Localization 1: Dudek-Romanik-Whitesides Localization

Problem definition

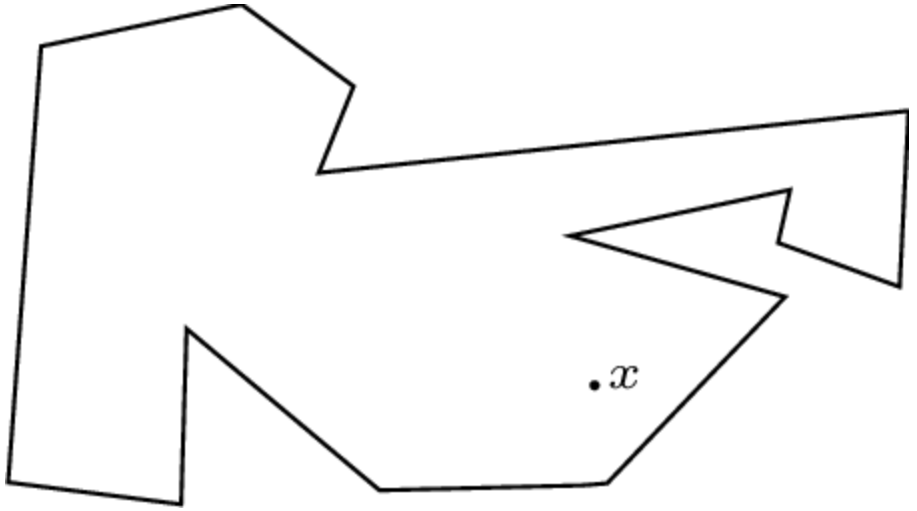
Today: Active Global Localization

Suppose we have a robot in a polygonal environment, equipped with a **range sensor** and a **compass**. (...but without sensor noise.)

State space: $\mathbb{R}^2$ (position only; no orientation)

Today, we'll talk about the

- active
- global

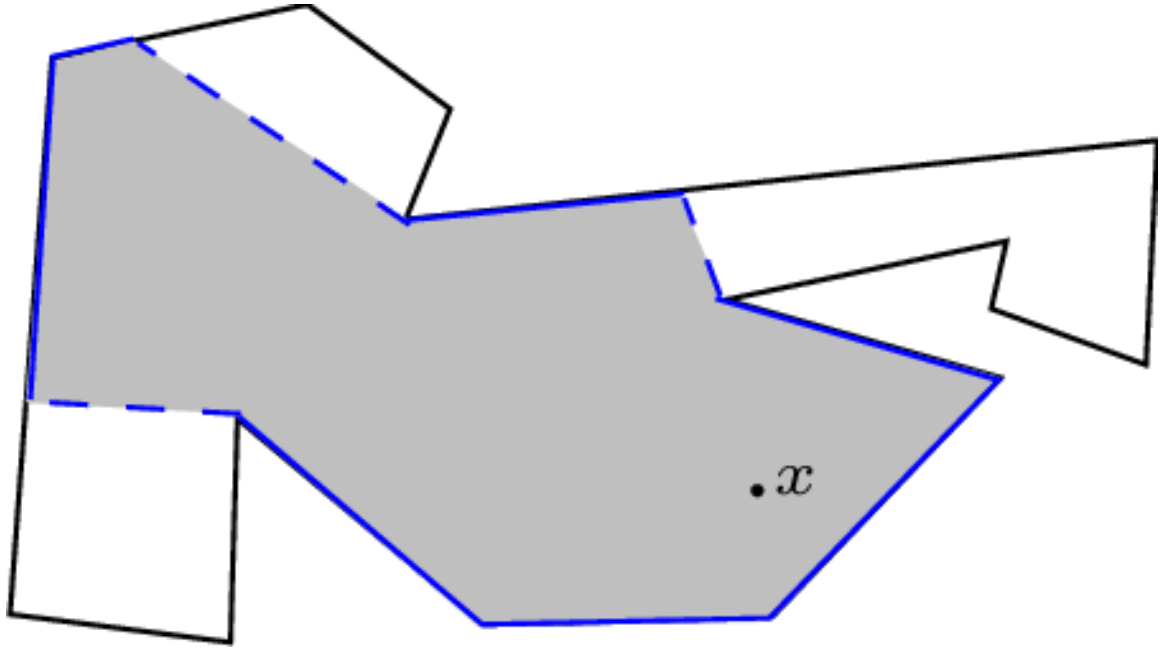


localization problem for this system.

This is called Dudek-Romanik-Whitesides localization, after the roboticists that first solved it.

Sensor information: Visibility polygon

We can think of the range sensor as providing the **visibility polygon** of the robot's state x in its environment.



$$V(x, E) = \{y \in E \mid \overline{xy} \subset E\}$$

Sensor information: Visibility polygon

We can think of the range sensor as providing the **visibility polygon** of the robot's state x in its environment.

The visibility polygon is expressed the robot's **body frame**.

- The robot is located at the origin in this frame.
- Visibility polygon vertices are expressed relative to the robot's position.