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DEK MARITIME

AI sail

From an intuitive case study to maritime applications

Fanny Rebiffé

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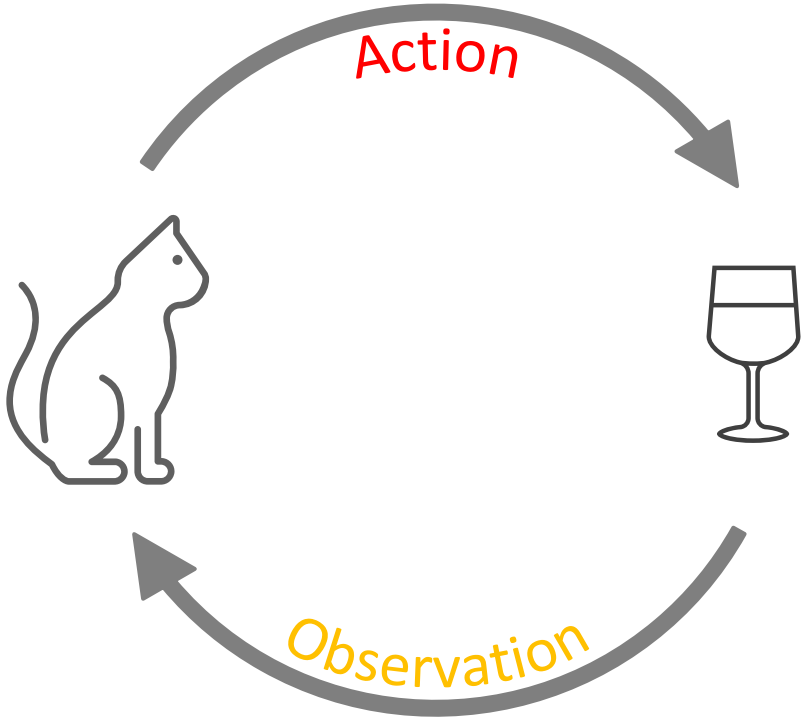
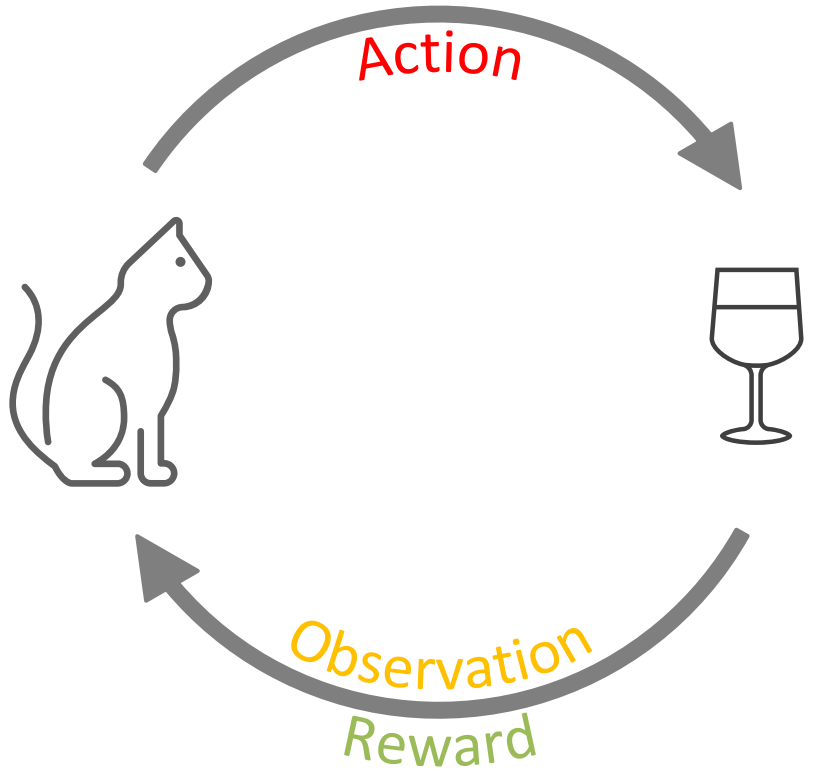
Explicit knowledge vs implicit knowledge

Learning by trial and error

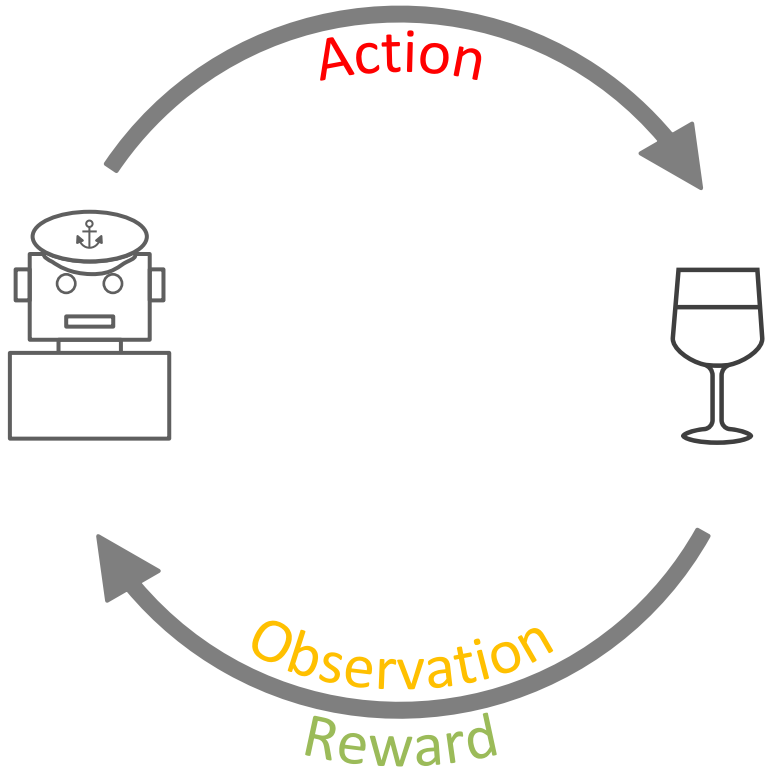
Interactions



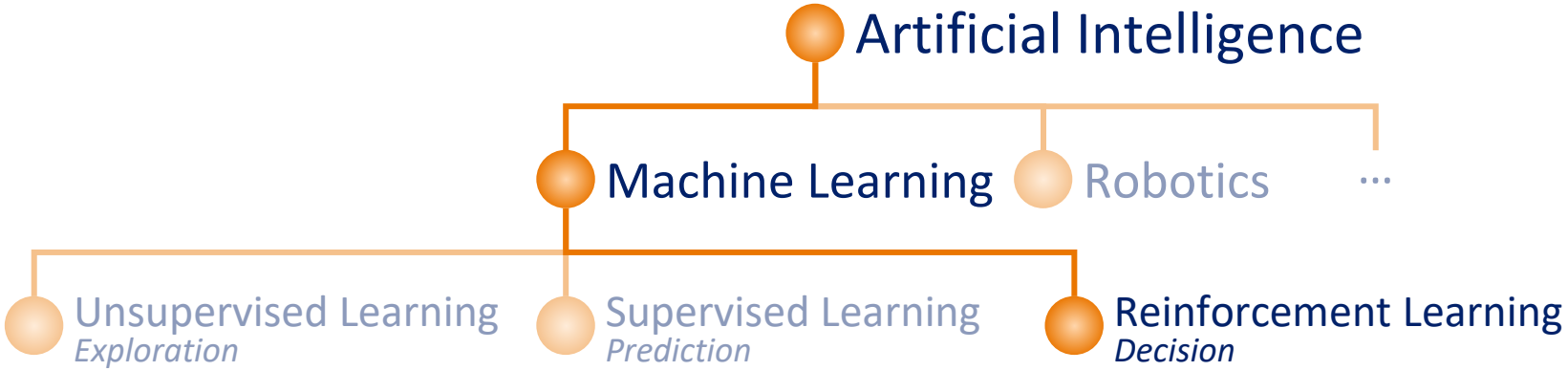
Reinforcement Learning



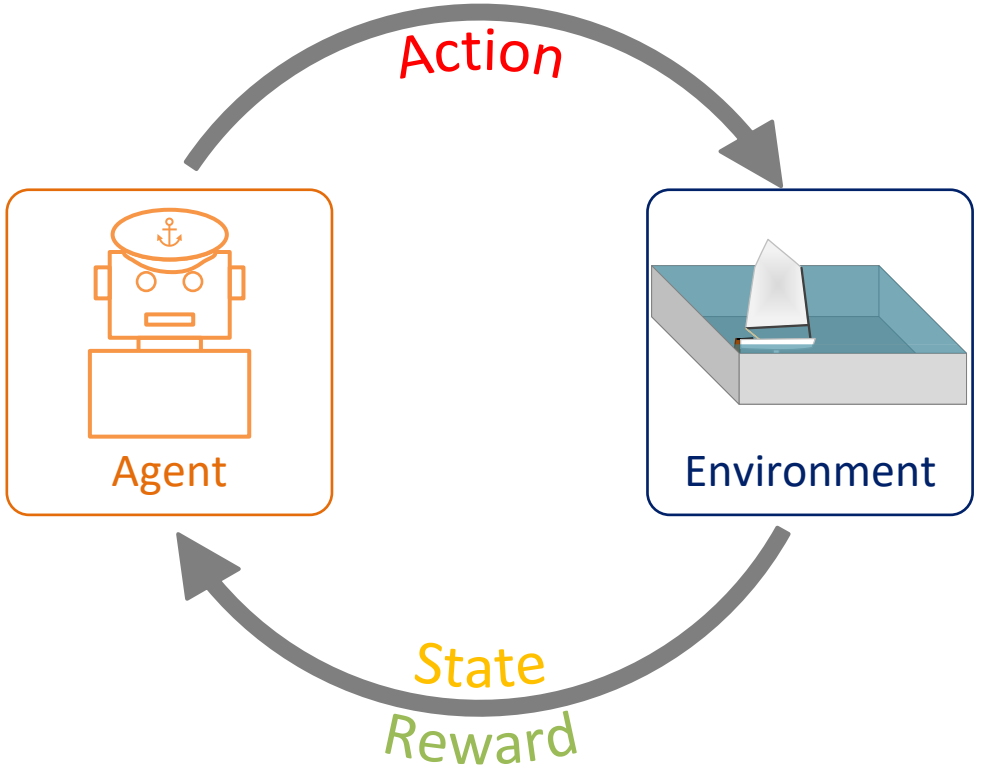
Reinforcement Learning



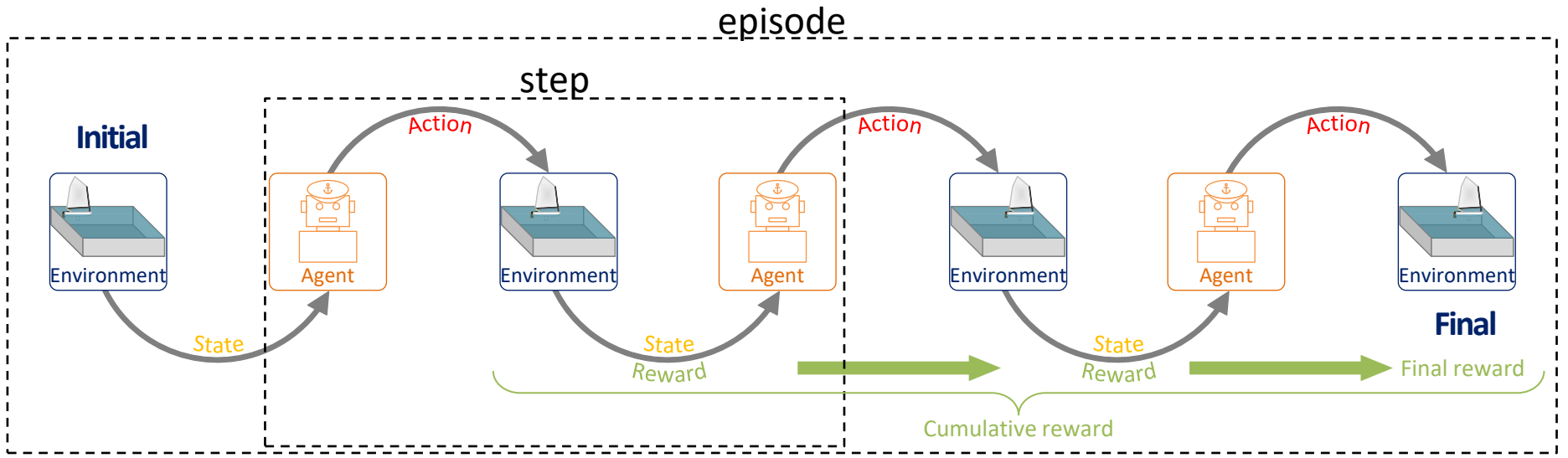
Reinforcement Learning



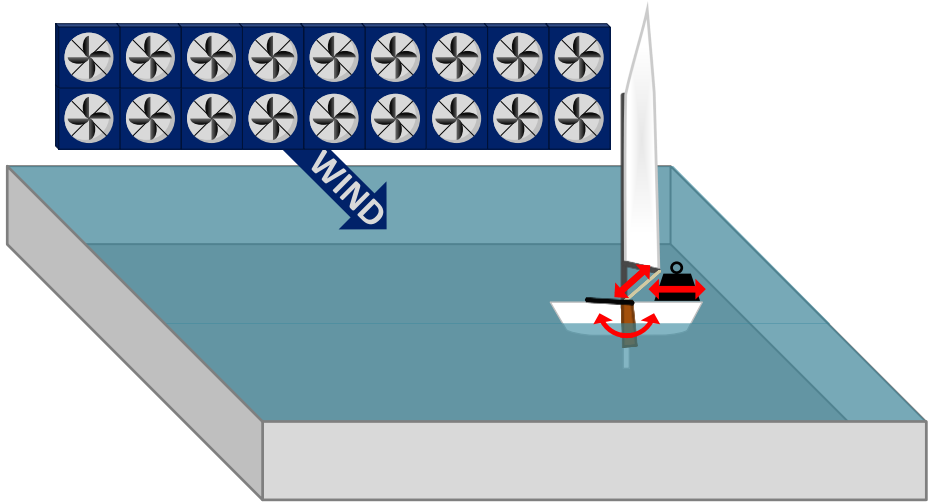
Reinforcement Learning



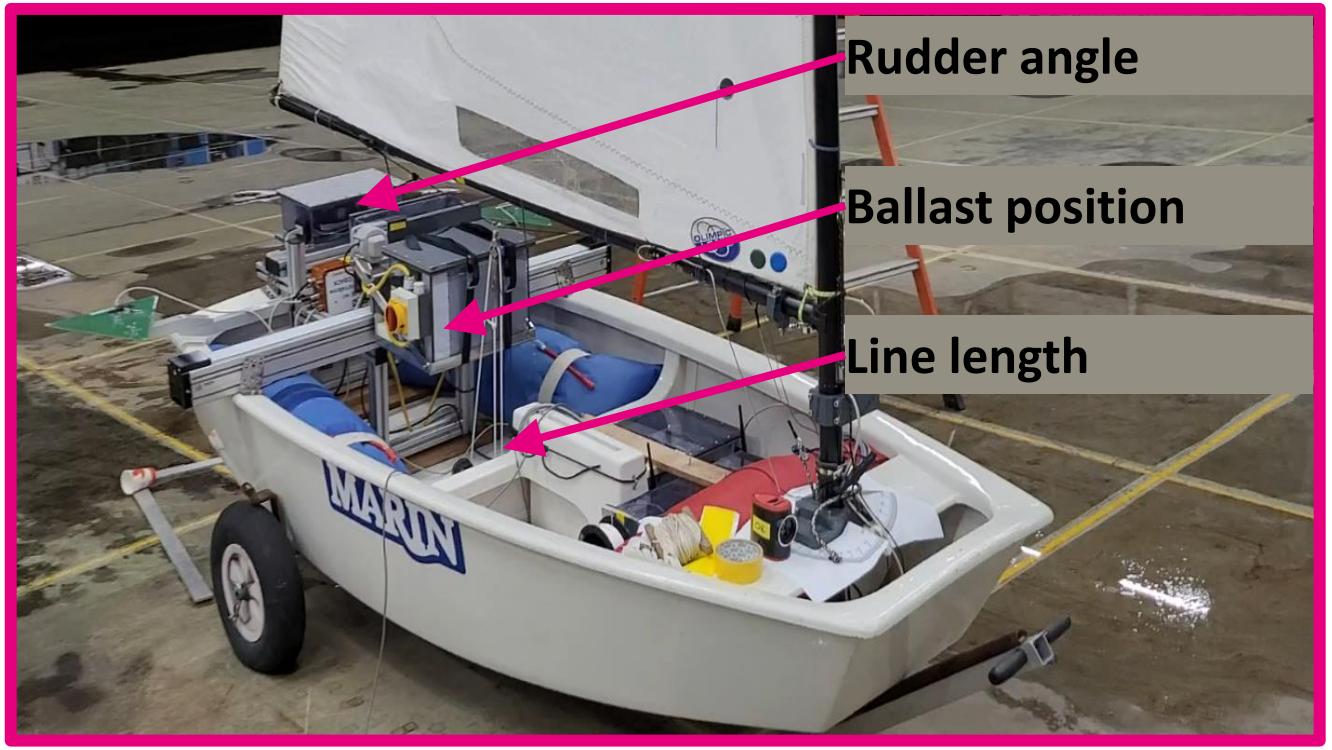
Training


episode
step
Initial
Environment
Action
Agent
Environment
Action
Agent
Environment
Action
Agent
Environment
Final
State
State
Reward
State
Reward
Final reward
Cumulative reward

Sailing upwind

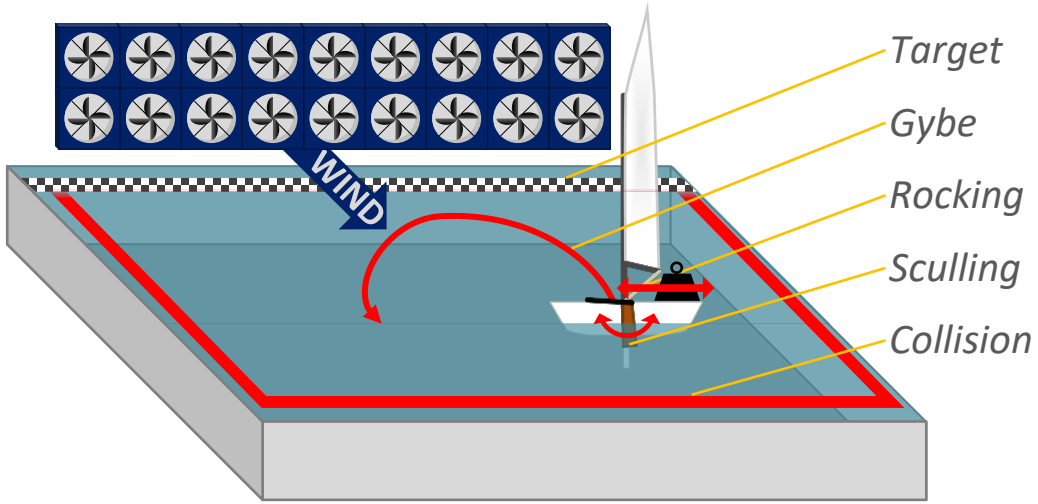


Sailing upwind

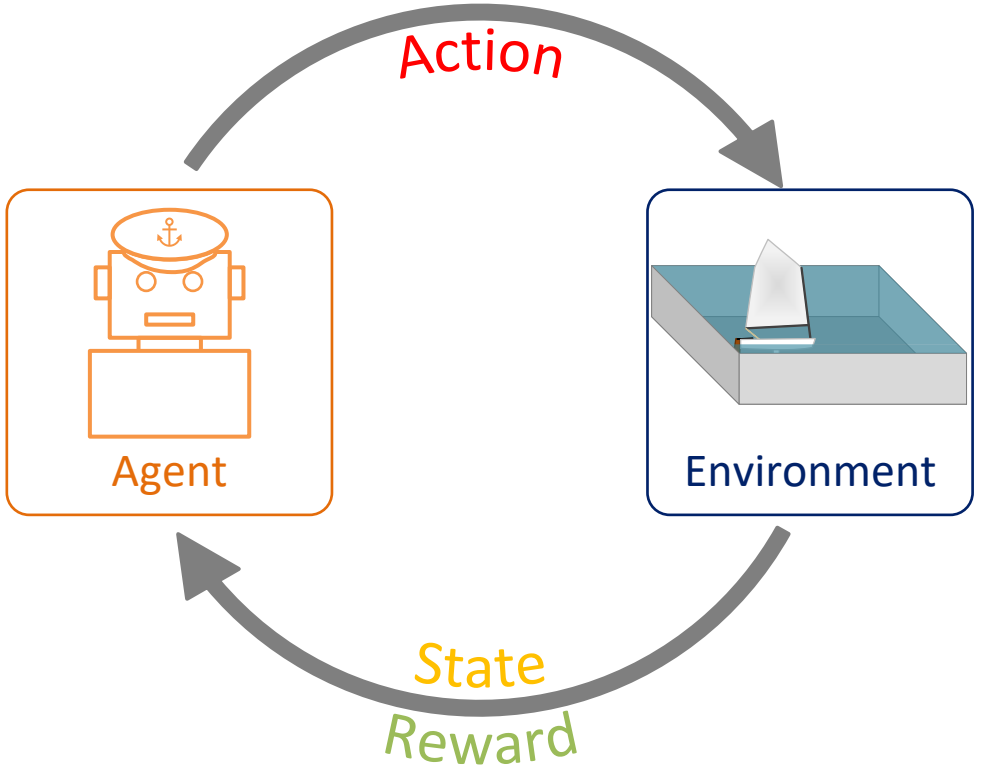


Sailing upwind

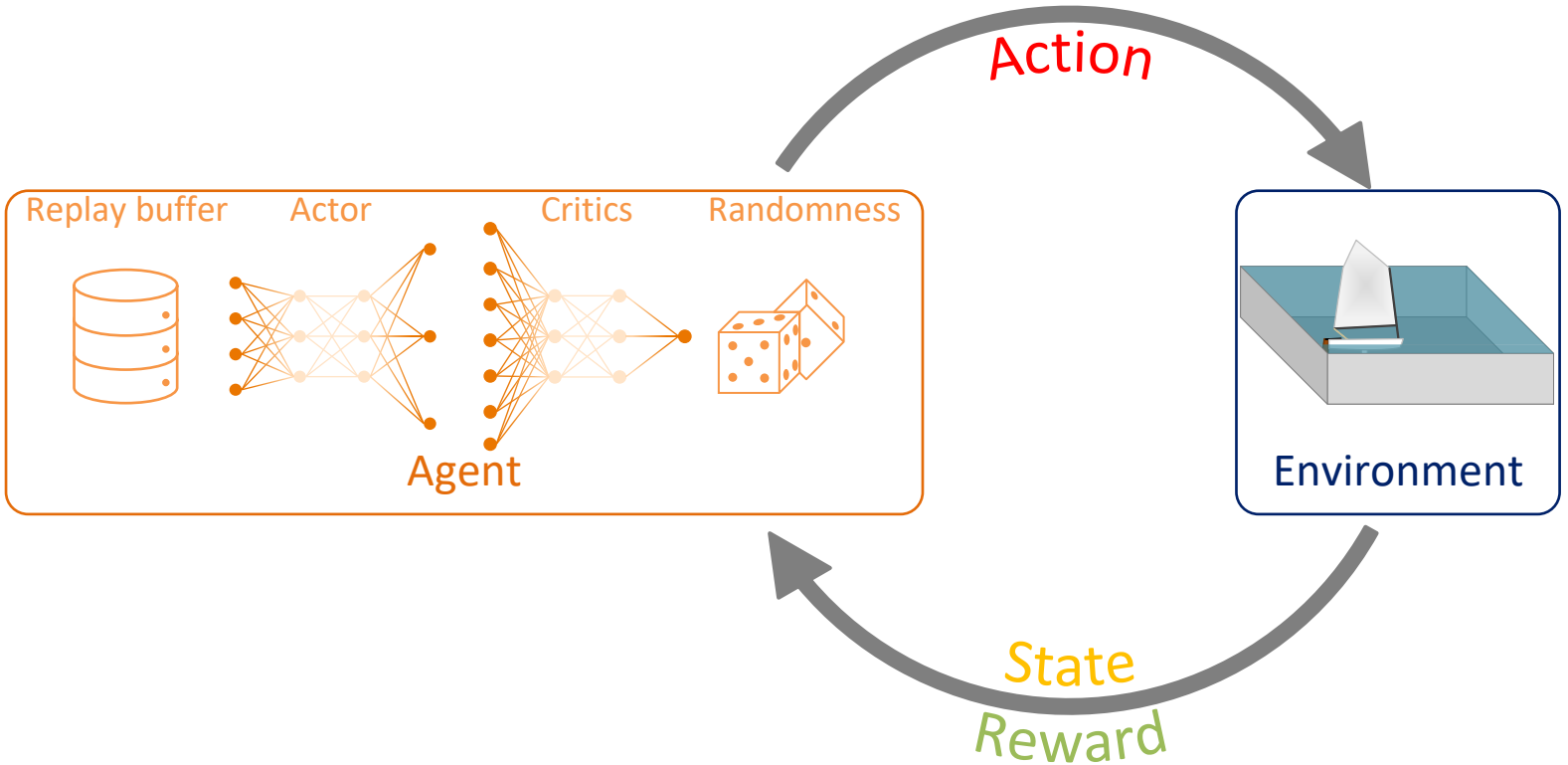
Sailing upwind



Reinforcement Learning



RL agent



Agent & hyperparameters

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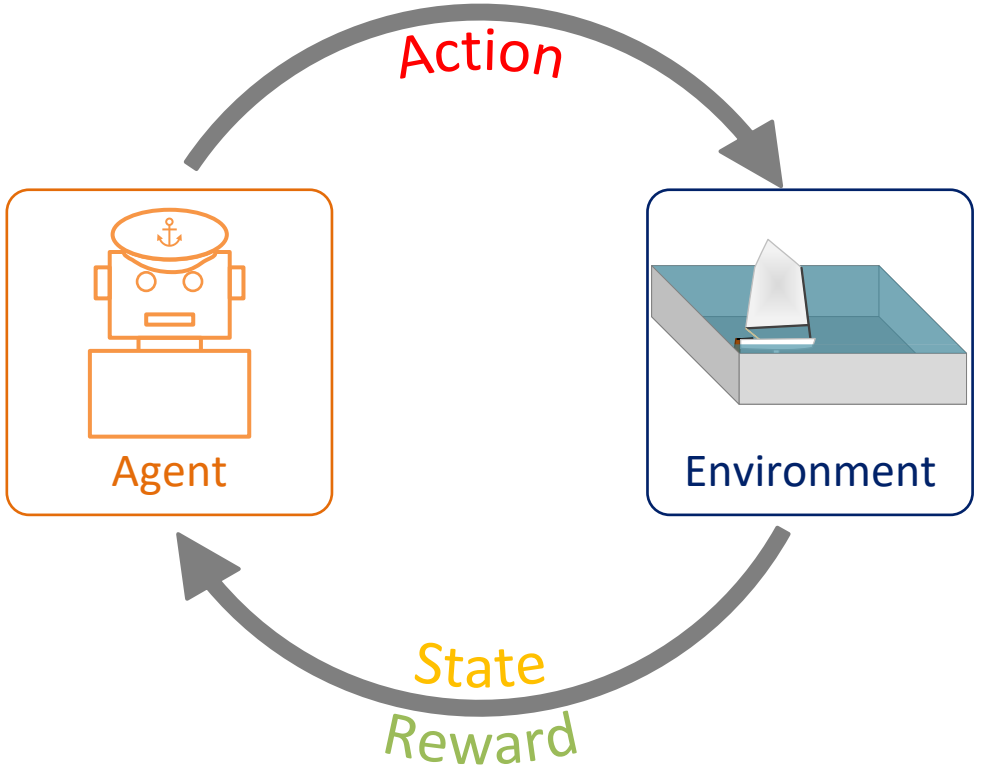
State encoding



Agent & hyperparameters

State encoding

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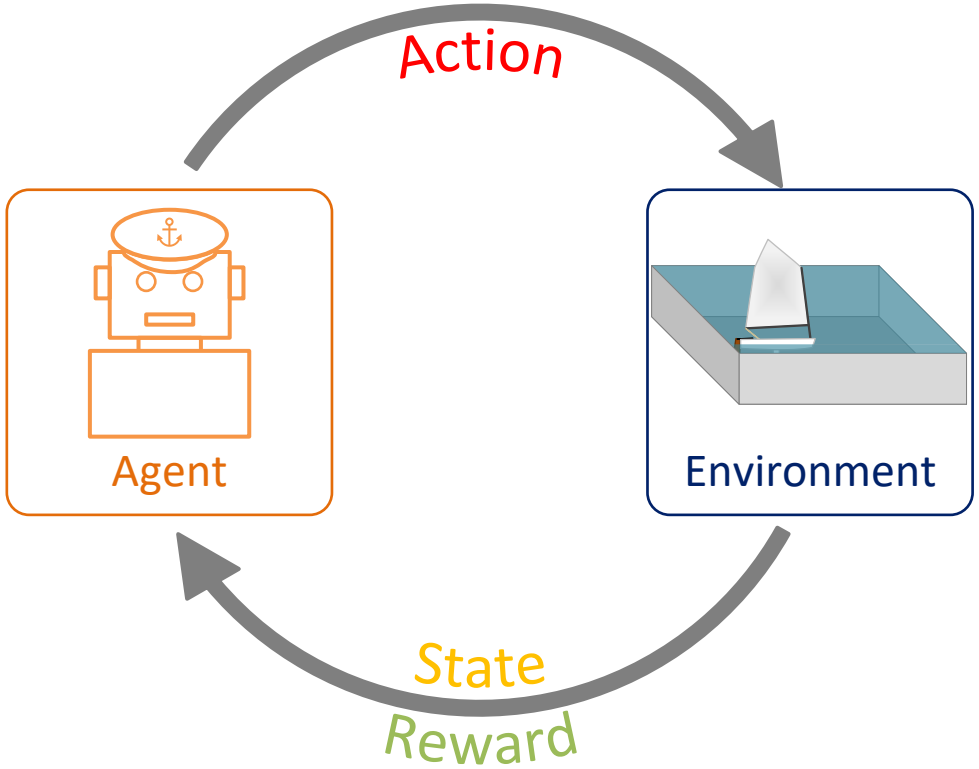
Reward design



Agent & hyperparameters

State encoding

End conditions & reward

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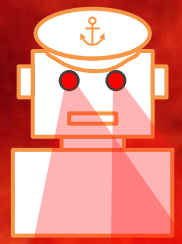
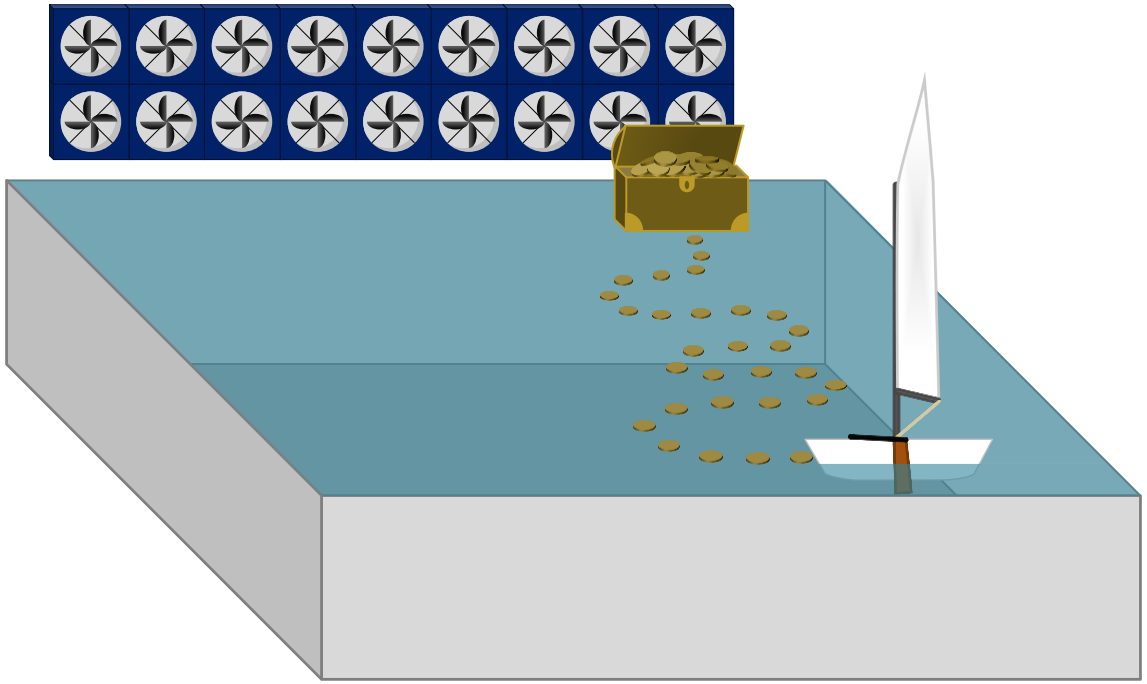


Reward design



Agent & hyperparameters

State encoding

End conditions & reward

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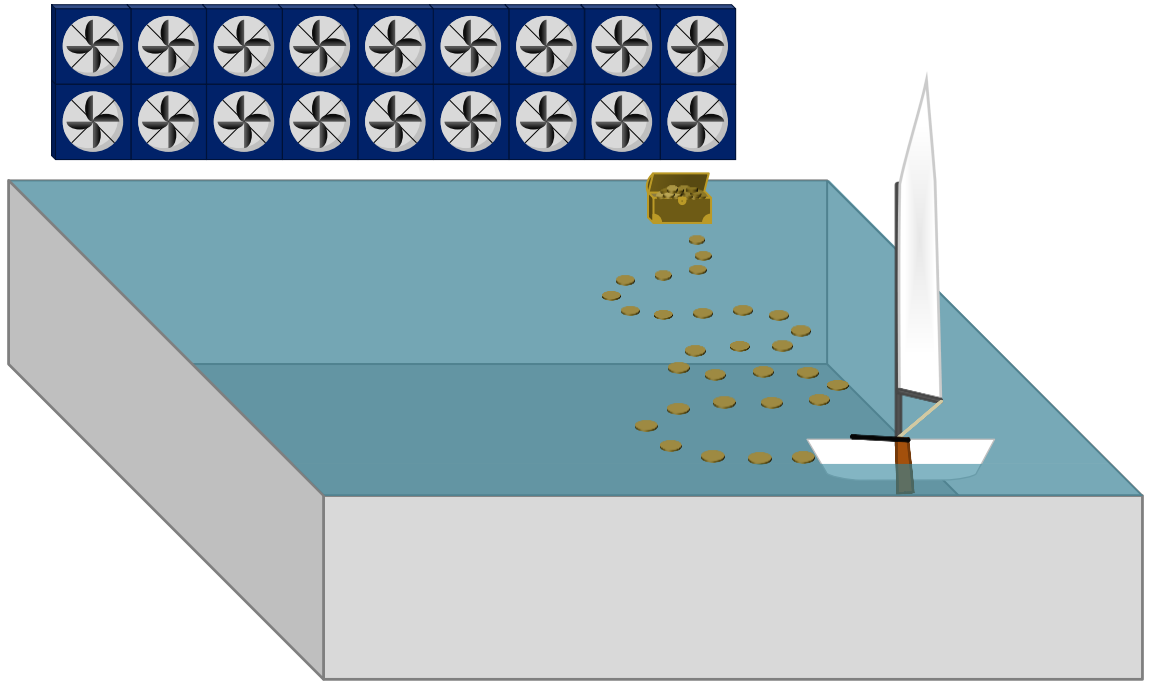
Reward design



Agent & hyperparameters

State encoding

End conditions & reward

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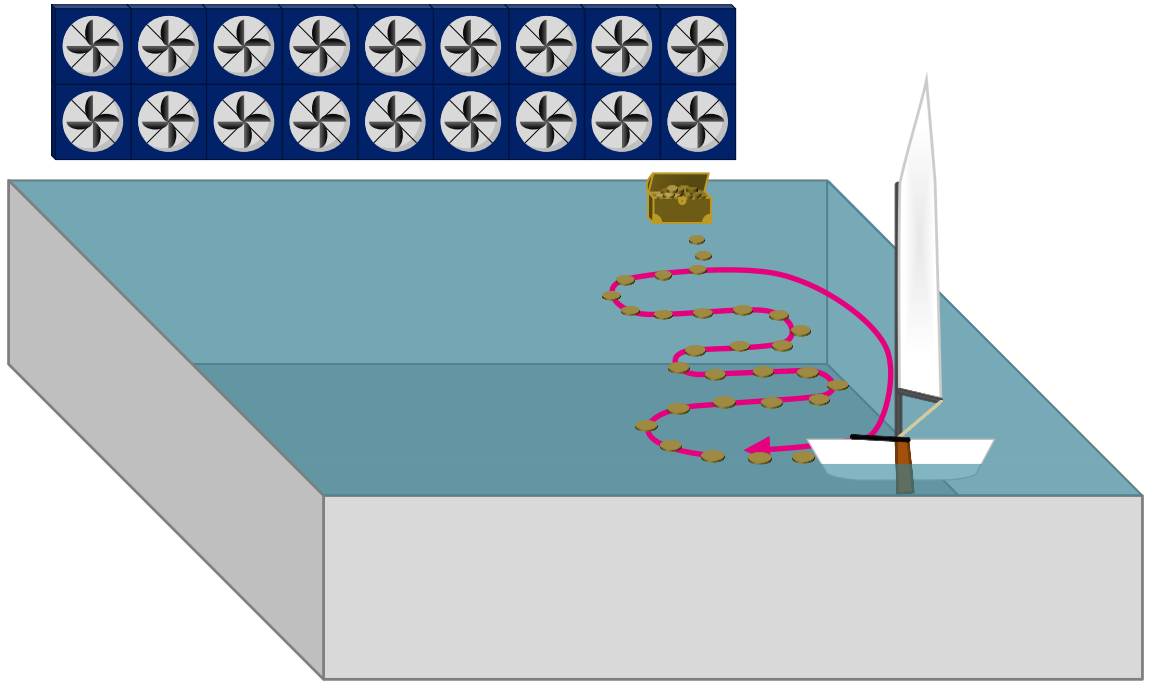
Reward design



Agent & hyperparameters

State encoding

End conditions & reward

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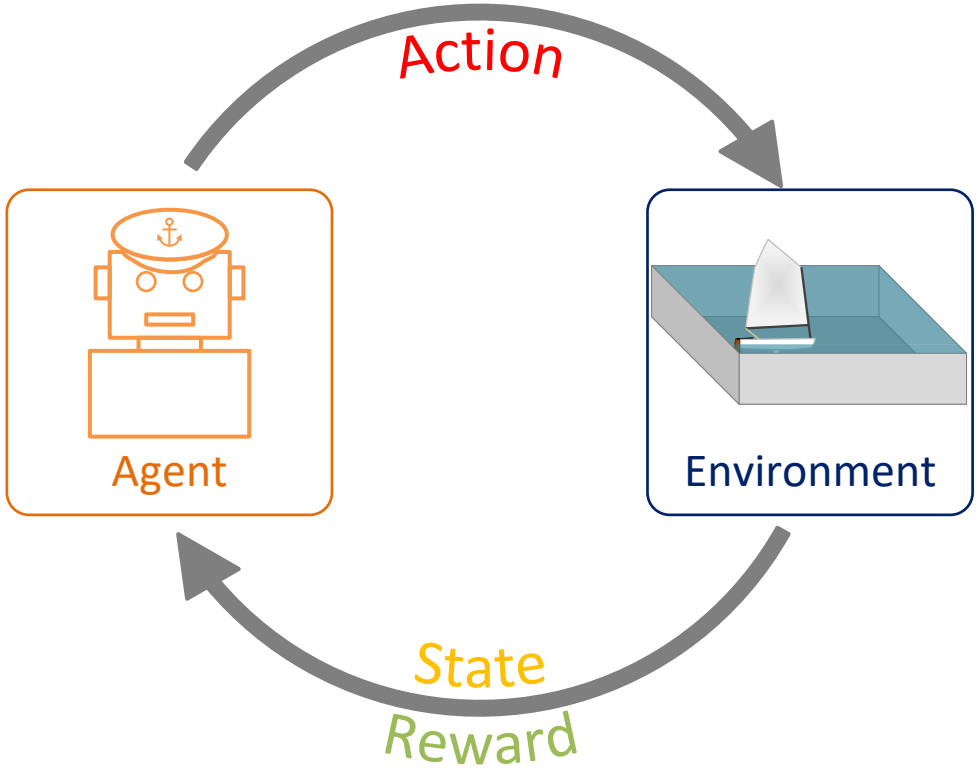
Environment



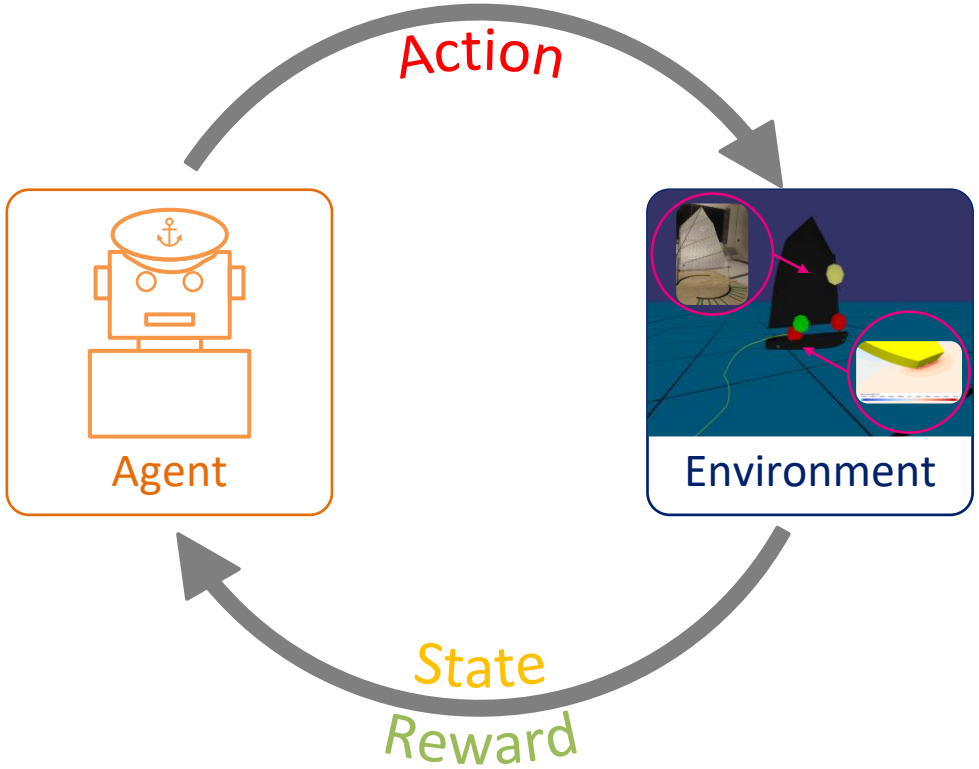
Agent & hyperparameters

State encoding

End conditions & reward

Environment settings

Environment



Agent & hyperparameters

State encoding

End conditions & reward

Environment settings

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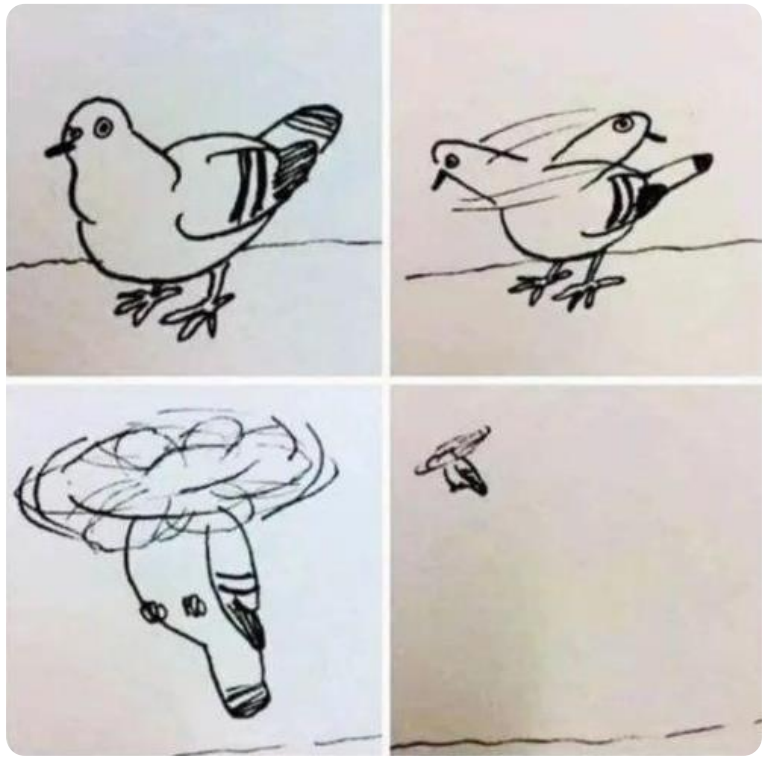
Environment



Agent & hyperparameters

State encoding

End conditions & reward

Environment settings

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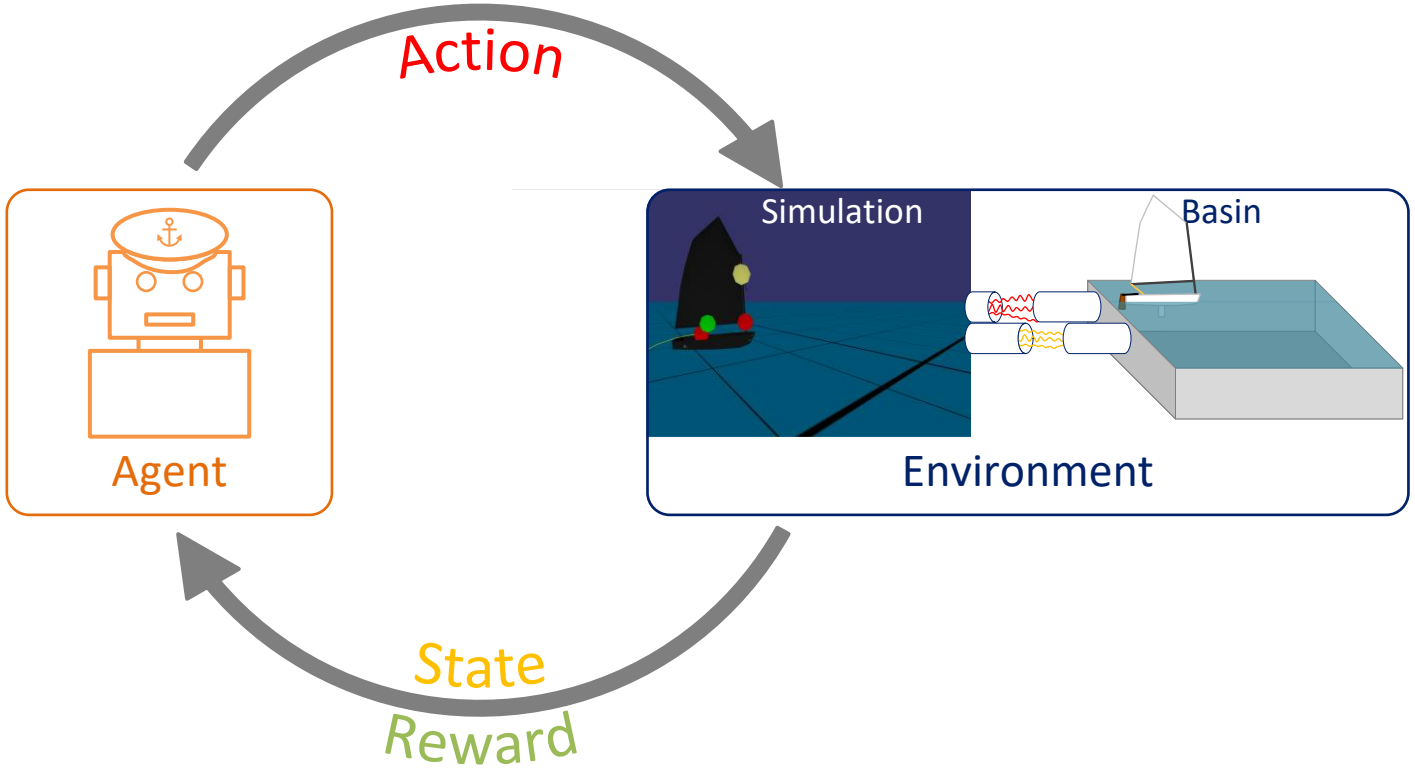
Environment



Agent & hyperparameters

State encoding

End conditions & reward

Environment settings

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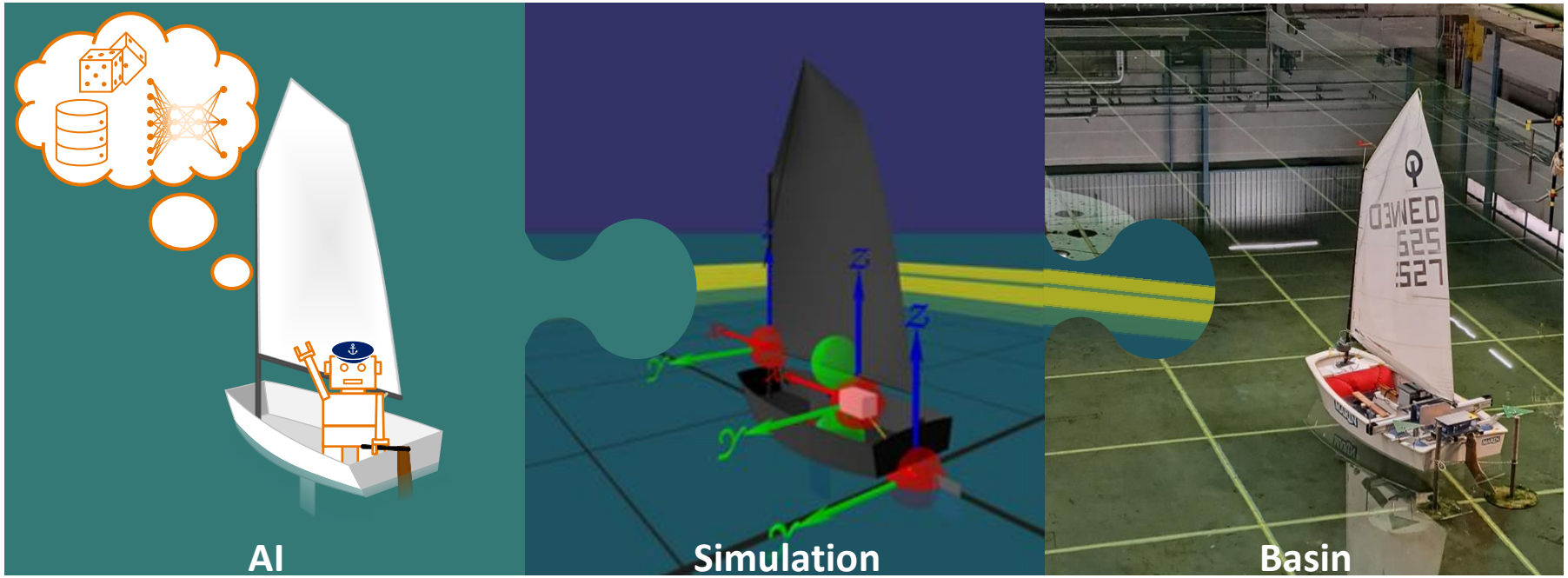
Facilities



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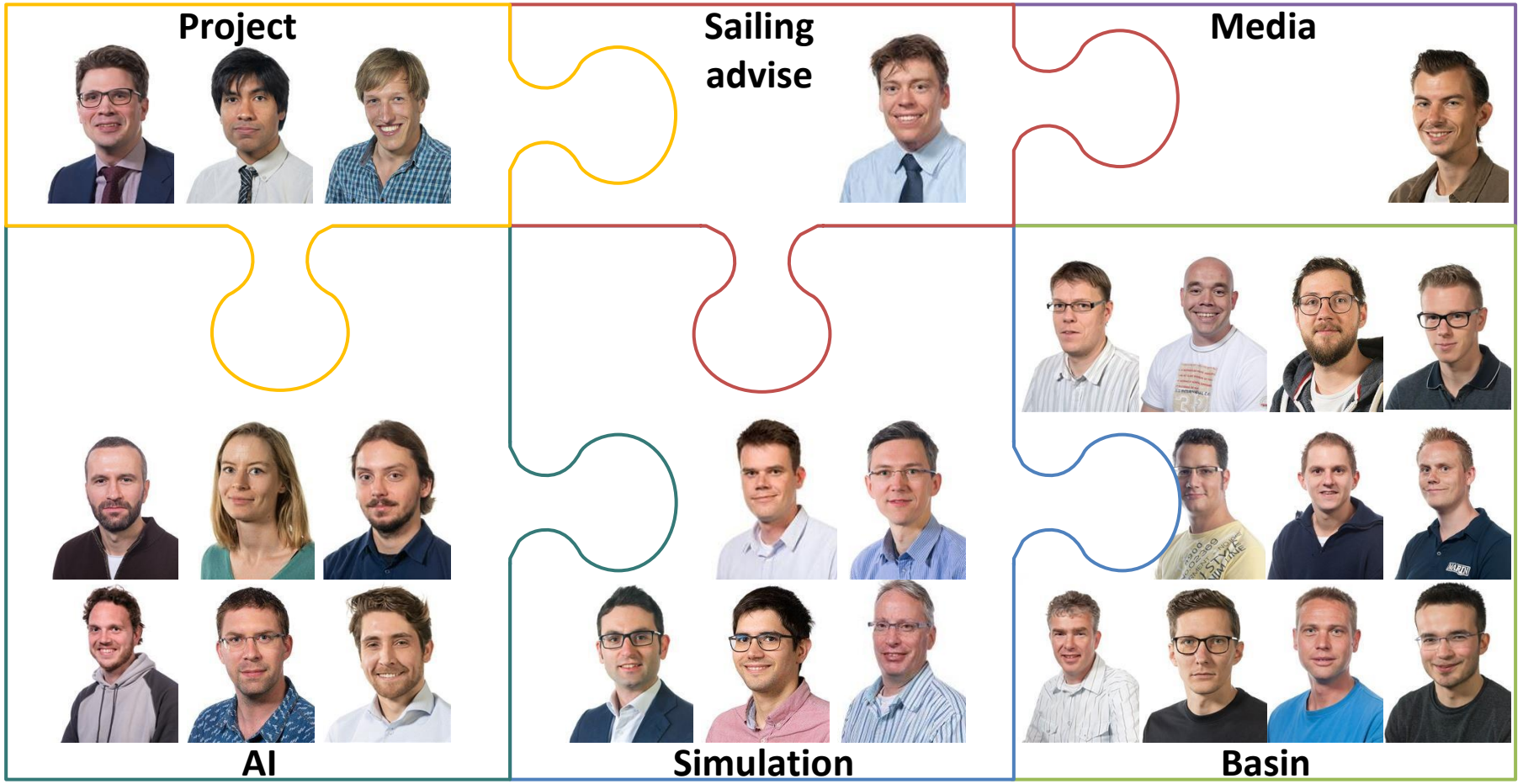
Expertise



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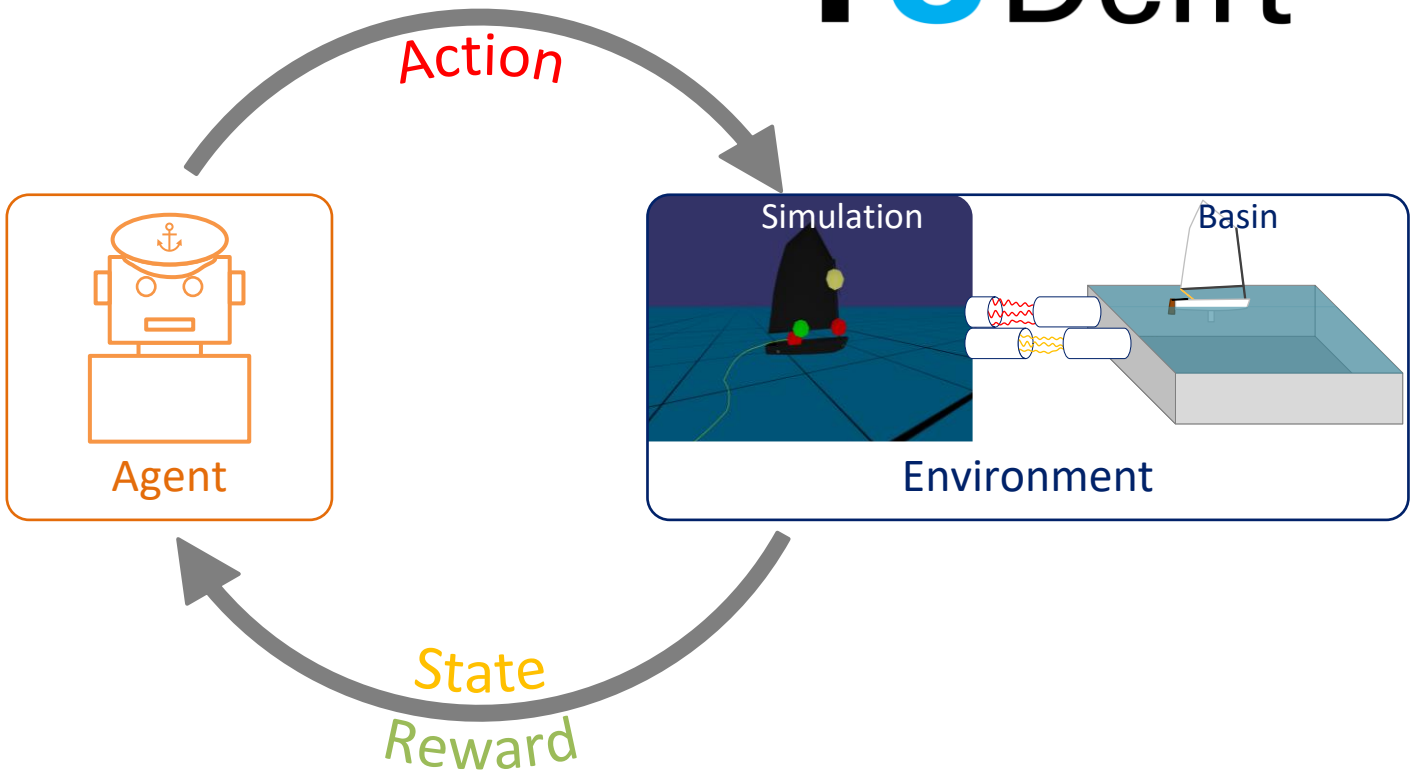
Environment



Agent & hyperparameters

State encoding

End conditions & reward

Environment settings

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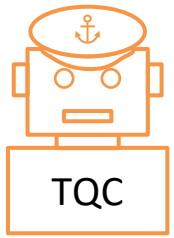
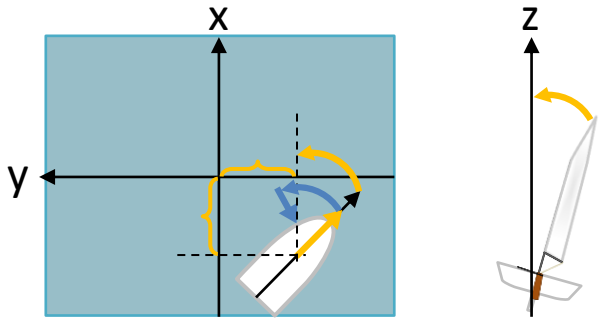
Example

Agent

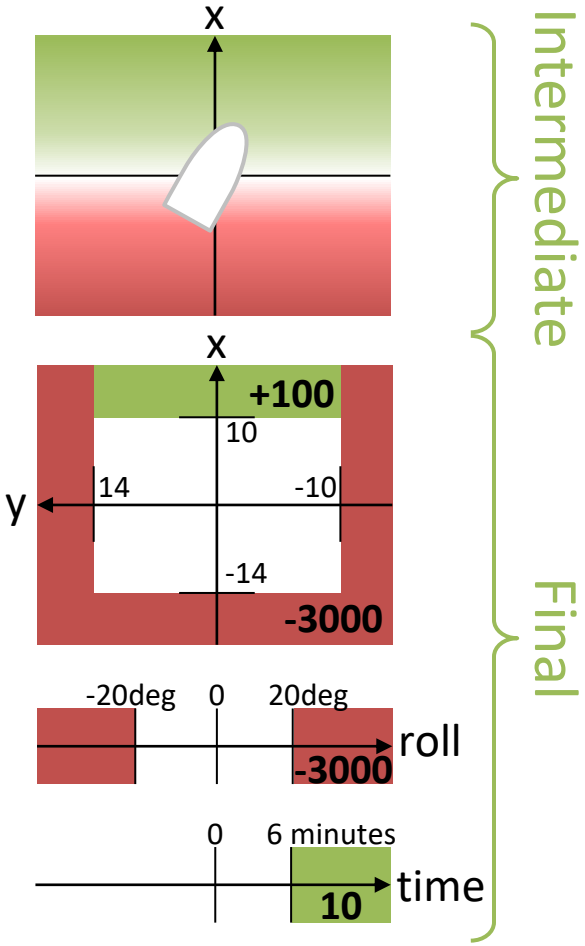


State



- x
- y
- yaw
- roll
- forward speed
- acceleration
- relative wind speed
- relative wind heading

Reward



Discount factor

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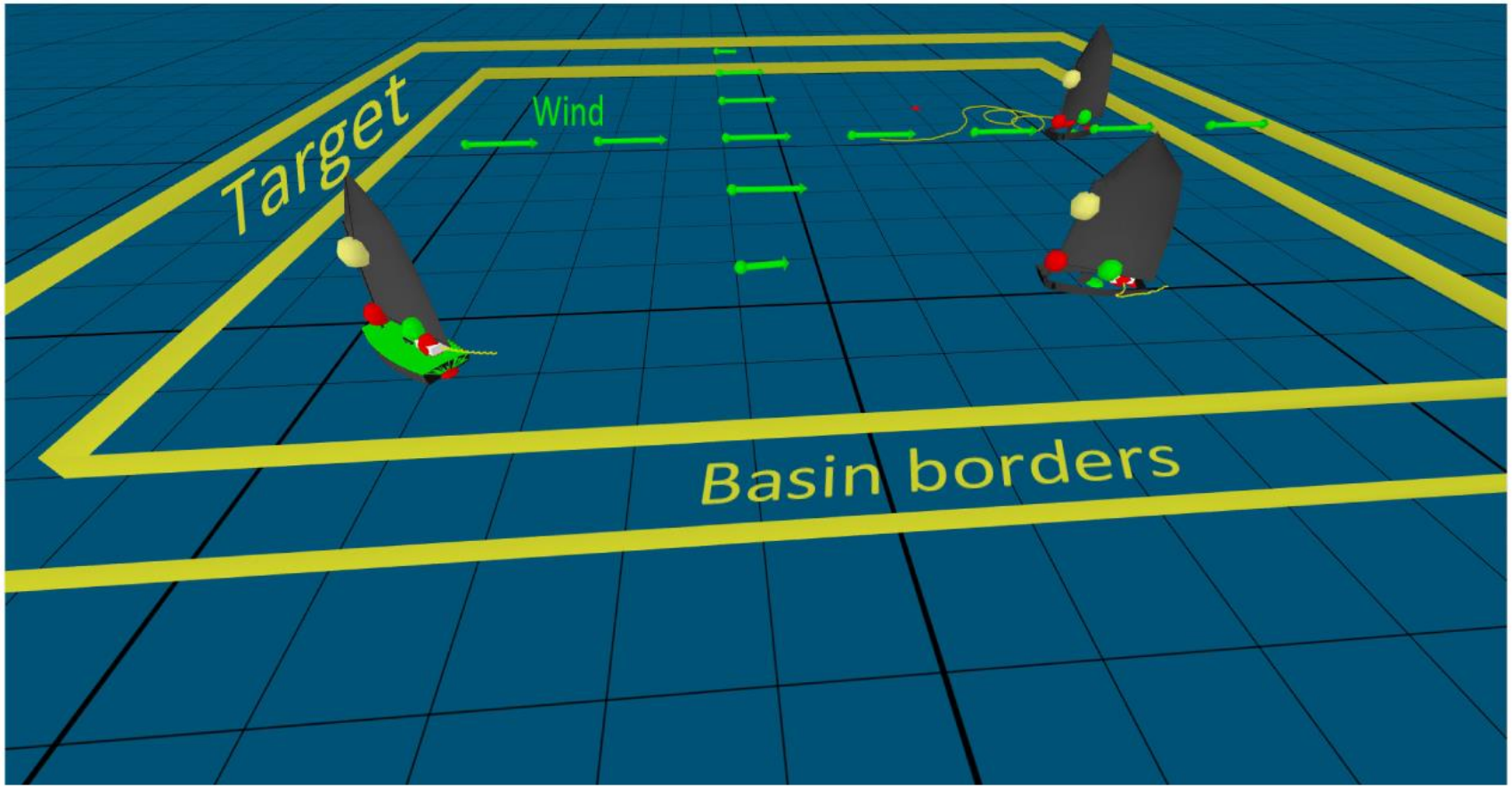
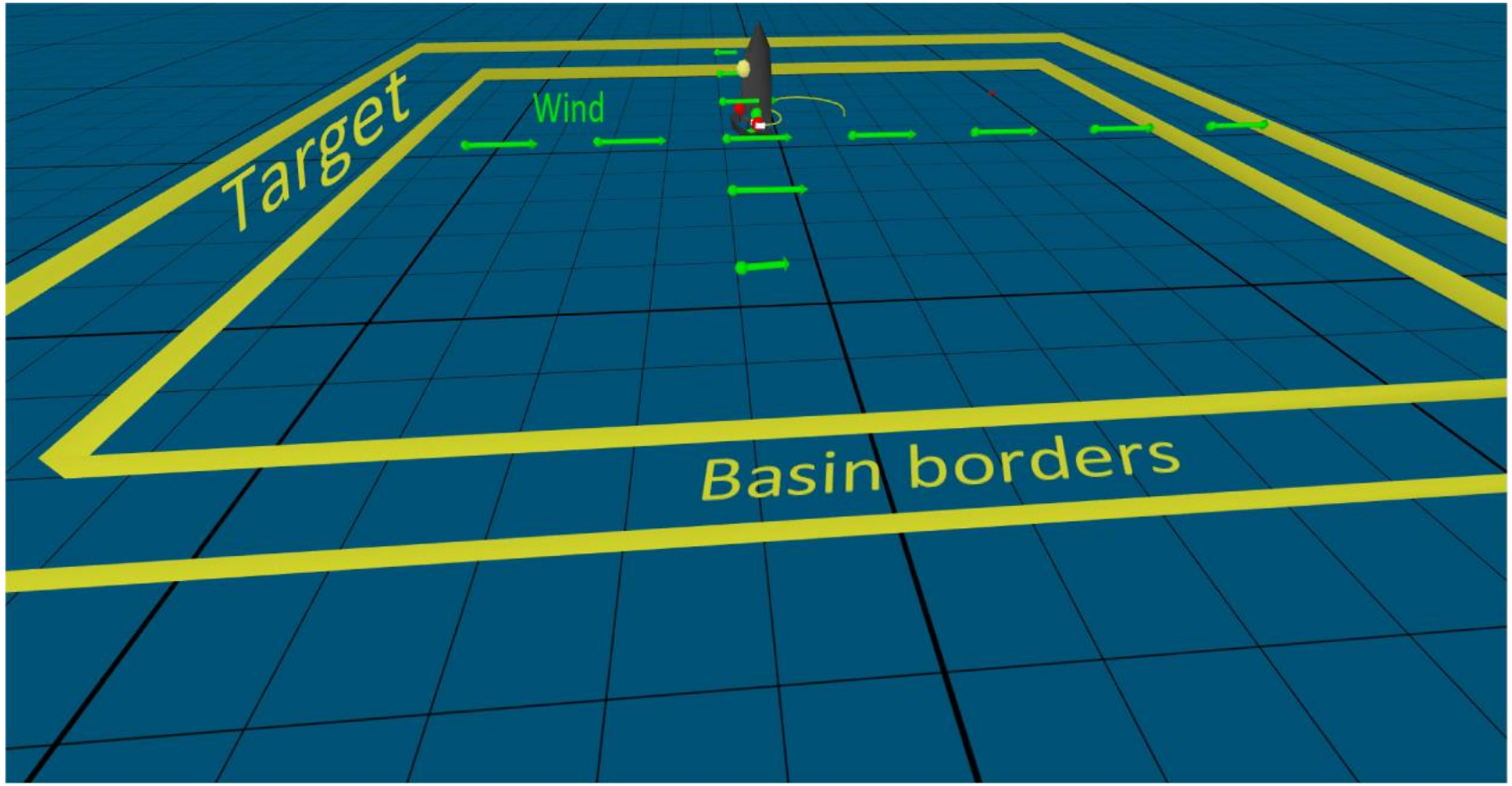
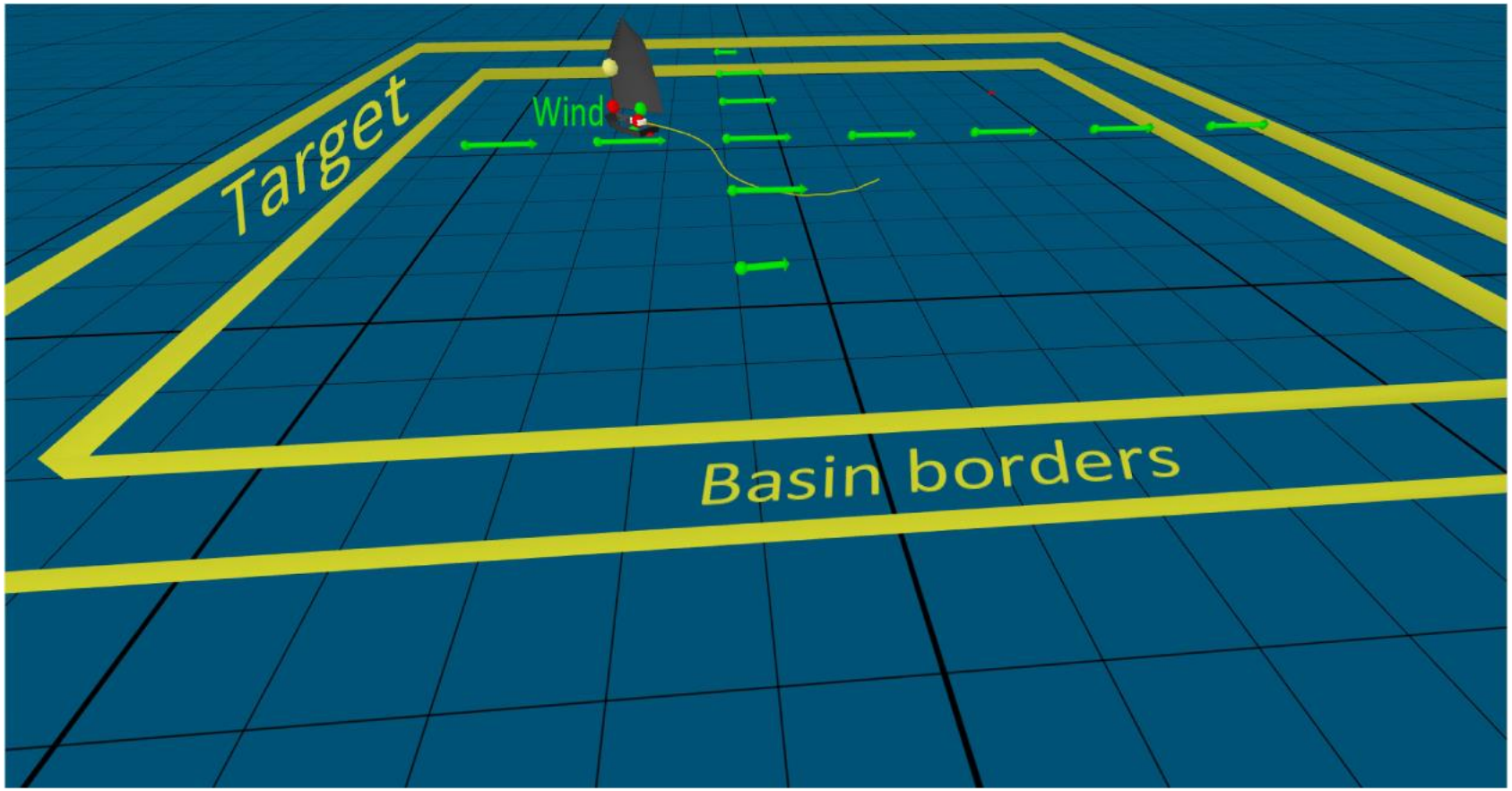
Exploration



After 70 episodes

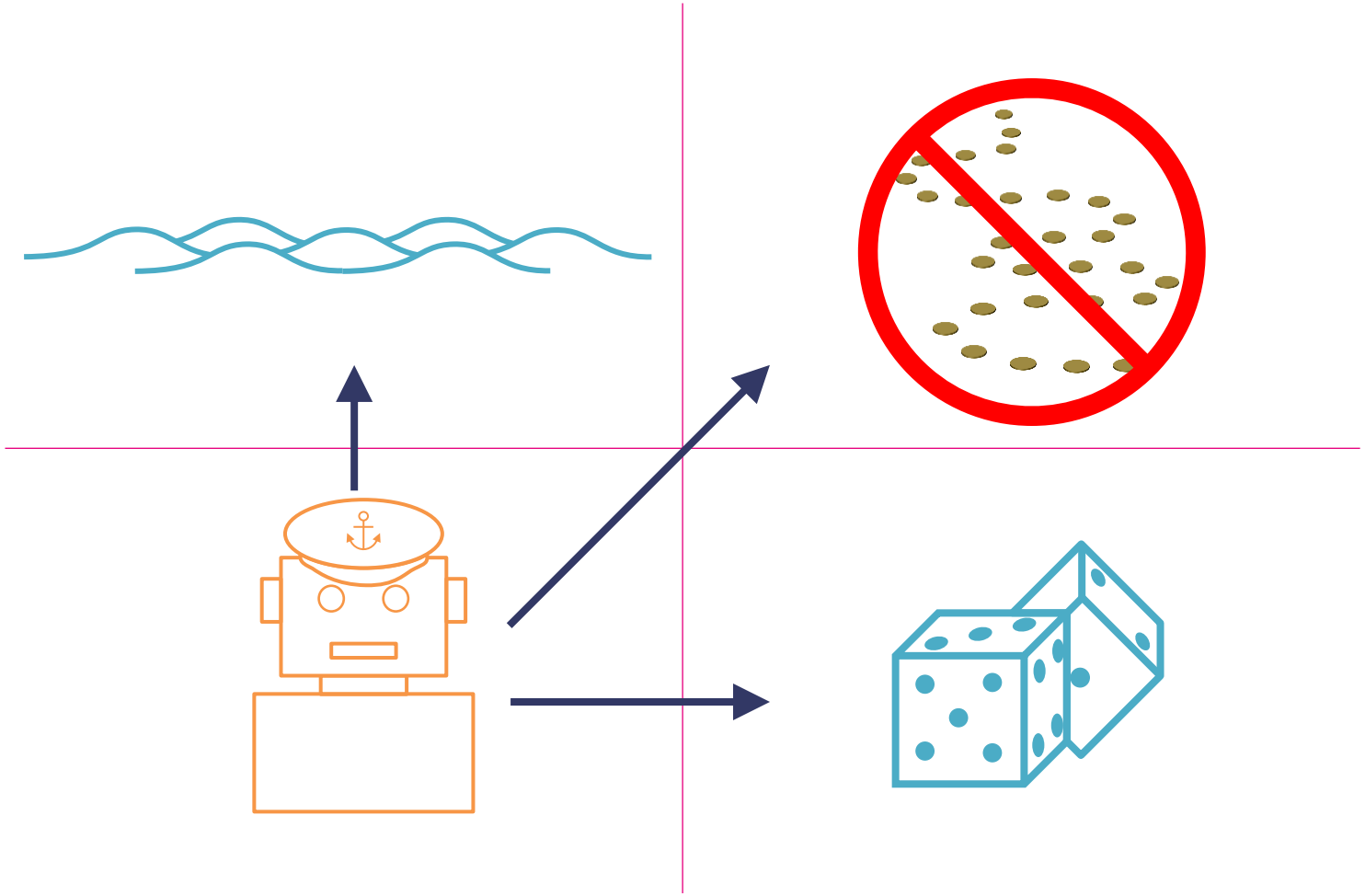


After 450 episodes



Stepping to real world

Improvement



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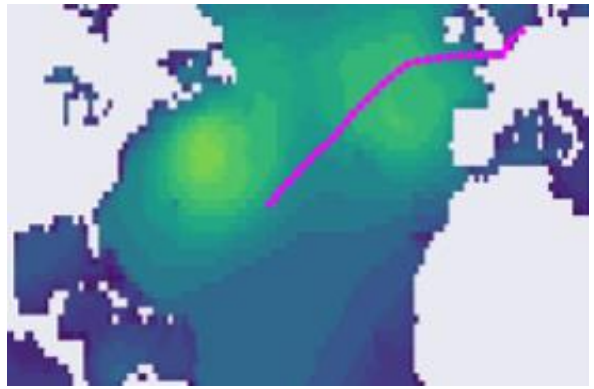
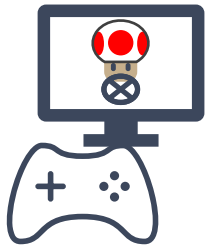
Real applications

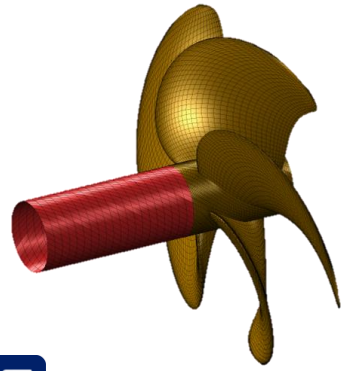
- Advice



- Assist

- Mimic





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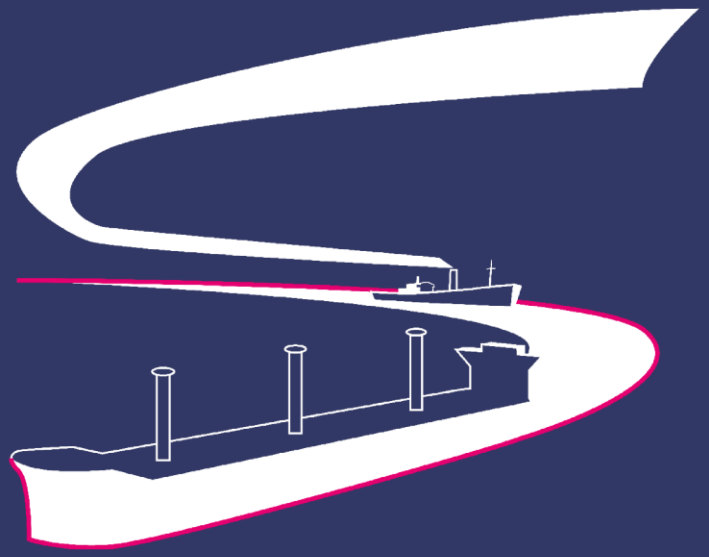
Thank you



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