

Robot Social-Aware Navigation to Accompany, Guide, Look for or Find People

Workshop in ERF2015 Natural Interaction with Social Robots



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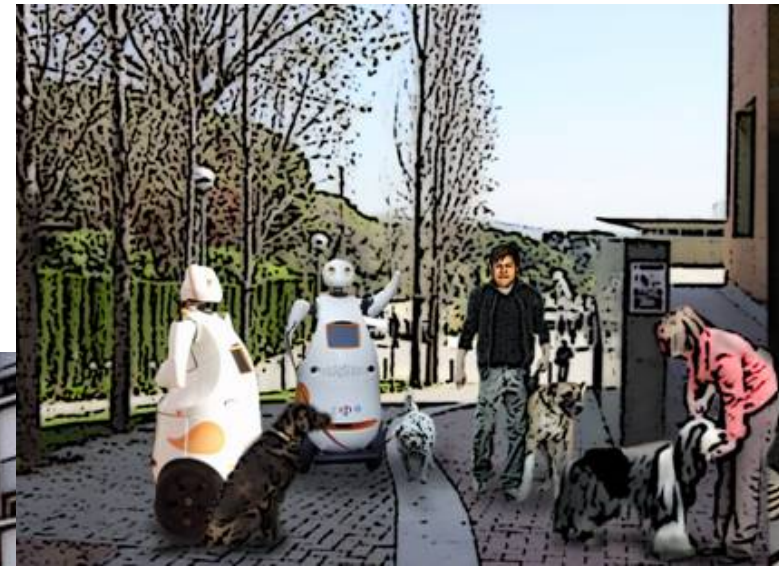
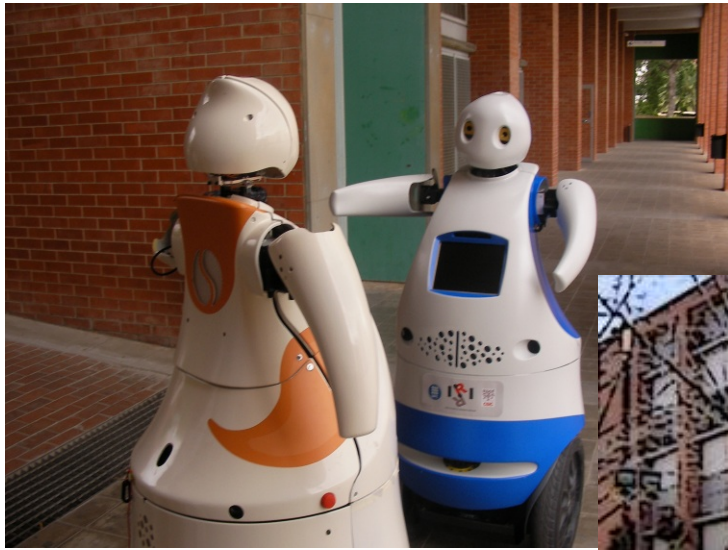
Universitat Politècnica de Catalunya

March 11th, 2015

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Robots Collaborating with People in Every Day Tasks Projects

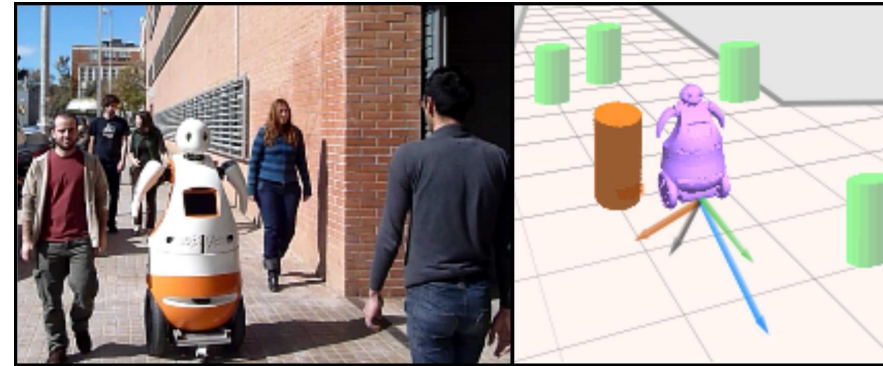
FP6 URUS (2006-2009); UBROB (2007-2010); RobTaskCoop (2010-2014), Robot-Int-Coop (2014-2017)



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Challenges

- **Social robots must live with people:**
- We need to develop mobile social robots that behaves in a natural way as human do in order to help them in every day tasks. Some typical tasks:
 - Low level motion tasks (some examples)
 - Navigation human-aware
 - Walk side-by-side
 - Guide people
 - Follow people
 - Proactive behavior for interaction with people
 - Look for people (hide & seek game)
 - Cooperation between human and robots (some examples)
 - Build an environment map
 - Look for objects or people
 - Move objects

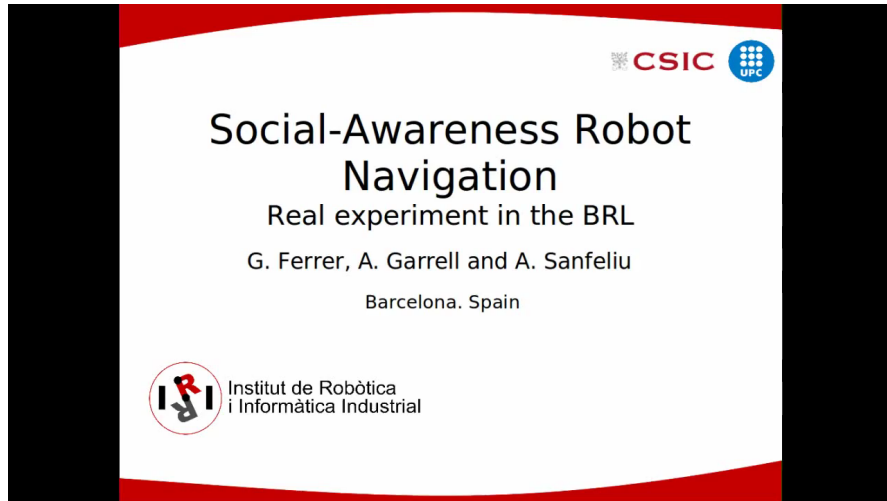


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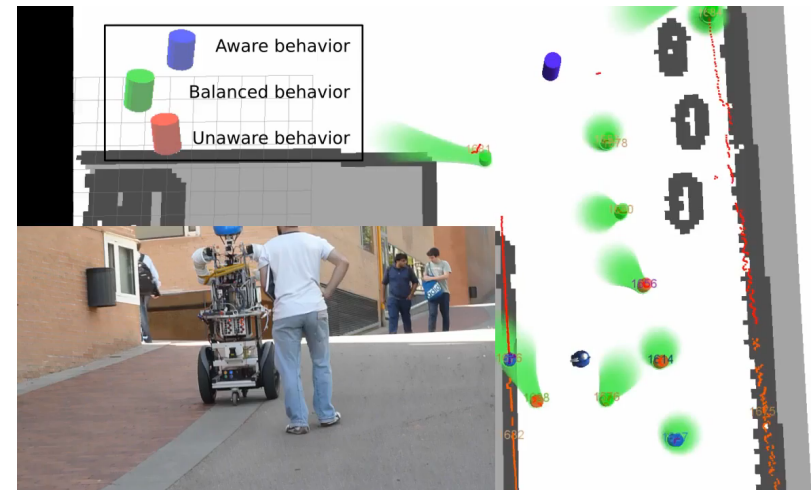
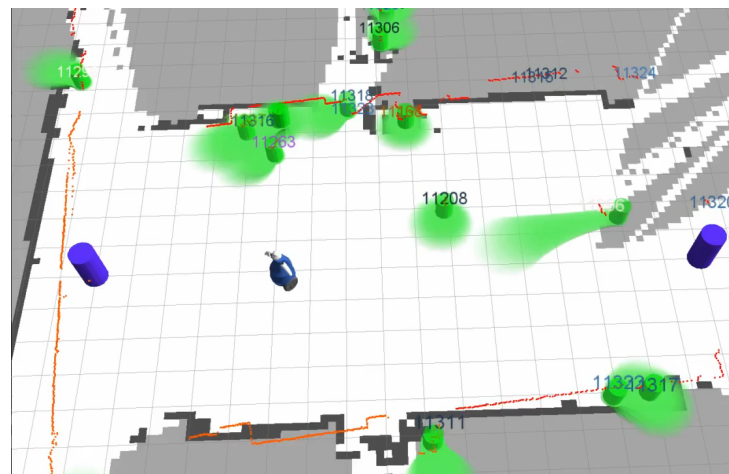
Robot Human Aware Navigation

Robot Human Aware Navigation
with Social Force Model

Robot Human Aware Navigation
With Anticipating Kinodynamic Planning



Human Behavior Estimation for Robot Human Aware Navigation



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[G. Ferrer and
A. Sanfeliu (2014b)]

[G. Ferrer and
A. Sanfeliu (2014a)]

[G. Ferrer and
A. Sanfeliu (2013)]

Following and Guiding People

Guiding people using Social Force Model

Guiding people in Barcelona



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**RobTaskCoop: Cooperación
robots humanos en áreas urbanas**

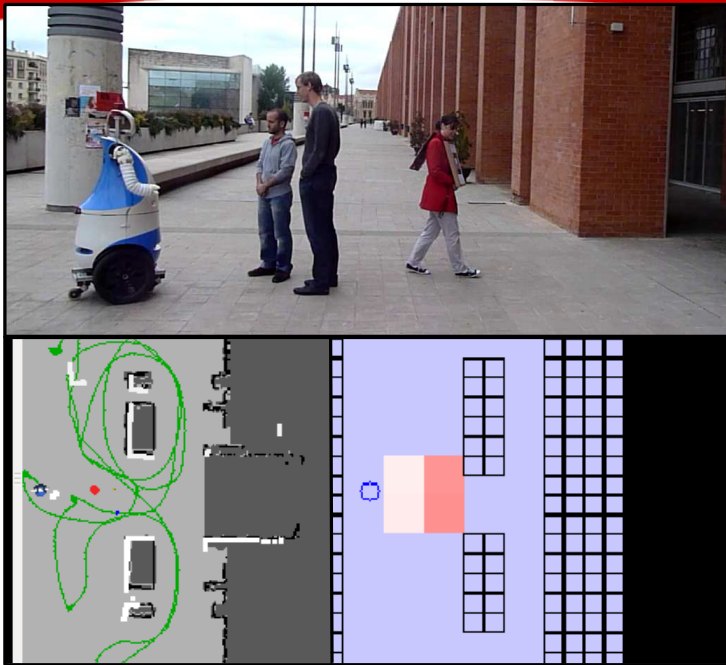
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[A. Garrell and A. Sanfeliu (2012)]

[G. Ferrer et al. (2013)]

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People Find-and-Follow



A New Social Robot Cooperation Method to Localize People in an Urban Environment

Alex Goldhoorn, Anaís Garrell, René Alquézar and Alberto Sanfeliu



People Find-and-Follow Behavior for Service Robots using Adaptive Continuous Real-Time POMCP

Alex Goldhoorn, Anaís Garrell, Fernando Herrero, René Alquézar and Alberto Sanfeliu

Cooperative robots looking for and finding people

Video: file://localhost/Users/sanfeliu/Presentaciones+videos/0_Presentaciones_y_Videos/

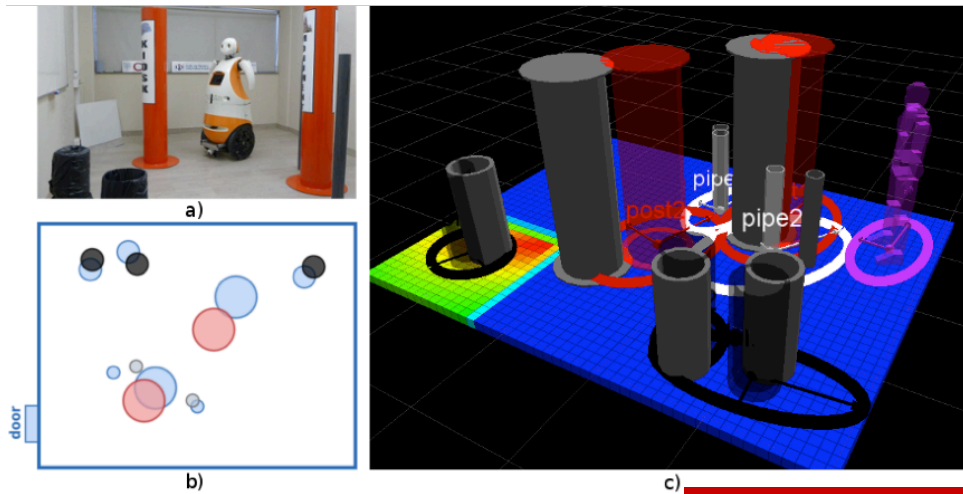
Robots finding people using Find-and-Follow strategies

[A. Goldhoorn, A. Sanfeliu, R. Alquézar (2013)]

[A. Goldhoorn et al. (2014)]

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Building Maps By Human-Robot Colaboration



Cooperation between robots and humans to build a map

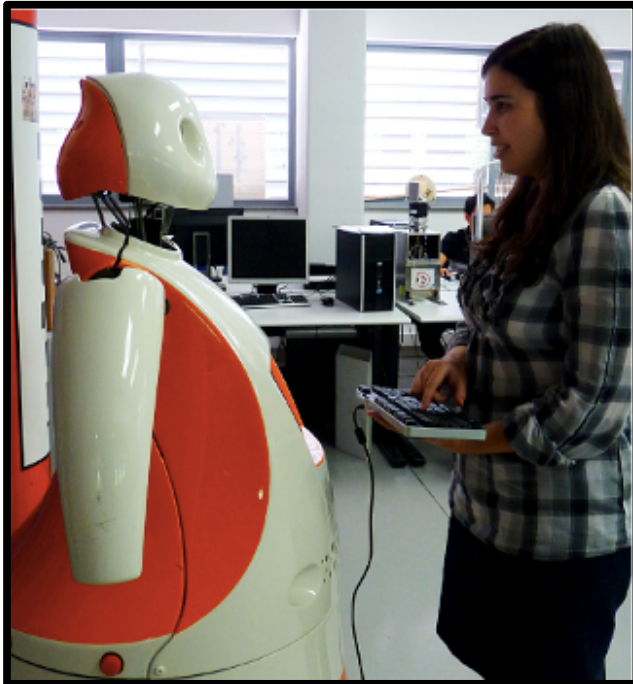
Human-Robot Collaborative Scene Mapping from Relational Descriptions

Eloy Retamino Carrión and Alberto Sanfeliú

Robot Learning Faces and Objects

Objective:

Robot TIBI learns and improves its visual perception capabilities by means of interactions with humans



Robot TIBI



Robot TIBI

[M. Villamizar, A. Garrell, A. Sanfeliu and F. Moreno-Noguer (2012)]

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