

MOBILE ROBOTS Case Studies 6

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Drawing on large surfaces

You want to build a cheap version of a differential wheel robot able to draw polygons (squares, rectangles etc) on large surfaces. The robot being for the consumer market, you have to choose only few cheap sensors. What do you choose to ensure the better precision (do not consider price as criteria, imagine all option have the same price):



TurfTank

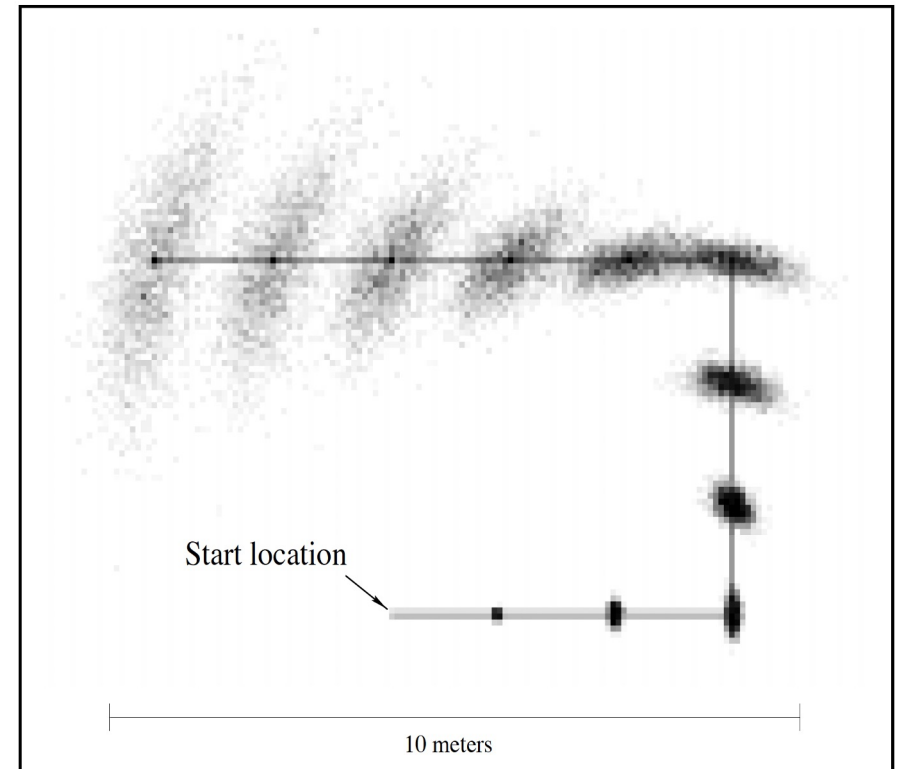
- A. Encoder on the wheels, and good wheel design**
- B. Motor speed sensor, good wheel design, and compass**
- C. Gyro and accelerometer**

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Relative (integration of error)

Absolute (and on rotation!)



Fox, D., Burgard, W., Dellaert, F., & Thrun, S. (1999). Monte carlo localization: Efficient position estimation for mobile robots. *AAAI/IAAI*, 1999(343-349), 2-2.

Sensors in localization

The simplified Bayesian localization process seen last week includes successive steps of motion and sensing. If you add a proprioceptive sensor to the motor (encoder, for instance) how this impacts the motor step:

- A. The motion model stays the same, no impact of the motion step on the localisation uncertainty**
- B. This helps the motion step in reducing the global localisation uncertainty**
- C. The motion step become precise, there is no uncertainty anymore**
- D. This helps the motion step in less augmenting the global localisation uncertainty**

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Cheap robot

In the design of a robot that need to localize itself, you hesitate between putting an encoder on the motor, which is expensive, and the use of an IMU, much cheaper. Which of the following arguments (several possibilities) are correct?

- A. For a simple linear movement, encoders are better than an accelerometer, requiring double integration**
- B. For rotations, where encoders are not very precise, the simple integration of a gyro is interesting**
- C. The IMU is better for kidnapping situations**
- D. Both accelerometer and gyro integrate errors and drift in the long run**

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