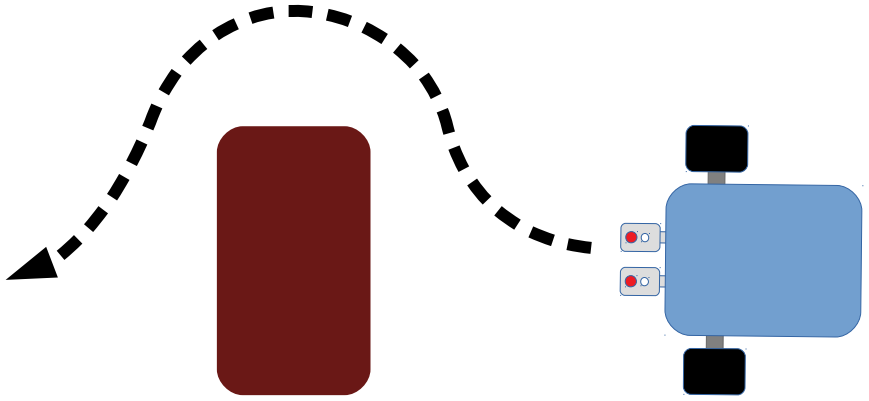
LEGO mindstorms EV3

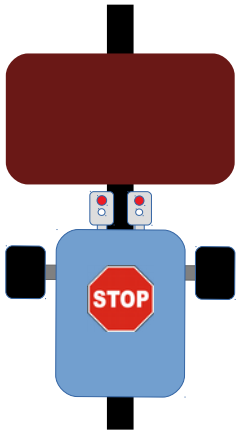
OBSTACLES AVOIDANCE



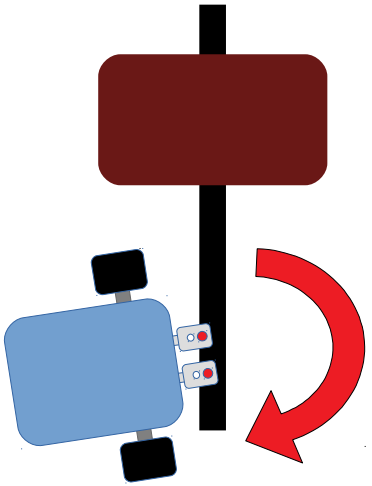
A POSTERIORI

Play · Experience · Learn

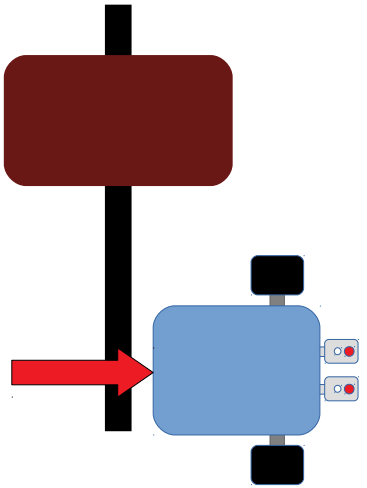
Naive Approach



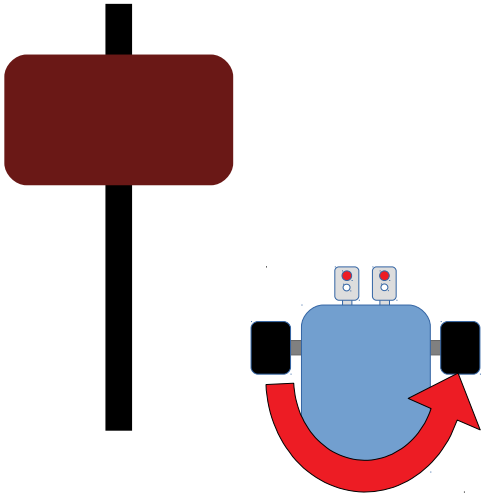
Stop



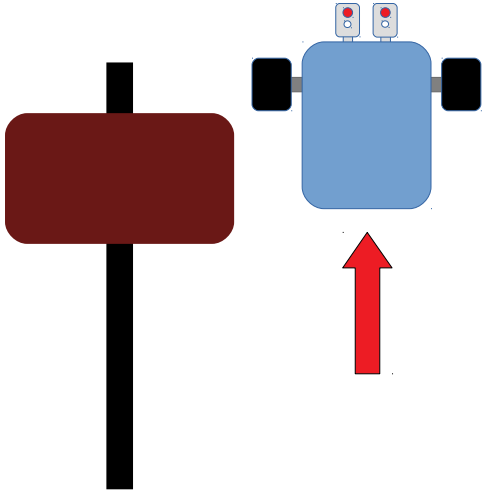
Turn



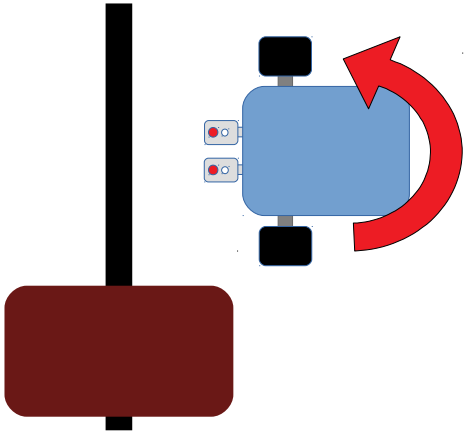
Go Straight



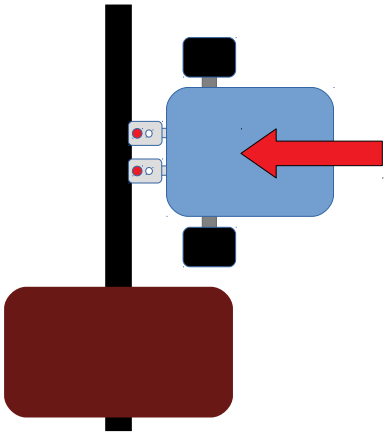
Turn



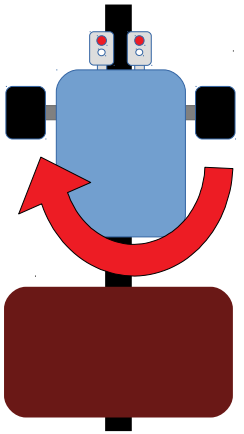
Go Straight



Turn

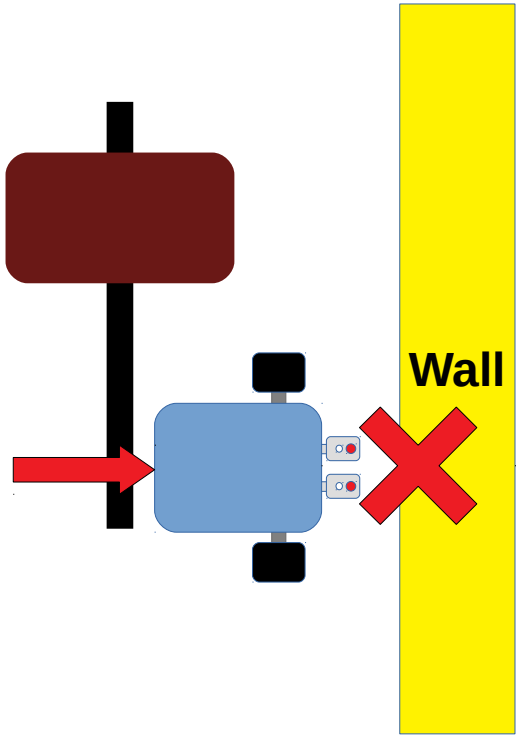


Go Straight
Continue until you see line



Turn and Continue Line Following

Potential Problems



Wall on One Side

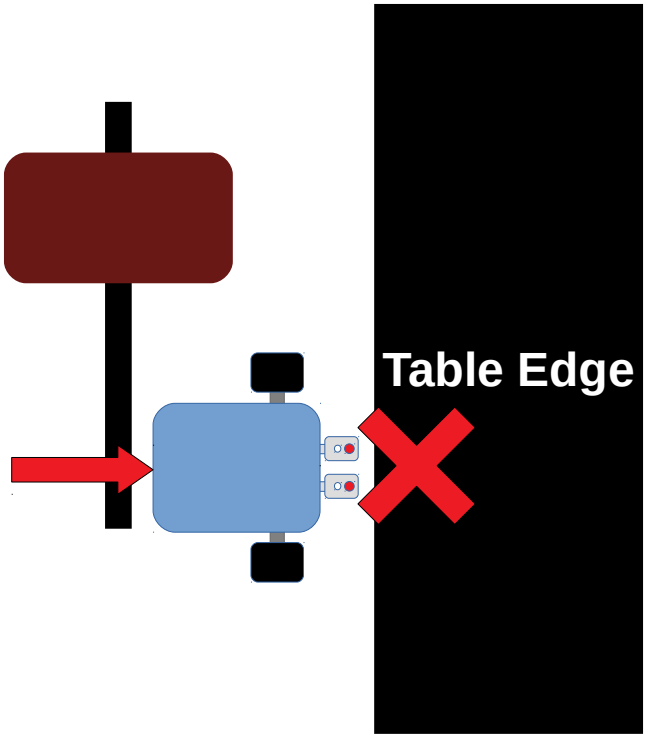
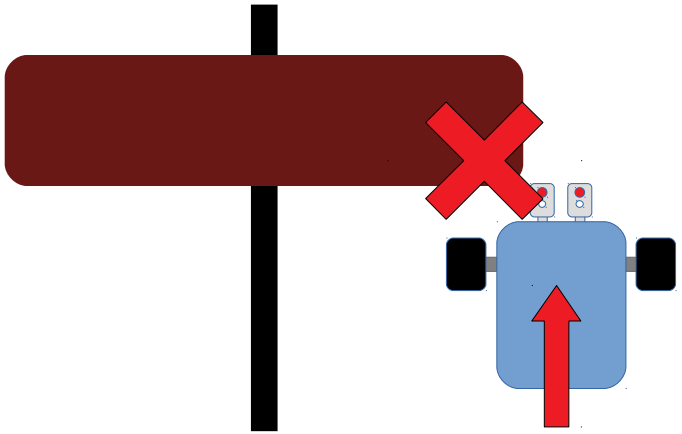


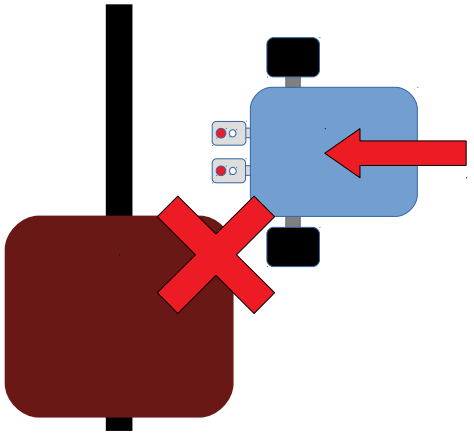
Table Edge on One Side

Need to detect walls and edges, and change direction

Potential Problems



Obstacle Wider than Expected



Obstacle Longer than Expected

- Less likely to be a problem (...they usually have only one type of obstacle)
- Can program robot to detect if it hits the obstacle and go further around

Which Sensor To Use?

Touch

Good

- Detect touch across the entire front of the robot (use a bumper)

Bad

- May push obstacle away
- Takes up more space and may obstruct other mechanism

Bumper with Touch Sensor

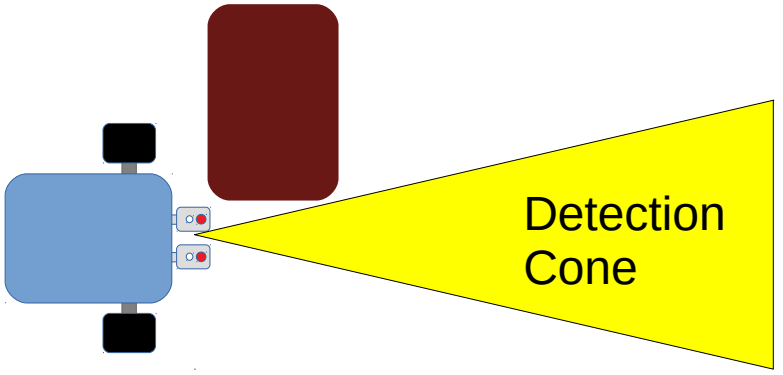
Ultrasonic

Good

- Non-contact
- Easier to fit into robot
- Provide range

Bad

- Detects in a cone
- Cannot cover the entire width of robot

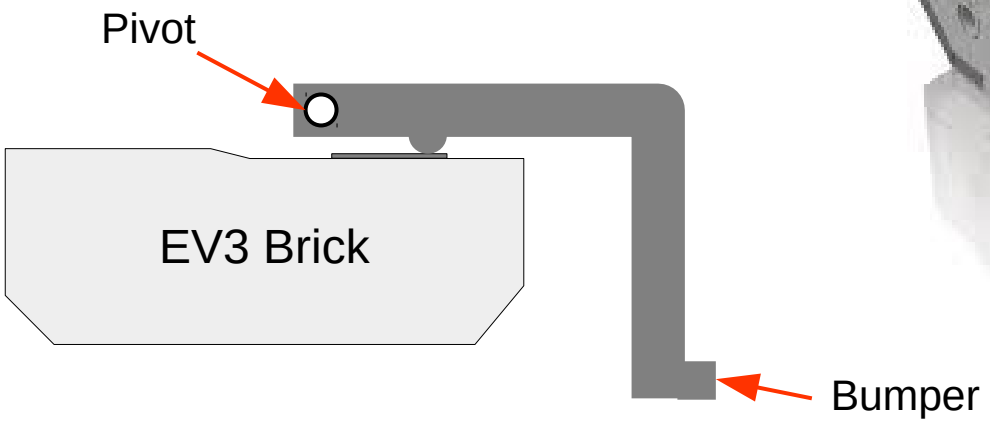


Which Sensor To Use? (Advanced)

Brick Button

Good
- Same benefits as touch sensor
- Don’t need to use a port

Bad
- Same drawbacks as touch sensor
- Very difficult to build mechanism
- Less sensitive than touch sensor

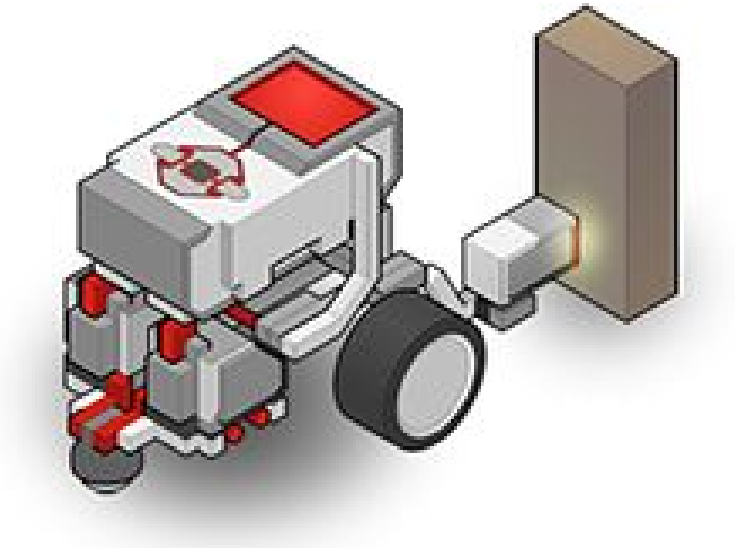


Which Sensor To Use? (Advanced)

Color Sensor

Good
- Can detect color

Bad
- Very short range
- Difficult to detect black
- May be affected by surrounding lights



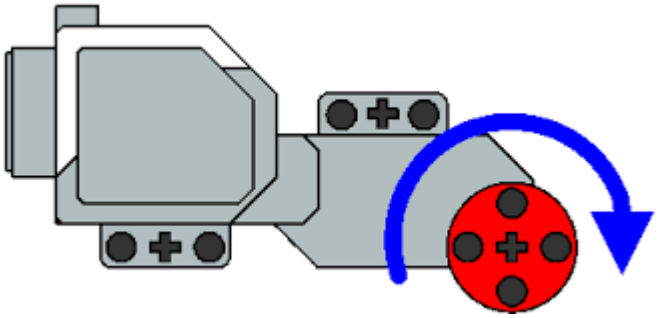
Which Sensor To Use? (Advanced)

No Sensors!
(Detect motor stall...)

How?!?
- Detect stall (...motor unable to turn)

Good
- No sensor or parts needed

Bad
- Cannot detect light obstacles (...robot will just push them away)
- Need to use unregulated motors blocks
- May have false positives with ramps

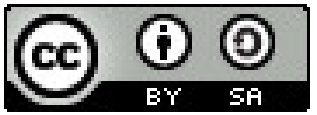


Tips

- **Start with the naive approach, using either a touch or ultrasonic sensor!**
- Write and test the obstacle avoidance program by itself; don’t integrate it into your main program at first
- When successful, make it into a My Block
- If you have time, improve it to detect walls and table edges

Copyright

- Created by A Posteriori LLP
- Visit http://aposteriori.com.sg/ for more tips and tutorials
-



A POSTERIORI

Play · Experience · Learn