Regulating the lateral optic flow to navigate in a corridor

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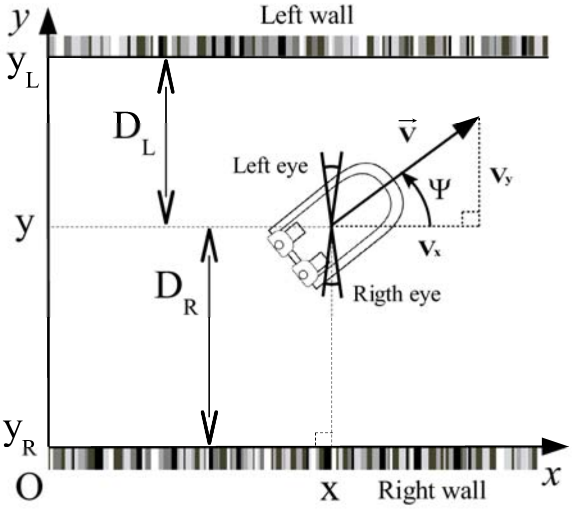
Future and Emerging Technologies

• Lateral optic flow to navigate safely



Ψ : hovercraft yaw angle

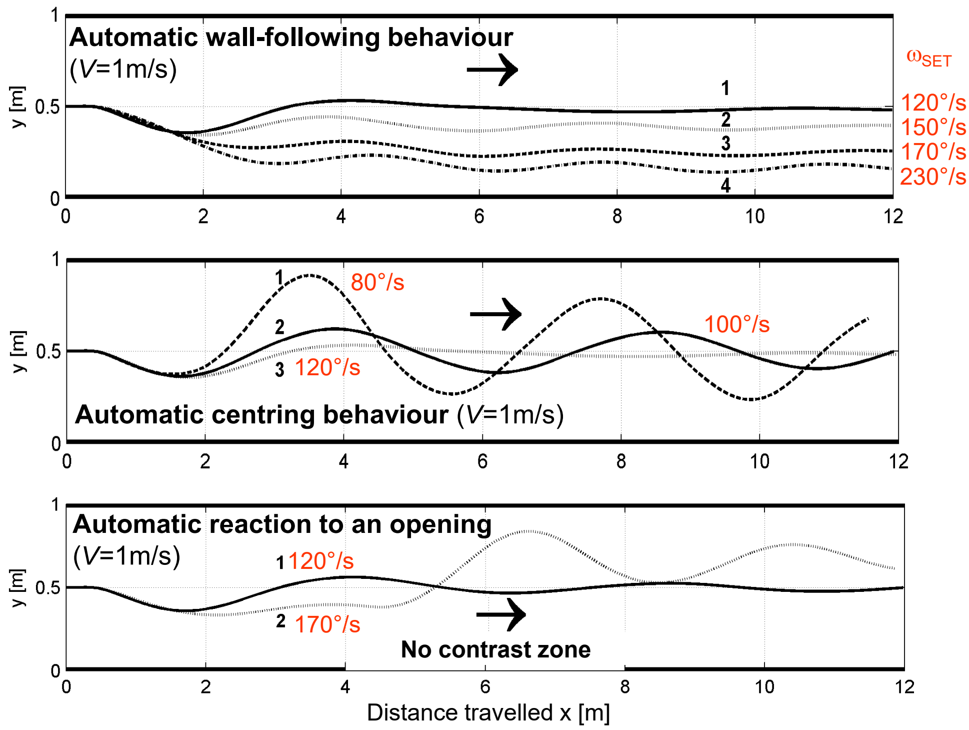
v_x : ground speed along X-axis

D_R : distance from right wall

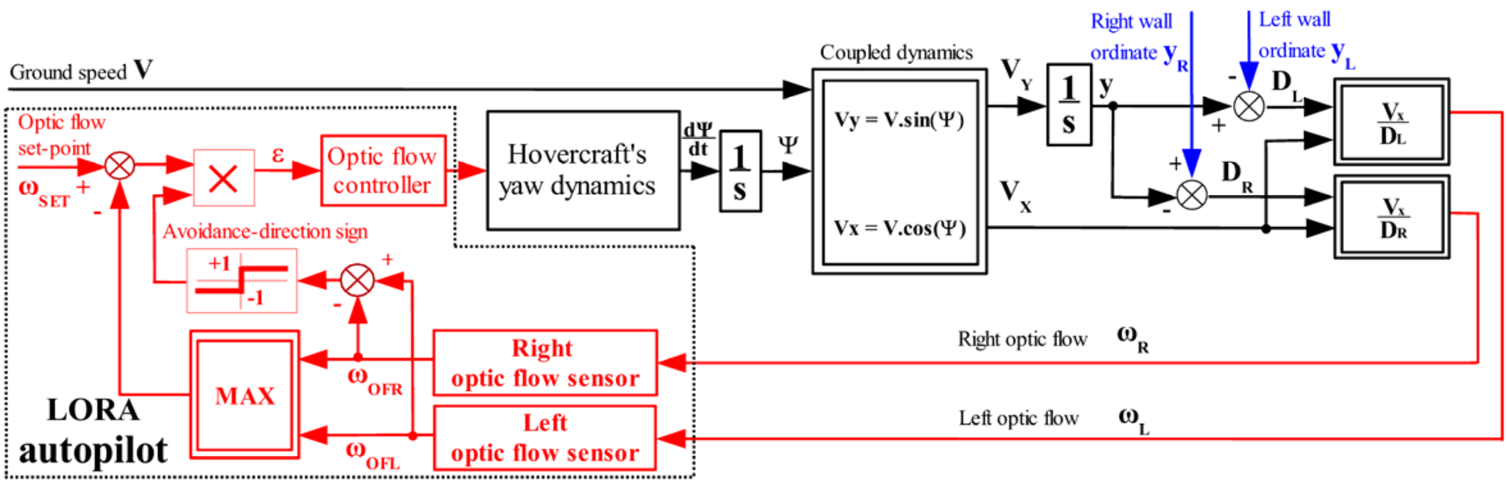
ω_R : right optic flow

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

• 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?**