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Regulating the lateral optic flow to navigate in a corridor

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Regulating the lateral optic flow to navigate in a corridor

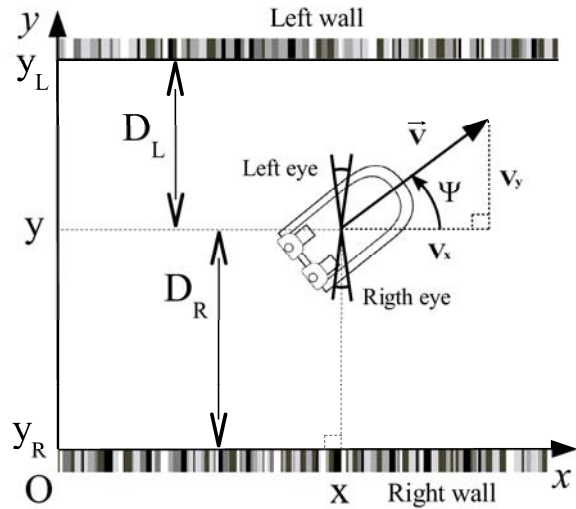
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Lateral optic flow to navigate safely



Ψ : hovercraft yaw angle

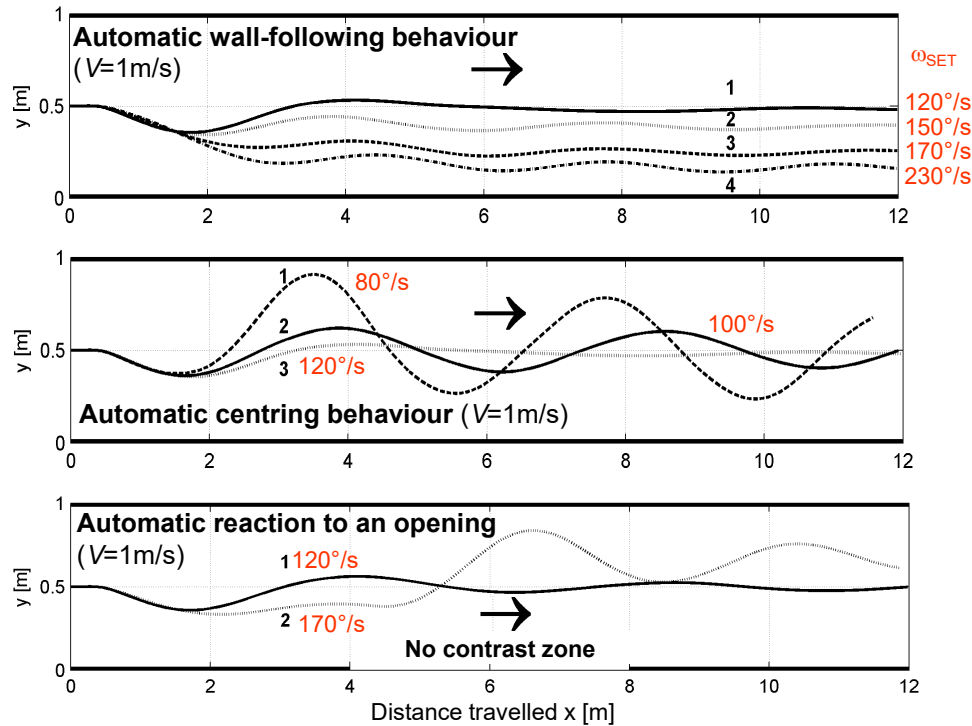
v_x : ground speed along X-axis

D_R : distance from right wall

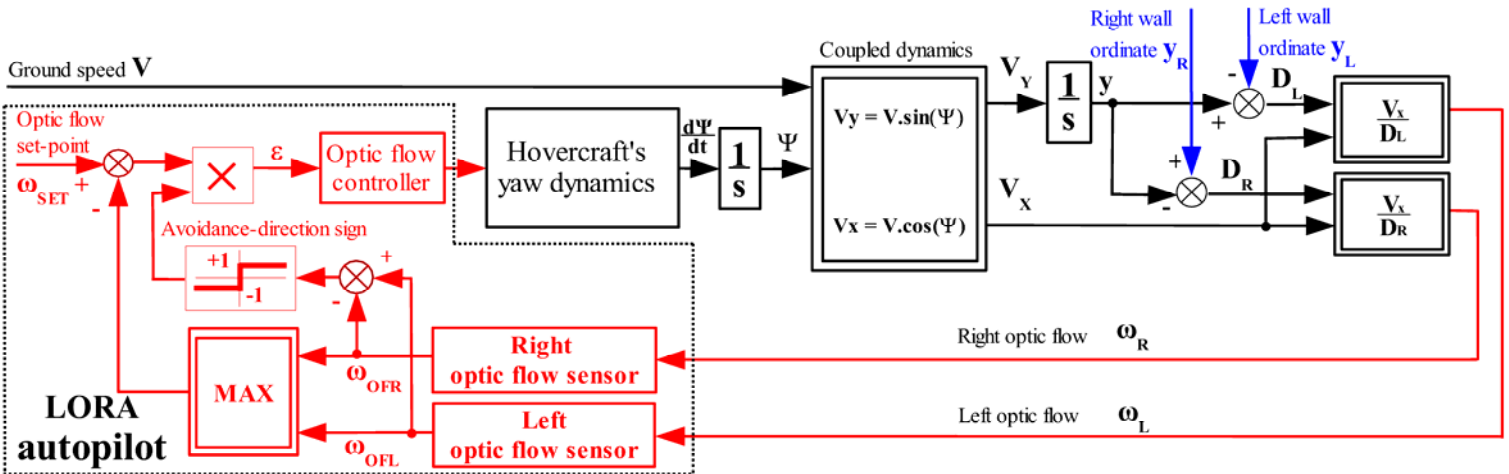
ω_R : right optic flow

$$\omega_R = \frac{v_x}{D_R}$$

Corridor following



The "optic flow regulation" loop (LORA = Lateral Optic flow Regulation Autopilot)



1. The autopilot keeps constant the ratio v_x / D .
2. It reacts to any optic flow variations by acting on the yaw.

3. Remote control ground speed
4. Active gaze stabilization by inertial information

Optic flow regulation does not require explicit knowledge of :

1. Ground speed (wheel tachometer not required),
2. Distance (emissive rangefinders not required),
3. Relief data (cartography not required)

⇒ Well adapted to artificial (and natural) Micro-Air Vehicles

Future improvements

- Visual control of ground speed
 - Independent control of each vehicle degree of freedom
 - Implementation on a miniature hovercraft
- [1] Serres J., Ruffier F., Franceschini N., Int. Modeling Mediteraean Multiconference, I3M'2005. Biomimetic visual navigation in a corridor: to centre or not to centre?