agent senses the environment in which it is and decides what to do, **reacting** on its **perceptions**.



C. Concurrency/Sociality

Agents can interact with other agents through communication, in different modes: **coordination**, **cooperation** and **competition**.

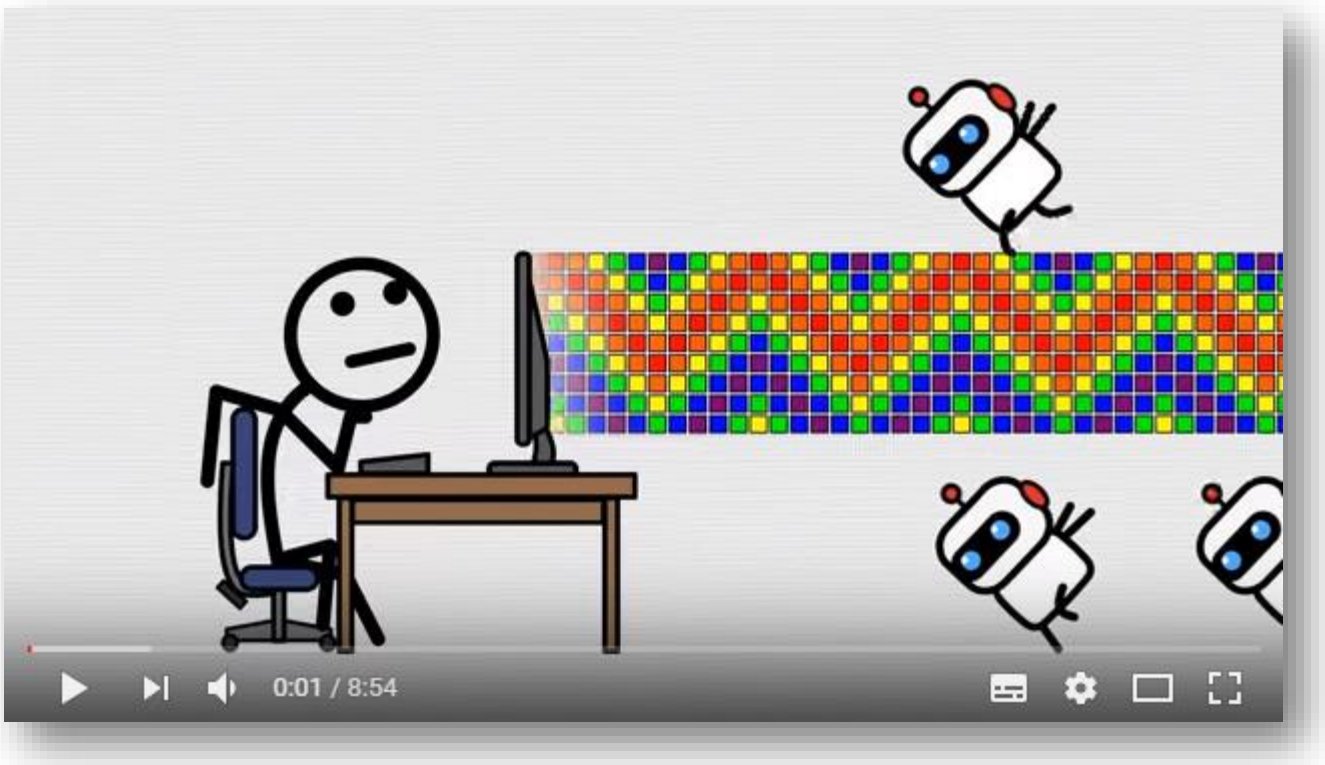




D. Persistence

The code describing an agent **runs continuously** like a process, and it not executed on demand.

Video: How machines learn



Link (YouTube): https://youtu.be/R9OHn5ZF4Uo

Video playlist: Autonomous Agents

There is a great set of videos released by the Coding Train that explains autonomous agents in great detail.

Link (YouTube) to playlist: https://youtu.be/JIz2L4tn5kM