

# GRACE HOPPER CELEBRATION



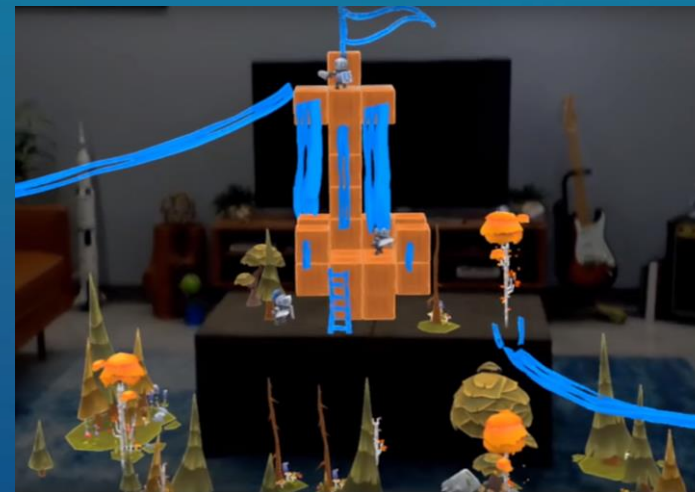
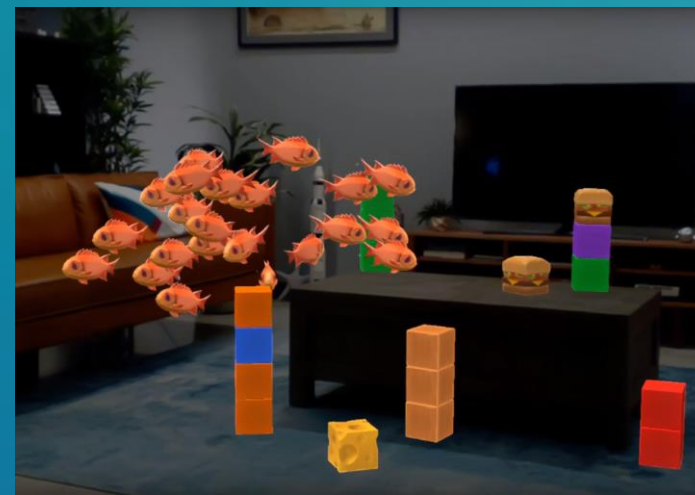
ANITA  
B.ORG

# Blending AI Characters Into the Real-World Using Spatial Computing





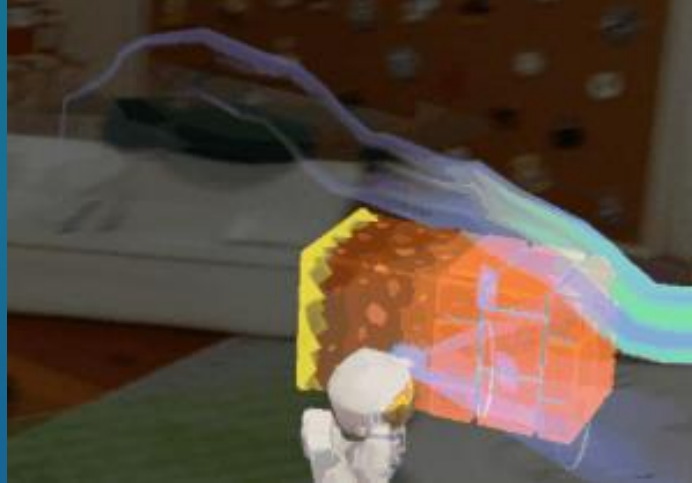
# PROJECT CREATE





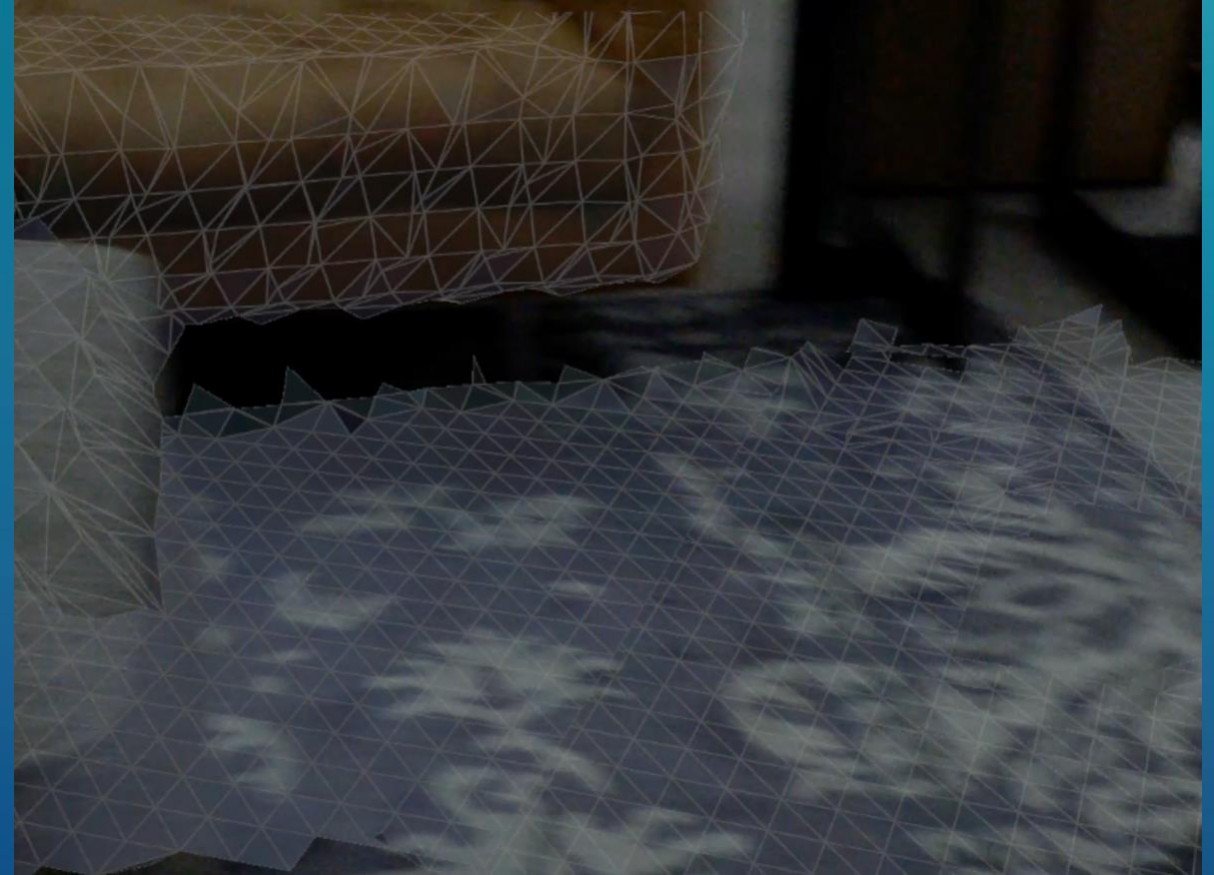
# AI Characters

- Promote Interaction
- Highlight Unique Platform Aspects
- Subset of Larger Experience





# Detecting the Environment





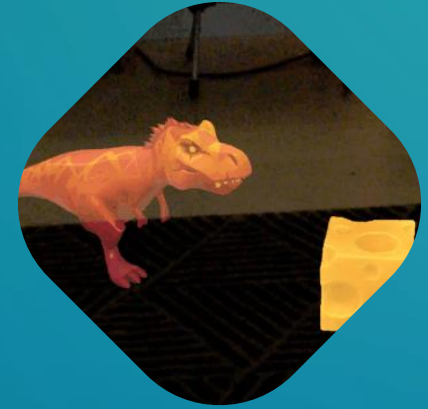
## PERCEIVE WORLD

Physical and Virtual  
Player



## MAKE DECISIONS

Interactive  
Designed Centered



## PERFORM ACTIONS

Simple  
Extensible



## BELIEFS

Parametrize World  
SmartObjects

Action: Eat Food



## DESIRES

Temporary Goals

Goal: Hungry



## INTENTIONS

Task Execution

[GoToFood]  
[EatFood]



# Implementation: Goal Oriented Behavior Trees

SELECTION → Priority List

HEURISTIC → Proximity

TASK EXECUTION → Sub-Tree Injection

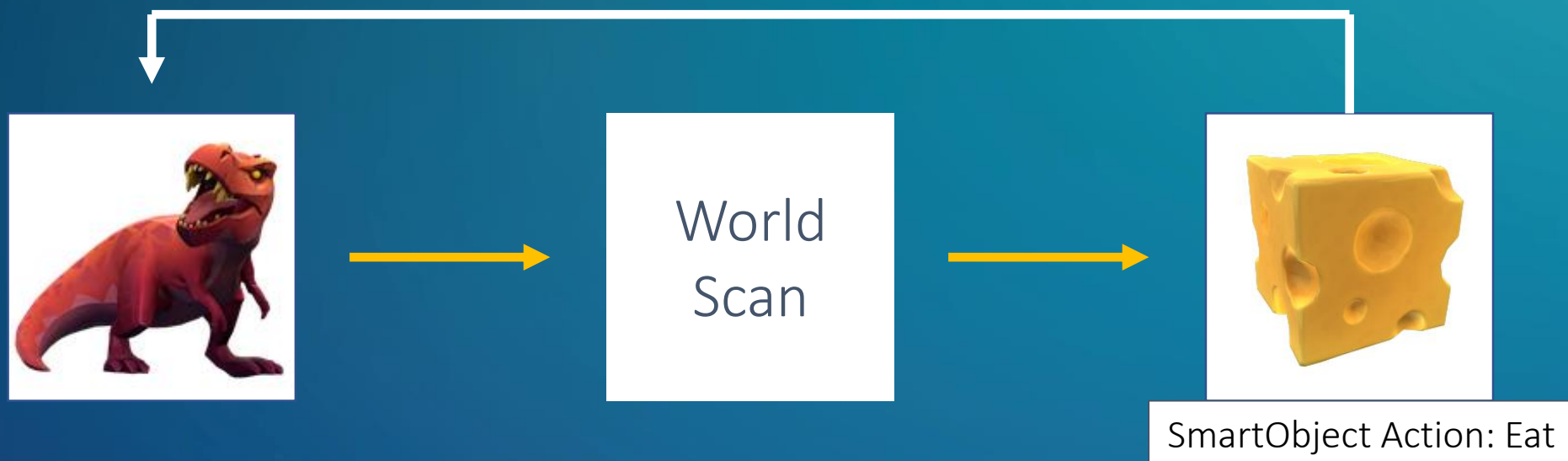
# Task Execution Example



World  
Scan

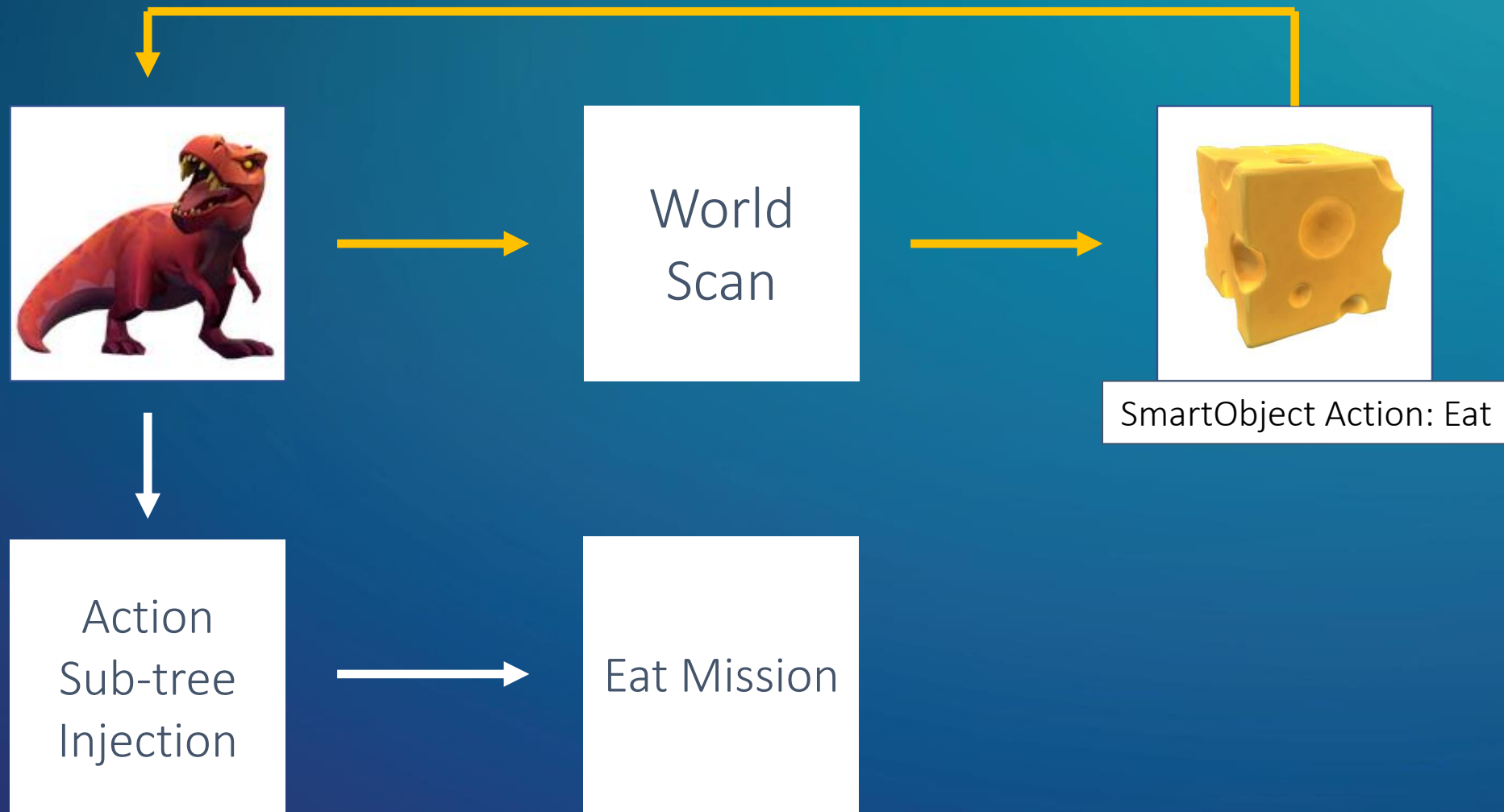


# Task Execution Example

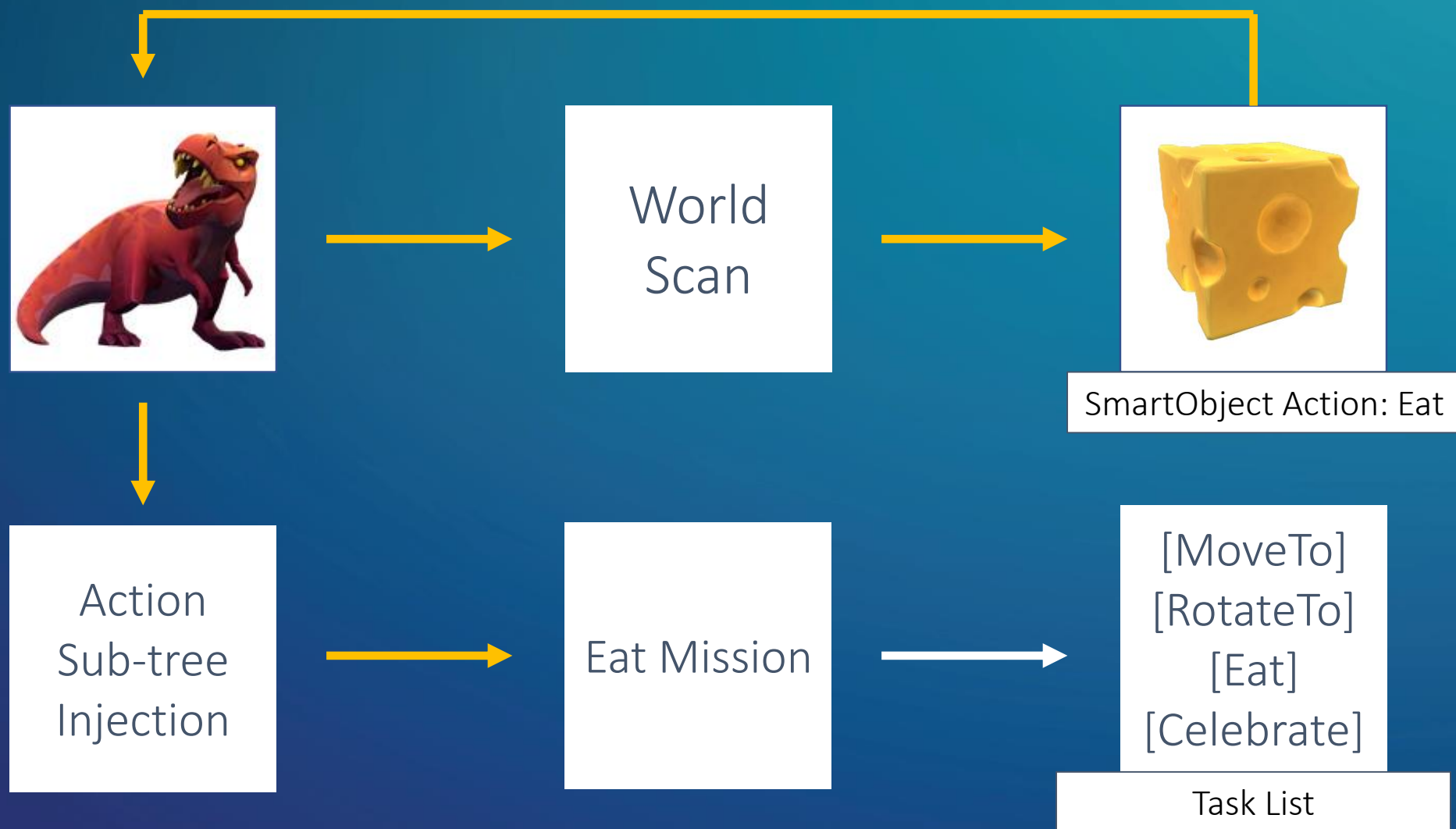




# Task Execution Example



# Task Execution Example



# Goal Oriented Behavior Tree



## Priority Mission List

Eat
Squish
Respond
Greet
Chase
Jump
Wander





# Goal Oriented Behavior Tree



Priority Mission List

Eat
Squish
Respond
Greet
<b>Chase</b>
Jump
Wander



SmartObject Action: Chase



[MoveTo]
[RotateTo]
[Smack]

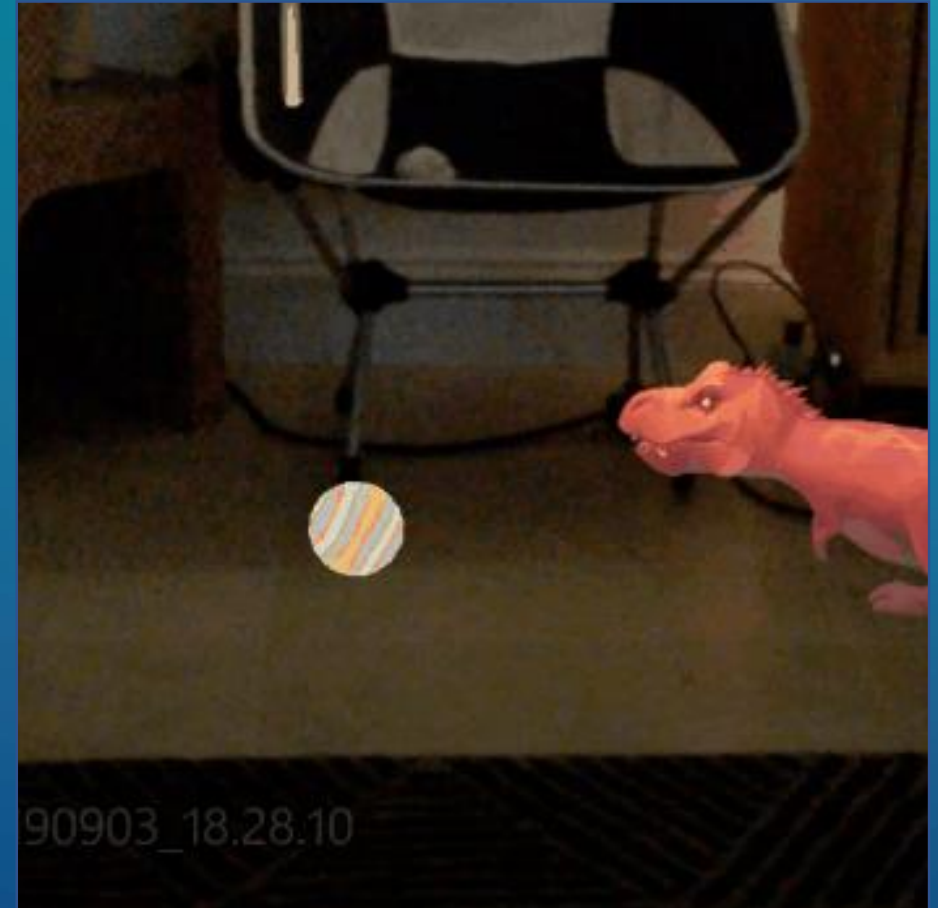


# Goal Oriented Behavior Tree: Priority



## Priority Mission List

Eat	
Squish	
Respond	
Greet	
Chase	[MoveTo]
	[RotateTo]
Jump	[Smack]
Wander	



# Goal Oriented Behavior Tree: Priority



Priority Mission List

Eat

Squish

Respond

Greet

Chase

Jump

Wander

[MoveTo]

[RotateTo]

[Eat]

[Celebrate]





# Goal Oriented Behavior Tree: Cooldowns



Priority Mission List

Eat

Squish

Respond

Greet

Chase

Jump

Wander

Success!

Initiate Cooldown

Ignore Mission for X Seconds



# Goal Oriented Behavior Tree: Stall Handling



## Priority Mission List

Eat
Squish
Respond
Greet
Chase
Jump
Wander

No Progress
Initiate Stall Handler
Fail!
Ignore Mission for X Seconds



# Goal Oriented Behavior Tree: Locking Missions



## Priority Mission List

Eat
Squish
Respond
Greet
Chase
Jump
Wander

Start!
Initiate Lock
Ignore Other Missions





# Goal Oriented Behavior Tree: Interruptions



## Priority Mission List

Eat	
Squish	High Interrupt Priority
Respond	
Greet	Medium Interrupt Priority
Chase	
Jump	
Wander	Low Interrupt Priority



# Goal Oriented Behavior Tree: Force Reactions



Priority Mission List

Eat
Squish
Respond
Greet
Chase
Jump
Wander



Priority Mission List

SeeHappy
SeeSad
Storm
Rainbow
MoodChange
Wander



# Goal Oriented Behavior Tree: Force Reactions



Priority Mission List

Eat
Squish
<b>Respond</b>
Greet
Chase
Jump
Wander



Priority Mission List

SeeHappy
SeeSad
<b>Storm</b>
Rainbow
MoodChange
Wander



# Social Awareness



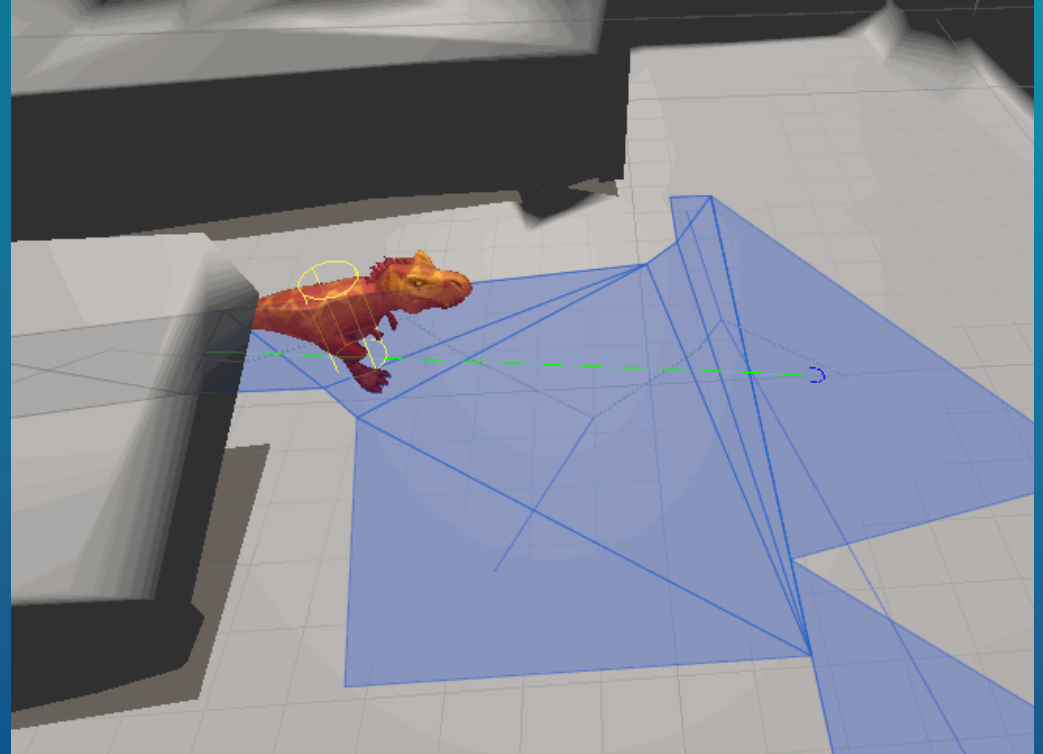
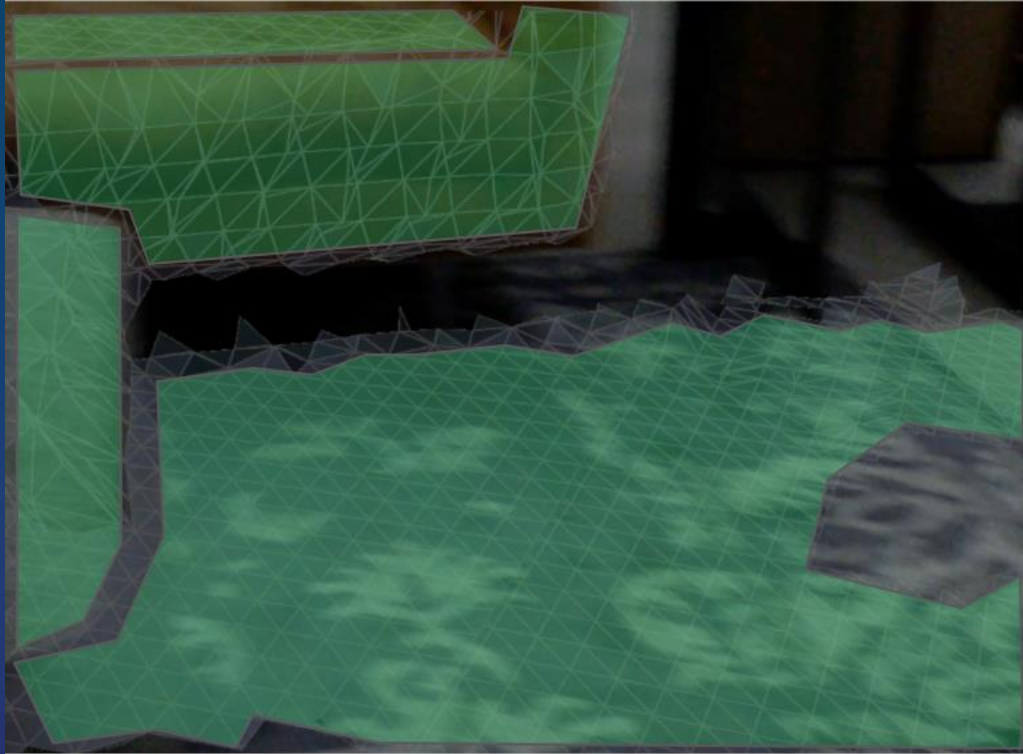


# Locomotion

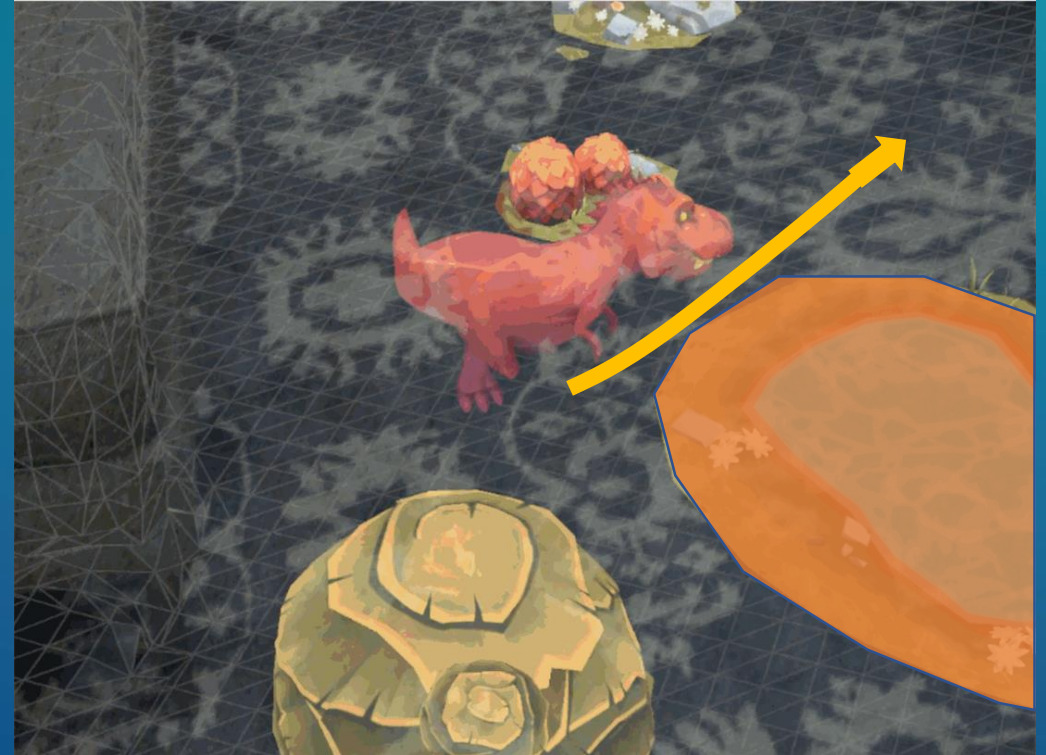




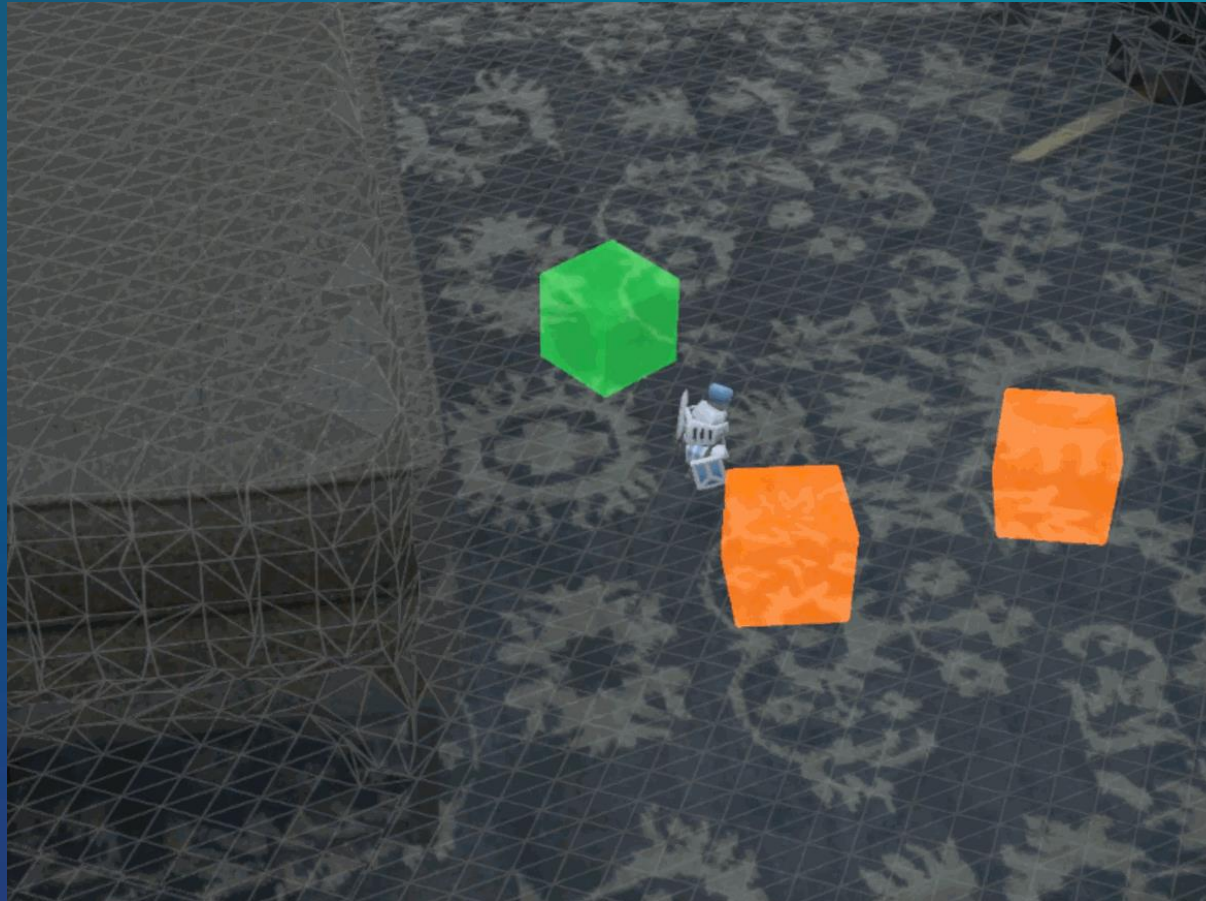
# Locomotion: A\* Pathfinding



# Locomotion: Nav Graph Cuts



# Locomotion: Obstacle Avoidance





# Locomotion: Unconnected Graph Jumping



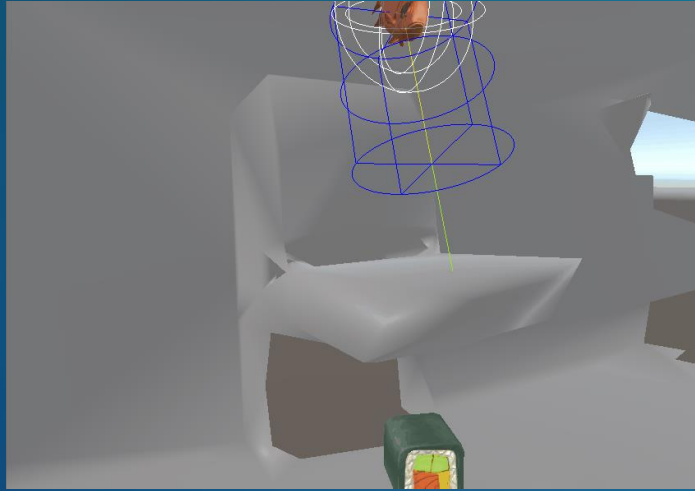
# Locomotion: Flying Characters





# Locomotion: Steering Behaviors

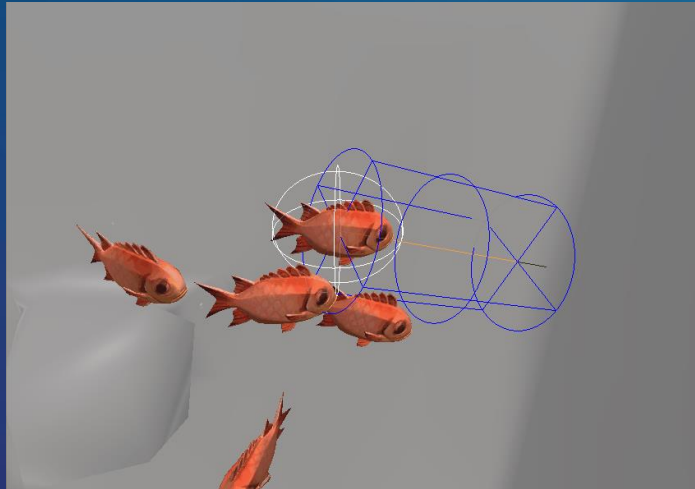
Avoid



Seek



School

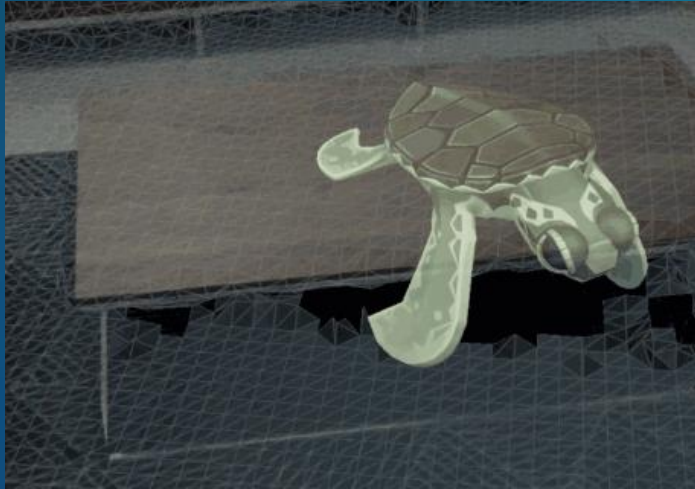


Blend



# User Interaction

Avoid



Look At



Moods



Combinations





# Emergent Storytelling

- Believable Characters
- Player Engagement
- Stronger Immersion

# Key Takeaways



## Goal Based Behavior Trees

Simple behaviors and extensibility allow for designer crafted interactions.



## Expect the Unexpected

User interactions at anytime.  
Anticipate conditions such as stalls and interruptions.



## World Environment

Respond to world geometry.  
Let the characters explore and become at home in the player's space.



Please remember to  
complete the session  
survey in the mobile  
app.

THANK YOU!  
YOU CAN *FOLLOW ME*  
@



 @sprotchet

 @Kathryn-Scelina

GRACE HOPPER  
CELEBRATION



#GHC19