

# transHumUs

a poetic experience in mobile robotics

Wednesday 18<sup>th</sup> May, 2016

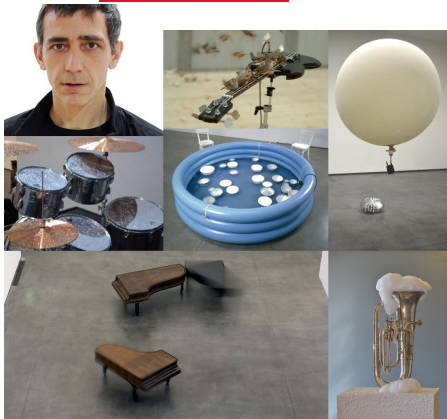
G. Saurel M. Taïx J.-P. Laumond

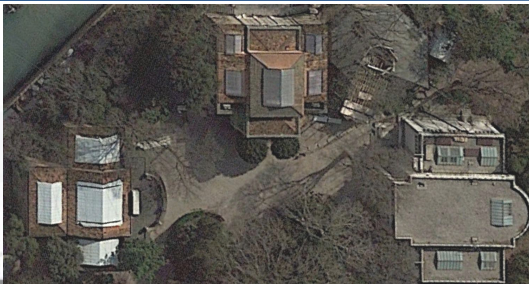


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- 3 trees: 1 inside, 2 outside (shared area)
- Alive
- height: 5 m ;  $\varnothing$ : 3 m ; weight: 4 tons
- speed:  $\leq 1$  m/min
- path: function of the tree's metabolism
- motion: smooth and holonomic
- noiseless



 Ubisense

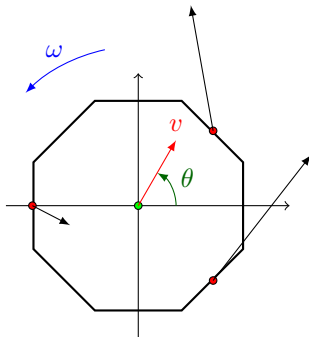


```

state ← 1                                ▷ Finite State Machine variable
start_loop:                               ▷ Start label
loop
  map_sap_flow[position] ← S3             ▷ Updating maps
  map_timestamp[position] ← timestamp
  if ||goal - position|| < 1 then         ▷ Need new goal
    for i ← 1, N do
      if state = 1 then
        goal ← MINI(map_sap_flow)
      else if state = 2 then
        goal ← MAXI(map_sap_flow)
      else
        goal ← MINI(map_timestamp)
      end if
      state ← (state + 1) % 3
      if CLEARPATH(goal - position) then
        goto continue                       ▷ new goal is good
      end if
    end for
    goal ← position                         ▷ Failed to find a new goal
    v ← 0
    sleep 5s
    goto start_loop                         ▷ Try again
  end if
continue:                                  ▷ Success label
v ← S1
ω ← 2S2 - 1
θ_goal ← atan2(y_position - y_goal, x_position - x_goal) - α_position
sleep 100ms
end loop
function MINI(map)
  return coordinates of a random minima of map
end function
function MAXI(map)
  return coordinates of a random maxima of map
end function
function CLEARPATH(trajjectory)
  return trajectory ∩ (borders ∪ trajectory_otherAGV) = ∅
end function                                ▷ No obstacle between position and goal
  
```



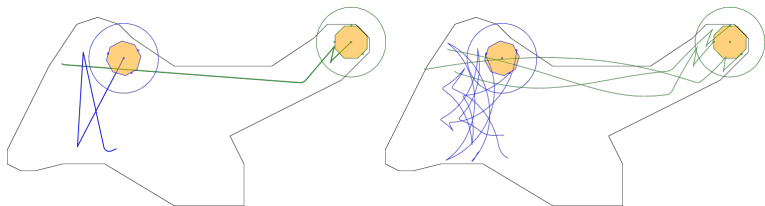
- $\theta \in [0, 2\pi[$  : direction of the center of the AGV;
- $v \in [0, 1]$  : its linear velocity along the direction  $\theta$ ;
- $\omega \in [-1, 1]$  : its angular velocity.



$$v = s_1$$

$$\omega = 2s_2 - 1$$

$$\theta = \text{atan2}(y - y_{\text{goal}}(s_3), x - x_{\text{goal}}(s_3)) - \alpha$$

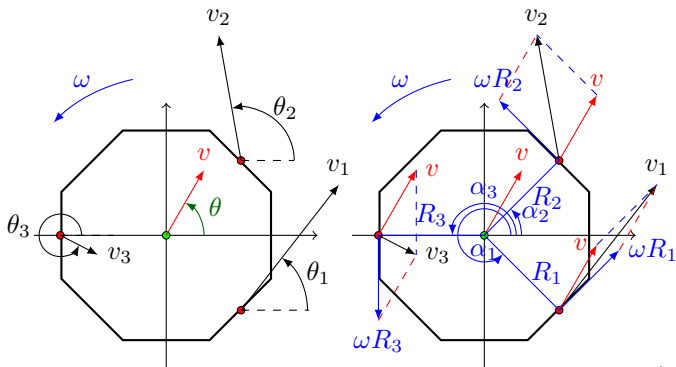


$$v_{ix} = v \cos(\theta) - \omega R_i \sin(\alpha_i)$$

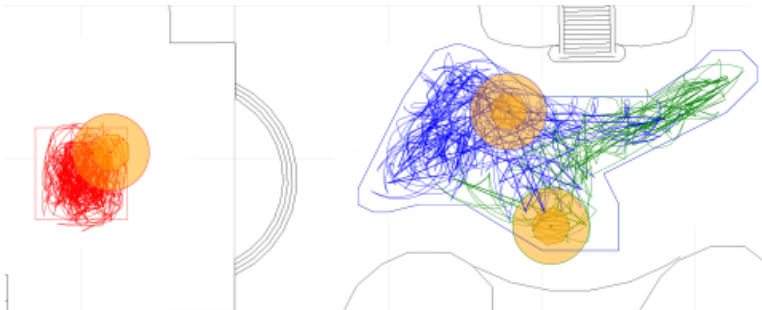
$$v_{iy} = v \sin(\theta) + \omega R_i \cos(\alpha_i)$$

$$v_i = \sqrt{v_{ix}^2 + v_{iy}^2}$$

$$\theta_i = \text{atan2}(v_{iy}, v_{ix})$$







On site implementation

Questions ?