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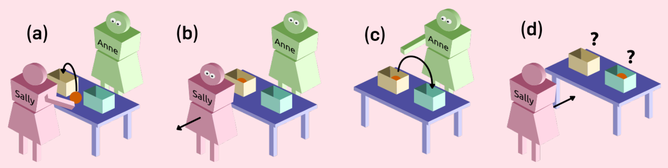
Implementing an implicit false belief task[1] by cascading situation assessment with UNDERWORLDS[2]

Y. Sallami, S. Lemaignan, A. Clodic, R. Alami

From the classic false belief task

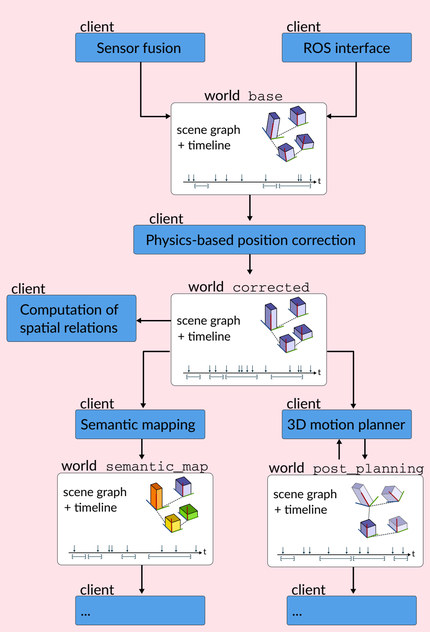


Theory of Mind, how we understand others mental states, have been well studied in psychology. Recently it has been used for human robot collaboration because understanding others intentions and beliefs is a key capability for robots in order to interact with humans. However, infering and reasoning about mental states during a Human-Robot interaction remains difficult.

We present here how we apply Theory of Mind by implementing an implicit false belief task with UNDERWORLDS. In this task we explicitly maintain alternative world states associated to the beliefs of the humans and we show the interest of this approach.

...to cascading situation assessment

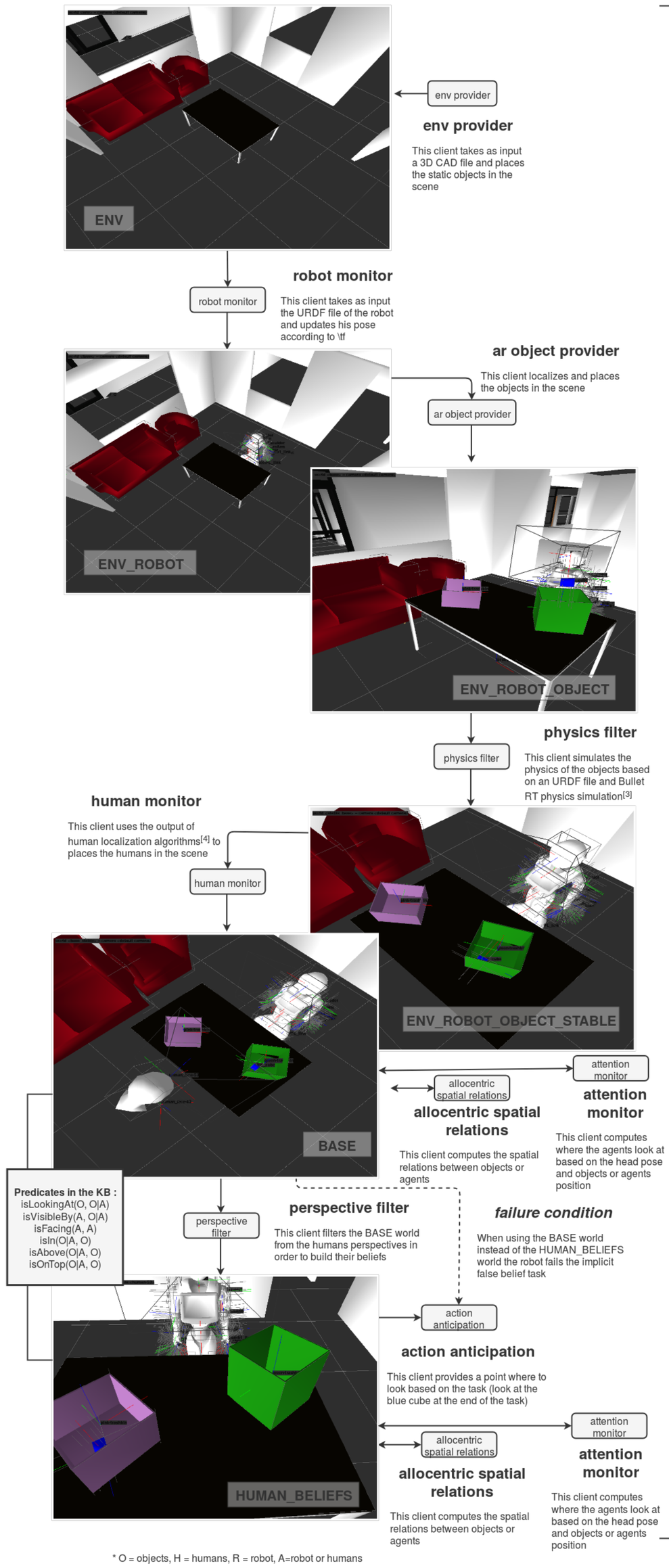
UNDERWORLDS, is a novel lightweight framework for cascading spatio-temporal situation assessment in robotics. UNDERWORLDS allows programmers to represent the robot's environment as real-time distributed data structures, containing both scene graphs (for representation of 3D geometries) and timelines (for representation of temporal events). UNDERWORLDS supports cascading representations: the environment is viewed as a set of worlds that can each have different spatial and temporal granularities, and may inherit from each other. UNDERWORLDS also provides a set of high-level client libraries and tools to introspect and manipulate the environment models.



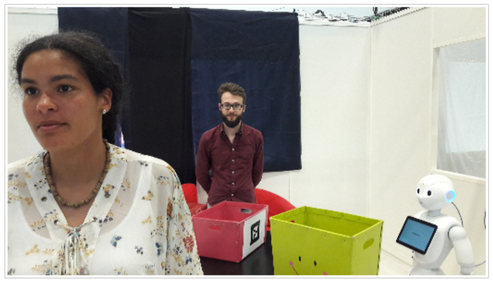
Let's play together !

How could you simply compute the common ground between the actor and the robot from the task at right ?

By only using the clients presented at right, how could you implement a higher order Theory of Mind task ?



(a) The experimenter puts the cube in the box

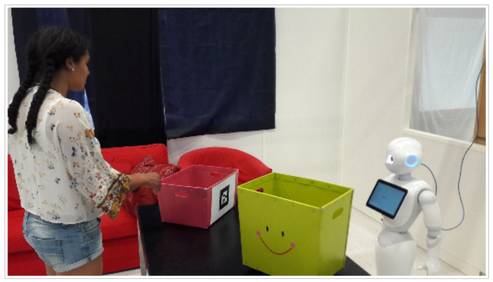


(b) The actor leaves the room

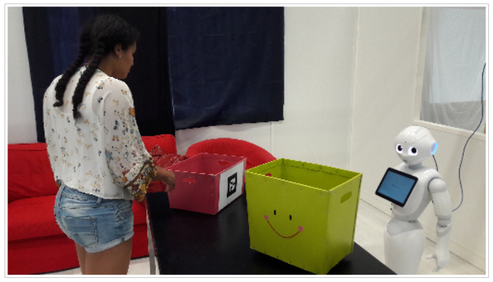
(c) The experimenter changes the cube location

(b) The actor reaches the box

Action anticipation



Success : The robot looks where the actor last saw the cube



Failure : The robot looks at the actual position of the cube

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https://github.com/underworlds-robot

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