

# IEEE SA - 1872.2

## Standard for Autonomous Robotics (AuR) Ontology

*Working group committee:*

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# Behavior

- Mohamed: (related to planning) sequence of atomic actions in a short term (manipulation behavior).
- Jaeho Lee, Ji Sang: Exhibited outcome of collective actions (parallel or sequence) exerted by an agent to achieve and/or maintain some state/goal/objective.
- Ricardo: a predicate of an entity. evolution of the state when deployed in an environment.
- Notes:  
Result of a sequence of actions exerted by na agent deployed in na environment  
(observable property ? To whom ? Internal to the robot or from outside. Inner (prepare a map) or outer (grasping) behaviors ). Define 'agent behavior'

## Behavior (ROMAN paper)

- ▶ Behavior relates to the actions of the robot.
- ▶ More specifically, it can be defined as:
  - ▶ (a) a specific action of the robot, regardless of whether it was specified, desired, or intended by the designer (“The robot’s looping behavior is preventing it from reaching the waypoint”)
  - ▶ (b) a generic term for the observed or desired actions of the robot (“The robot’s behavior wasn’t what the user wanted”)
  - ▶ (c) some property of the actions of the robot (“The behavior of this avoidance algorithm includes avoiding narrow but passable hallways.”)
  - ▶ (d) a self-contained set of actions relating to a specific task (that robot has an “avoid” behavior that’s very effective) It is worth to note that none of these definitions differentiate between behaviors that are pre-programmed vs. learned or reactive vs. deliberative.

# Behavior (under development)

- ▶ A *behavior* is a property of an agent that makes it perform certain types of actions when it faces certain types of situations
- ▶ NOTE: these definitions sound more like the definition of ‘function’ (3 people)
- ▶ Iterate behavior definition when action is defined.

# Function

Jaeho Lee: Property or Capability attributed (by design) to an entity which has input/output. (Association between action and function, e.g., na action has a function)

Ricardo: Capability when deployed in the environment produces a behavior,. Interface between structure (the system, e.g., robot (components and interconnections) ) and goal.

Veera: related to design intent of the system.

Alberto: Action versus Function (the same?)

# Function (ROMAN paper)

- ▶ *Function*: Functions define goal at the behavioral level. More specifically, it can be defined as:
  - ▶ (a) the thing a given component is supposed to do, defined at any level (“This robot’s function is to clean floors.”)
  - ▶ (b) a procedure or routine that returns a value - this procedure or routine can be constrained by the complexity of the software implementing it, can be a behavior, something that implements a behavior, or something that is implemented by behaviors; it can be defined at any level of complexity
  - ▶ (c) a mathematical relationship between variables (“Force is a function of mass and acceleration;  $F=g(m,a)$ ”)

# Structure

- ▶ Ricardo: Set of entities and its relation between entities ! **Ongoing definition**
- ▶ Jaeho Lee. Organization of entities in terms of relations between entities.

Only 3 minutes discussion on this one ...

## Structure (ROMAN paper)

- ▶ *Robot Structure* is a physical object that is part of a robot and gathers relevant parts together.

# Capability

- ▶ A *capability* is a property of an agent that allows it to perform or to participate in a certain type of action.

# Action

- ▶ An *action* is a process performed by an agent.

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