MOBILE ROBOTS Case Studies 2

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Drones offer new opportunities

Monocular Vision Based Navigation

Inspection of pipes

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Drones offer new opportunities

We need to inspect the pipe of a water system (see picture, imagine a straight pipe of 20m).
I want to send in a drone. How should I localize the drone inside the pipe (distance from the entrance):

A – Vision looking at the tube surface

B – Vision looking at the end of tube

C – No vision (laser, rope, ultrasound, …)

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Angle of robot based on image

From a drone we look with a camera at a ground robot that has a long black line on his top surface (see image). We would like to extract the angle of the robot. How could we do this with the less possible computational power?

A. Applying a Sobel and Hough transform and get the peak > get angle
B. For each pixel apply various Sobel with various angles (for instance for 45 degrees: $\begin{matrix} 0 & 1 & 1 & 0 \\ 1 & 2 & 0 & -1 \\ 1 & 0 & -2 & -1 \\ 0 & -1 & -1 & 0 \end{matrix}$)
C. For each pixel we compute Sobel vertical and horizontal, then extract angle, making an *atan*

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Where do we look?

For an indoor mobile robot running on a flat ground, it would be interesting to use vision to identify locations in the environment. How would you position the camera on the robot to have the most easy-to-use vision input?

A – Camera looking forward

B – Camera looking on the side

C – Camera looking to the ground

D – Camera looking to the ceiling

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