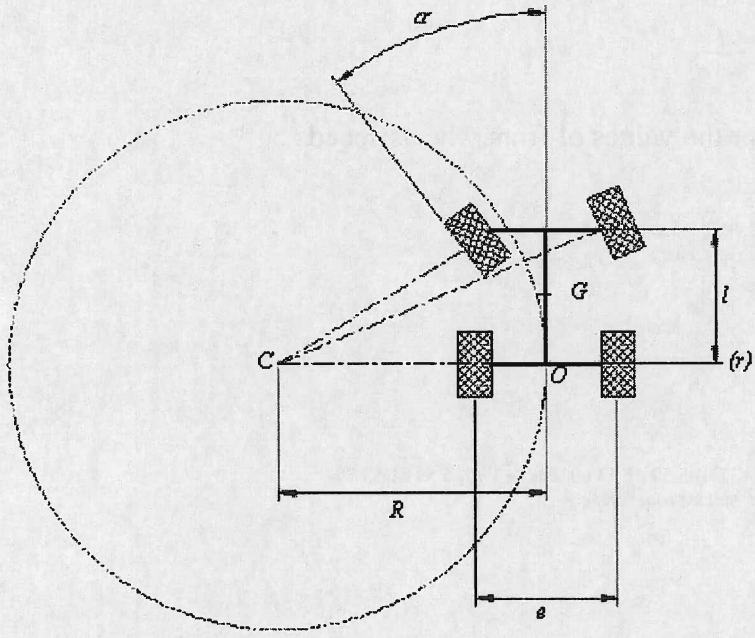
Geometric model of the CyCab[tm]

Single drive mode (front guiding wheels)
The principle scheme of the CyCab[tm] behaviour along a trajectory is presented in [Fig. 1].

Fig. 1 : Principle of the CyCab[tm] "single drive" navigation mode.



In single drive mode, the bending centre C of the car belongs to the rear wheels axis *(r)*. So, in this case, the desired speed of the RobuCar[tm] will be expressed at the geometric centre *O* of its rear end. Now, given the desired speed in *O* and the desired steering lock "alfa" of the inner turning front wheels (see [Fig. 1]), we are able to find the speed command to apply to each wheel.

Let's adopt the following notations :

- V_D : Desired speed
- V_{RR}: Right Rear wheel speed
- V_{LR} : Left Rear wheel speed
- V_{RF} : Right Front wheel speed
- V_{LF} : Left Front wheel speed

Let's also define the length "e" and "l " as depicted in [Fig. 1].

Speeds are proportionnal to the distant between the centers of the wheels and the bending center of the car. The values of rear wheels speeds are given by :

$$V_{LR} = \frac{\left(R - \frac{e}{2}\right) \quad V_D}{R}$$

$$V_{RR} = \frac{\left(R + \frac{e}{2}\right) \quad V_D}{R}$$

n which R is a function of the steering lock "alfa" of the inner turning front wheels :

$$R = \frac{l}{\tan \alpha}$$

We have two similar expressions for the values of front wheels speeds :

$$V_{LF} = \frac{\sqrt{\left(R - \frac{e}{2}\right)^2 + l^2} \quad |\tan \alpha|}{l} \quad V_D$$

$$V_{RF} = \frac{\sqrt{\left(R + \frac{e}{2}\right)^2 + l^2} \quad |\tan \alpha|}{l} \quad V_D$$

Technopole d'Izarbel F-64210 BIDART Tel (+33/0) 5 59 41 53 60 Fax (+33/0) 5 59 41 53 79
www.robosoft.fr sales@robosoft.fr