MOBILE ROBOTS Case Studies 1

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Session ID: 859438

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EPFL

Sustainability

The Thymio robot is mainly produced in China. Since some years we have a small production line in Lausanne, @ETML.

How is this Swiss production improving the impact on the environment?

A − It improves the impact of the transportation, which can represent 20% of the global impact

B − It does not really improve the impact

C − It improves the impact on the production of the components, that can be produced in Switzerland

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Components cannot be produced in Switzerland, these are made in global factories

Distribution is a very small part of the impact <5%

ChatGPT4: Among the given options, choice A provides a clear and direct benefit of reducing transportation emissions by having a local production line in Lausanne. Additionally, there might be some benefits from choice C, if the production in Switzerland adheres to higher environmental standards or utilizes cleaner energy sources. Without precise data on the production efficiencies, energy sources, and environmental regulations adherence in both locations, it's challenging to definitively quantify the overall environmental impact improvement.
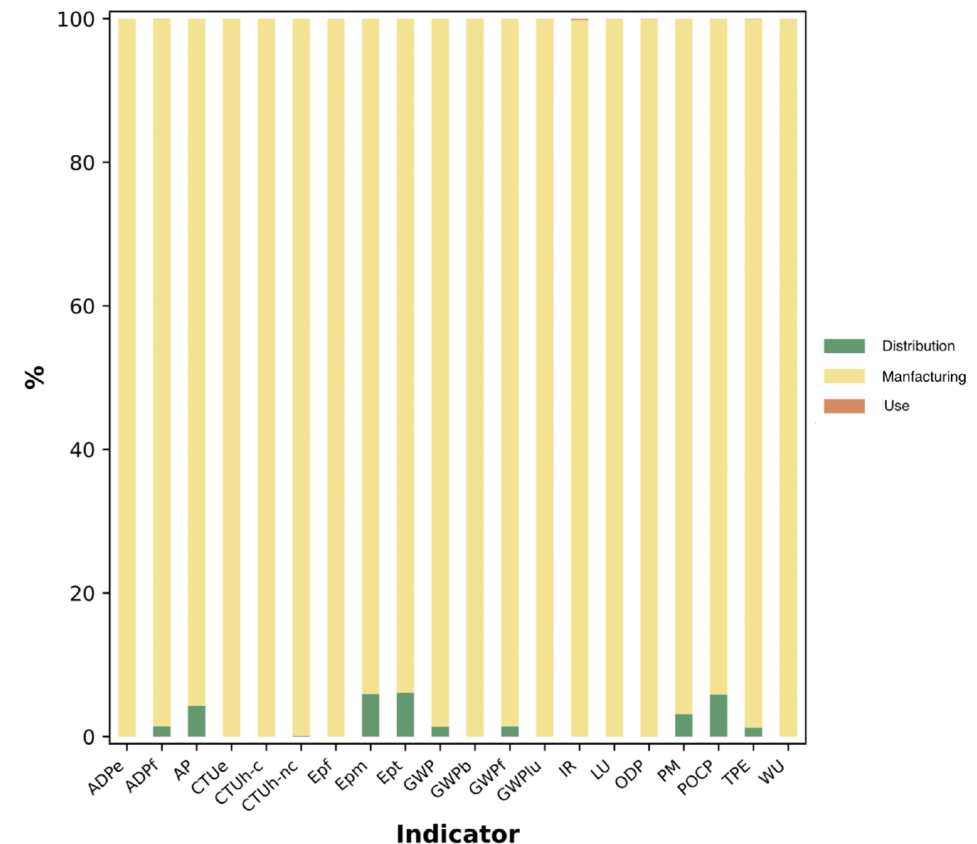
Sensors

We need the distance measurement of a laser-based sensor for a measurement range from 1m to 2 m at 100 Hz . We found a sensor whose characteristics are the same over the whole measurement range. In the following table, you find a set of raw measurements when measuring a distance of 1.5m.

time [ms]	measured value [m]
0	1.5073
1	1.5069
2	1.5072
3	1.5070
4	1.5071
5	1.5068
6	1.5069
7	1.5070
8	1.5071
9	1.5067

Can you improve the precision of the sensor?

A – yes

B – no
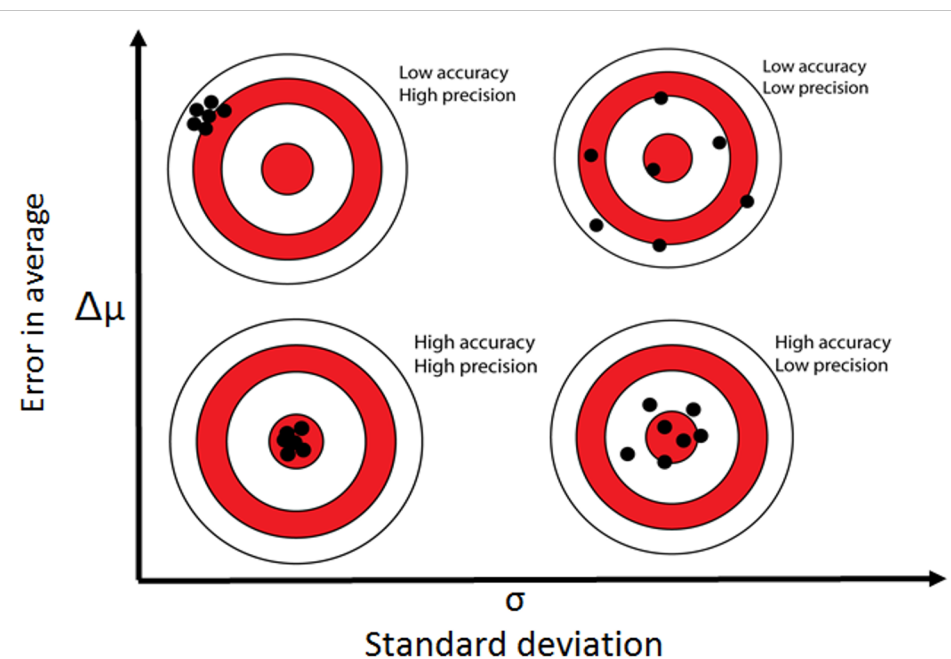
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Can you improve the precision of the sensor?

 Yes, by taking the mean of all the values (1.507m); It's possible to do that because the sampling rate is 10x the required one.

Mechanics – DOF and actuators

In your company you need to build a system with 1 DOF with a precision of 1µm and a speed of 1m/s, in cycles taking approximately one second. For logistic reasons you have to choose a manufacturer of actuators among these three, looking for the cheapest solution. What do you choose?

The company A produces two actuators:
- A1 has a precision of 0.5µm and a speed of 2m/s for 200CHF
- A2 has a precision of 3µm and a speed of 2m/s for 150CHF

The company B produces two actuators:
- B1 has a precision of 6µm and a speed of 3m/s for 50CHF
- B2 has a precision of 0.1µm and a speed of 0.5m/s for 30CHF

The company C produces two actuators:
- C1 has a precision of 1µm and a speed of 1m/s for 180CHF
- C2 has a precision of 3µm and a speed of 1m/s for 120CHF

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