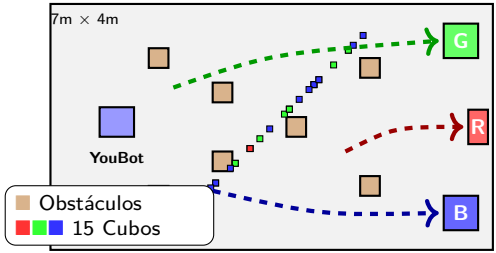
Robô Autônomo para Coleta de Cubos

Luis Felipe Sena

Agenda

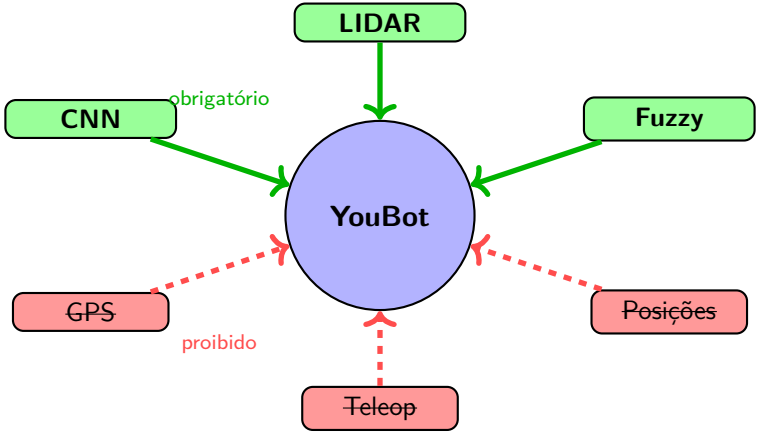

Problema
Perceporange!60cã
Fuzzy
A*
Demo
0–3min
3–6min
6–9min
9–12min
12–15min

O Problema

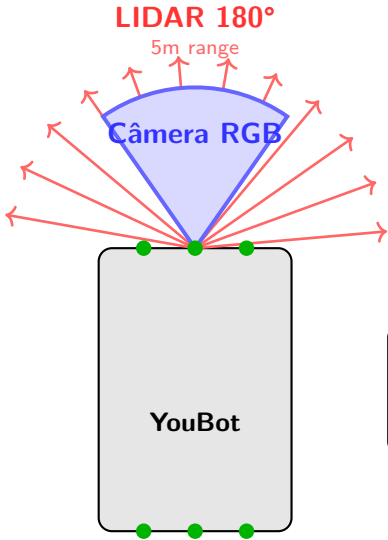


15 cubos $\rightarrow$ **3 caixas** por cor

Restrições


LIDAR
obrigatório
CNN
Fuzzy
YouBot
GPS
Posições
proibido
Teleop

Sensores

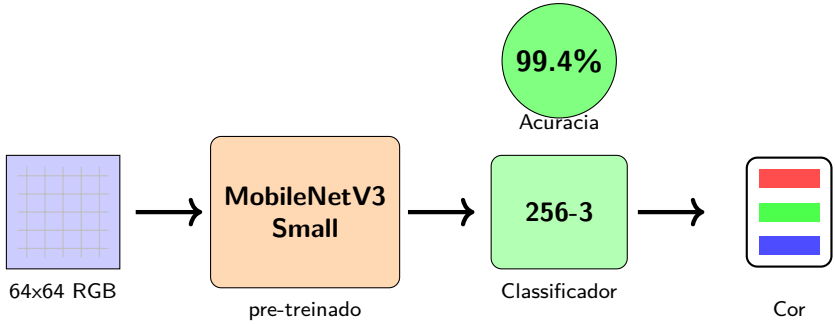


Função:

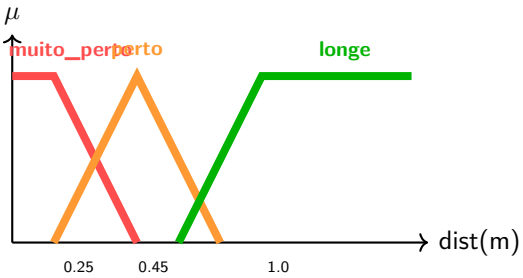
- LIDAR → Obstáculos
- Câmera → Cubos + CNN
- Dist. → Colisão

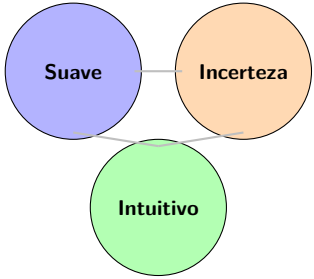
6 Dist. Sensors

CNN – MobileNetV3

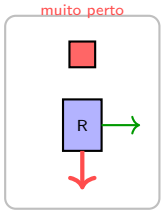


Lógica Fuzzy

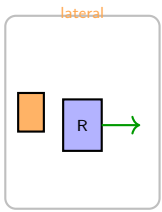




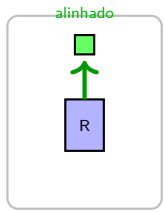
Regras Fuzzy



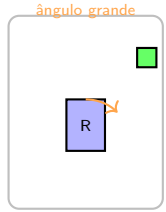
Ré + Strafe



Strafe



Avançar



Rotacionar

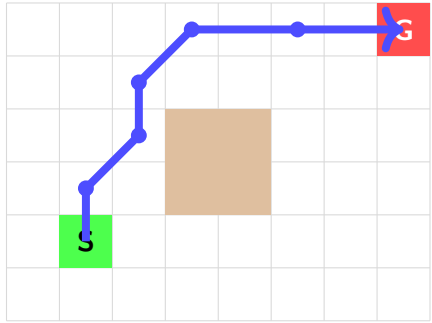
Algoritmo A*

$$f(n) = g(n) + h(n)$$

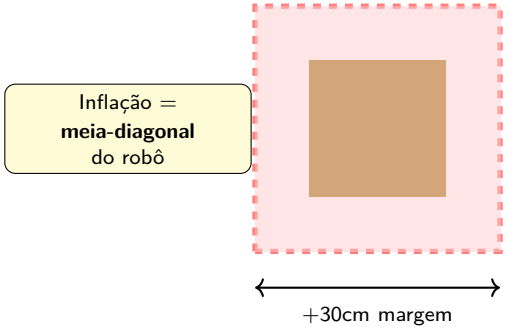
g = custo até aqui

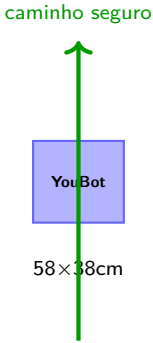
h = heurística

f = total

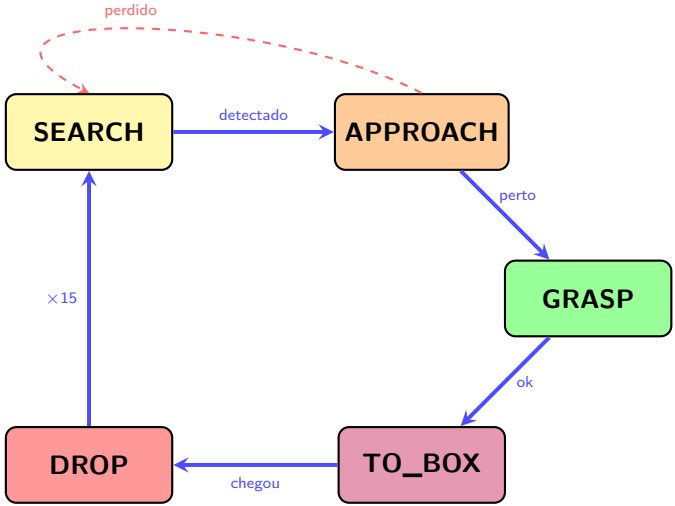


Inflação de Obstáculos

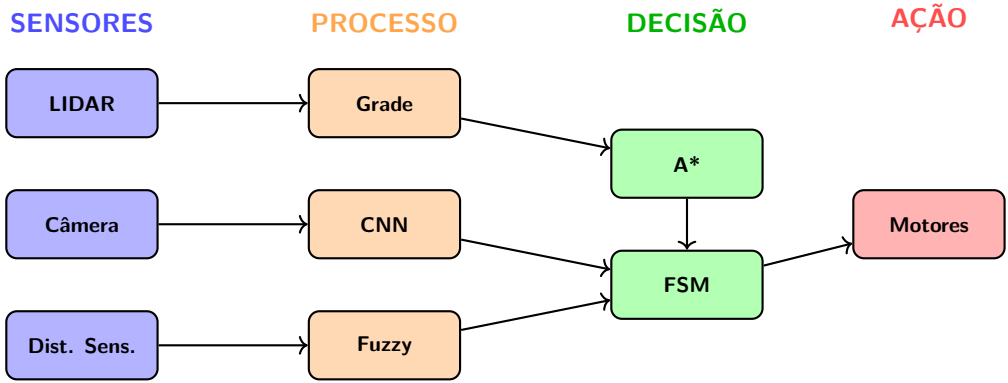




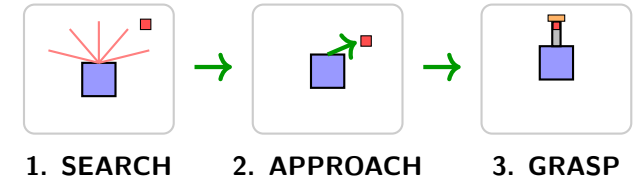
Máquina de Estados



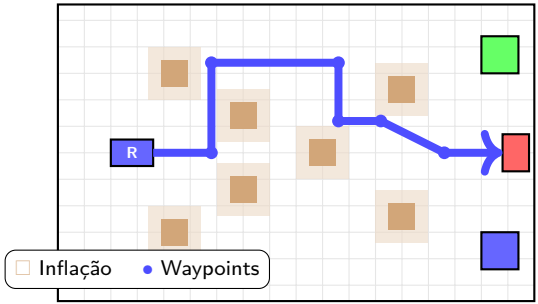
Pipeline Completo



Sequência de Coleta



Navegação A* em Ação



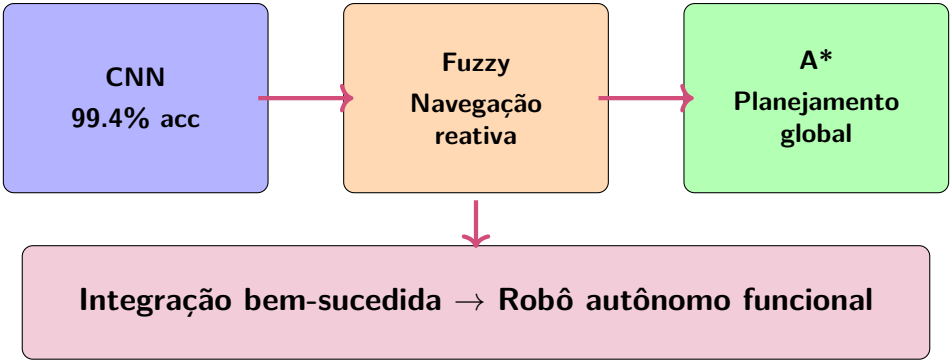
Demonstração

DEMO

Execução do robô coletando cubos

Webots Simulator

Conclusão


CNN
99.4% acc
Fuzzy
Navegação reativa
A*
Planejamento global
Integração bem-sucedida → Robô autônomo funcional

Obrigado!

Perguntas?

Referências Principais

Hart et al. (1968) – A*
Zadeh (1965) – Fuzzy Sets
Howard et al. (2019) – MobileNetV3