

Lab 7

*School of Architecture, Civil and
Environmental Engineering*

EPFL, SS 2021-2022

http://disal.epfl.ch/teaching/signals_instruments_systems/

What this lab is about

- Mini tutorial on Webots
- Understanding sensors
 - examples of sensors on-board the e-puck
 - notion of ‘noise’
 - how Webots simulates sensors
- Understanding how to use sensor data
 - input for actuation (example: robot control)
 - manipulation of data (logging and plotting)

Reminder: Webots GUI

scene tree

world view

editor

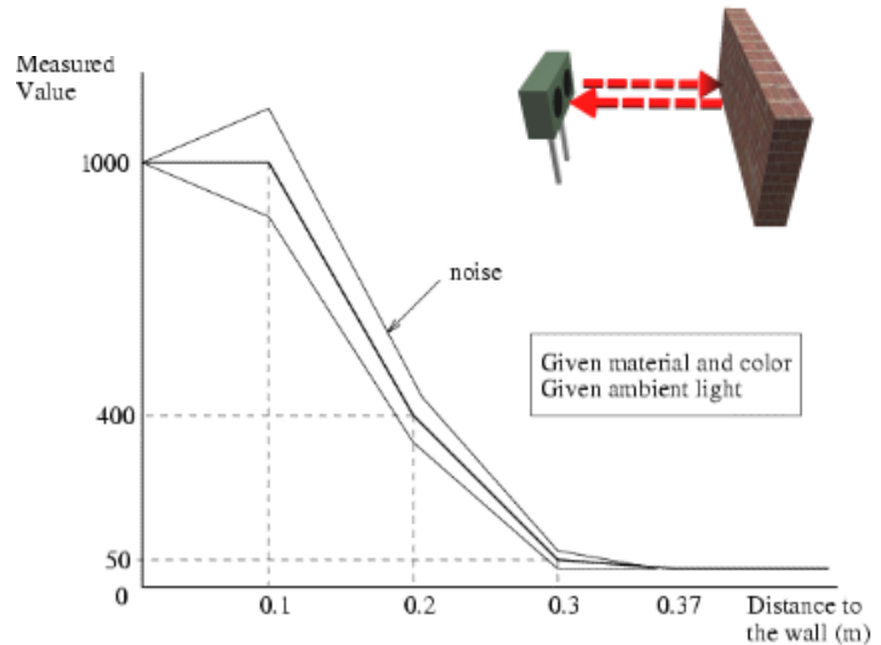
The screenshot displays the Webots GUI interface with four main components:

- Scene Tree (Left):** A hierarchical list of objects in the scene, including WorldInfo, Viewpoint, Background, PointLight, SquareArena, and several rock models (DEF short_rock_1_Solid to DEF short_rock_5_Solid) along with a DifferentialWheels robot.
- World View (Center):** A 3D perspective view of a yellow arena with a robot in the center and several grey rock obstacles. A red arrow points from the 'world view' label to this area.
- Editor (Right):** A code editor window showing the C++ source code for the robot's controller (e-puck.c). A blue arrow points from the 'editor' label to this window.
- Console (Bottom):** A terminal window showing the output of a 'make' command, including compilation flags and the start of the robot simulation. A yellow arrow points from the 'console' label to this window.

console

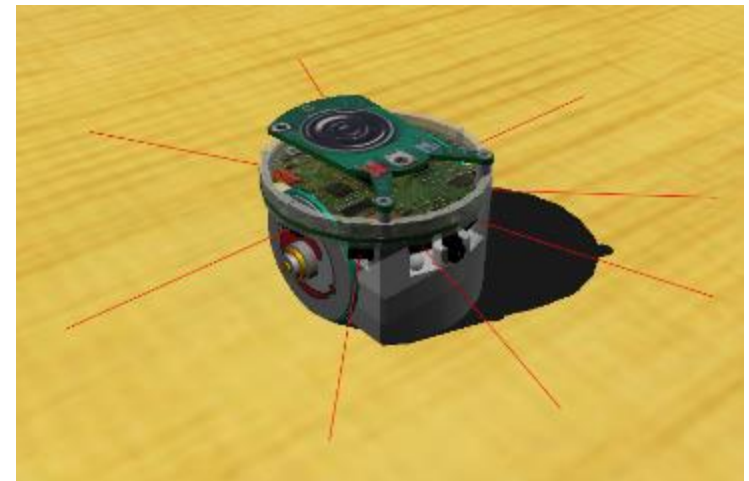
Reminder: Modeling sensors

- Capture **non-linearities** and **noise** of sensors.
- However, **calibration** is often approximative.
- Most often, sensor response is defined by a lookup table (here a proximity sensor):

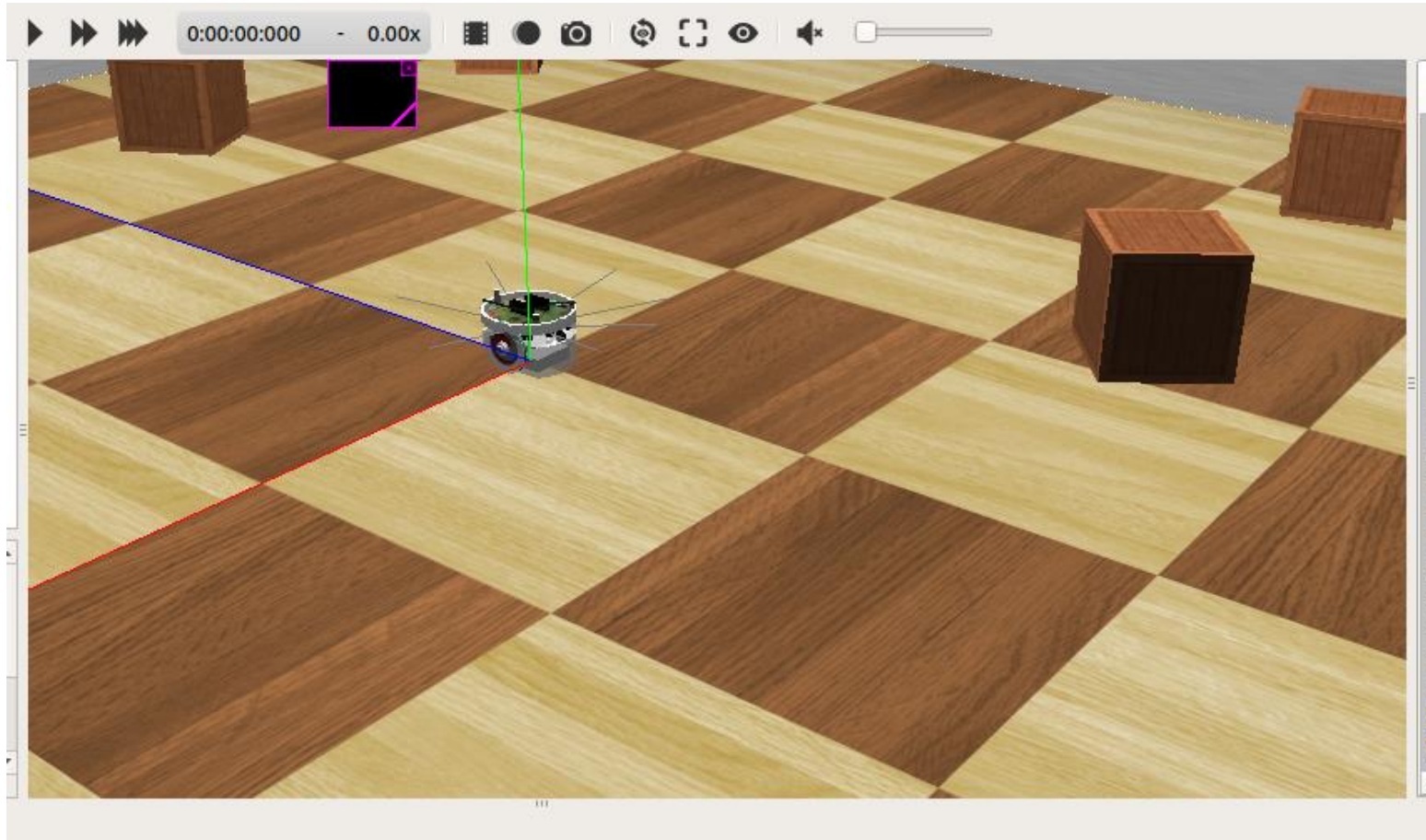


```
lookupTable [
  0
  0.1
  0.2
  0.3
  0.37
]
[
  1000
  1000
  400
  50
  30
]
[
  0,
  0.1,
  0.1,
  0.1,
  0
]
```

distance value noise



Robot control – Obstacle avoidance



Robot control – Braitenberg

