ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

Disal

Distributed Intelligent Systems
Lab 2 Tutorial

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Feedback forms

To help us improve, please fill them in.
They are anonymous.

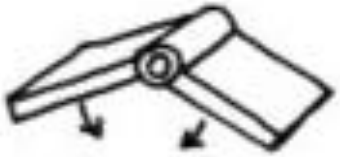
- Why robotics simulation software ?
  - Hardware prototyping is time consuming and expensive
  - Real commercial robots are expensive
  - Ability to quickly change the experimental set-up
  - Sometimes easier to measure physical quantities
  - Sometimes faster than real-time
    - Numerical optimization methods (GA, PSO, etc.)

- Robot prototyping and simulation software
- Can model practically any type of robot:
  - Wheeled, legged, flying, swimming, etc.
- Programming interface to C, C++, Java, Matlab
- Accelerated OpenGL graphics
- Physics simulation with Open Dynamics Engine (ODE)

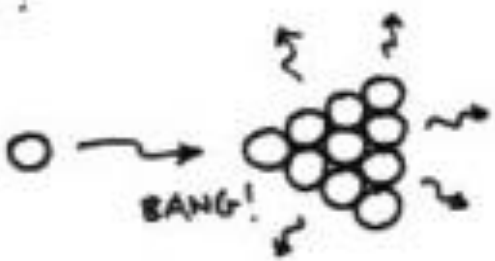
Physics-based simulation (ODE)

Mechanical systems that have:

Rigid bodies
(solid objects)

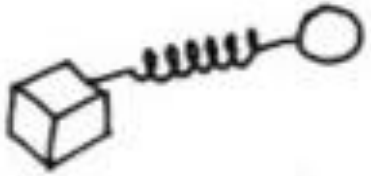


Joints
(like hinges)



Contact and
collisions

Friction
(keeps a tower
of cards steady)



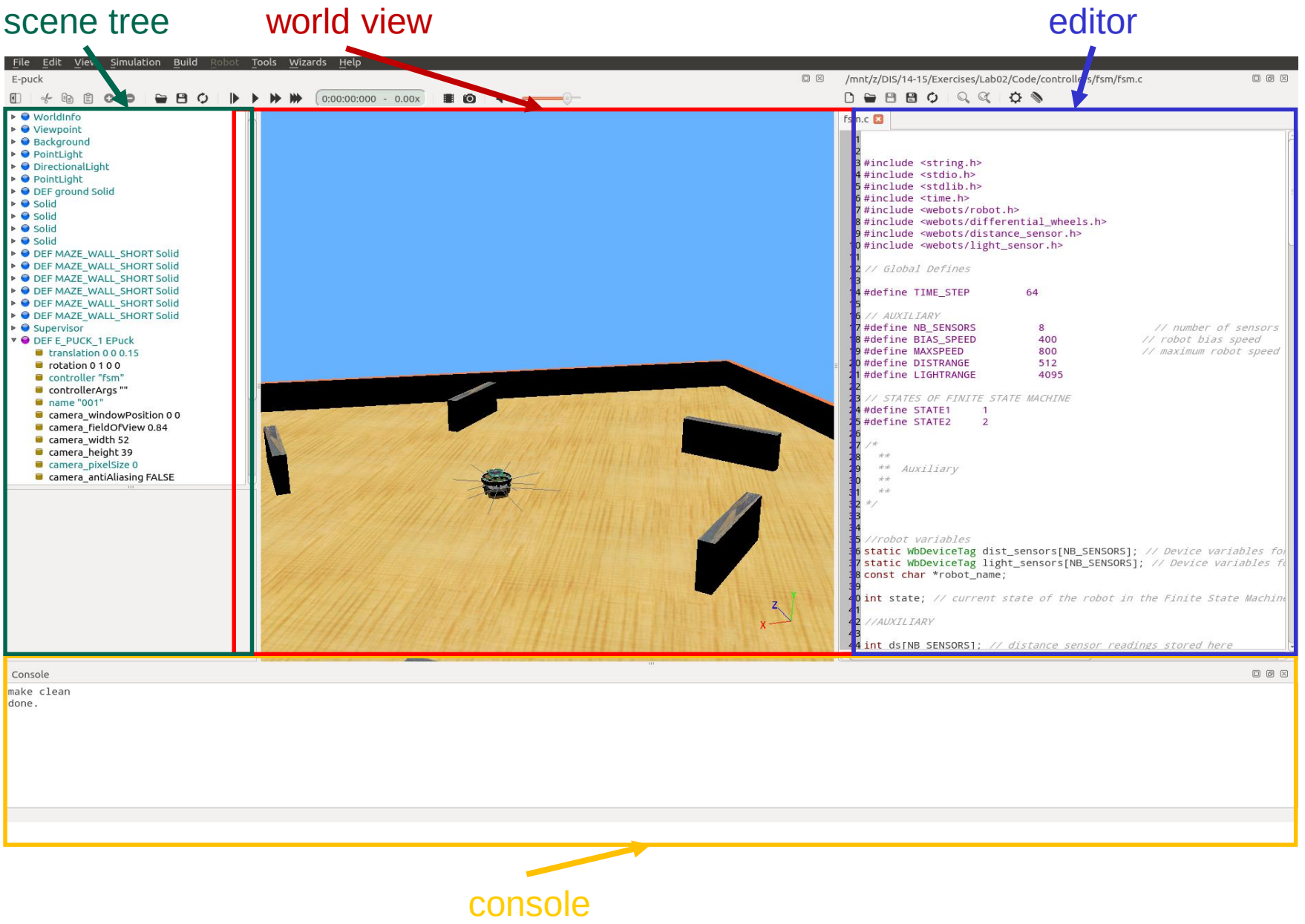
Gadgets
(like springs)

- Many robot models: Khepera, E-Puck, Aibo, Pioneer 3DX, DARwIn-OP, etc.
- Sensors: distance sensors, light sensors, cameras, touch sensors, GPSs, force sensors
- Actuators: servo-motors, grippers, LEDs, connectors, etc.
- Emitters and receivers (multi-agent systems)
- And more ...

Using Webots @ Home

- Available for Linux Ubuntu 12.04, 14.04 and 14.10 (64 bit)
  - Support for the lab is only guaranteed for the computers in this room
- Download Webots installation package from
  - http://www.cyberbotics.com/linux
- See installation instructions on Moodle
- Windows and Mac versions also available, we cannot offer support

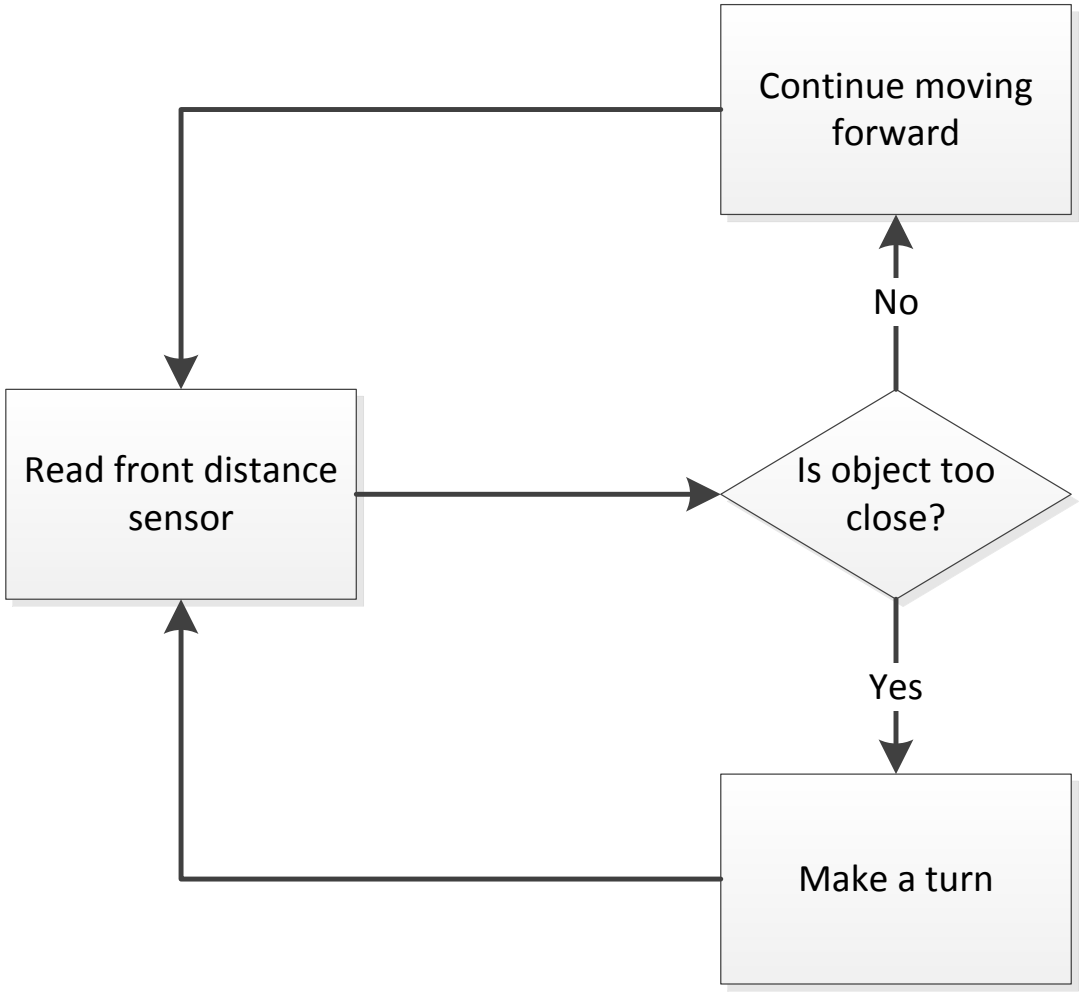
Reminder: Webots GUI



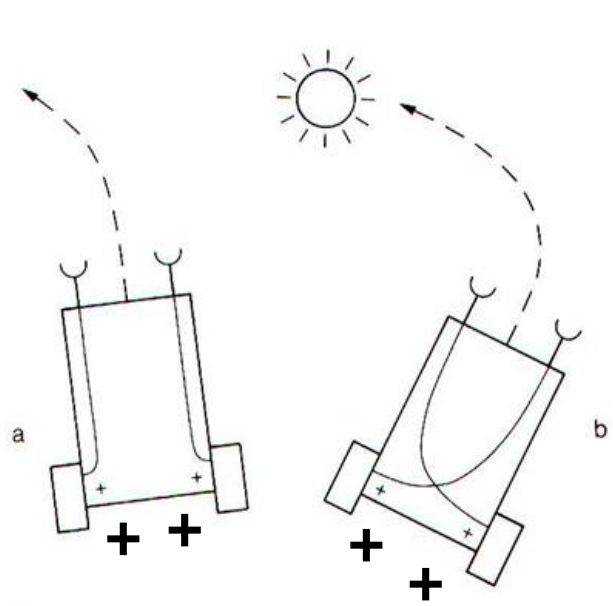
e-puck robot

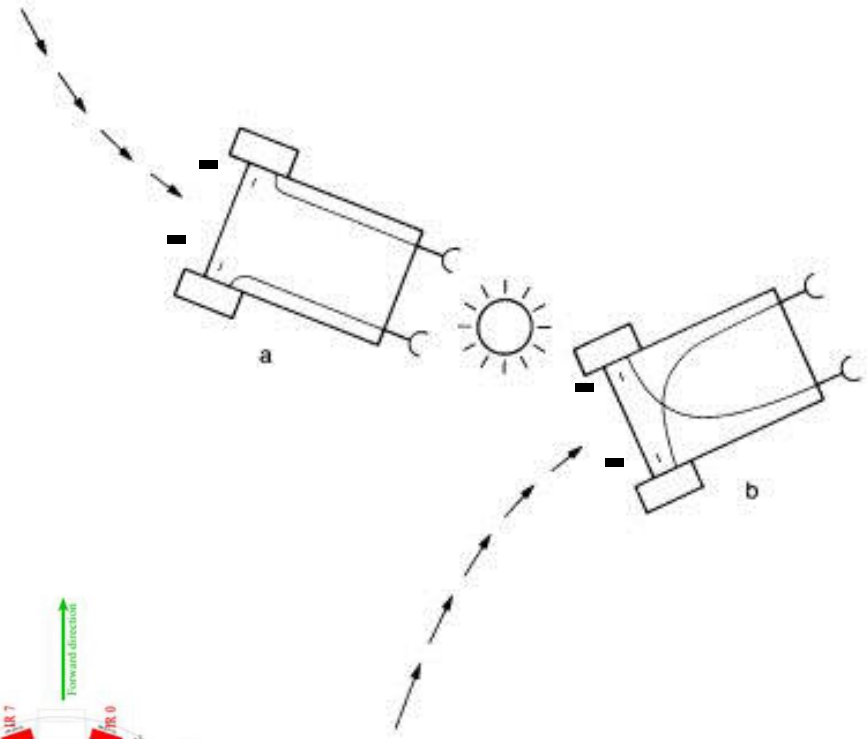
- 8 proximity sensors
- 8 light sensors
- 1 color camera
- 3 microphones
- 1 speaker
- 3 axis accelerometers
- and more ...

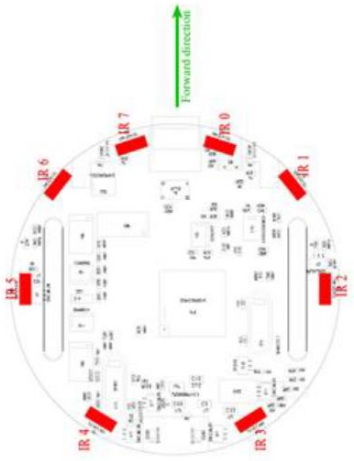
Robot control – Rule based



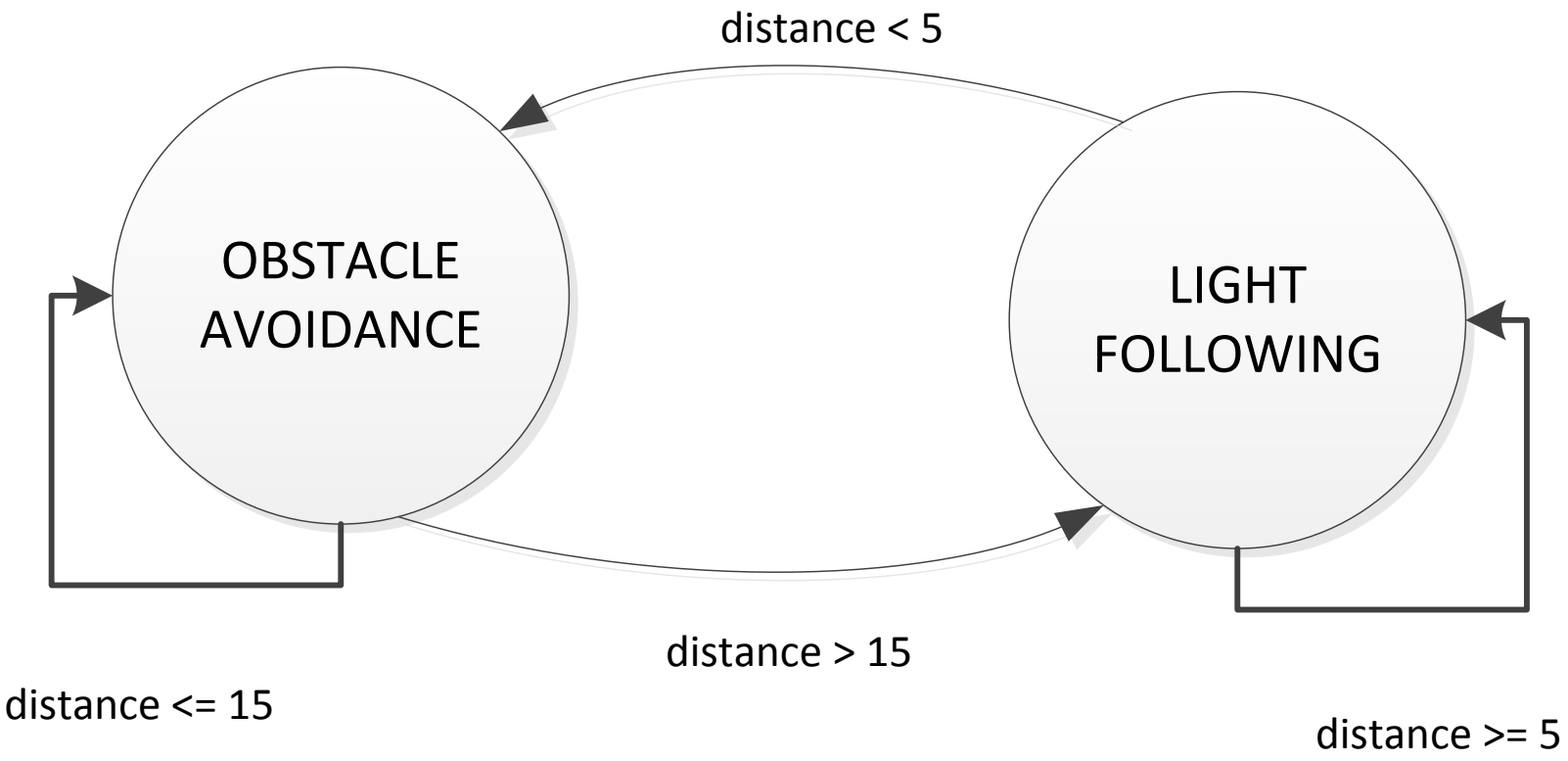
Robot control – Braitenberg







Finite State Machine (FSM)



And now: let's start ...