Description of Environment and Agents

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Definition of Environment

Accessible or Inaccessible

Deterministic or Non-deterministic

Episodic or Non-episodic

Static or Dynamic

Discrete or Continuous

As defined by Stuart Russell and Peter Norvig in *Articial Intelligence: International Version: A Modern Approach*. Pearson, 2010.

Environment: Accessible or Inaccessible

Fully accessible to the SystemAgent

Other agents can only obtain information about garbage through ScoutAgents, therefore **partially accessible** to non-system agents

Environment: Deterministic or Non-deterministic

Possible actions: detect garbage, harvest garbage, recycle garbage, randomly add garbage

Ignore uncertainty from other agent's actions

Entirely determined by current state and agents' actions, therefore **deterministic**

Environment: Episodic or Non-episodic

Efficient recycling of garbage requires planning of more than one step ahead

Decisions about actions are dependent on more than one episode, therefore

non-episodic

Environment: Static or Dynamic

SystemAgent only proceeds with next step after all coordination tasks have been completed

Environment doesn't change while the agents are deliberating, therefore **static**

Environment: Discrete or Continuous

Finite number of possible states for the city

Finite number of perceptions and actions

Time is handled in a turn-based way

Therefore **discrete**

Definition of Agent Architecture and Properties

HarvesterAgent

ScoutAgent

HarvesterCoordinator

ScoutCoordinator

CoordinatorAgent

SystemAgent

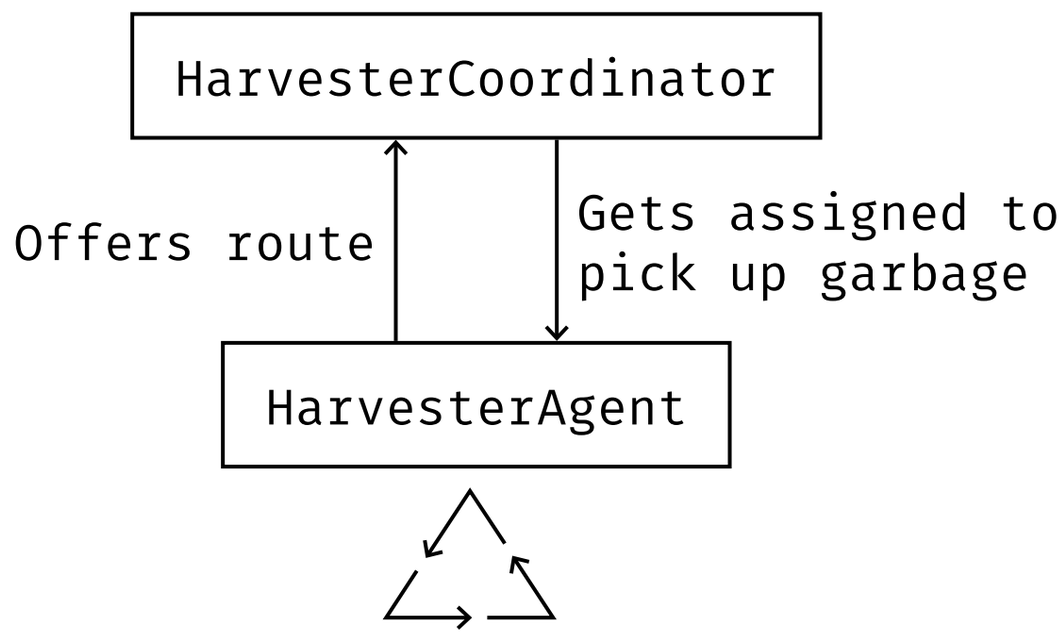
As defined by Michael Wooldridge in *An Introduction to MultiAgent Systems*. Wiley, 2009.

HarvesterAgent

Negotiates with HarvesterCoordinator

Offers shortest route to detected garbage

Receives assignment to pick up garbage and brings it to recycling centers



HarvesterAgent

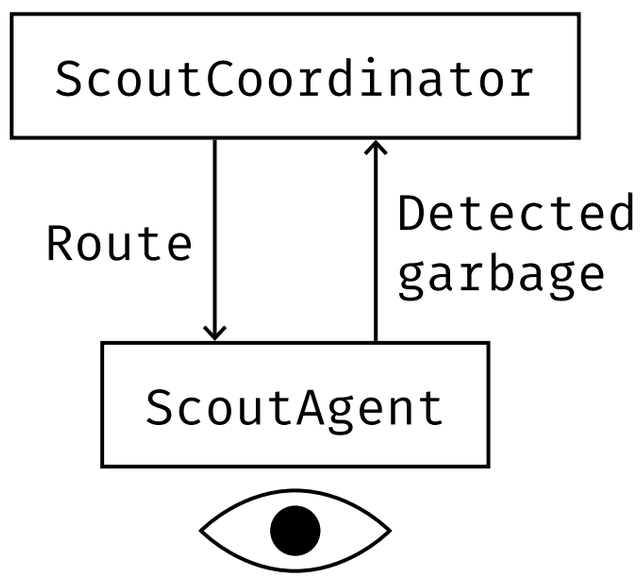
Architecture	**Properties**
Hybrid	~~Flexibility~~ Reactivity ✔ Pro-activeness ✔ Social Ability ✔ Rationality ✔ Reasoning Capabilities ✔ ~~Learning~~ Autonomy ✔ Temporal Continuity ✔ ~~Mobility~~

ScoutAgent

Moves through the city in order to detect garbage

Receives route from ScoutCoordinator

Reports back when it finds garbage



ScoutAgent

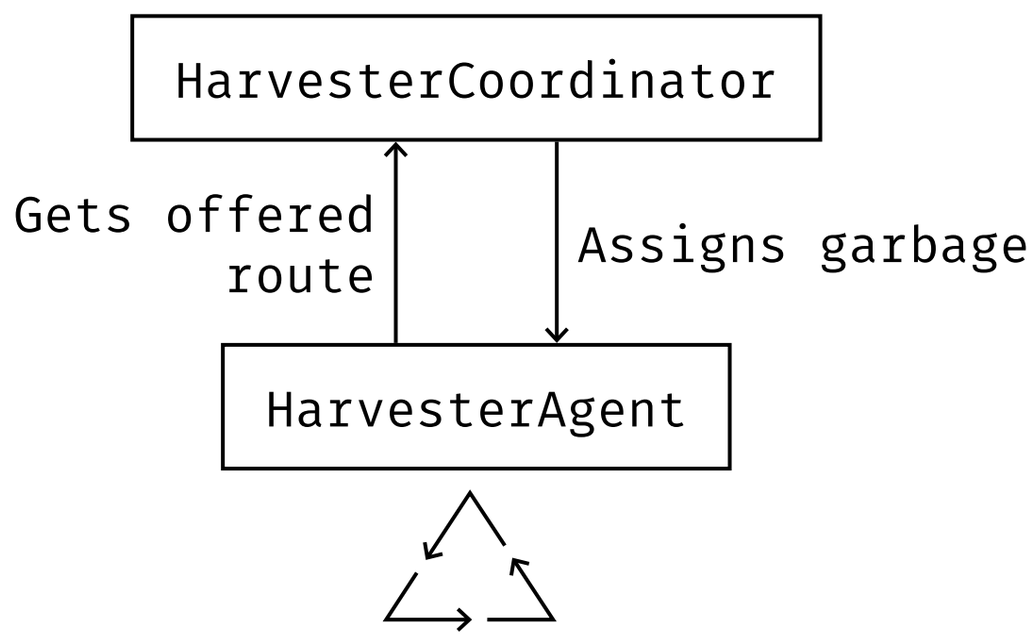
Architecture	**Properties**
Reactive	~~Flexibility~~ Reactivity ✔ ~~Pro-activeness~~ Social Ability ✔ Rationality ✔ ~~Reasoning Capabilities~~ ~~Learning~~ ~~Autonomy~~ Temporal Continuity ✔ ~~Mobility~~

HarvesterCoordinator

Tries to maximize benefits and minimize time

Negotiates with HarvesterAgents

Assigns found garbage to harvester that offers best conditions



HarvesterCoordinator

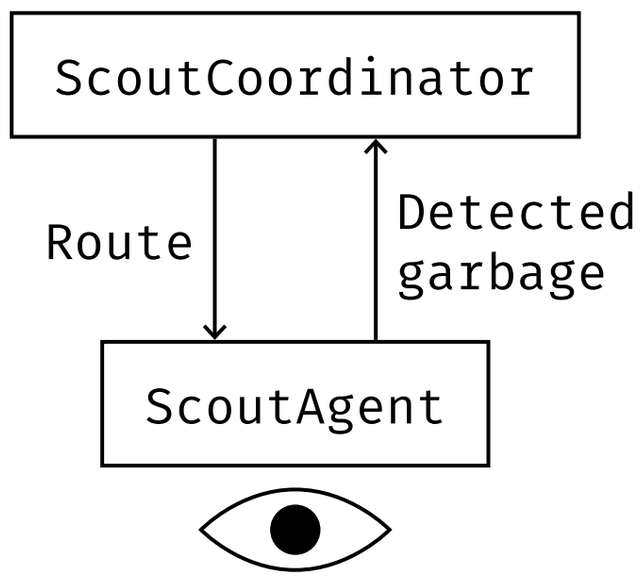
Architecture	**Properties**
Hybrid	Flexibility ✔ Reactivity ✔ Pro-activeness ✔ Social Ability ✔ Rationality ✔ Reasoning Capabilities ✔ Learning *(potentially)* Autonomy ✔ Temporal Continuity ✔ ~~Mobility~~

ScoutCoordinator

Makes intelligent plan for ScoutAgents

Tries to minimize garbage detection time

Receives information about detected garbage and passes it on

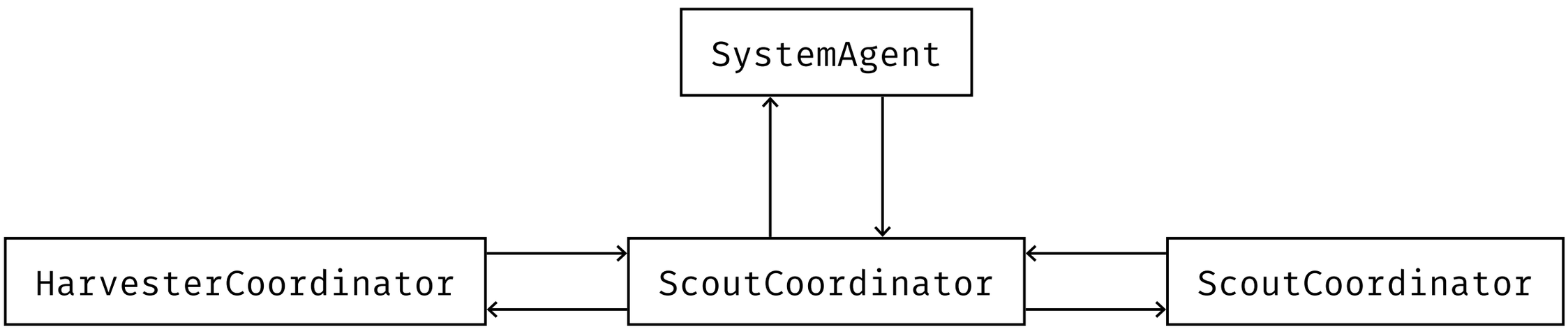


ScoutCoordinator

Architecture	**Properties**
Hybrid	~~Flexibility~~ Reactivity ✔ Pro-activeness ✔ Social Ability ✔ Rationality ✔ Reasoning Capabilities ✔ ~~Learning~~ Autonomy ✔ Temporal Continuity ✔ ~~Mobility~~

CoordinatorAgent

Interlocutor between coordinators and SystemAgent



CoordinatorAgent

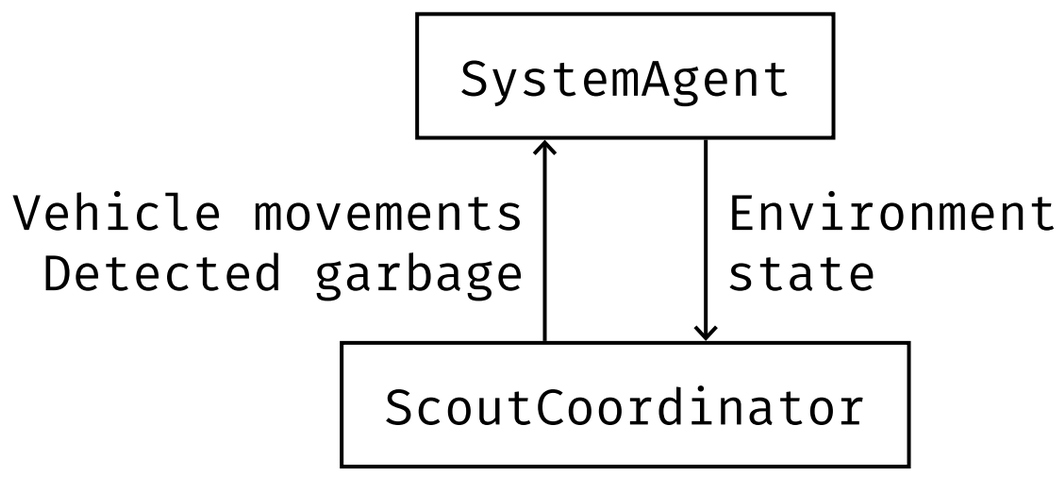
Architecture	**Properties**
Reactive	~~Flexibility~~ Reactivity ✔ ~~Pro-activeness~~ Social Ability *(minimal)* Rationality ✔ ~~Reasoning Capabilities~~ ~~Learning~~ ~~Autonomy~~ Temporal Continuity ✔ ~~Mobility~~

SystemAgent

Has complete representation of the environment

Randomly adds new garbage

Updates city state based on agents' actions



SystemAgent

Architecture	**Properties**
Reactive	~~Flexibility~~ Reactivity ✔ ~~Pro-activeness~~ Social Ability *(minimal)* Rationality ✔ ~~Reasoning Capabilities~~ ~~Learning~~ Autonomy Temporal Continuity ✔ ~~Mobility~~

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