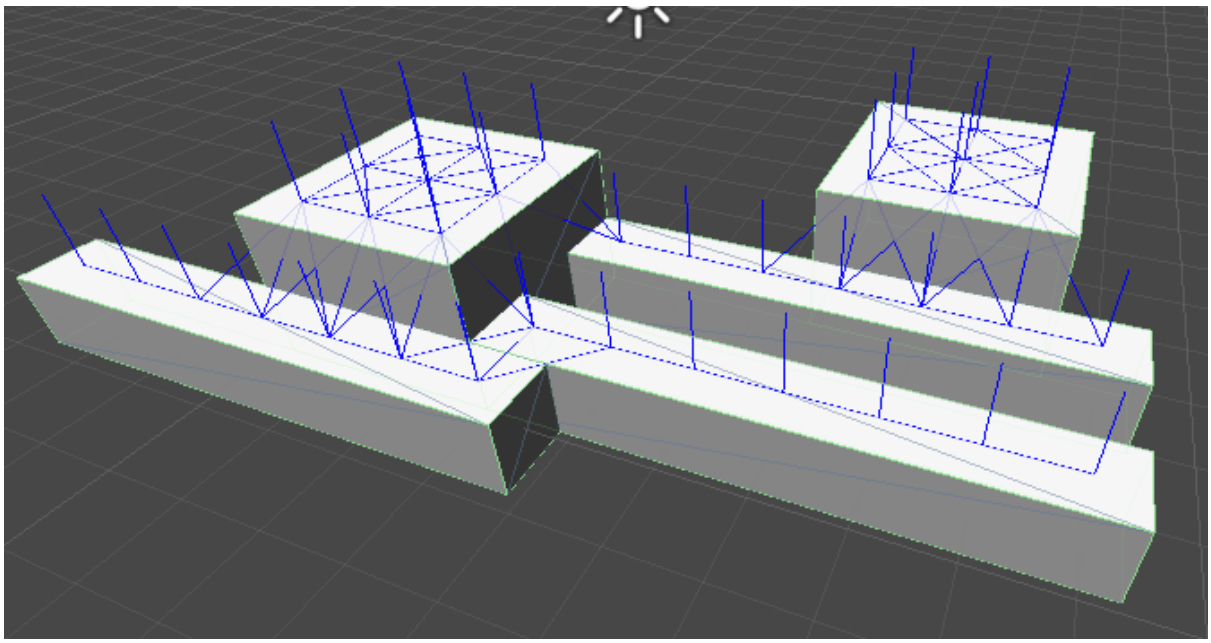
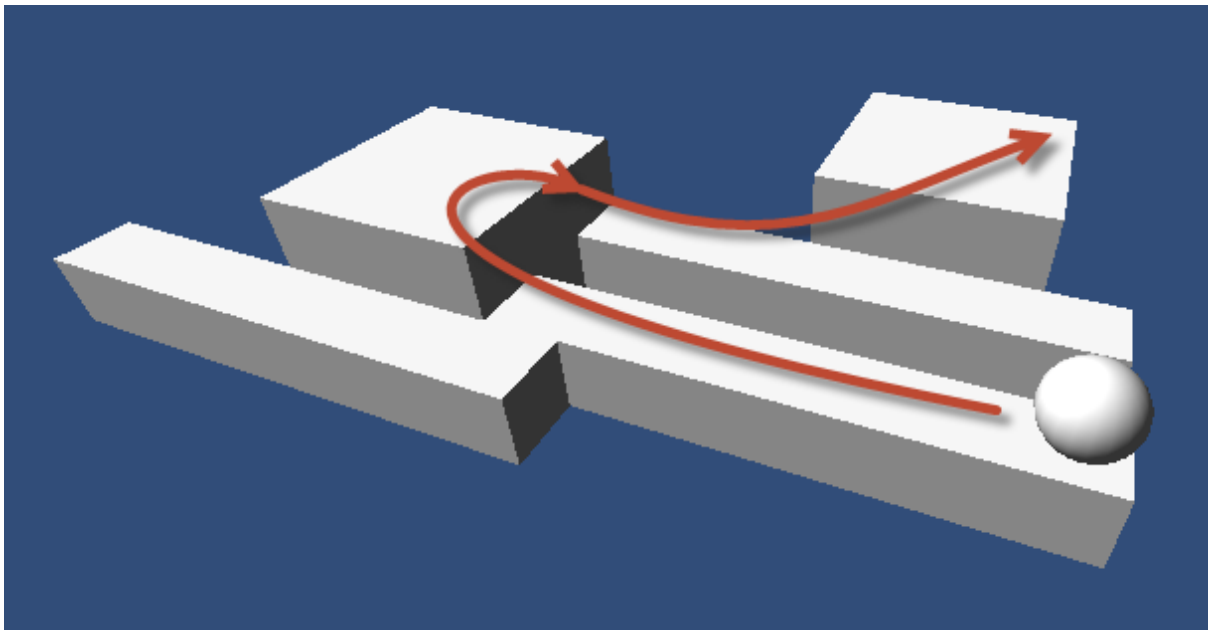
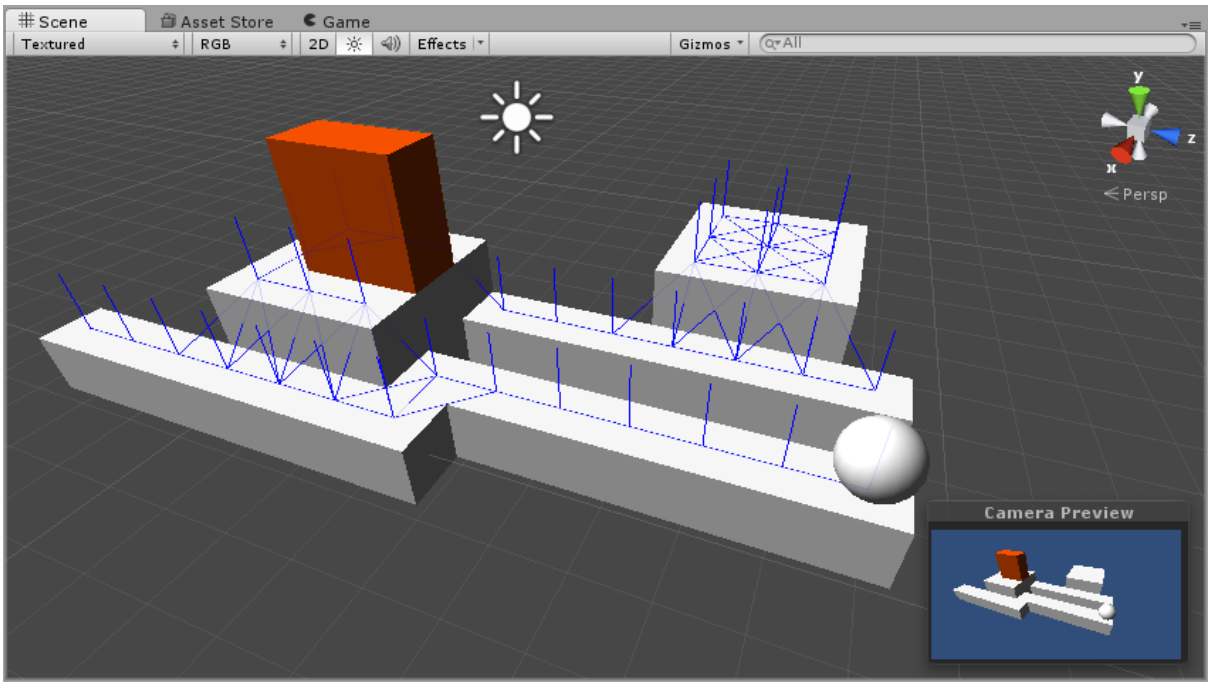
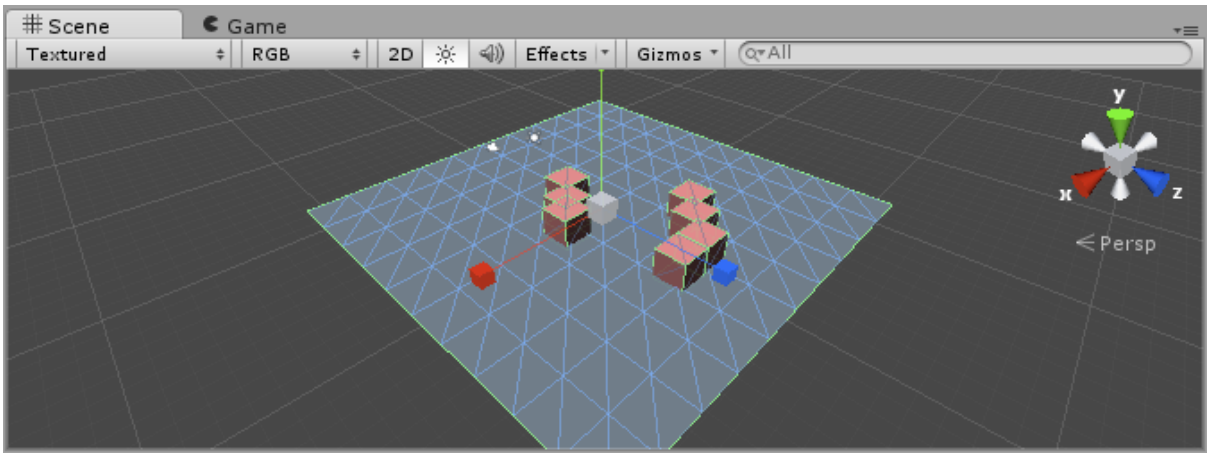
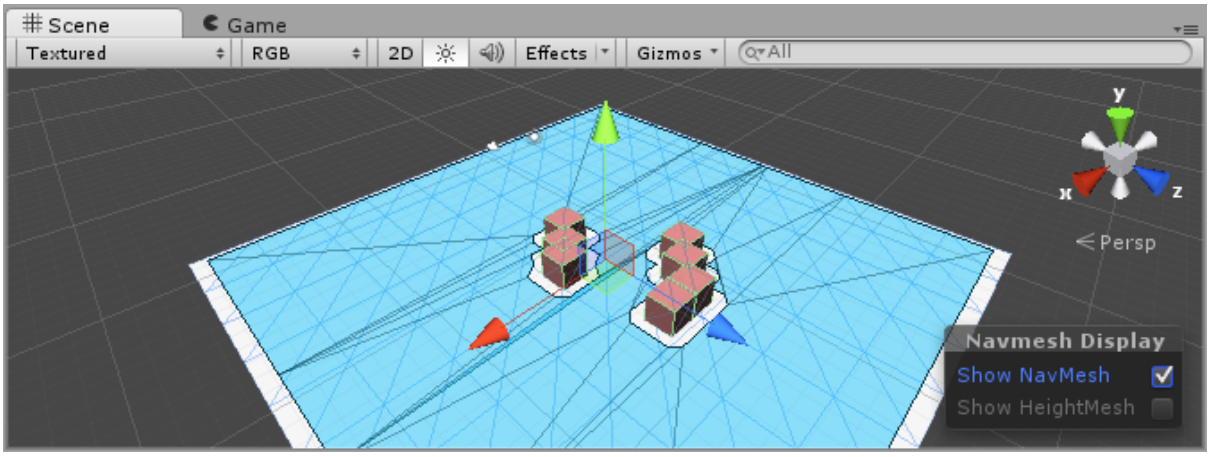
Chapter 1: Pathfinding

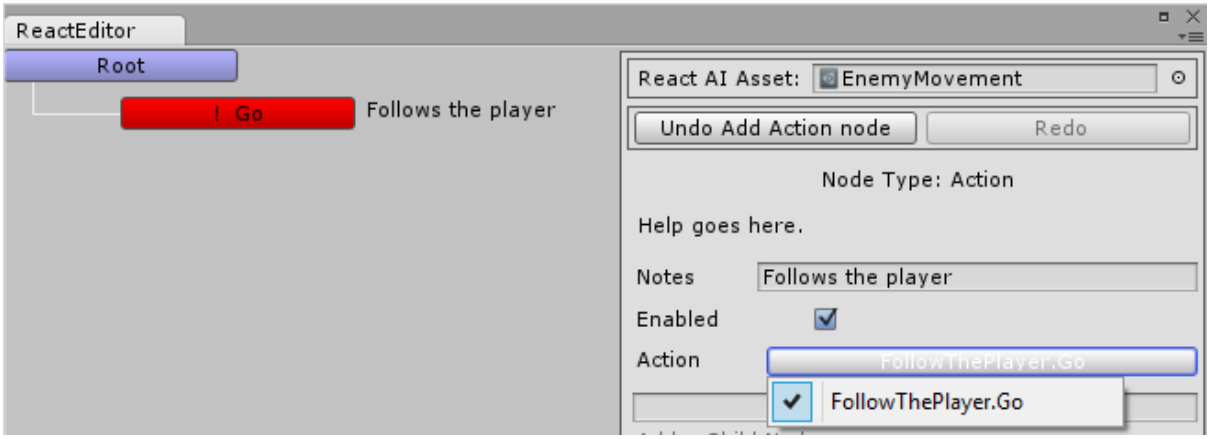


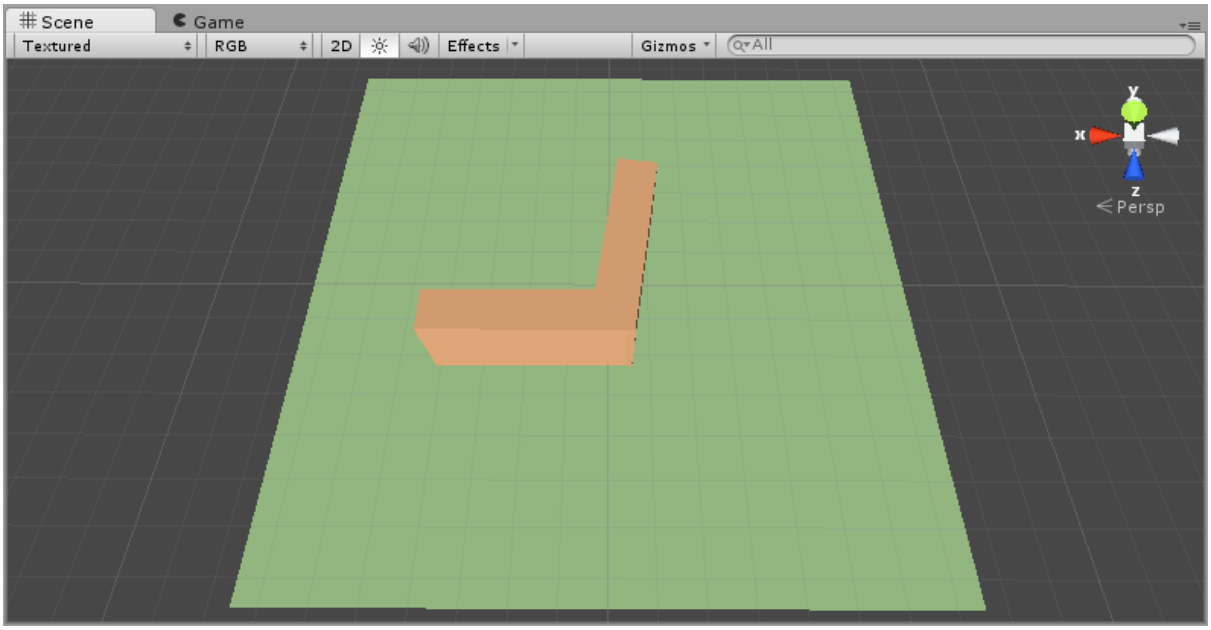


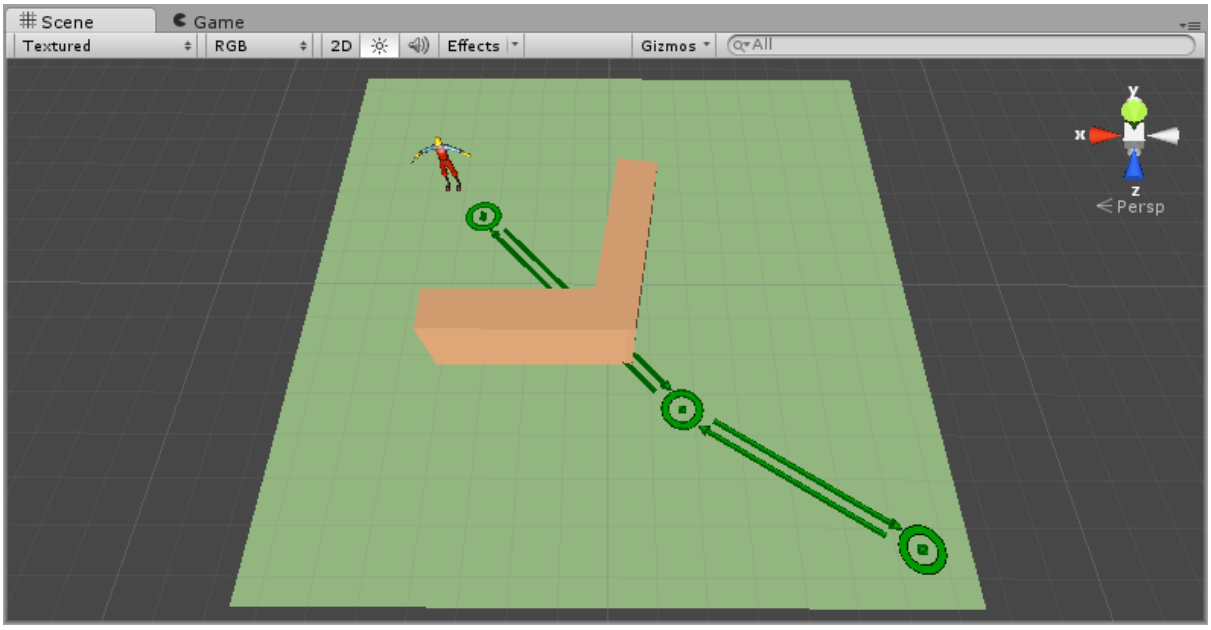

Scene
Asset Store
Game
Textured
RGB
2D
Effects
Gizmos
All
y
z
x
Persp
Camera Preview

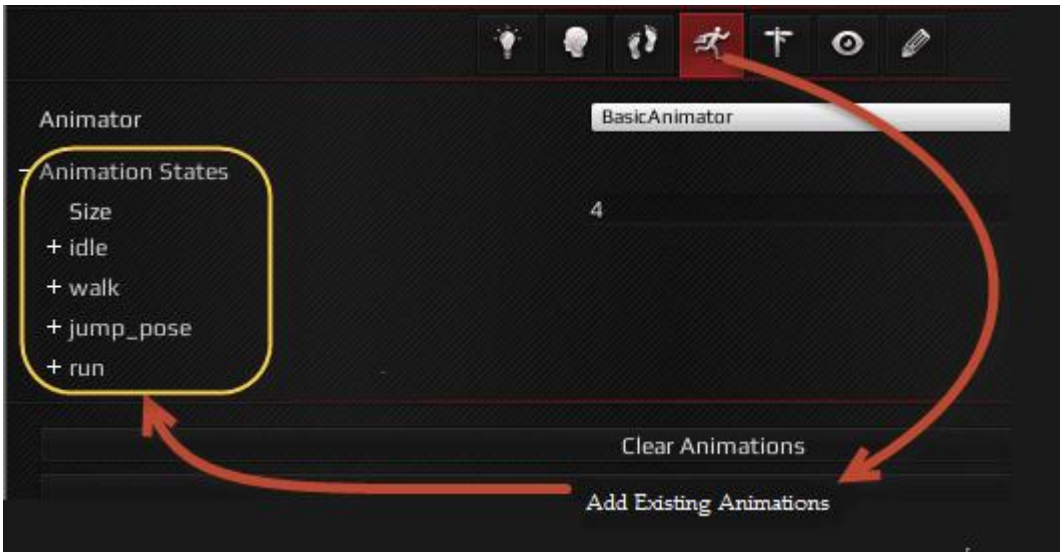

Scene
Game
Textured
RGB
2D
Effects
Gizmos
All
y
x
z
Persp

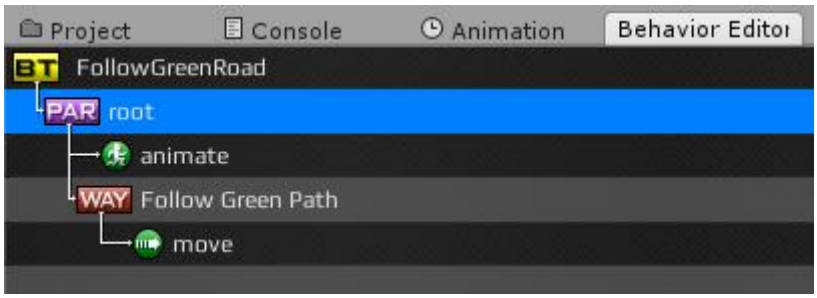

Scene
Game
Textured
RGB
2D
Effects
Gizmos
All
y
x
z
Persp
Navmesh Display
Show NavMesh
Show HeightMesh


ReactEditor
Root
! Go
Follows the player
React AI Asset:
EnemyMovement
Undo Add Action node
Redo
Node Type: Action
Help goes here.
Notes
Follows the player
Enabled
Action
FollowThePlayer.Go
FollowThePlayer.Go

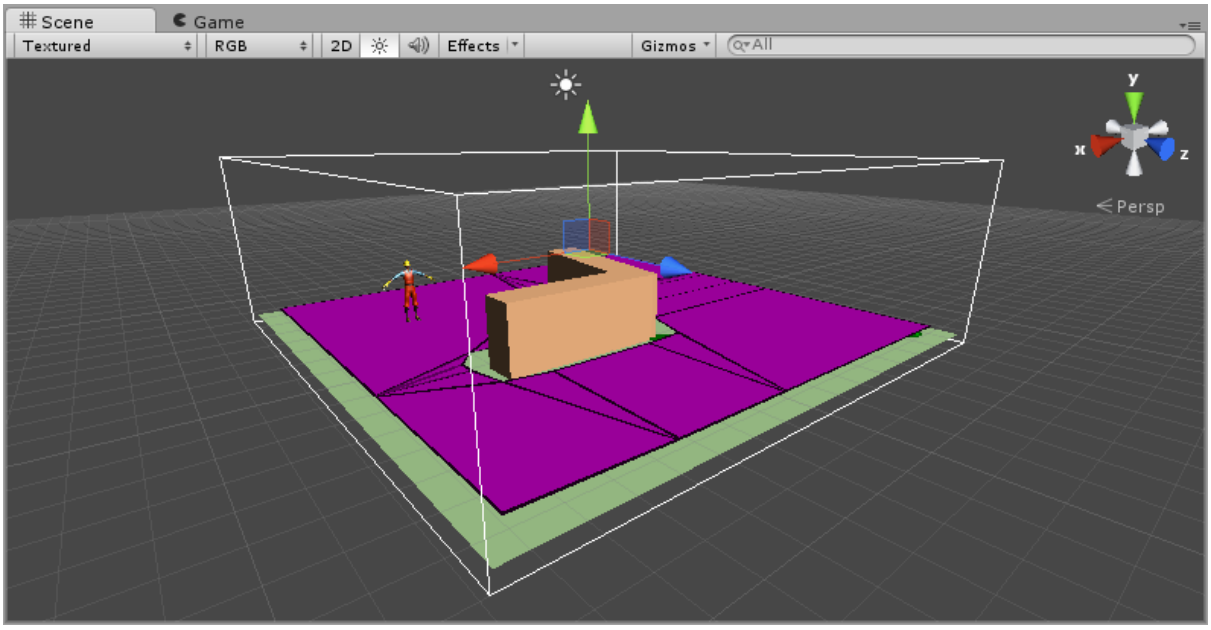

Scene
Game
Textured
RGB
2D
Effects
Gizmos
All
y
x
z
Persp


Scene
Game
Textured
RGB
2D
Effects
Gizmos
All
y
x
z
Persp

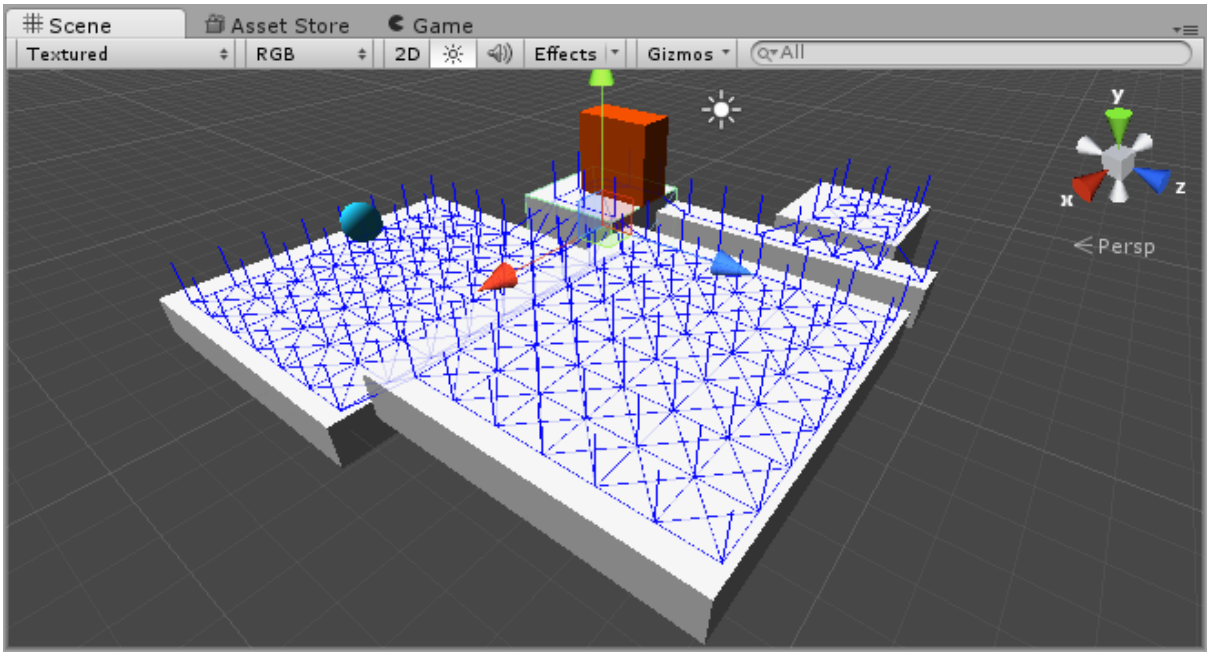

Animator
BasicAnimator
Animation States
Size
4
+ idle
+ walk
+ jump_pose
+ run
Clear Animations
Add Existing Animations

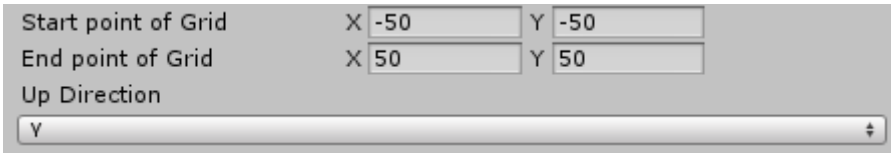

Project
Console
Animation
Behavior Editor
BT
FollowGreenRoad
PAR
root
animate
WAY
Follow Green Path
move

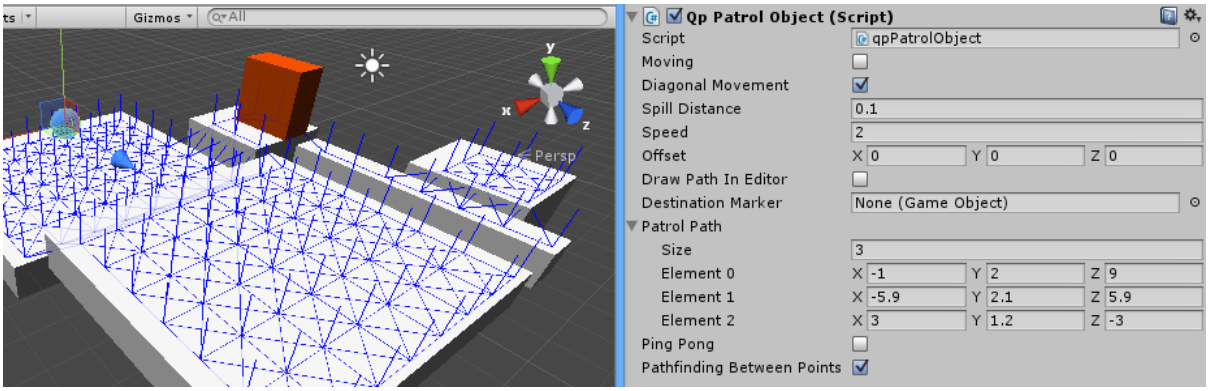
Node Type:	Patrol Route
Name:	Follow Green Path
Repeat:	Never
Pause When Hit:	
Waypoint Route:	GreenPath
Loop Type:	One Way
Direction:	Forward
Move Target Variable:	NextWayPoint

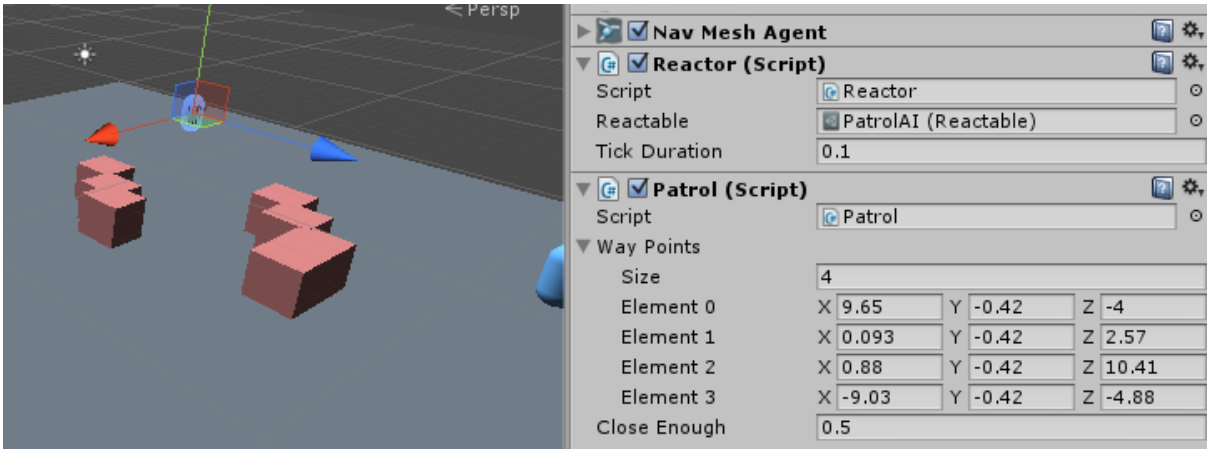


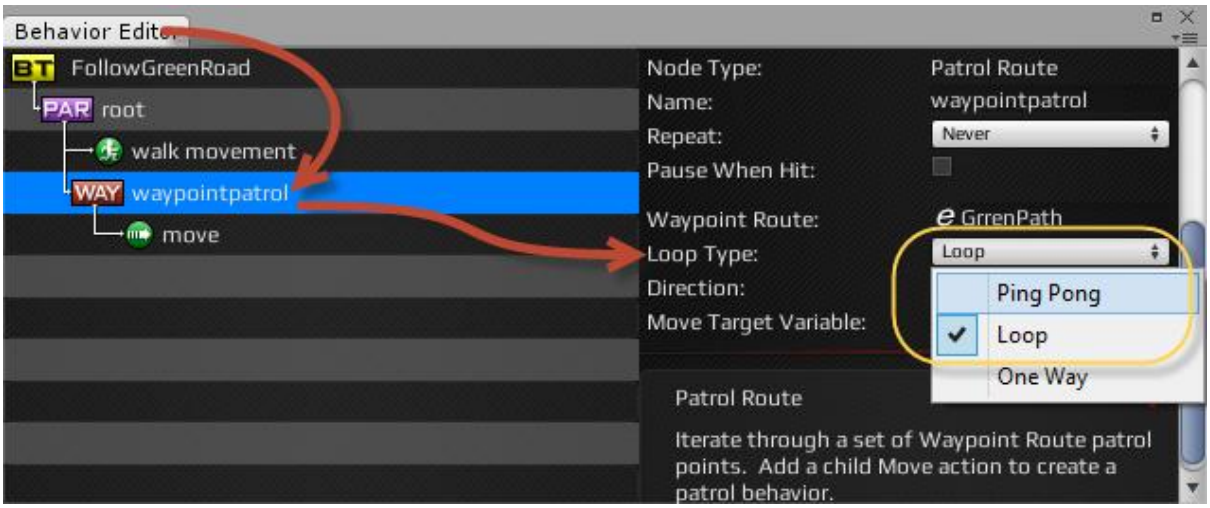
Chapter 2: Patrolling

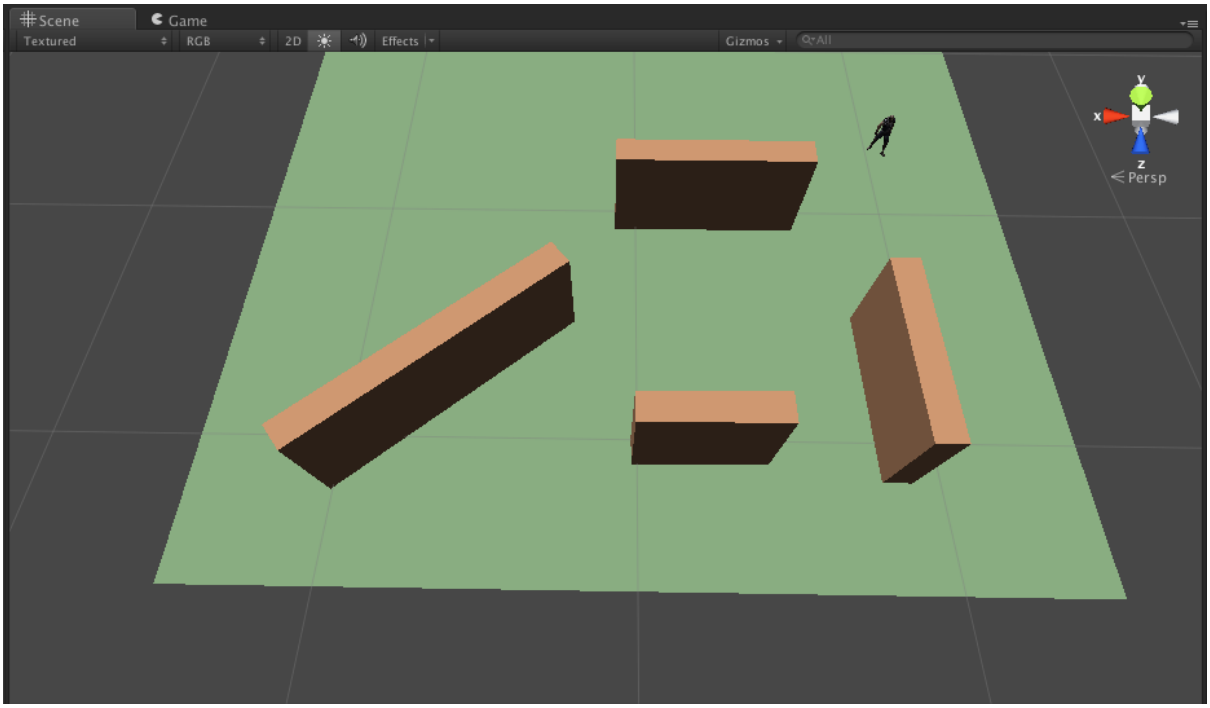


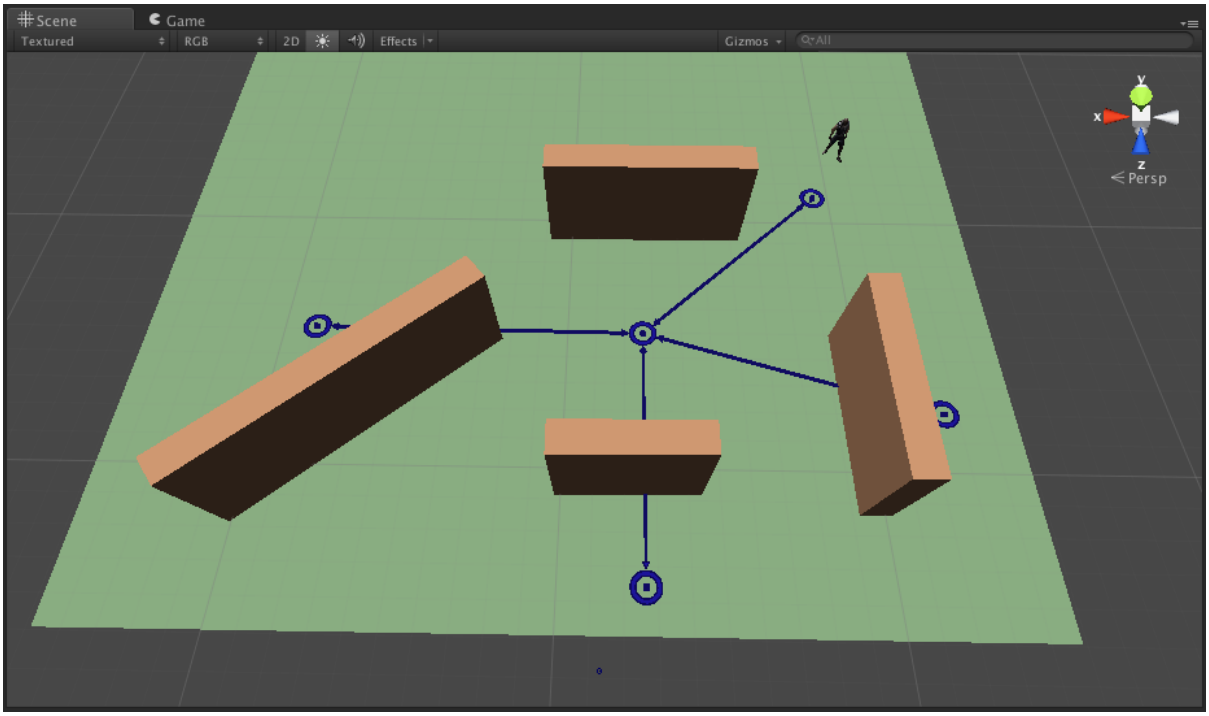


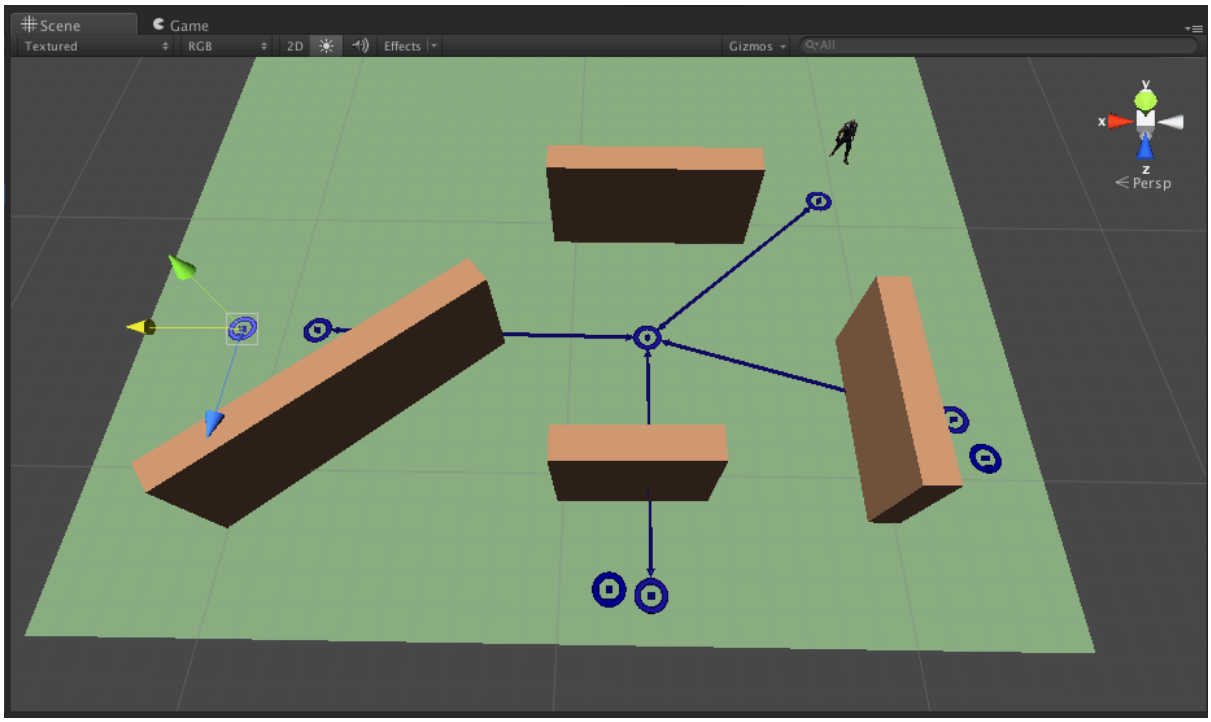



Persp
Nav Mesh Agent
Reactor (Script)
Script
Reactor
Reactable
PatrolAI (Reactable)
Tick Duration
0.1
Patrol (Script)
Script
Patrol
Way Points
Size
4
Element 0
X 9.65
Y -0.42
Z -4
Element 1
X 0.093
Y -0.42
Z 2.57
Element 2
X 0.88
Y -0.42
Z 10.41
Element 3
X -9.03
Y -0.42
Z -4.88
Close Enough
0.5


Behavior Editor
BT FollowGreenRoad
PAR root
walk movement
WAY waypointpatrol
move
Node Type:
Patrol Route
Name:
waypointpatrol
Repeat:
Never
Pause When Hit:
Waypoint Route:
GrrenPath
Loop Type:
Loop
Direction:
Move Target Variable:
Ping Pong
Loop
One Way
Patrol Route
Iterate through a set of Waypoint Route patrol points. Add a child Move action to create a patrol behavior.

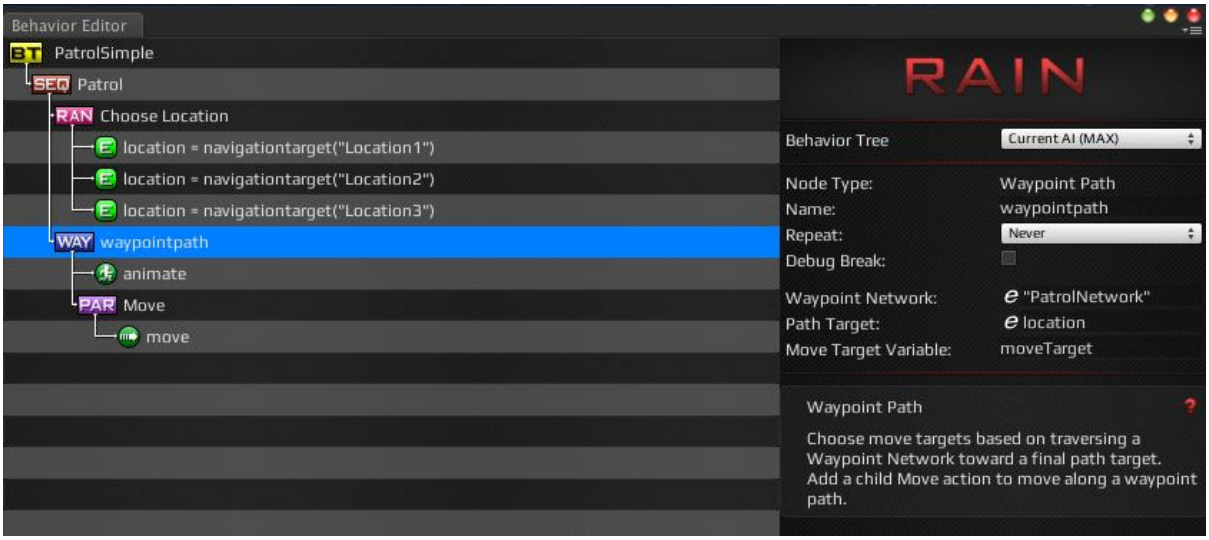

Scene
Game
Textured
RGB
2D
Effects
Gizmos
Persp


Scene
Game
Textured
RGB
2D
Effects
Gizmos
Persp

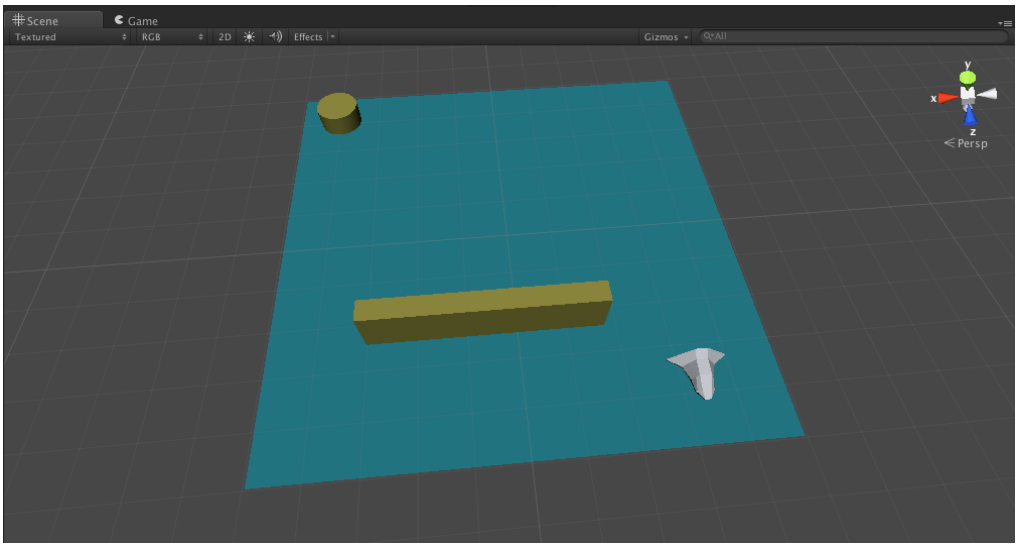

Scene
Game
Textured
RGB
2D
Effects
Gizmos
Persp

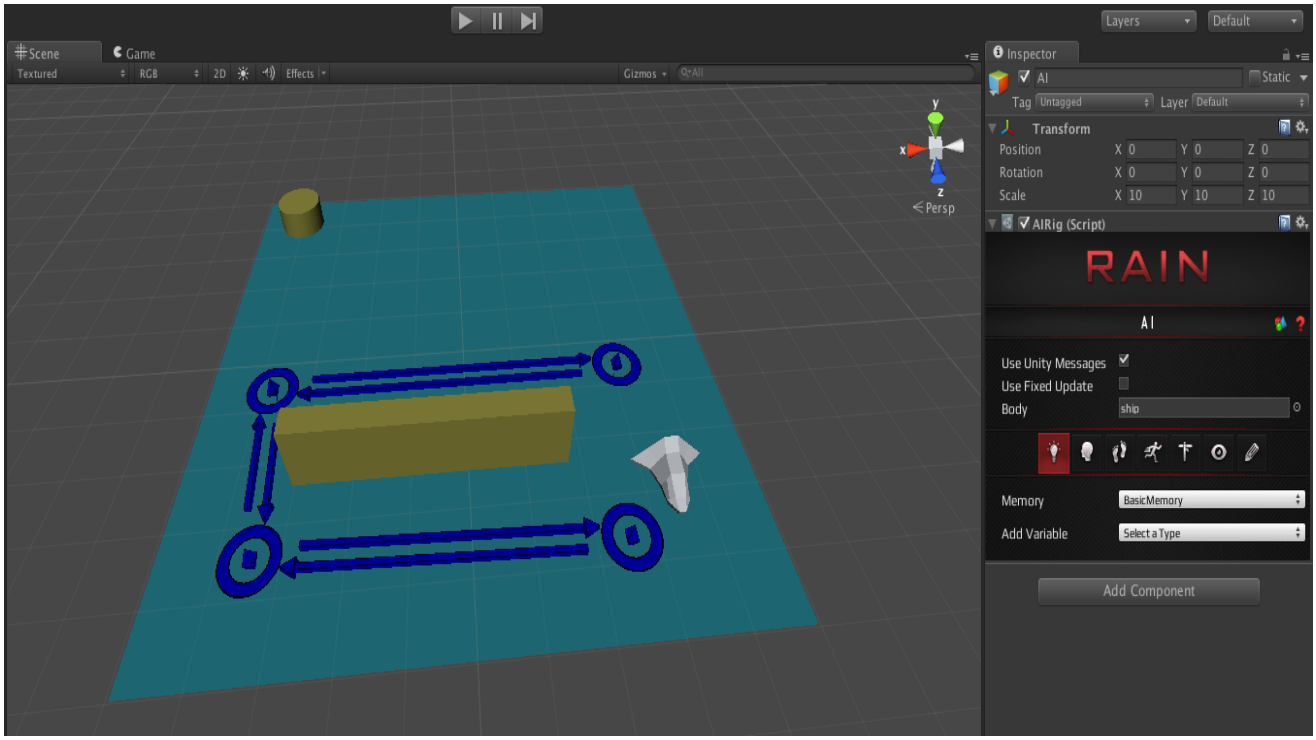

Inspector
Location1
Static
Tag
Untagged
Layer
Default
Transform
Position
X 0
Y 0
Z 0
Rotation
X 0
Y 0
Z 0
Scale
X 1
Y 1
Z 1
Navigation Target Rig (Script)
RAIN
NAVIGATION TARGET
Mount Point
Location1
Position Offset
X 11.6349
Y 0
Z 4.867311
Angle Offset
X 0
Y 0
Z 0
Range
0.5
Drop To Surface
Add Component


Behavior Editor
BT Patrol
SEQ root
RAN random
Choose Location 1
Choose Location 2
Choose Location 3
RAIN
Behavior Tree
Patrol
Reload
Import XML
Export XML
Node Type:
Expression
Name:
Choose Location 1
Repeat:
Never
Debug Break:
Weight:
Expression:
Returns:
Evaluate
Expression
Evaluate an expression. Returns success, failure, or either based on evaluating the expression. Expression examples: 'health = 5' or 'target != null'


Behavior Editor
BT PatrolSimple
SEQ Patrol
RAN Choose Location
location = navigationtarget("Location1")
location = navigationtarget("Location2")
location = navigationtarget("Location3")
WAY waypointpath
animate
PAR Move
move
RAIN
Behavior Tree
Current AI (MAX)
Node Type:
Waypoint Path
Name:
waypointpath
Repeat:
Never
Debug Break:
Waypoint Network:
"PatrolNetwork"
Path Target:
location
Move Target Variable:
moveTarget
Waypoint Path
Choose move targets based on traversing a Waypoint Network toward a final path target. Add a child Move action to move along a waypoint path.

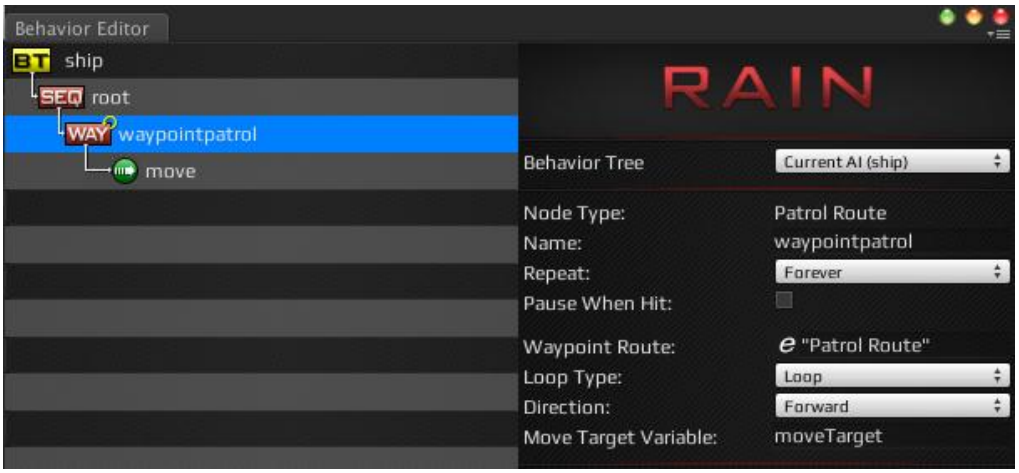
Chapter 3: Behavior Trees

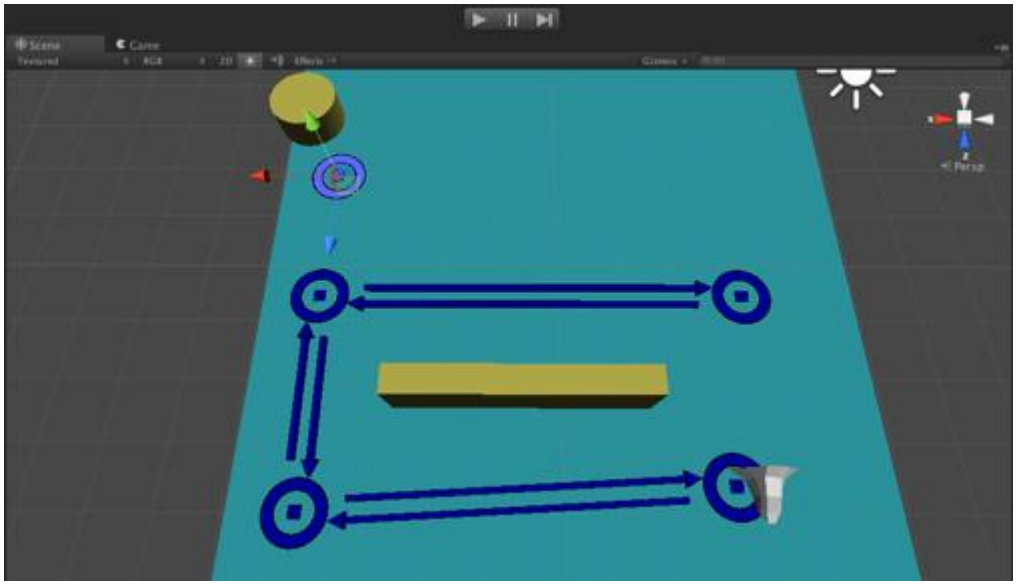




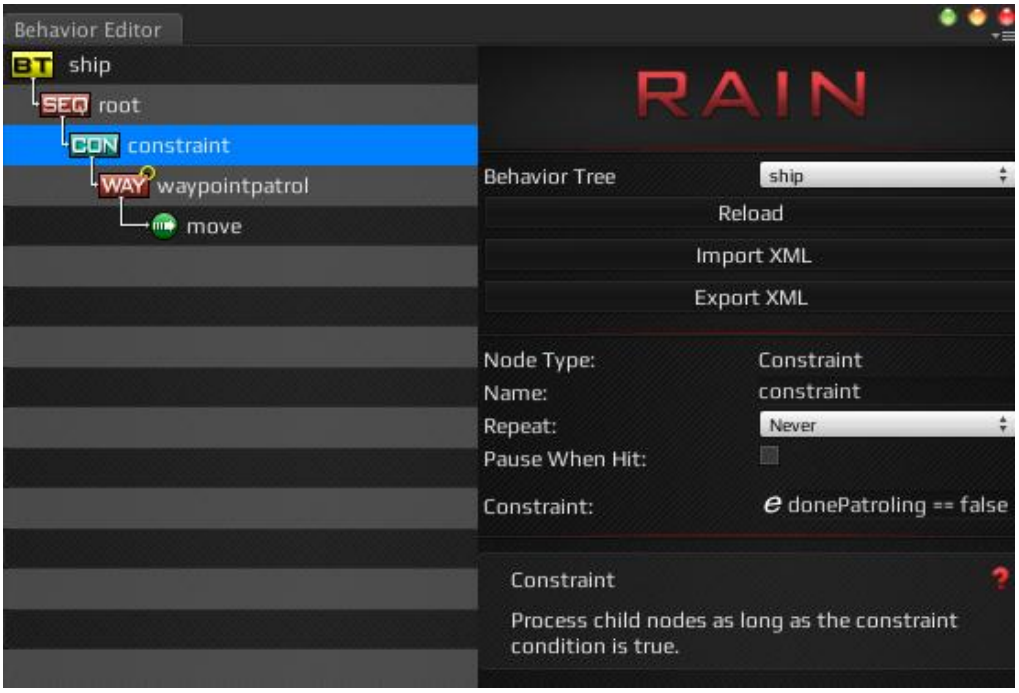
The scene after performing the given steps


RAIN
AI
Use Unity Messages
Use Fixed Update
Body
ship
Mind
BasicMind
Behavior Tree Asset
None (BTAsset)
Open Behavior Editor

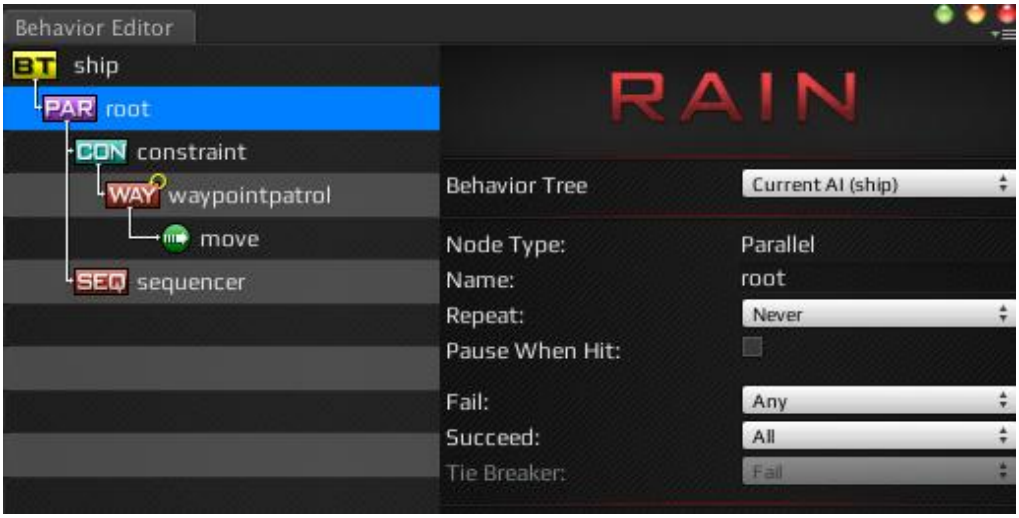

Behavior Editor
ship
root
waypointpatrol
move
RAIN
Behavior Tree
Current AI (ship)
Node Type:
Patrol Route
Name:
waypointpatrol
Repeat:
Forever
Pause When Hit:
Waypoint Route:
"Patrol Route"
Loop Type:
Loop
Direction:
Forward
Move Target Variable:
moveTarget

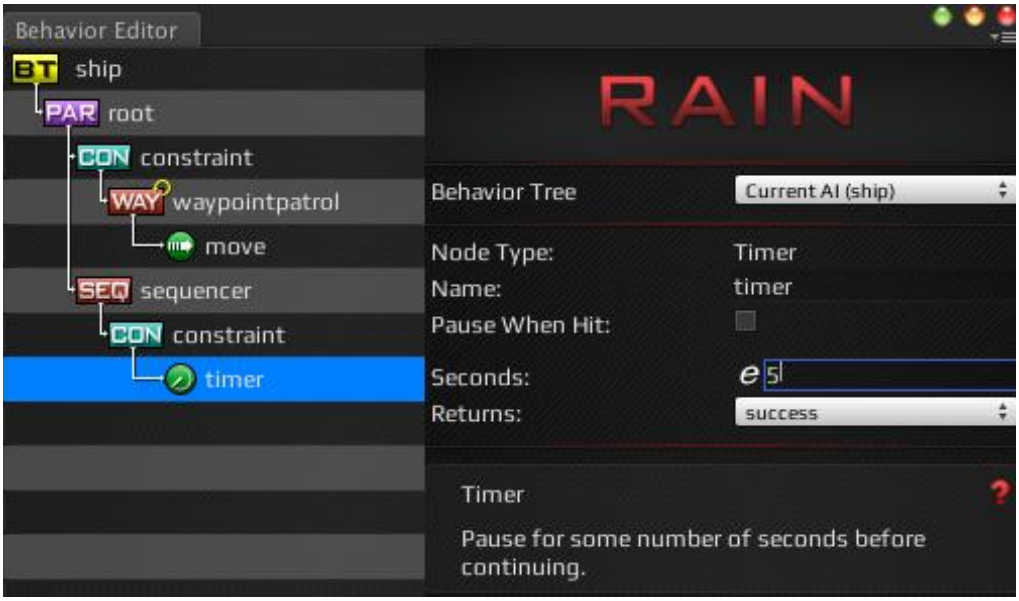


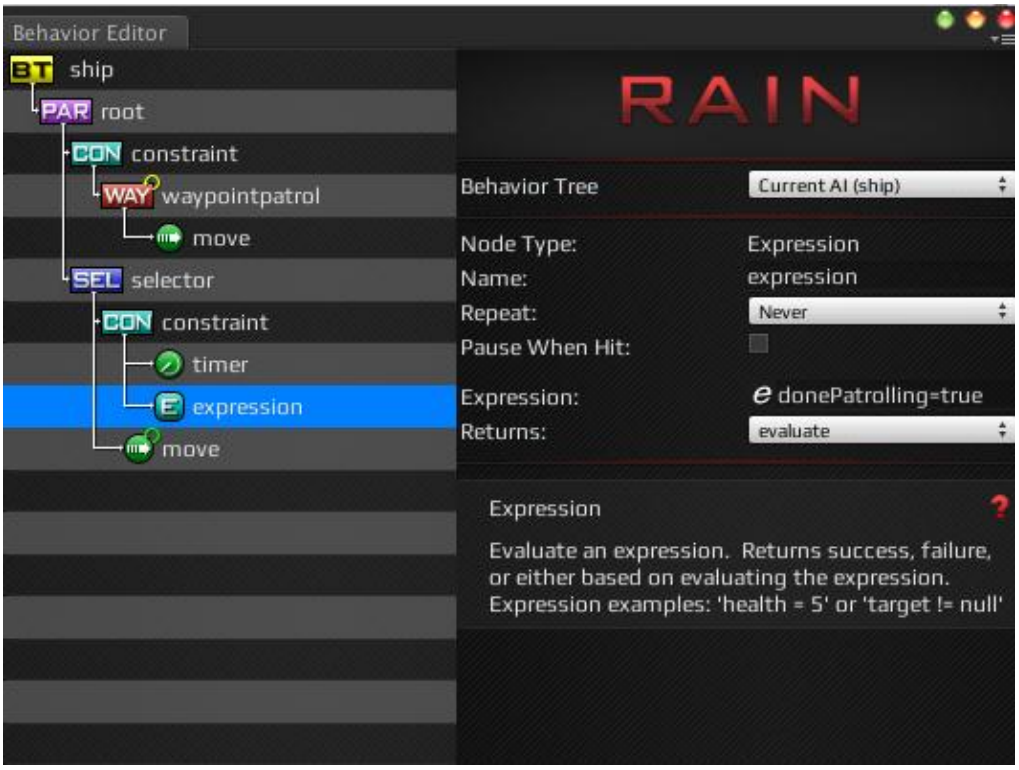

AIRig (Script)
RAIN
AI
Use Unity Messages
Use Fixed Update
Body
ship
Memory
BasicMemory
Add Variable
Select a Type
Name
donePatrolling
Value
Name
gameBase
Value
Cylinder

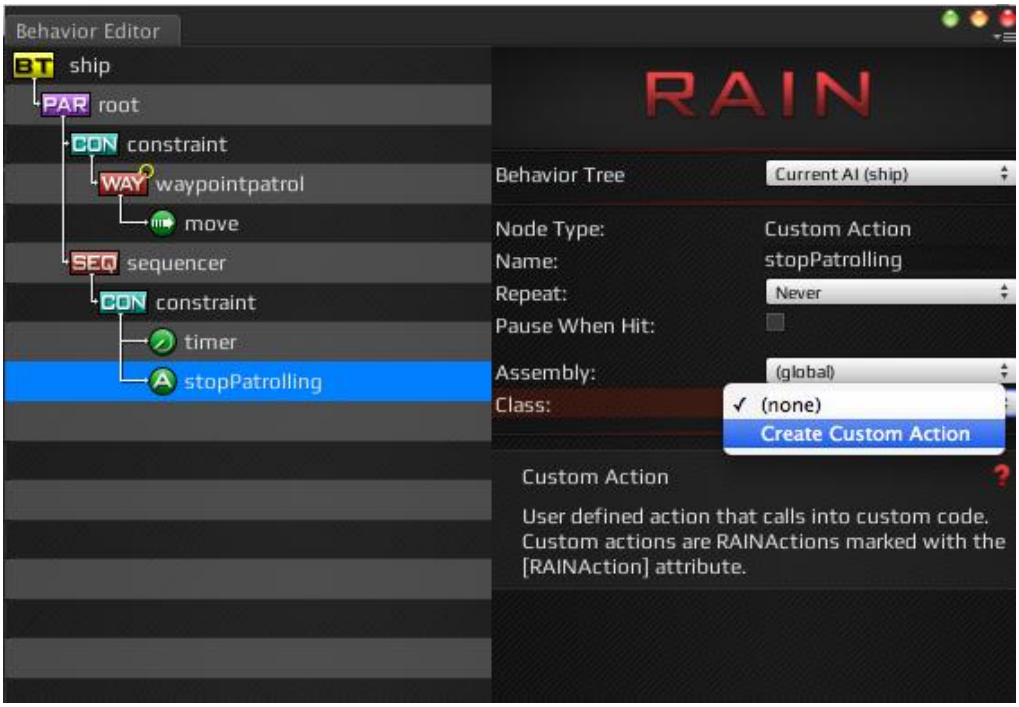

Behavior Editor
ship
root
constraint
waypointpatrol
move
RAIN
Behavior Tree
ship
Reload
Import XML
Export XML
Node Type:
Constraint
Name:
constraint
Repeat:
Never
Pause When Hit:
Constraint:
donePatroling == false
Constraint
Process child nodes as long as the constraint condition is true.

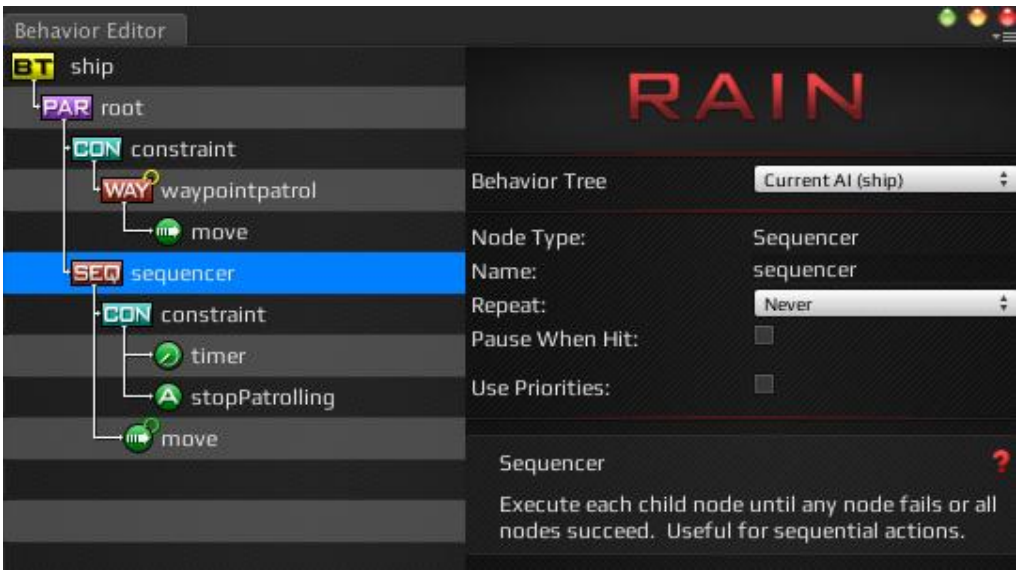

RAIN
AI
Use Unity Messages
Use Fixed Update
Body
ship
Memory
BasicMemory
Add Variable
Select a Type
Name
donePatrolling
Value
Name
gameBase
Value
Cylinder

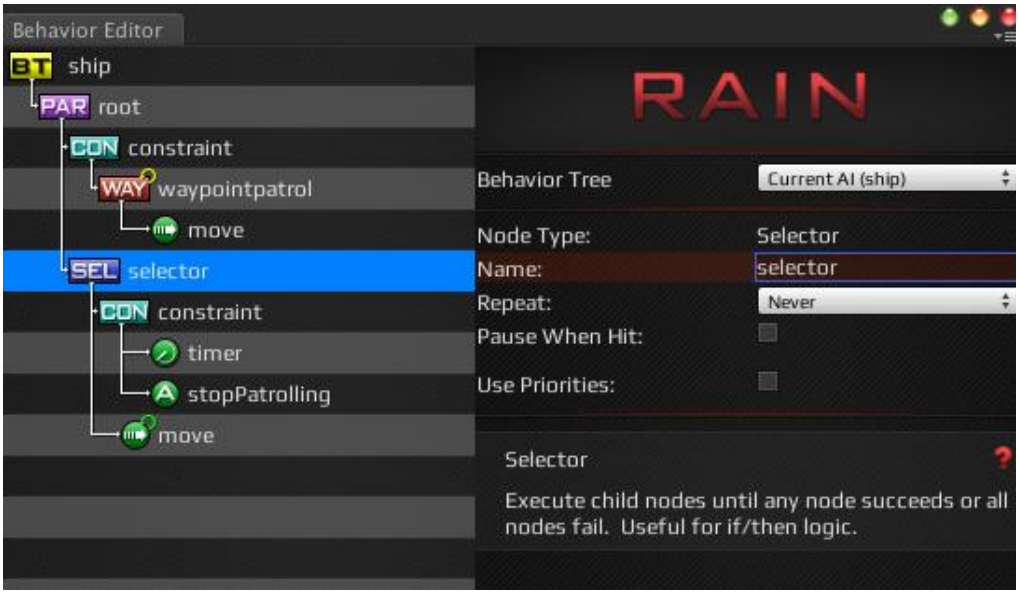

Behavior Editor
BT ship
PAR root
CON constraint
WAY waypointpatrol
move
SEQ sequencer
RAIN
Behavior Tree
Current AI (ship)
Node Type:
Parallel
Name:
root
Repeat:
Never
Pause When Hit:
Fail:
Any
Succeed:
All
Tie Breaker:
Fail

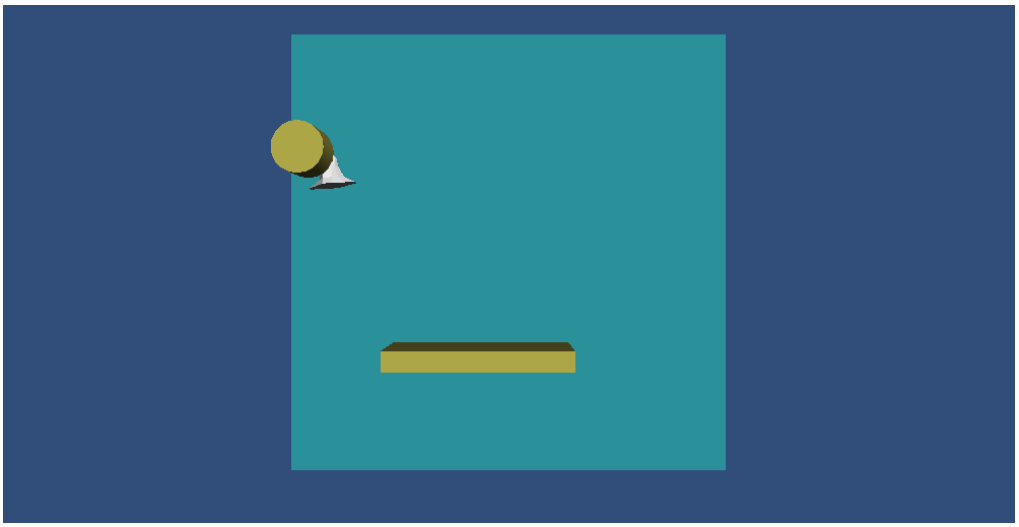

Behavior Editor
BT ship
PAR root
CON constraint
WAY waypointpatrol
move
SEQ sequencer
CON constraint
timer
RAIN
Behavior Tree
Current AI (ship)
Node Type:
Timer
Name:
timer
Pause When Hit:
Seconds:
5
Returns:
success
Timer
Pause for some number of seconds before continuing.

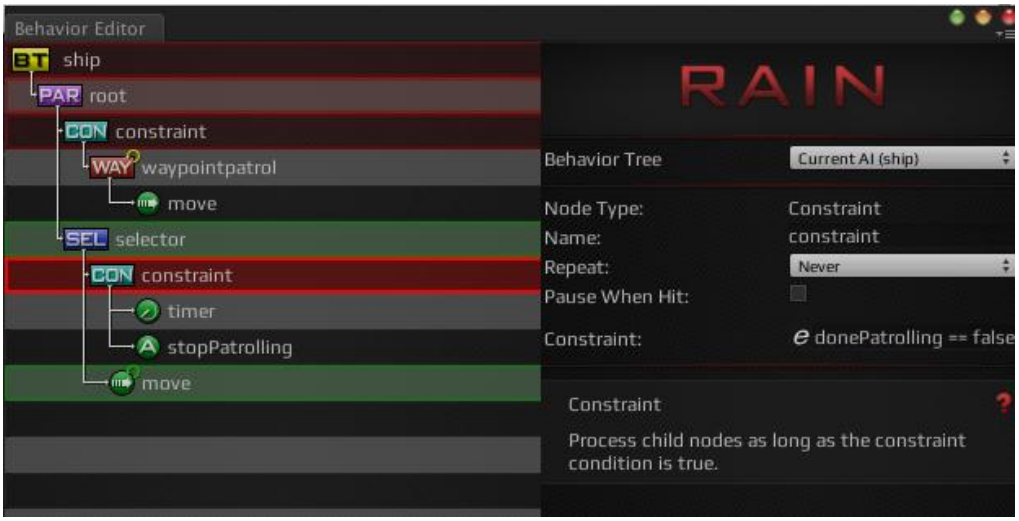

Behavior Editor
BT ship
PAR root
CON constraint
WAY waypointpatrol
move
SEL selector
CON constraint
timer
E expression
move
RAIN
Behavior Tree
Current AI (ship)
Node Type:
Expression
Name:
expression
Repeat:
Never
Pause When Hit:
Expression:
donePatrolling=true
Returns:
evaluate
Expression
Evaluate an expression. Returns success, failure, or either based on evaluating the expression.
Expression examples: 'health = 5' or 'target != null'


Behavior Editor
BT ship
PAR root
CON constraint
WAY waypointpatrol
move
SEQ sequencer
CON constraint
timer
stopPatrolling
RAIN
Behavior Tree
Current AI (ship)
Node Type:
Custom Action
Name:
stopPatrolling
Repeat:
Never
Pause When Hit:
Assembly:
(global)
Class:
(none)
Create Custom Action
Custom Action
User defined action that calls into custom code. Custom actions are RAINActions marked with the [RAINAction] attribute.

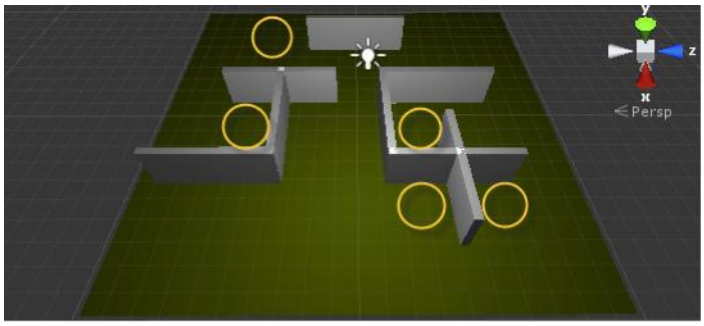

Behavior Editor
BT ship
PAR root
CON constraint
WAY waypointpatrol
move
SEQ sequencer
CON constraint
timer
stopPatrolling
move
RAIN
Behavior Tree
Current AI (ship)
Node Type:
Sequencer
Name:
sequencer
Repeat:
Never
Pause When Hit:
Use Priorities:
Sequencer
Execute each child node until any node fails or all nodes succeed. Useful for sequential actions.

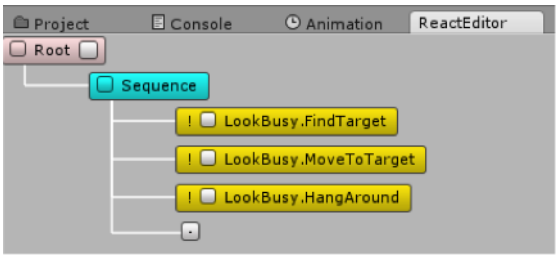

Behavior Editor
BT ship
PAR root
CON constraint
WAY waypointpatrol
move
SEL selector
CON constraint
timer
stopPatrolling
move
RAIN
Behavior Tree
Current AI (ship)
Node Type:
Selector
Name:
selector
Repeat:
Never
Pause When Hit:
Use Priorities:
Selector
Execute child nodes until any node succeeds or all nodes fail. Useful for if/then logic.

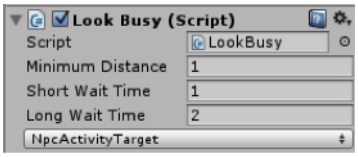


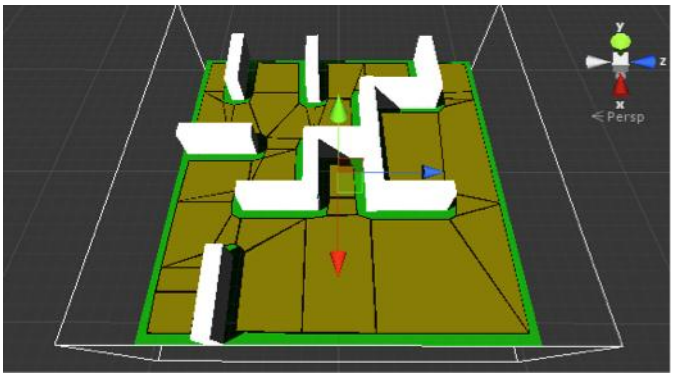

Behavior Editor
BT ship
PAR root
CON constraint
WAY waypointpatrol
move
SEL selector
CON constraint
timer
stopPatrolling
move
RAIN
Behavior Tree
Current AI (ship)
Node Type:
Constraint
Name:
constraint
Repeat:
Never
Pause When Hit:
Constraint:
donePatrolling == false
Constraint
Process child nodes as long as the constraint condition is true.

Chapter 4: Crowd Chaos

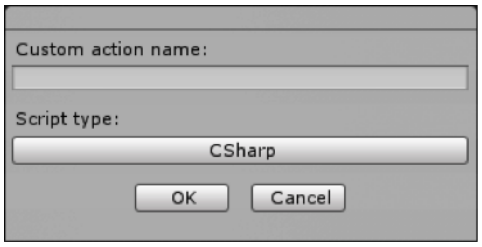




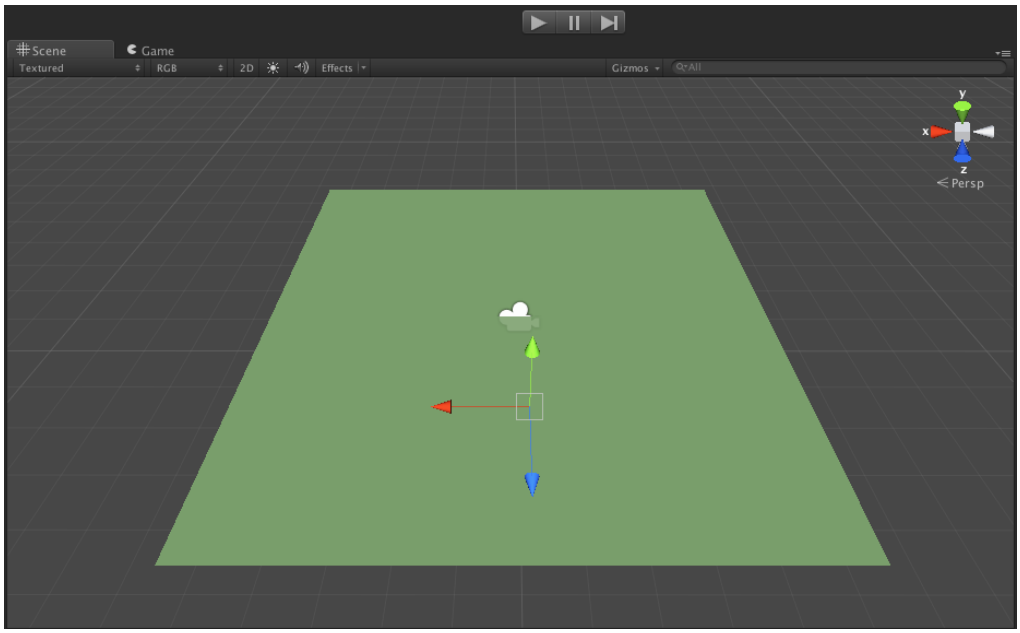


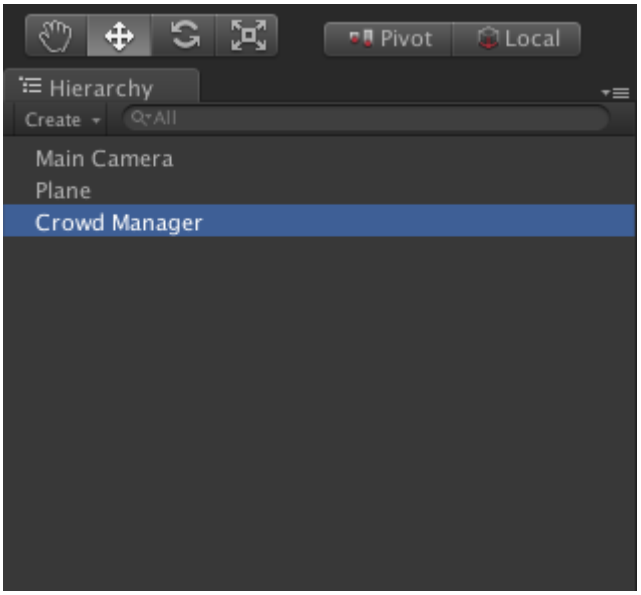


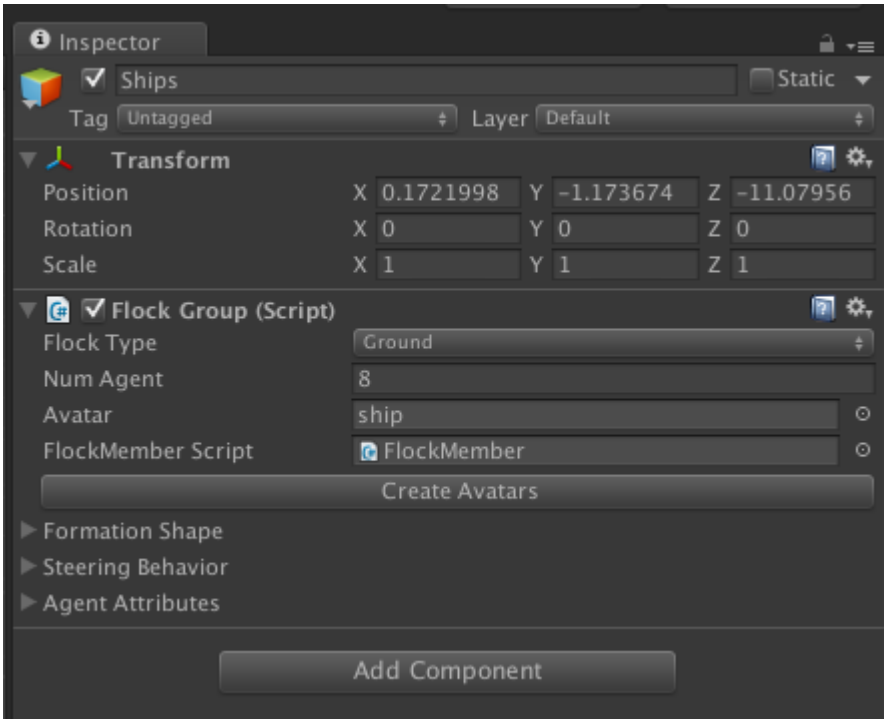

BT RandomWalk
SEQ root
Select Next Target
PAR Walk To Target
Appear Walking
Move
PAR Look Busy
Stand here
For a couple seconds

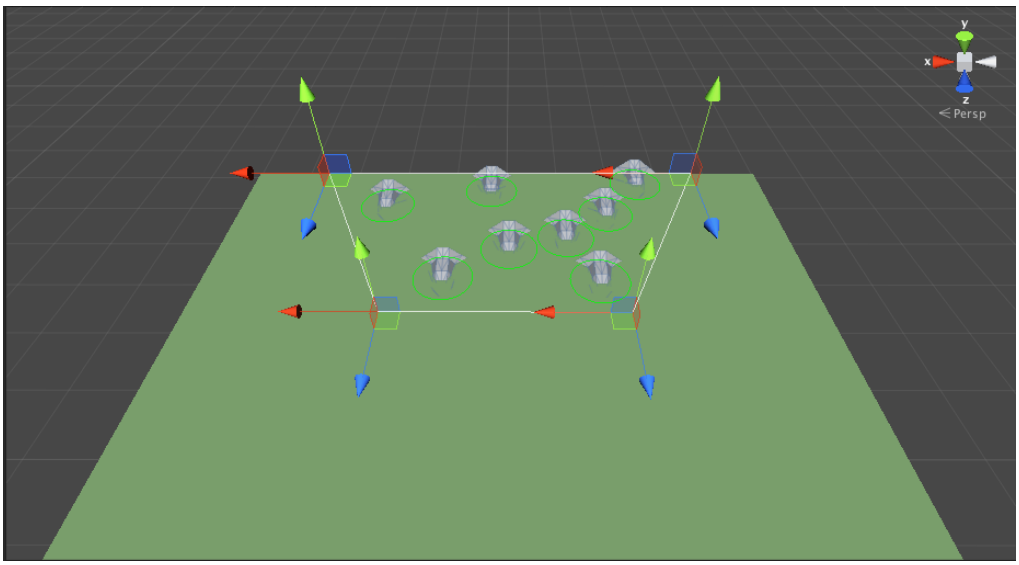

Custom action name:
Script type:
CSharp
OK
Cancel

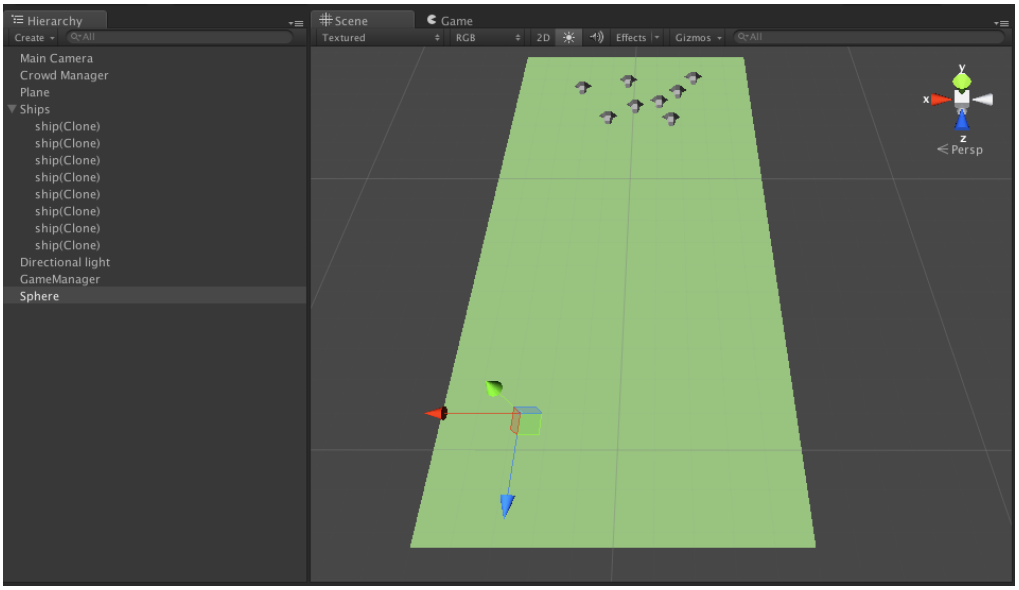
Chapter 5: Crowd Control

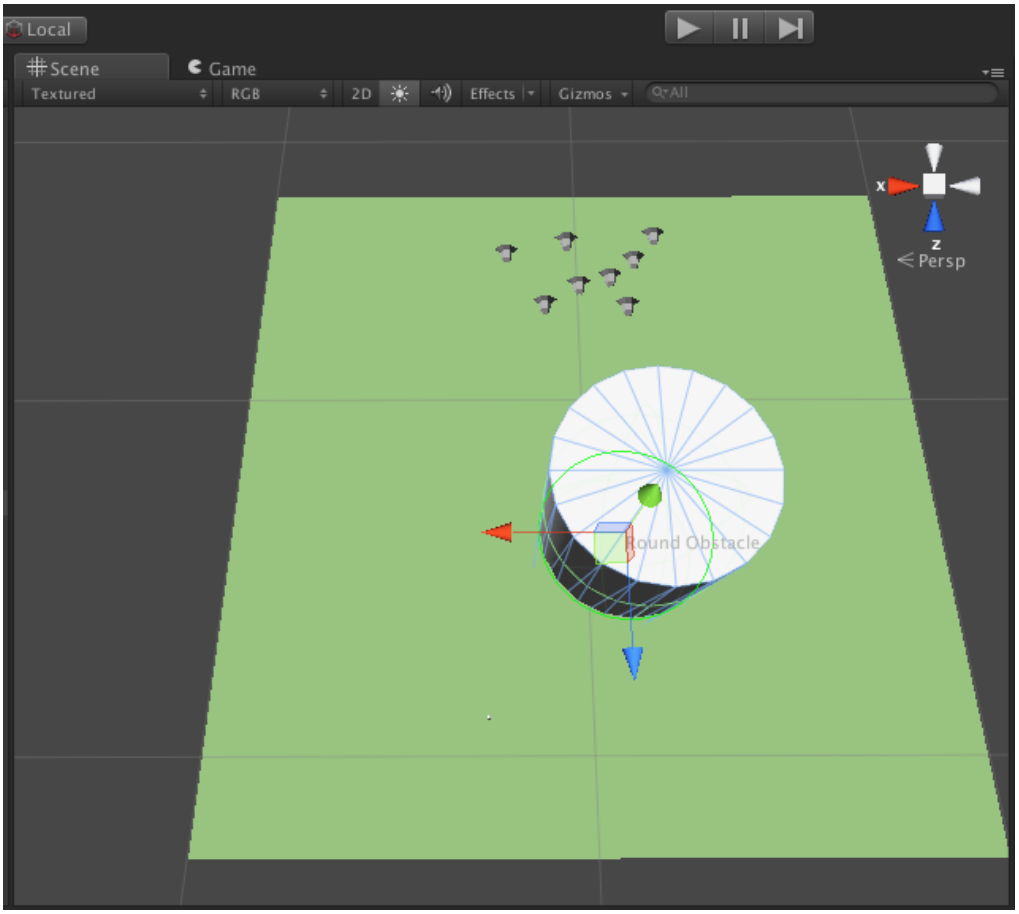


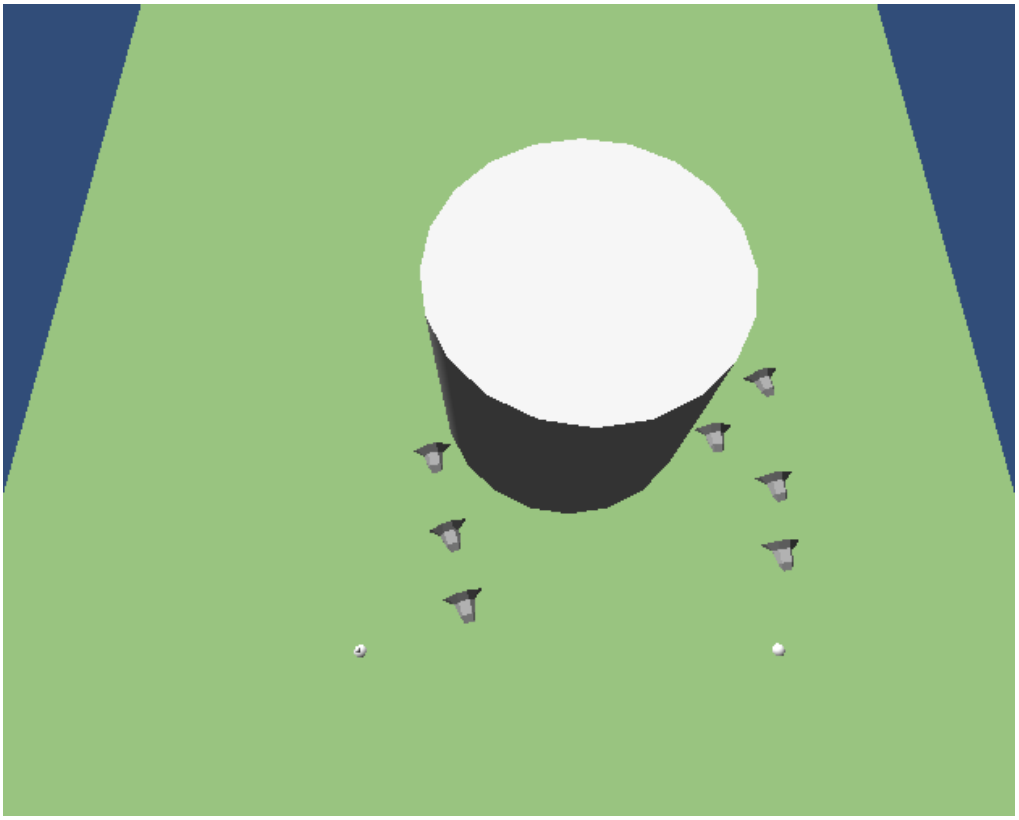


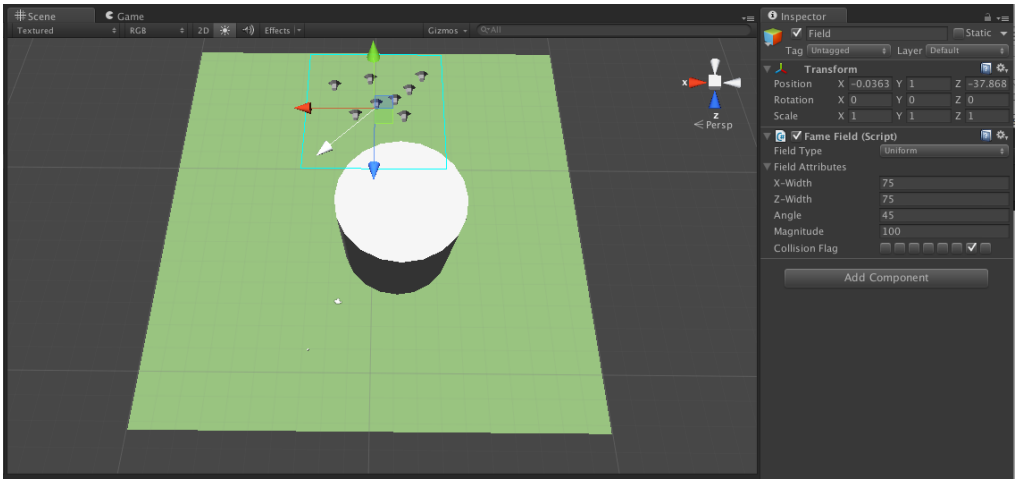

Inspector
Ships
Static
Tag
Untagged
Layer
Default
Transform
Position
X 0.1721998
Y -1.173674
Z -11.07956
Rotation
X 0
Y 0
Z 0
Scale
X 1
Y 1
Z 1
Flock Group (Script)
Flock Type
Ground
Num Agent
8
Avatar
ship
FlockMember Script
FlockMember
Create Avatars
Formation Shape
Steering Behavior
Agent Attributes
Add Component

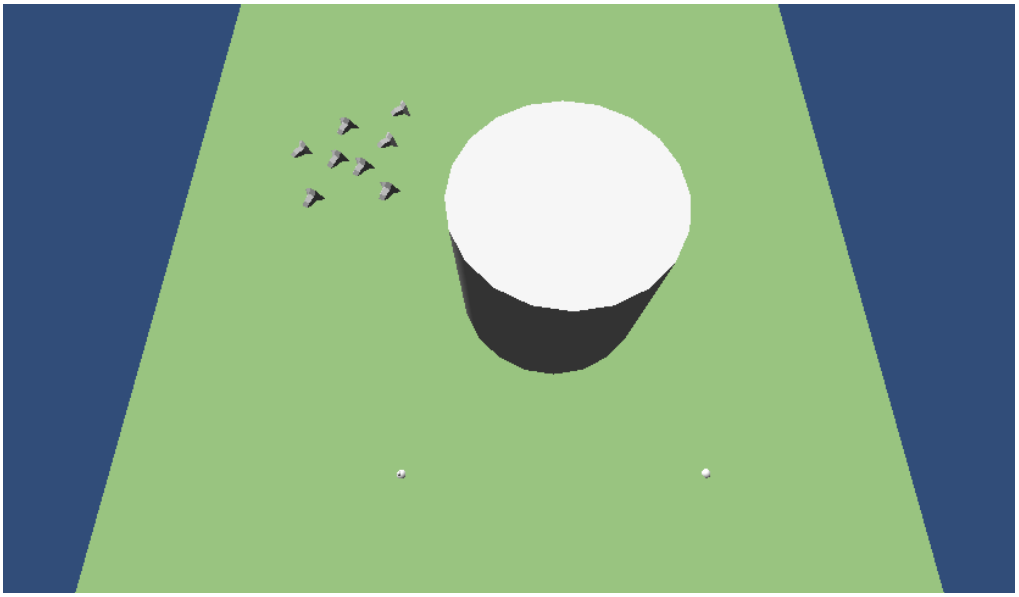

y
x
z
Persp

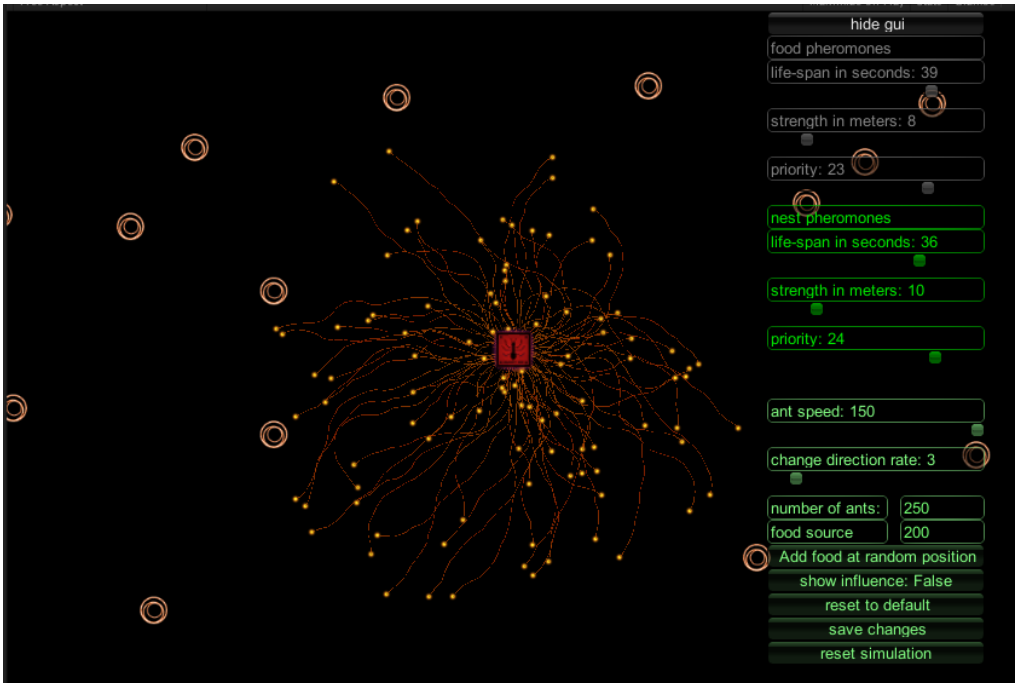

Hierarchy
Create
All
Main Camera
Crowd Manager
Plane
Ships
ship(Clone)
ship(Clone)
ship(Clone)
ship(Clone)
ship(Clone)
ship(Clone)
ship(Clone)
ship(Clone)
Directional light
GameManager
Sphere
Scene
Game
Textured
RGB
2D
Effects
Gizmos
All
y
x
z
Persp

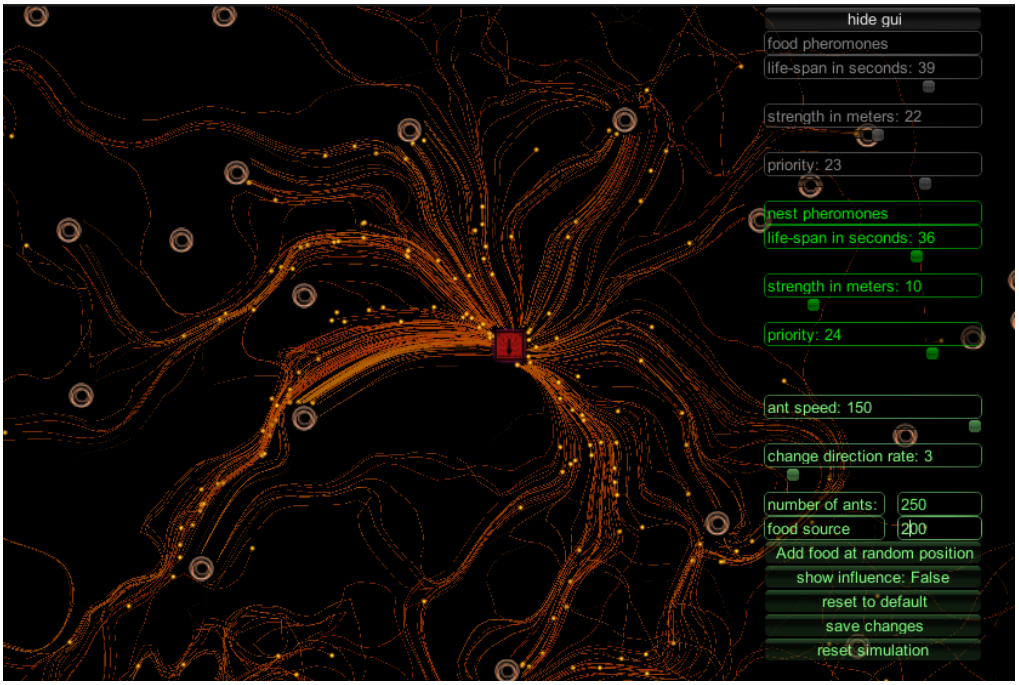

Local
Scene
Game
Textured
RGB
2D
Effects
Gizmos
All
x
z
Persp
Round Obstacle



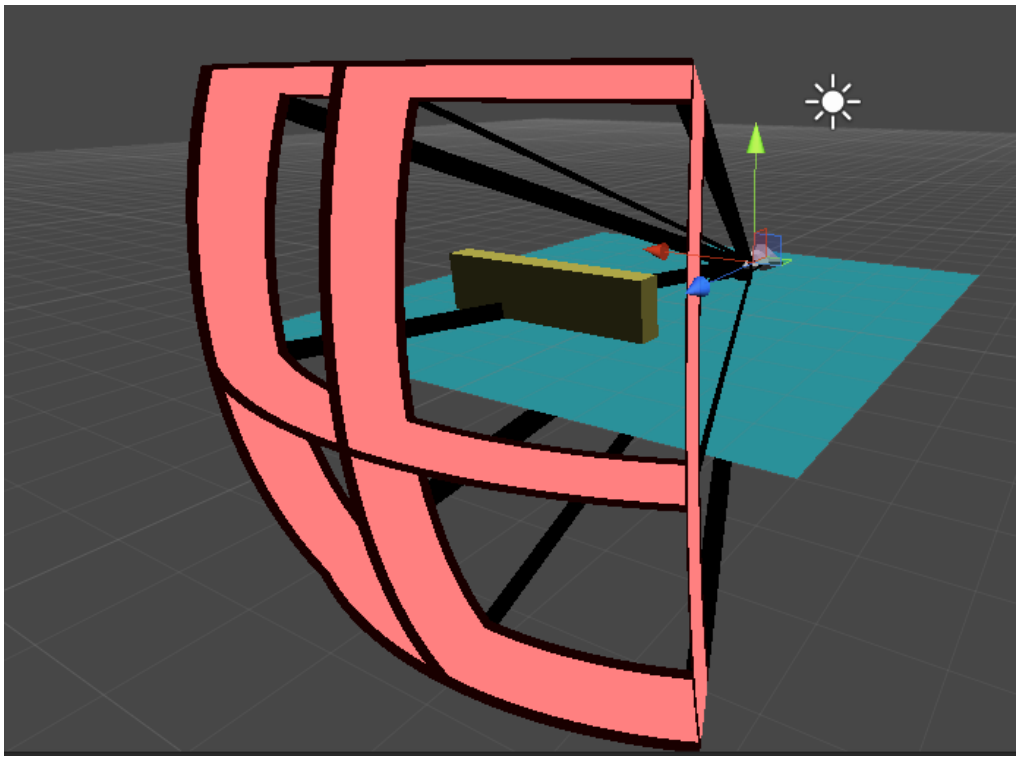

Scene
Game
Textured
RGB
2D
Effects
Gizmos
Persp
Inspector
Field
Static
Tag
Untagged
Layer
Default
Transform
Position
X -0.0363
Y 1
Z -37.868
Rotation
X 0
Y 0
Z 0
Scale
X 1
Y 1
Z 1
Fame Field (Script)
Field Type
Uniform
Field Attributes
X-Width
75
Z-Width
75
Angle
45
Magnitude
100
Collision Flag
Add Component

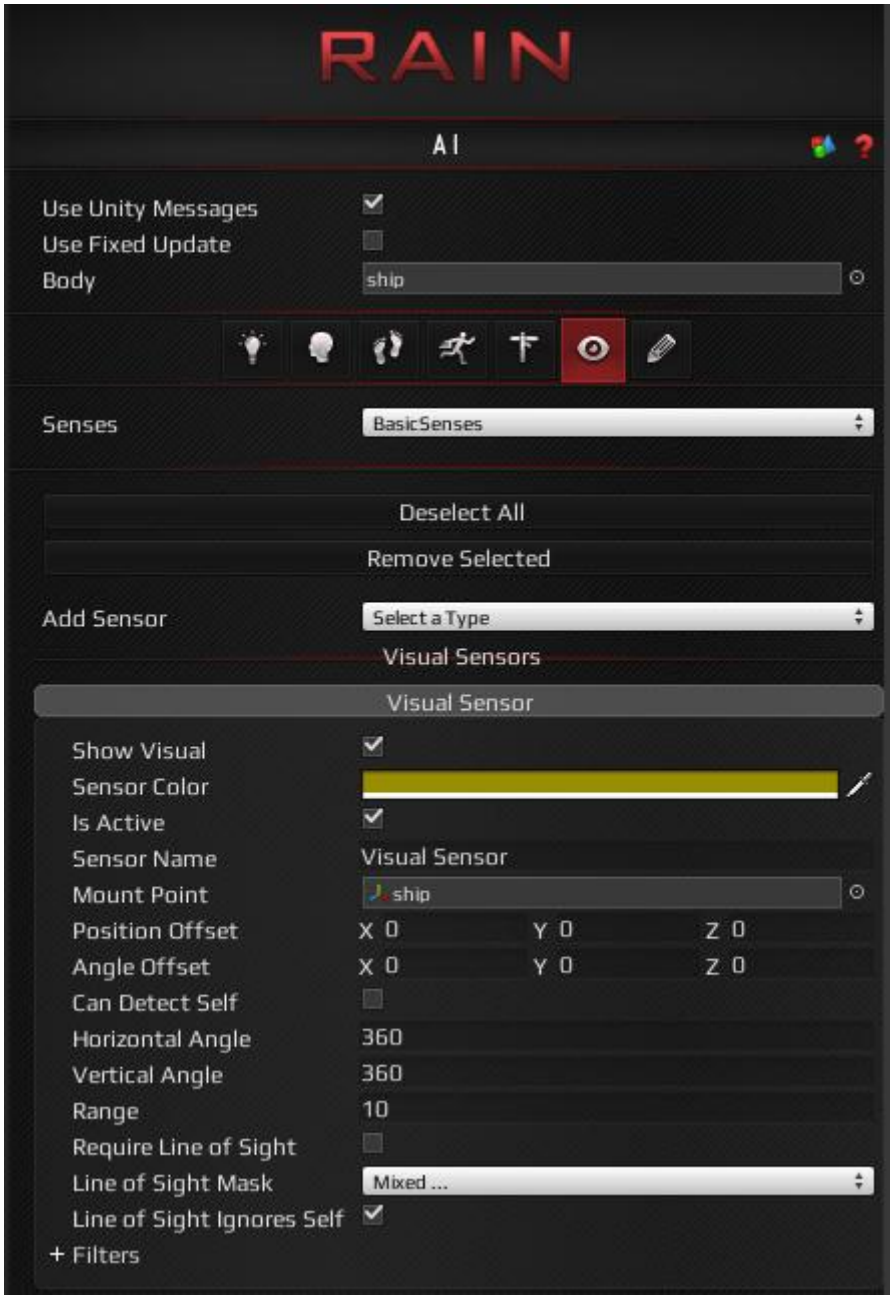


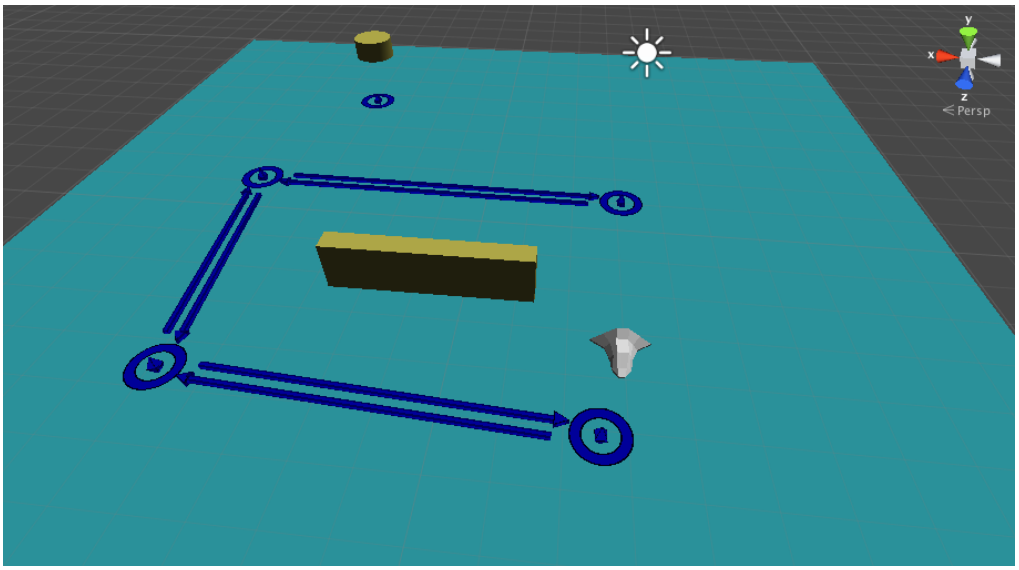

hide gui
food pheromones
life-span in seconds: 39
strength in meters: 8
priority: 23
nest pheromones
life-span in seconds: 36
strength in meters: 10
priority: 24
ant speed: 150
change direction rate: 3
number of ants:
250
food source
200
Add food at random position
show influence: False
reset to default
save changes
reset simulation

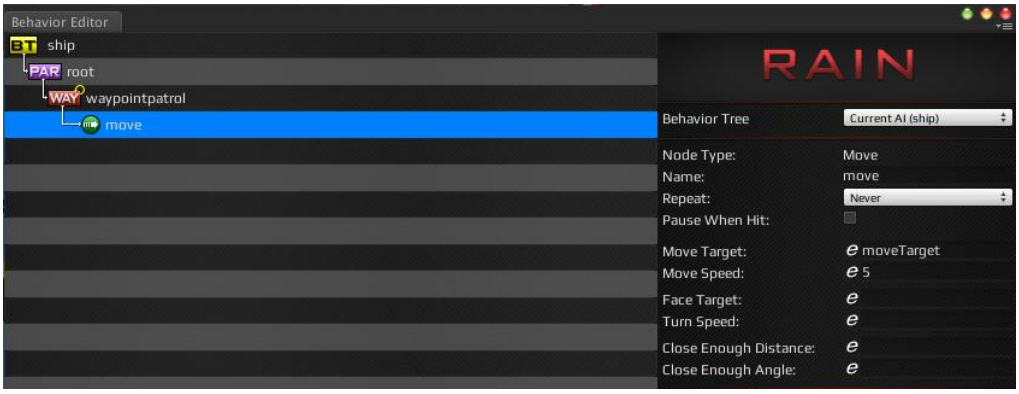

hide gui
food pheromones
life-span in seconds: 39
strength in meters: 22
priority: 23
nest pheromones
life-span in seconds: 36
strength in meters: 10
priority: 24
ant speed: 150
change direction rate: 3
number of ants:
250
food source
200
Add food at random position
show influence: False
reset to default
save changes
reset simulation

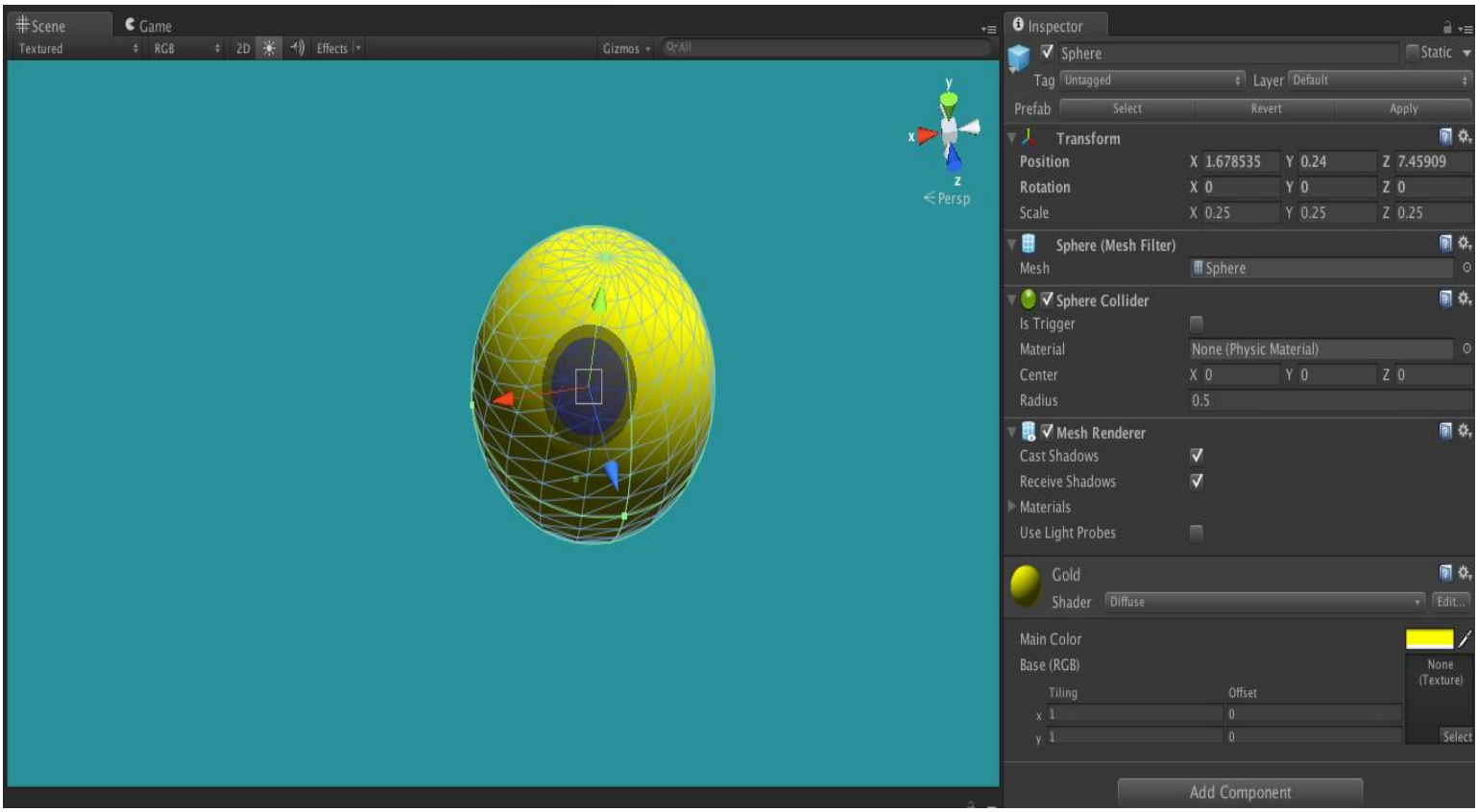
Chapter 6: Sensors and Activities



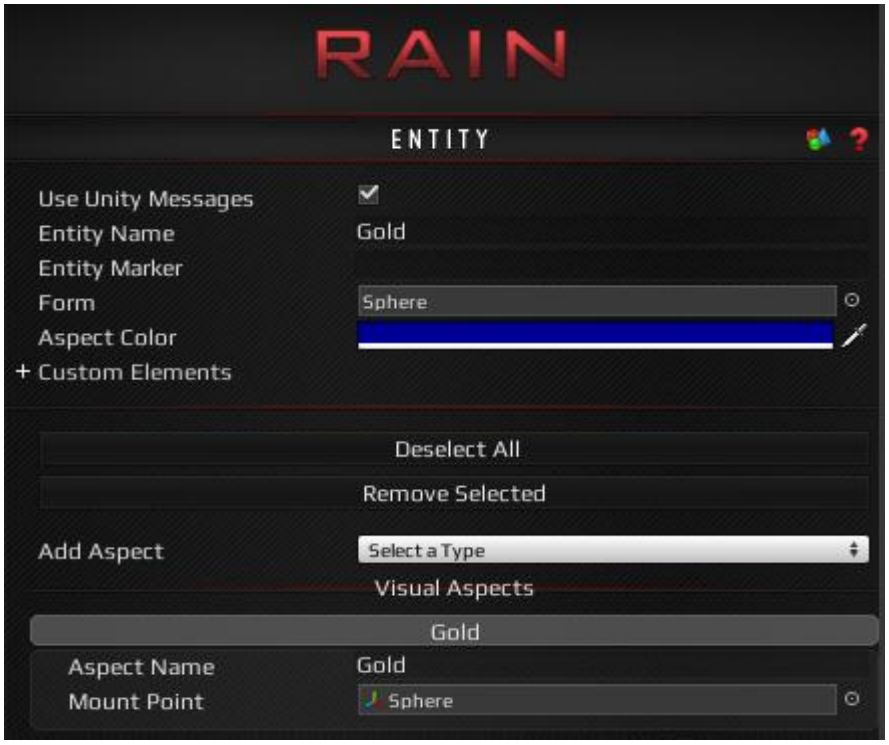

RAIN
AI
Use Unity Messages
Use Fixed Update
Body
ship
Senses
BasicSenses
Deselect All
Remove Selected
Add Sensor
Select a Type
Visual Sensors
Visual Sensor
Show Visual
Sensor Color
Is Active
Sensor Name
Visual Sensor
Mount Point
ship
Position Offset
X 0
Y 0
Z 0
Angle Offset
X 0
Y 0
Z 0
Can Detect Self
Horizontal Angle
360
Vertical Angle
360
Range
10
Require Line of Sight
Line of Sight Mask
Mixed ...
Line of Sight Ignores Self
+ Filters

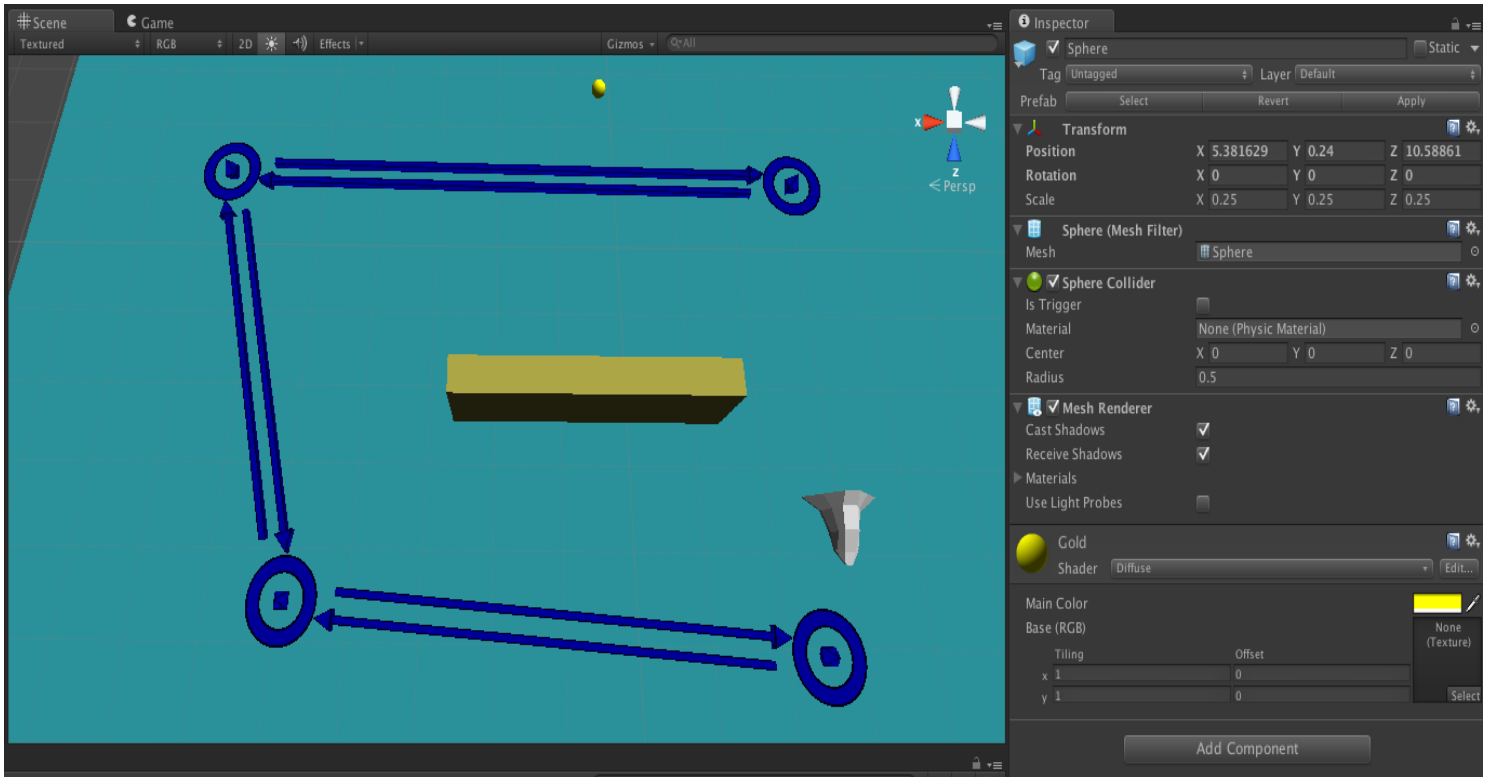

y
x
z
Persp


Behavior Editor
BT ship
PAR root
WAY waypointpatrol
move
RAIN
Behavior Tree
Current AI (ship)
Node Type:
Move
Name:
move
Repeat:
Never
Pause When Hit:
Move Target:
moveTarget
Move Speed:
5
Face Target:
Turn Speed:
Close Enough Distance:
Close Enough Angle:

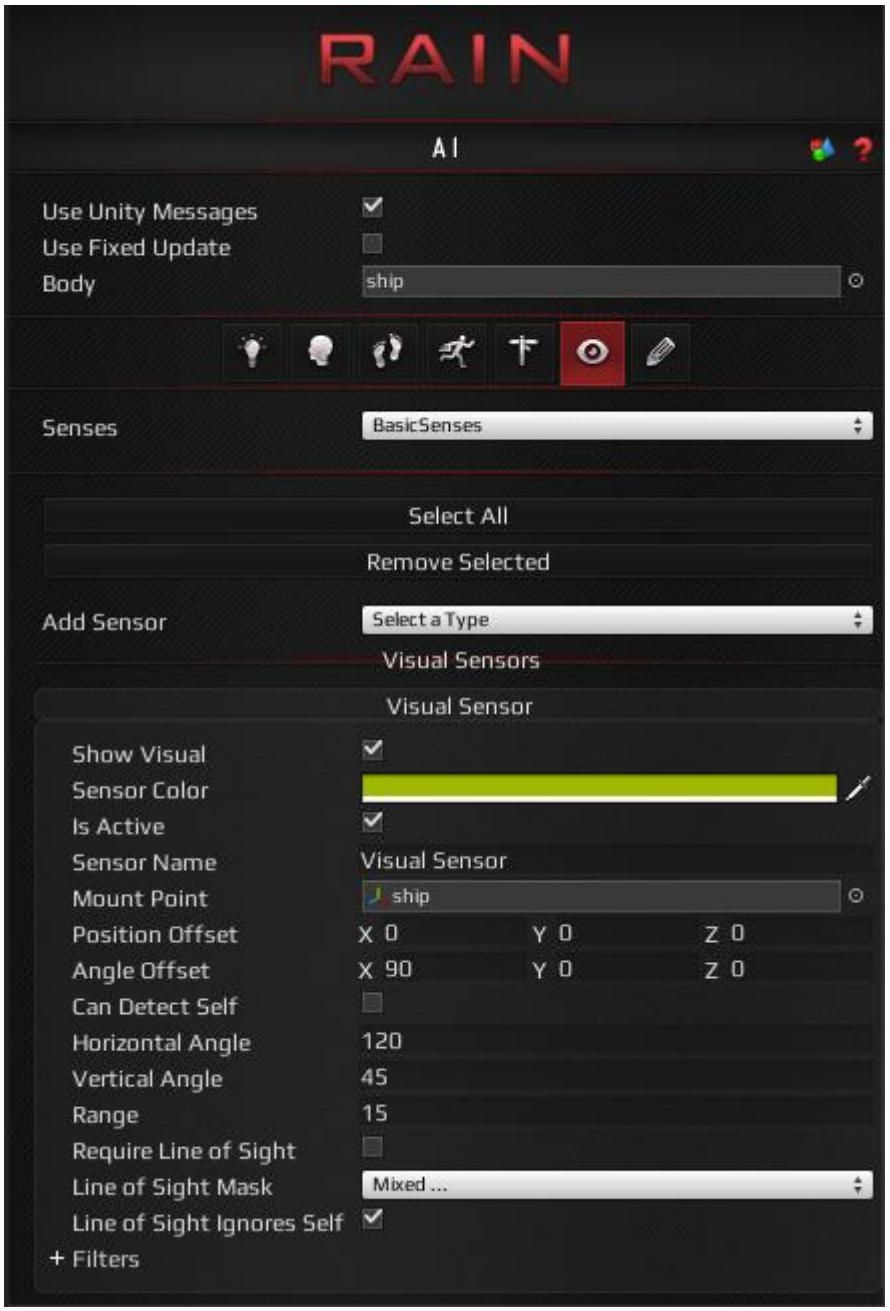


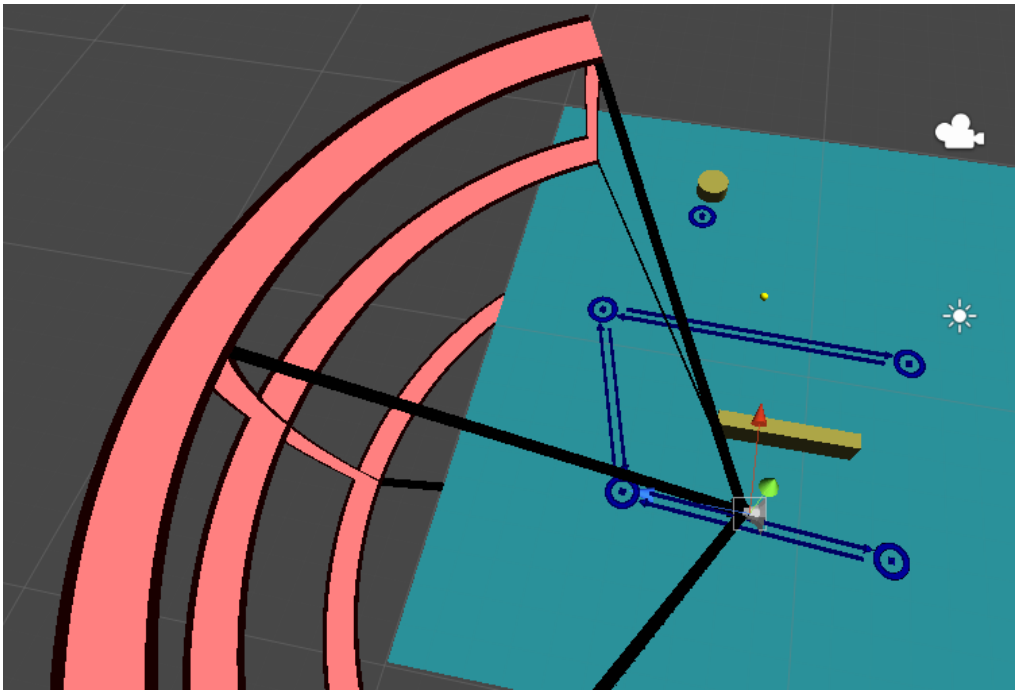
The starting point of our object (Sphere)


RAIN
ENTITY
Use Unity Messages
Entity Name
Gold
Entity Marker
Form
Sphere
Aspect Color
+ Custom Elements
Deselect All
Remove Selected
Add Aspect
Select a Type
Visual Aspects
Gold
Aspect Name
Gold
Mount Point
Sphere

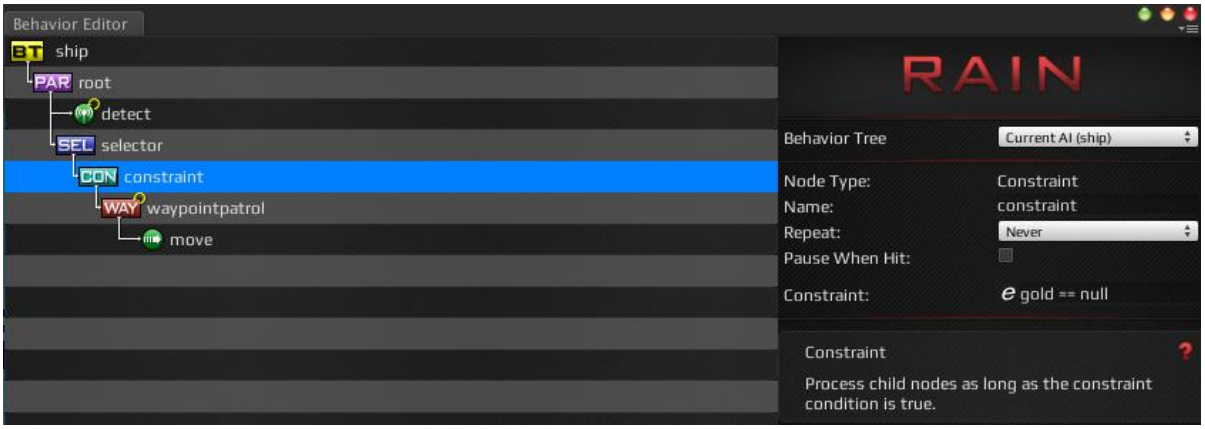


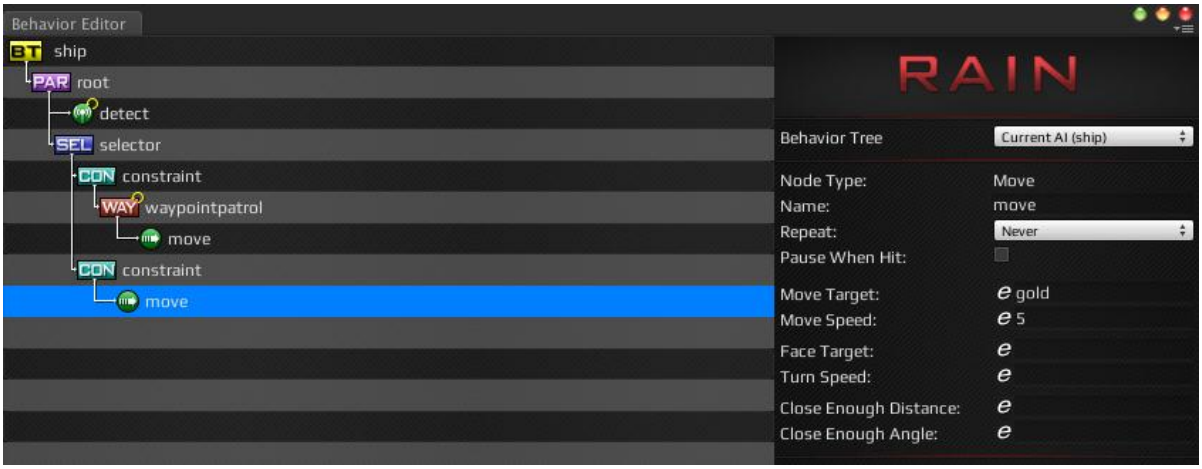
A sensor demo with gold

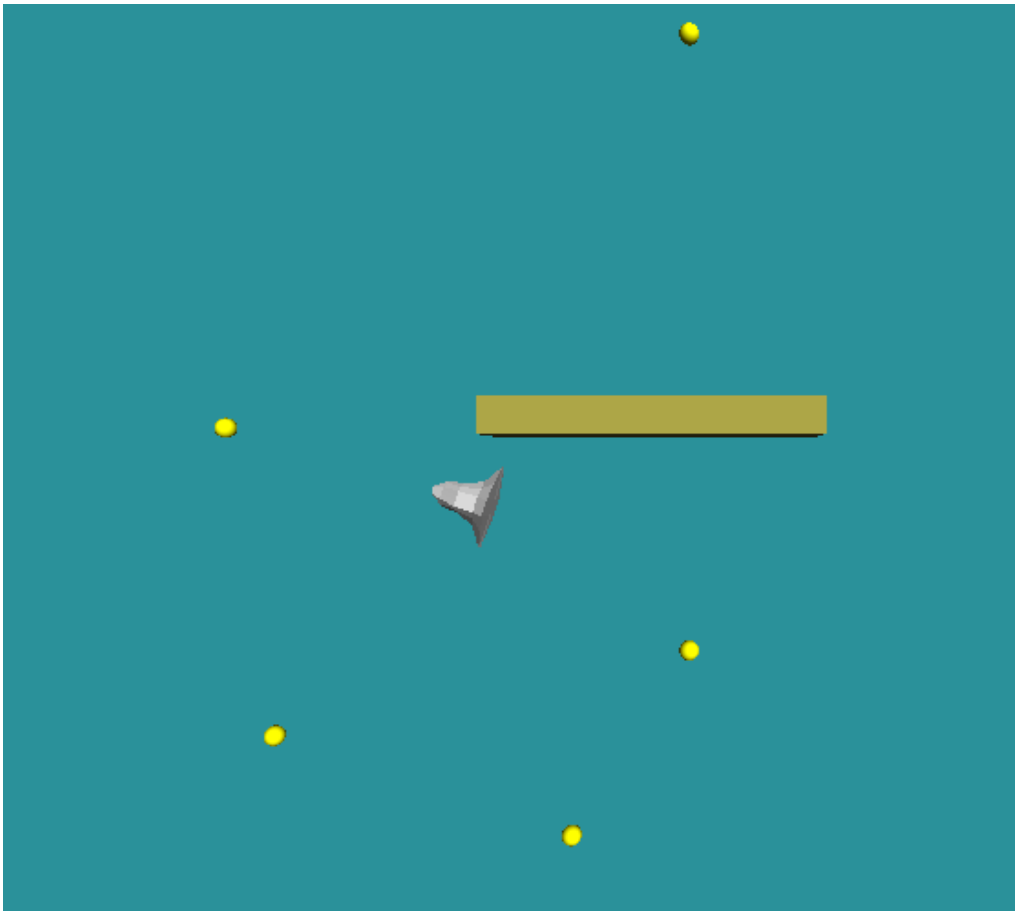

RAIN
AI
Use Unity Messages
Use Fixed Update
Body
ship
Senses
BasicSenses
Select All
Remove Selected
Add Sensor
Select a Type
Visual Sensors
Visual Sensor
Show Visual
Sensor Color
Is Active
Sensor Name
Visual Sensor
Mount Point
ship
Position Offset
X 0
Y 0
Z 0
Angle Offset
X 90
Y 0
Z 0
Can Detect Self
Horizontal Angle
120
Vertical Angle
45
Range
15
Require Line of Sight
Line of Sight Mask
Mixed ...
Line of Sight Ignores Self
+ Filters

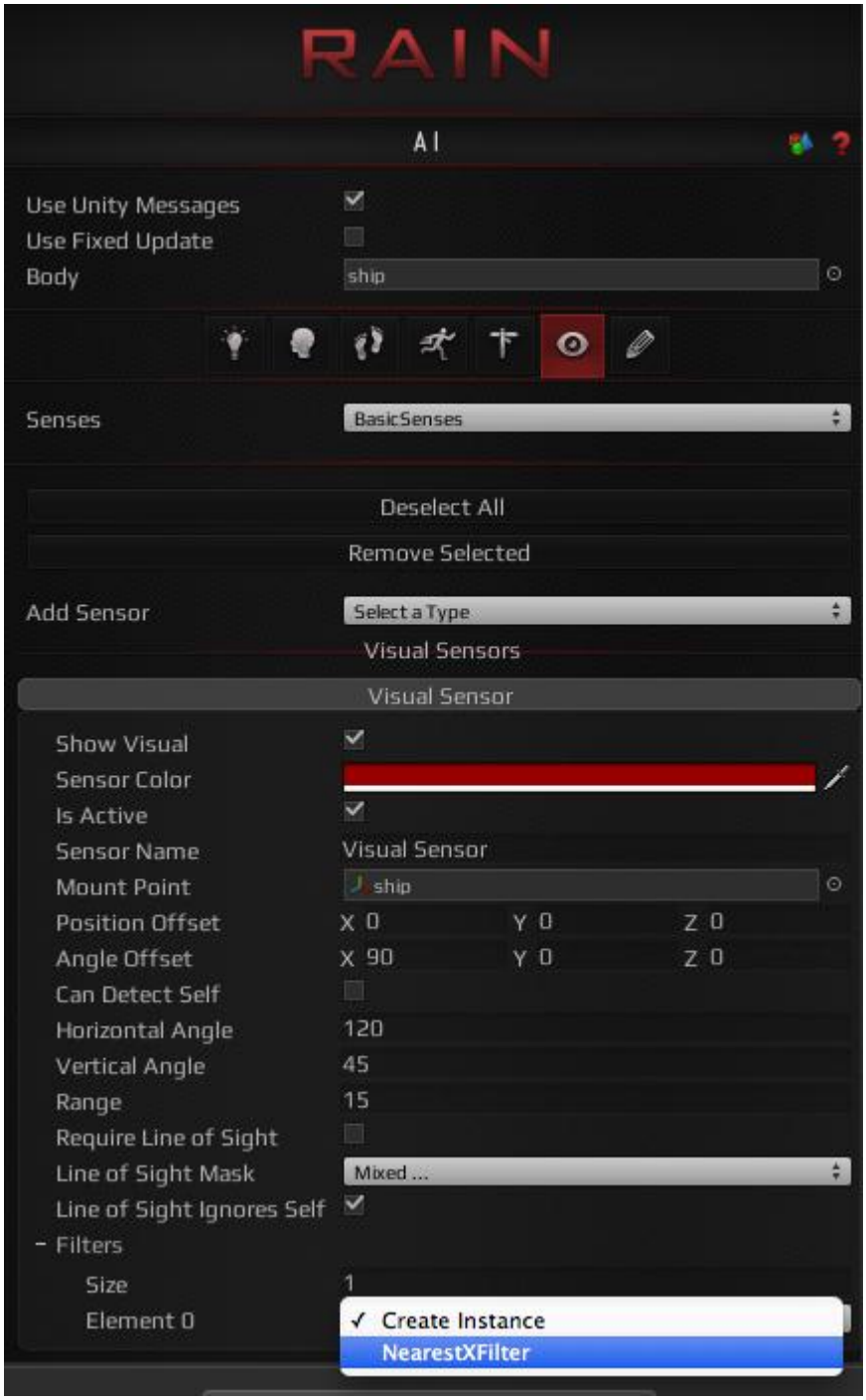



Behavior Editor
BT ship
PAR root
detect
WAY waypointpatrol
move
RAIN
Behavior Tree
Current AI (ship)
Node Type:
Detect
Name:
detect
Repeat:
Forever
Pause When Hit:
Sensor:
"Visual Sensor"
Aspect:
"Gold"
Aspect Variable:
Mount Point Variable:
Form Variable:
gold
Detect
Use Sensors to detect an Aspect. Store the result in an AI Memory variable.

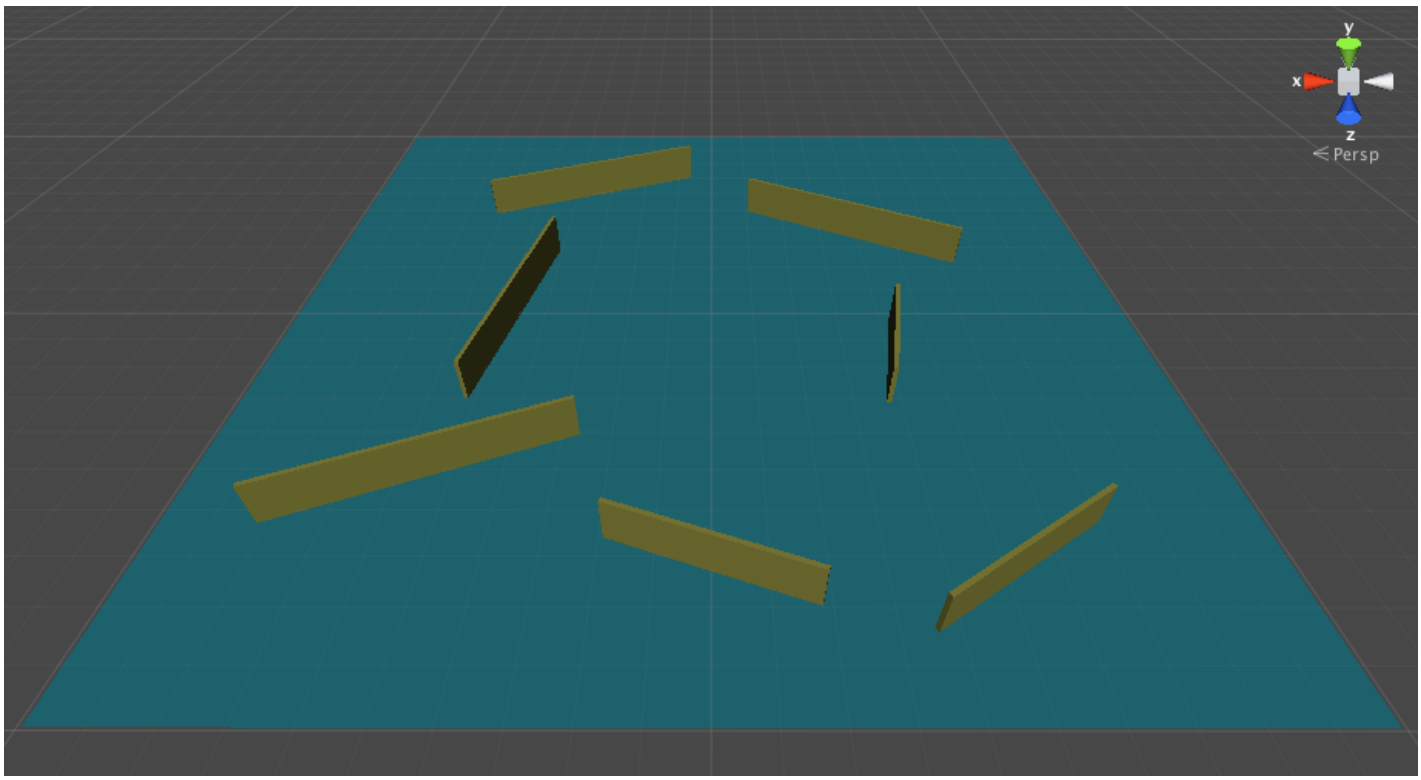

Behavior Editor
BT ship
PAR root
detect
SEL selector
CON constraint
WAY waypointpatrol
move
RAIN
Behavior Tree
Current AI (ship)
Node Type:
Constraint
Name:
constraint
Repeat:
Never
Pause When Hit:
Constraint:
e gold == null
Constraint
Process child nodes as long as the constraint condition is true.


Behavior Editor
BT ship
PAR root
detect
SEL selector
CON constraint
WAY waypointpatrol
move
CON constraint
move
RAIN
Behavior Tree
Current AI (ship)
Node Type:
Move
Name:
move
Repeat:
Never
Pause When Hit:
Move Target:
e gold
Move Speed:
e 5
Face Target:
e
Turn Speed:
e
Close Enough Distance:
e
Close Enough Angle:
e




RAIN
AI
Use Unity Messages
Use Fixed Update
Body
ship
Senses
BasicSenses
Deselect All
Remove Selected
Add Sensor
Select a Type
Visual Sensors
Visual Sensor
Show Visual
Sensor Color
Is Active
Sensor Name
Visual Sensor
Mount Point
ship
Position Offset
X 0
Y 0
Z 0
Angle Offset
X 90
Y 0
Z 0
Can Detect Self
Horizontal Angle
120
Vertical Angle
45
Range
15
Require Line of Sight
Line of Sight Mask
Mixed ...
Line of Sight Ignores Self
Filters
Size
1
Element 0
Create Instance
NearestXFilter

Chapter 7: Adaptation



The basic starting point of our demo

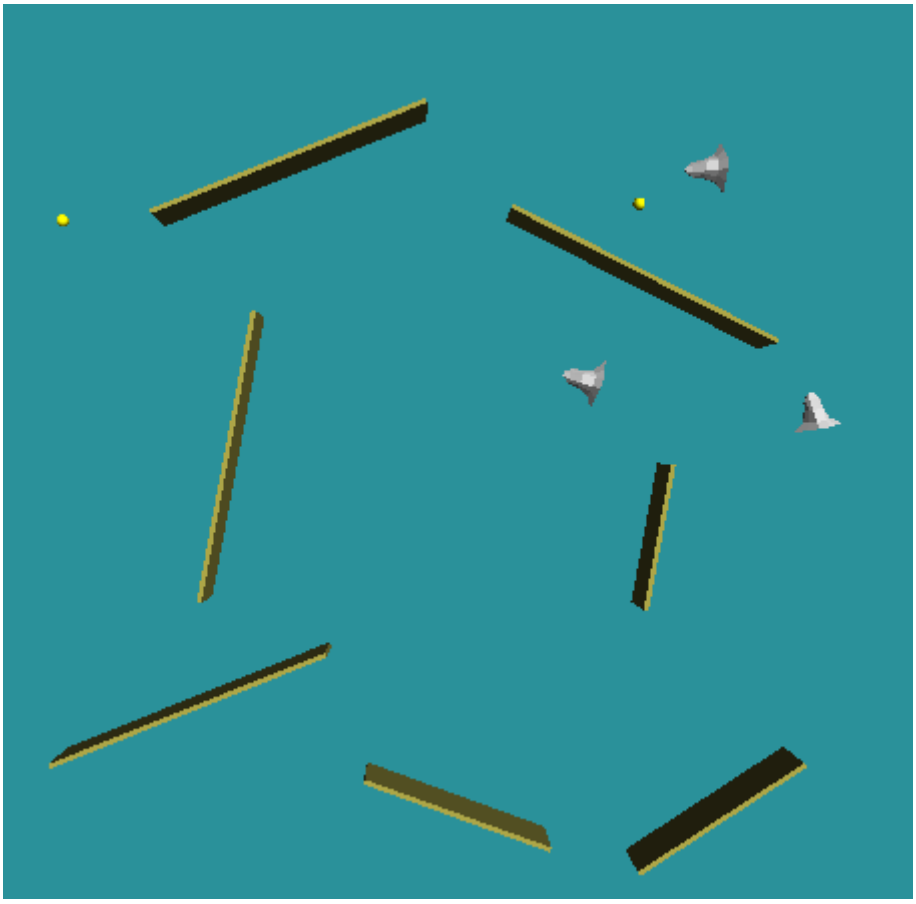
```
using UnityEngine;
using System.Collections;
using RAIN.Core;

public class Ground : MonoBehaviour {

    private static Vector3 min, max;

    private const float LevelHeight = 0.5f;

    public static Vector3 randomLevelPosition() {
        Vector3 position = new Vector3();
        position.x = Random.Range(min.x, max.x);
        position.y = LevelHeight;
        position.z = Random.Range(min.z, max.z);
        return position;
    }

    void Start () {
        const float innerEdge = 0.9f;
        min = renderer.bounds.min * innerEdge;
        max = renderer.bounds.max * innerEdge;
    }

    void Update () {

    }
}

```

```
    public Transform gold;
    private float goldTimer = 0.0f;
    private const float goldCreateTime = 2.0f;

    void Update () {

        goldTimer += Time.deltaTime;
        if(goldTimer>= goldCreateTime) {
            Instantiate(gold, randomLevelPosition(), Quaternion.identity);
            goldTimer = 0.0f;
        }
    }
```

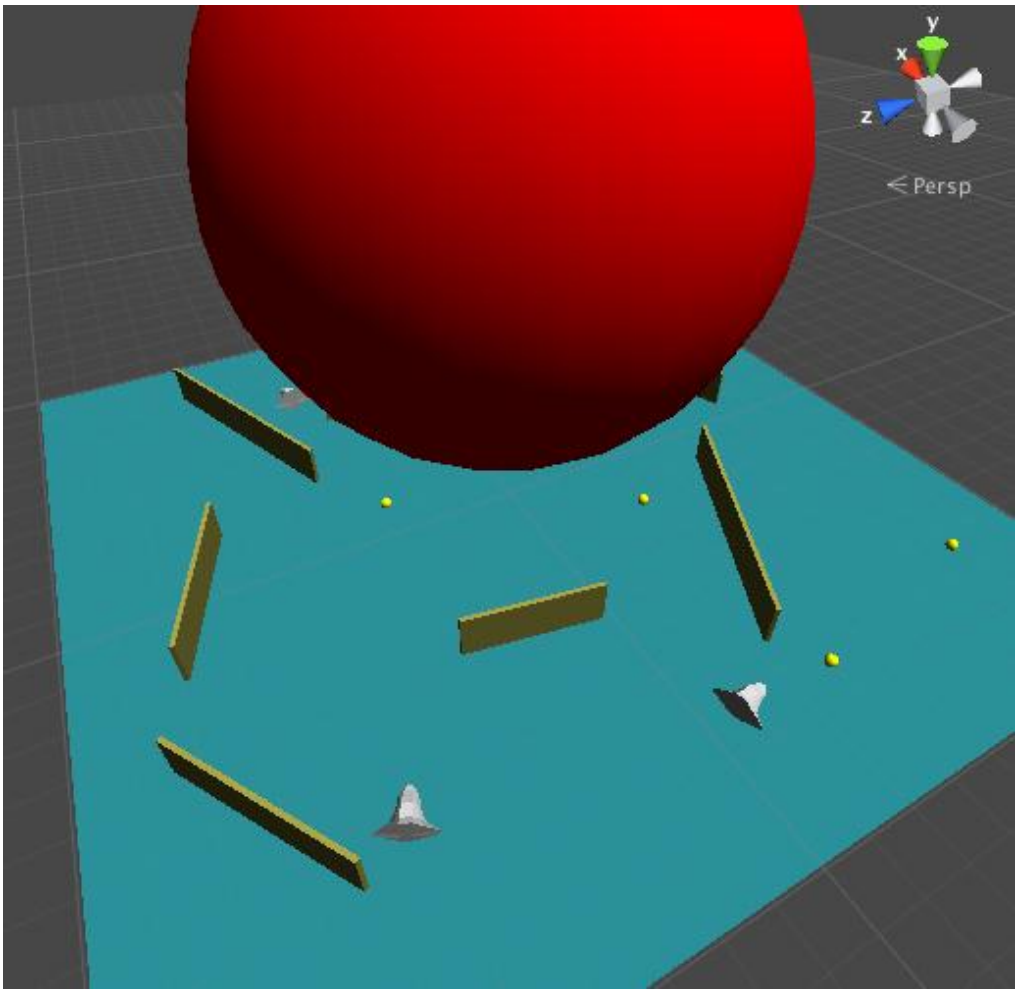
```
using UnityEngine;
using System.Collections;
using System.Collections.Generic;
using RAIN.Core;
using RAIN.Action;

[RAINAction]
public class ChooseRandomSpot : RAINAction
{
    public ChooseRandomSpot()
    {
        actionName = "ChooseRandomSpot";
    }

    public override void Start(AI ai)
    {
        Vector3 moveTarget = Ground.randomLevelPosition();
        ai.WorkingMemory.SetItem("moveTarget", moveTarget);
        base.Start(ai);
    }

    public override ActionResult Execute(AI ai)
    {
        return ActionResult.SUCCESS;
    }

    public override void Stop(AI ai)
    {
        base.Stop(ai);
    }
}
```


Behavior Editor
BT ship
PAR root
detect
SEL selector
CON constraint
action
move
CON constraint
move
action
RAIN
Behavior Tree
Current AI (SearchShip)
Node Type:
Move
Name:
move
Repeat:
Never
Pause When Hit:
Move Target:
moveTarget
Move Speed:
2
Face Target:
Turn Speed:
Close Enough Distance:
0.5
Close Enough Angle:
Move
Move to a target location and/or turn to face a target. Target can be a the name of a Navigation Target (in quotes), a vector, or a variable expression representing an object or location.

```
using UnityEngine;
using System.Collections;
using System.Collections.Generic;
using RAIN.Core;
using RAIN.Action;

[RAINAction]
public class ChooseRandomSpot : RAINAction
{
    public ChooseRandomSpot()
    {
        actionName = "ChooseRandomSpot";
    }

    public override void Start(AI ai)
    {
        Vector3 moveTarget = Ground.randomLevelPosition();
        ai.WorkingMemory.SetItem("moveTarget", moveTarget);
        base.Start(ai);
    }

    public override ActionResult Execute(AI ai)
    {
        GameObject gold = ai.WorkingMemory.GetItem<GameObject>("gold");
        if(gold != null) {
            return ActionResult.FAILURE;
        }

        Vector3 moveTarget = ai.WorkingMemory.GetItem<Vector3>("moveTarget");
        if(Vector3.Distance(moveTarget, ai.Body.transform.position) < 1.0f) {
            return ActionResult.SUCCESS;
        }

        ai.Motor.MoveTo(moveTarget);

        return ActionResult.RUNNING;
    }

    public override void Stop(AI ai)
    {
        base.Stop(ai);
    }
}
```

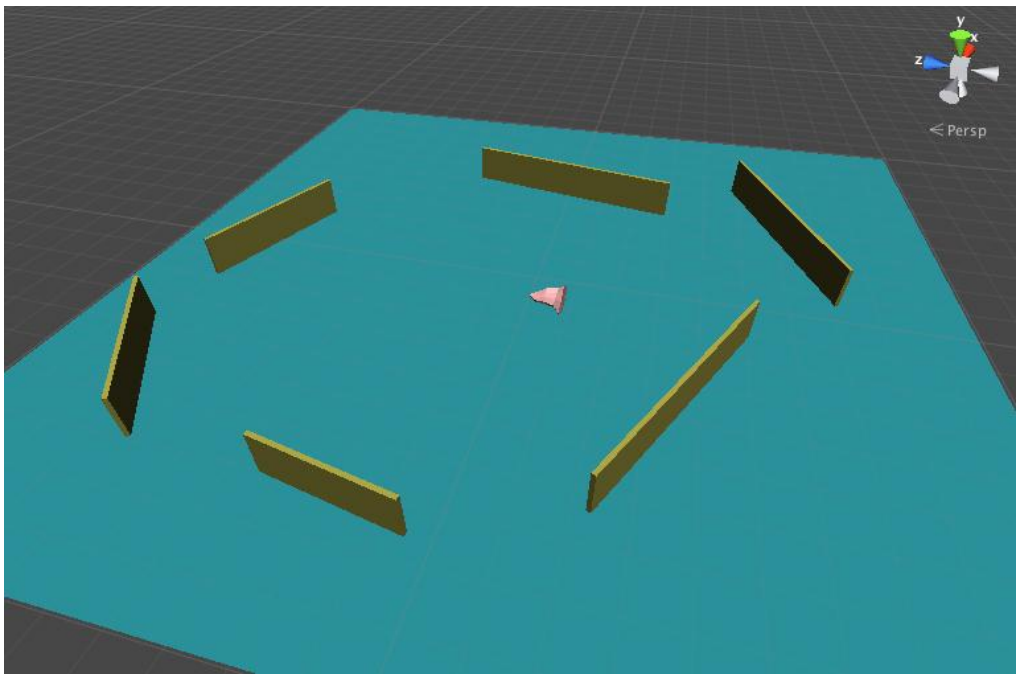


```
using UnityEngine;
using System.Collections;
using RAIN.Core;

public class Ground : MonoBehaviour {

	...
    public Transform bomb;
    public float BombTime = 30.0f;

	...

    void Update () {

        if(BombTime < 0.0f) {
            return;
        }

        goldTimer += Time.deltaTime;
        if(goldTimer >= goldCreateTime) {
            Instantiate(gold, randomLevelPosition(), Quaternion.identity);
            goldTimer = 0.0f;
        }

        BombTime -= Time.deltaTime;
        if(BombTime <= 0.0f) {
            GameObject.Instantiate(bomb);

            AIRig[] AIs = GameObject.FindObjectsOfType(typeof(AIRig)) as AIRig[];
            for(int i = 0; i < AIs.Length; i++) {
                AIs[i].enabled = false;
            }
        }
    }
}

```

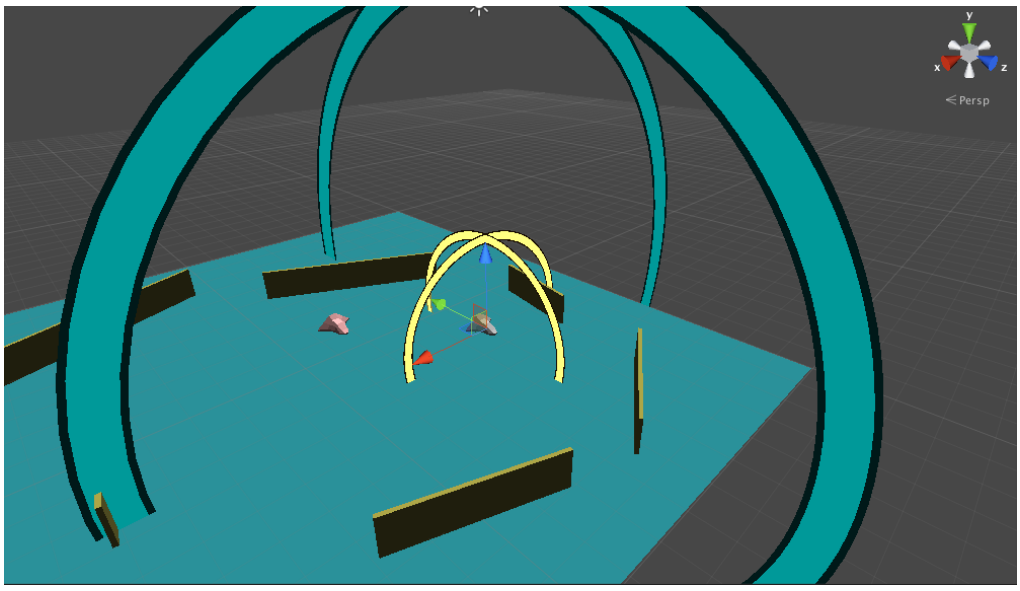


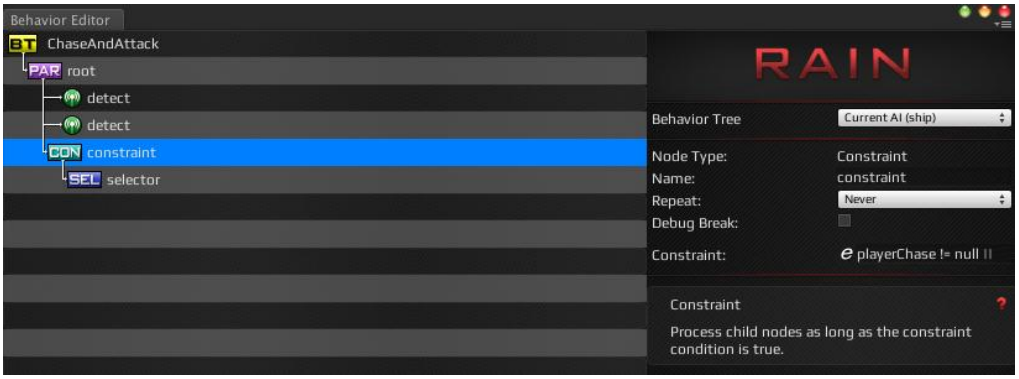

```
7       public bool IsTargetVisible (Transform target)
8       {
9           Vector3 targetDirection = target.position - transform.position;
10          Ray ray = new Ray (transform.position, targetDirection);
11          varinFOV = Vector3.Angle (transform.forward, targetDirection) < 45;
12          if (inFOV) {
13              RaycastHit hit;
14              if (Physics.Raycast (ray, out hit, 1000)) {
15                  return hit.collider.transform == target;
16              }
17          }
18          return false;
19      }
```

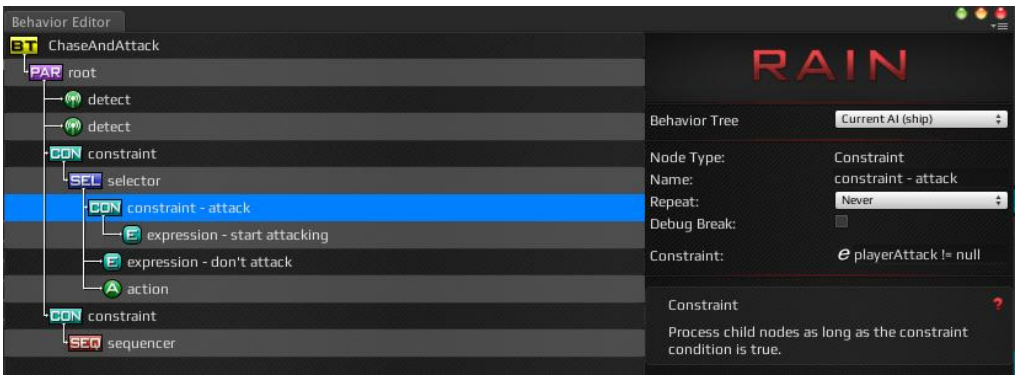
Chapter 8: Attacking



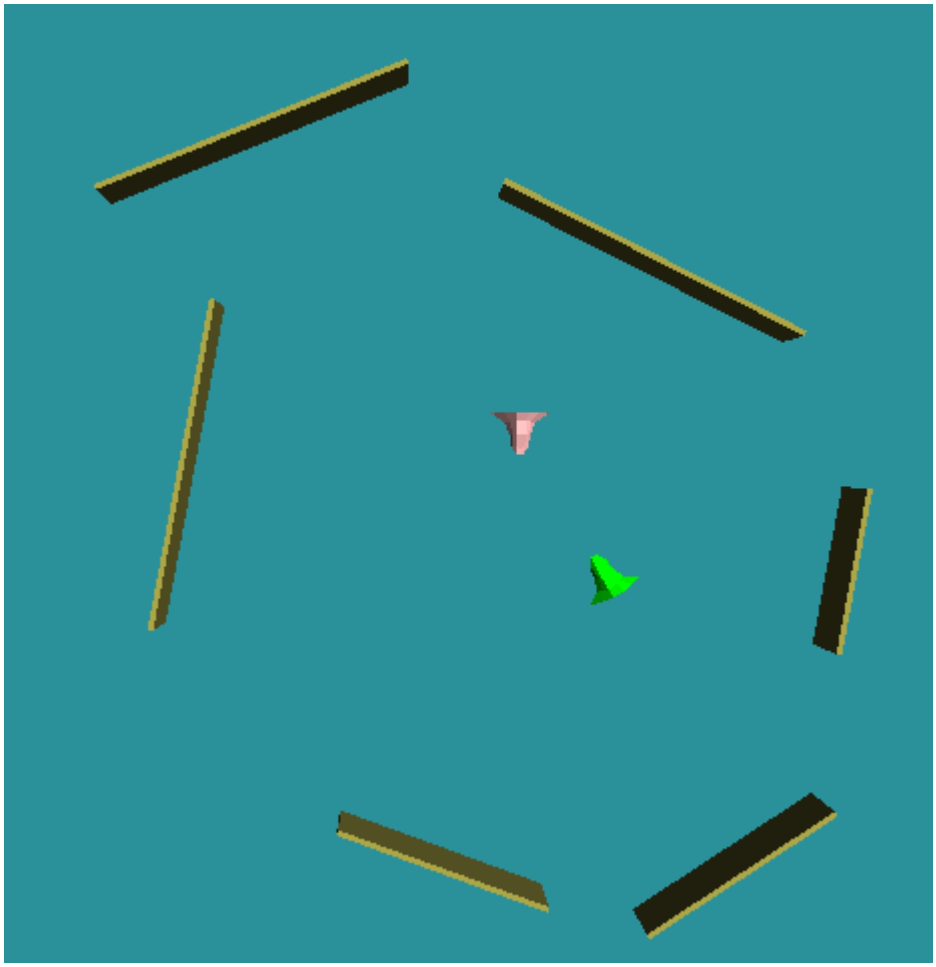
```
using UnityEngine;
using System.Collections;
using RAIN.Core;

public class Enemy : MonoBehaviour {

    float blinkTime = 0.0f;
    const float blinkLength = 0.1f;

    AIRig aiRig = null;

    void Start () {
        aiRig = GetComponentInChildren<AIRig>();
    }

    void Update () {

        bool isAttacking = aiRig.AI.WorkingMemory.GetItem<bool>("isAttacking");

        if(!isAttacking) {
            gameObject.renderer.material.color = Color.white;
            return;
        }

        blinkTime += Time.deltaTime;
        if(blinkTime > blinkLength) {
            blinkTime = -blinkLength;
        }

        gameObject.renderer.material.color = blinkTime < 0.0f ? Color.green : Color.white;
    }
}

```

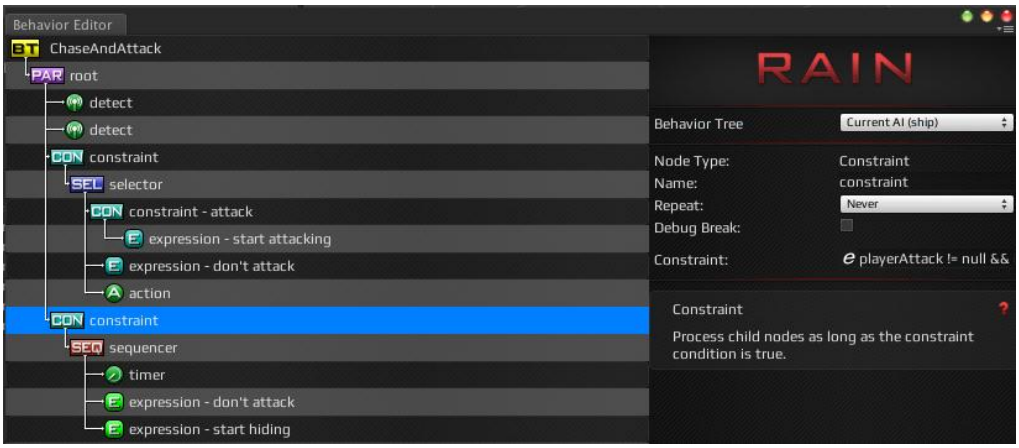


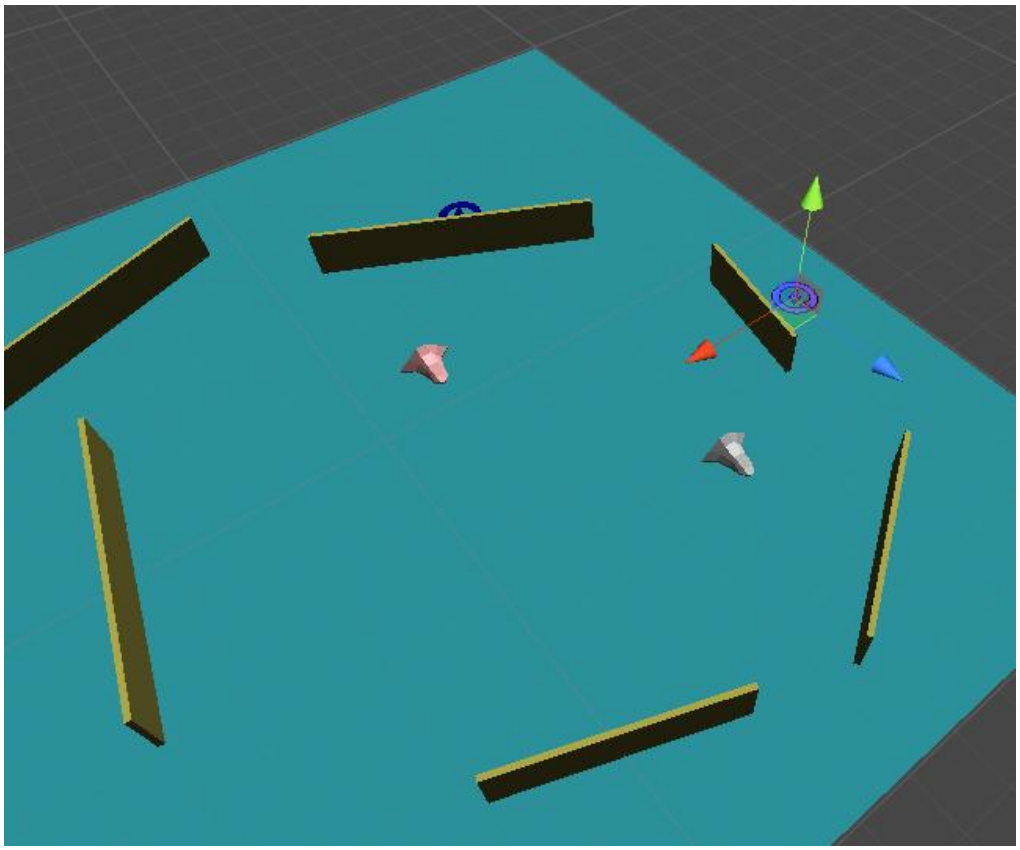

Behavior Editor
BT ChaseAndAttack
PAR root
detect
detect
CON constraint
SEL selector
RAIN
Behavior Tree
Current AI (ship)
Node Type:
Constraint
Name:
constraint
Repeat:
Never
Debug Break:
Constraint:
e playerChase != null ||
Constraint
Process child nodes as long as the constraint condition is true.

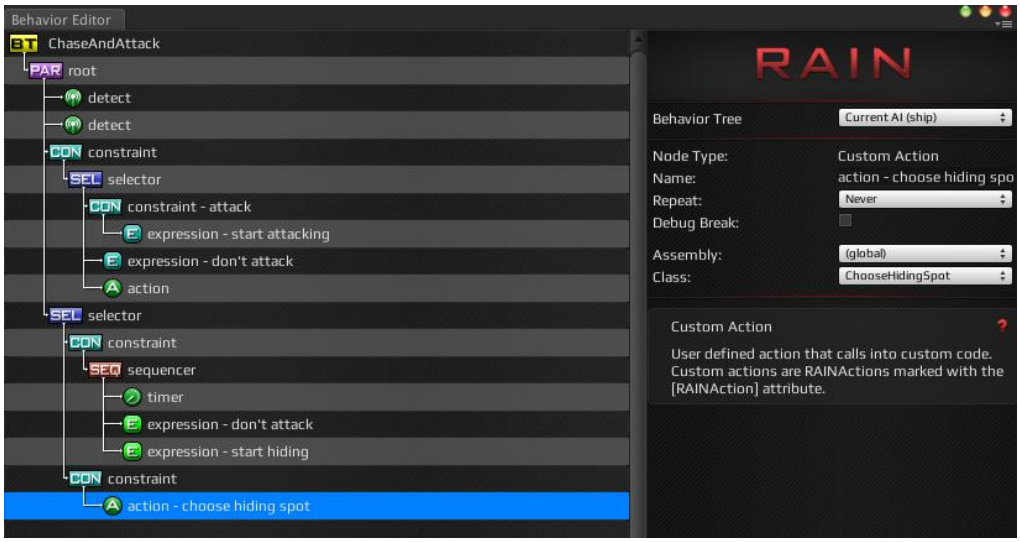

Behavior Editor
BT ChaseAndAttack
PAR root
detect
detect
CON constraint
SEL selector
CON constraint - attack
E expression - start attacking
E expression - don't attack
A action
CON constraint
SEQ sequencer
RAIN
Behavior Tree
Current AI (ship)
Node Type:
Constraint
Name:
constraint - attack
Repeat:
Never
Debug Break:
Constraint:
e playerAttack != null
Constraint
Process child nodes as long as the constraint condition is true.

```
using UnityEngine;
using System.Collections;
using System.Collections.Generic;
using RAIN.Core;
using RAIN.Action;

[RAINAction]
public class Chase : RAINAction
{
    public GameObject player;

    public override void Start(AI ai)
    {
        base.Start(ai);

        player = GameObject.Find("player");
    }

    public override ActionResult Execute(AI ai)
    {
        if(player == null) {
            return ActionResult.FAILURE;
        }

        ai.Motor.MoveTo(player.transform.position);

        return ActionResult.RUNNING;
    }

    public override void Stop(AI ai)
    {
        base.Stop(ai);
    }
}
```



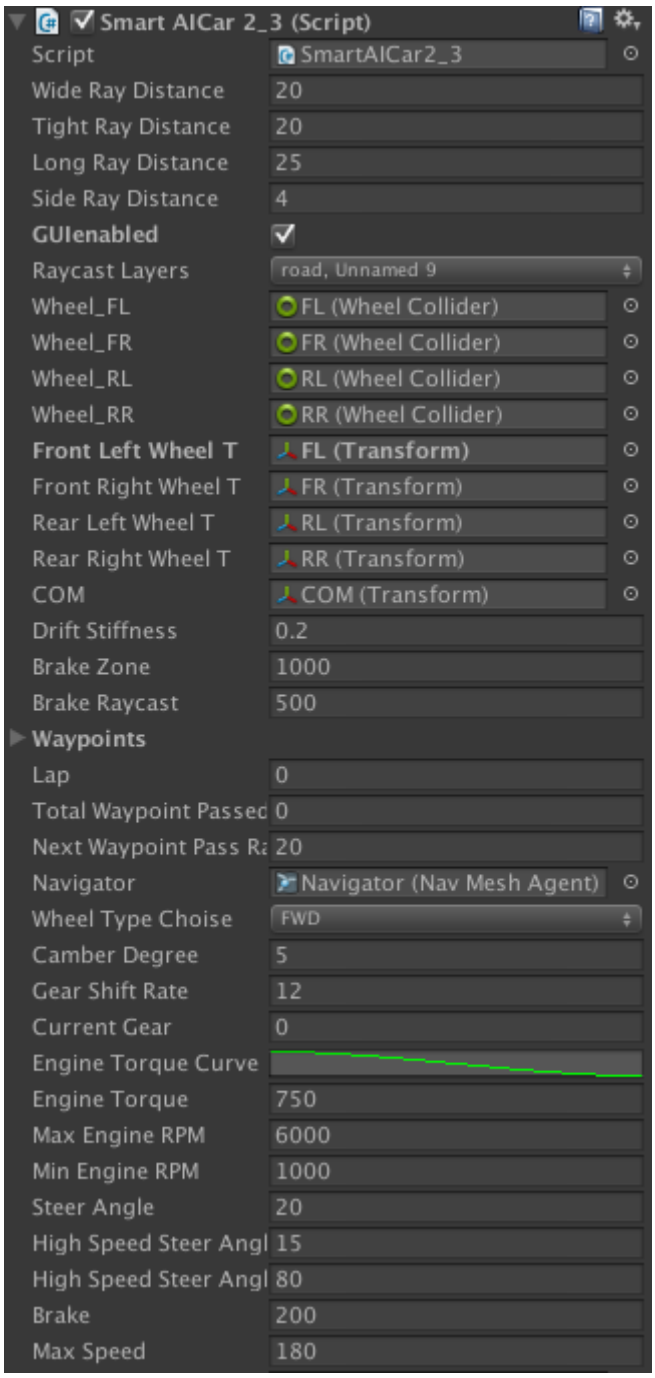

Behavior Editor
BT ChaseAndAttack
PAR root
detect
detect
CON constraint
SEL selector
CON constraint - attack
E expression - start attacking
E expression - don't attack
A action
CON constraint
SEQ sequencer
timer
E expression - don't attack
E expression - start hiding
RAIN
Behavior Tree
Current AI (ship)
Node Type:
Constraint
Name:
constraint
Repeat:
Never
Debug Break:
Constraint:
e playerAttack != null &&
Constraint
Process child nodes as long as the constraint condition is true.

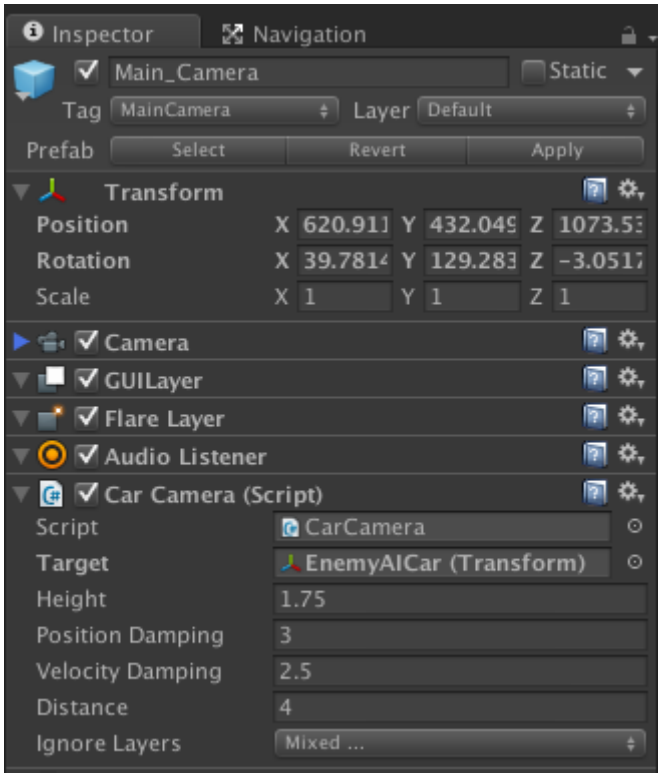


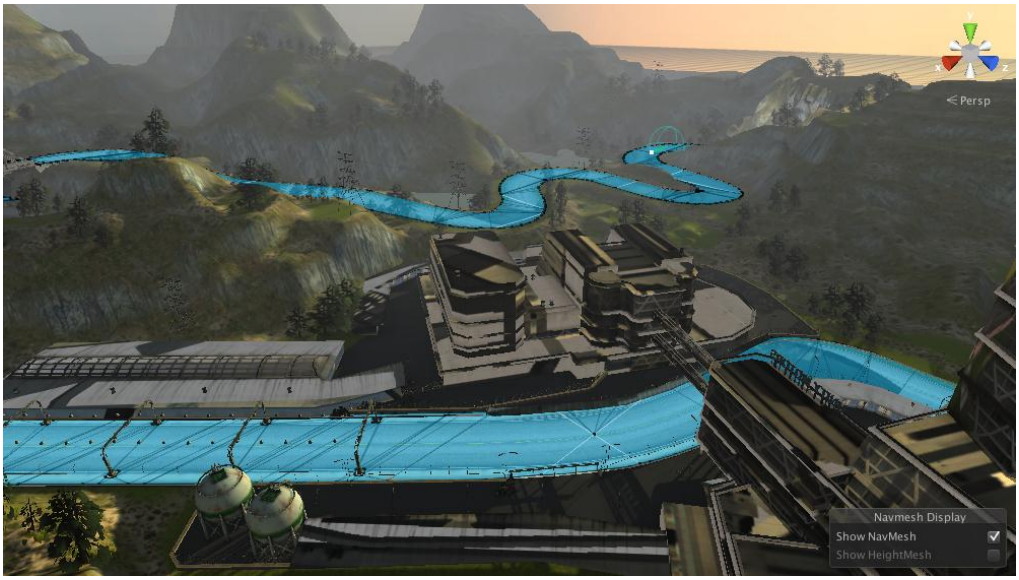

Behavior Editor
BT ChaseAndAttack
PAR root
detect
detect
CON constraint
SEL selector
CON constraint - attack
E expression - start attacking
E expression - don't attack
A action
SEL selector
CON constraint
SEQ sequencer
timer
E expression - don't attack
E expression - start hiding
CON constraint
A action - choose hiding spot
RAIN
Behavior Tree
Current AI (ship)
Node Type:
Custom Action
Name:
action - choose hiding spo
Repeat:
Never
Debug Break:
Assembly:
(global)
Class:
ChooseHidingSpot
Custom Action
User defined action that calls into custom code. Custom actions are RAINActions marked with the [RAINAction] attribute.

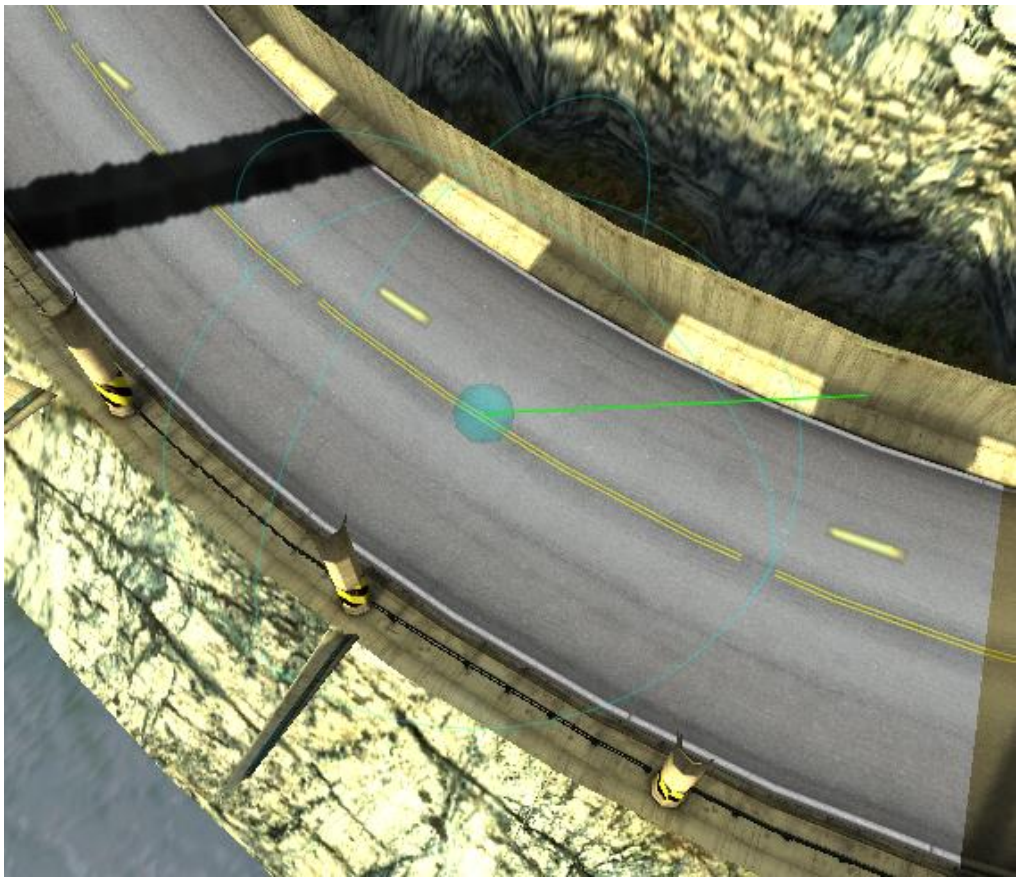
```
[RAINAction]
public class ChooseHidingSpot : RAINAction
{
    Vector3 hideTarget;

    public override void Start(AI ai)
    {
        NavigationTargetRig[] coverPoints = GameObject.FindObjectsOfType(typeof(NavigationTargetRig)) as NavigationTargetRig[];

        if(coverPoints.Length == 0)
        {
            return;
        }

        float length = float.MaxValue;
        Vector3 target = Vector3.zero;
        foreach(NavigationTargetRig obj in coverPoints)
        {
            if(Vector3.Distance(ai.Body.transform.position, obj.Target.PositionOffset) < length)
            {
                target = obj.Target.PositionOffset;
            }
        }

        hideTarget = target;

        base.Start(ai);
    }

    public override ActionResult Execute(AI ai)
    {
        if(Vector3.Distance(hideTarget, ai.Body.transform.position) < 1.0f) {
            return ActionResult.SUCCESS;
        }

        ai.Motor.MoveTo(hideTarget);

        return ActionResult.RUNNING;
    }

    public override void Stop(AI ai)
    {
        base.Stop(ai);
    }
}
```

Chapter 9: Driving

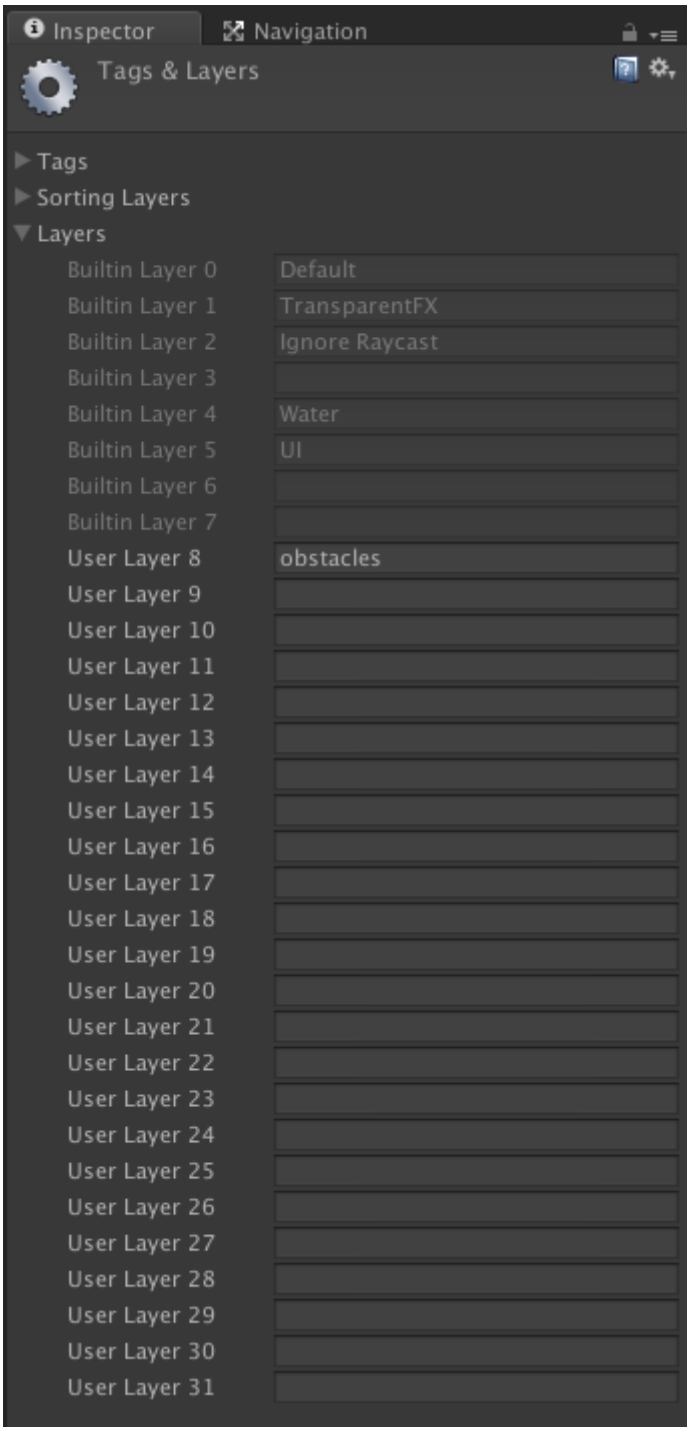



Inspector
Navigation
Main_Camera
Static
Tag
MainCamera
Layer
Default
Prefab
Select
Revert
Apply
Transform
Position
X 620.911
Y 432.049
Z 1073.53
Rotation
X 39.7814
Y 129.283
Z -3.0517
Scale
X 1
Y 1
Z 1
Camera
GUILayer
Flare Layer
Audio Listener
Car Camera (Script)
Script
CarCamera
Target
EnemyAICar (Transform)
Height
1.75
Position Damping
3
Velocity Damping
2.5
Distance
4
Ignore Layers
Mixed ...

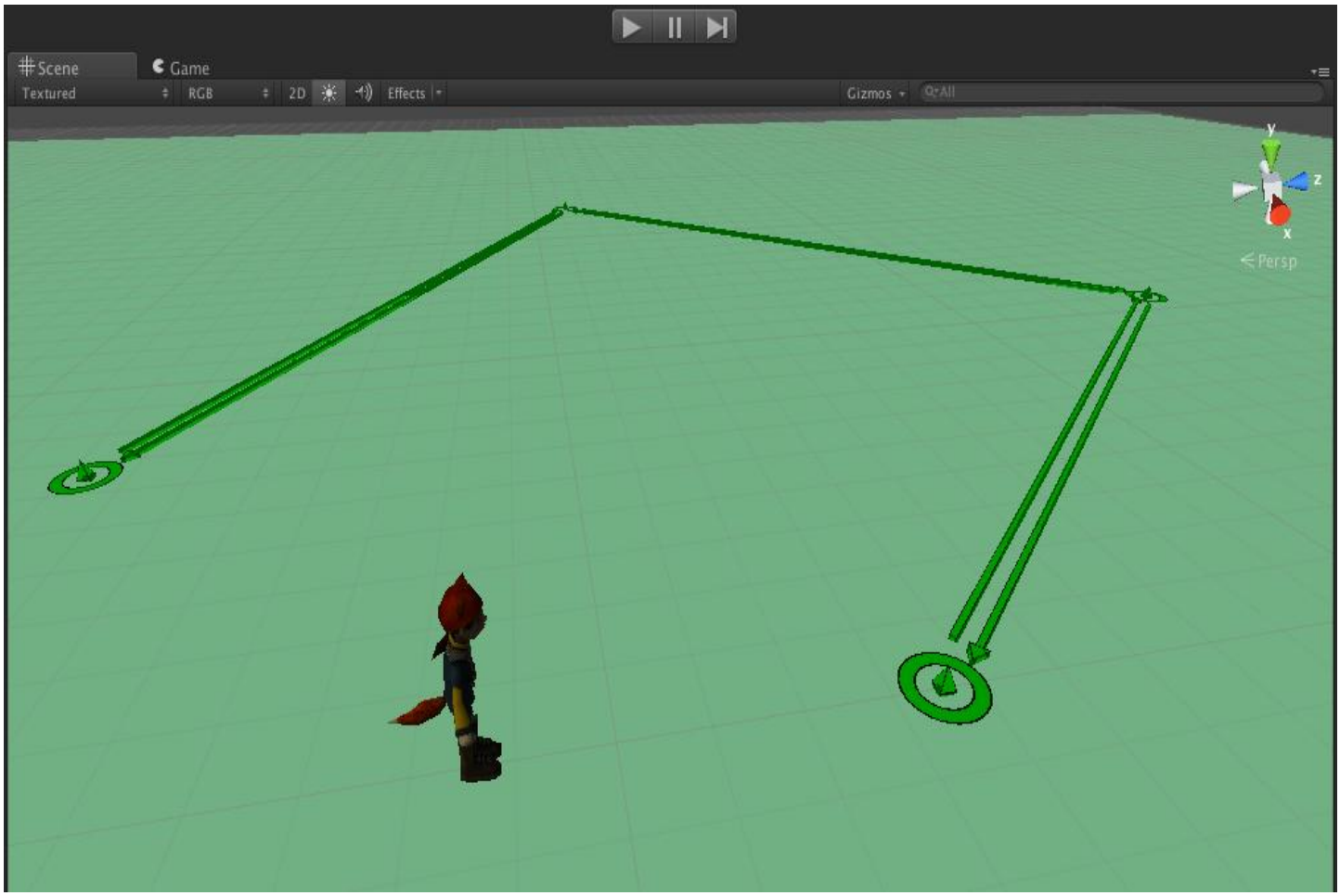

Persp
Navmesh Display
Show NavMesh
Show HeightMesh



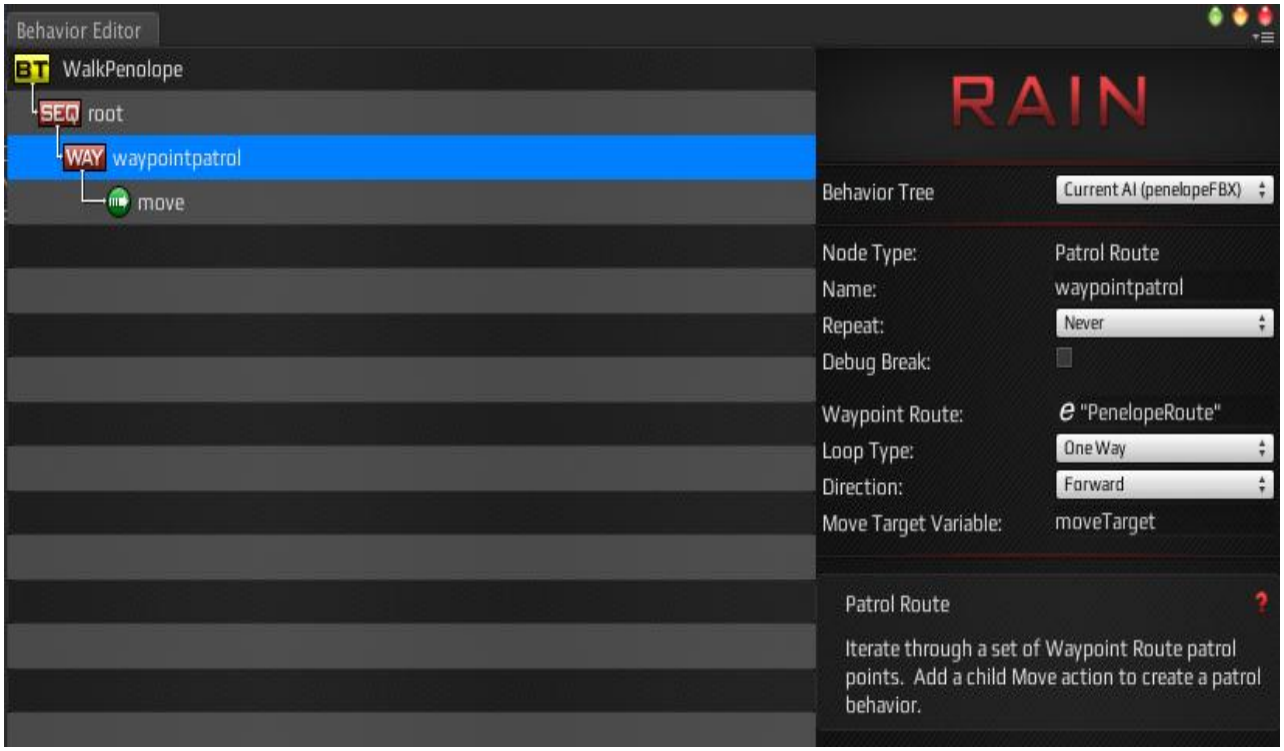

y
z
x
Persp

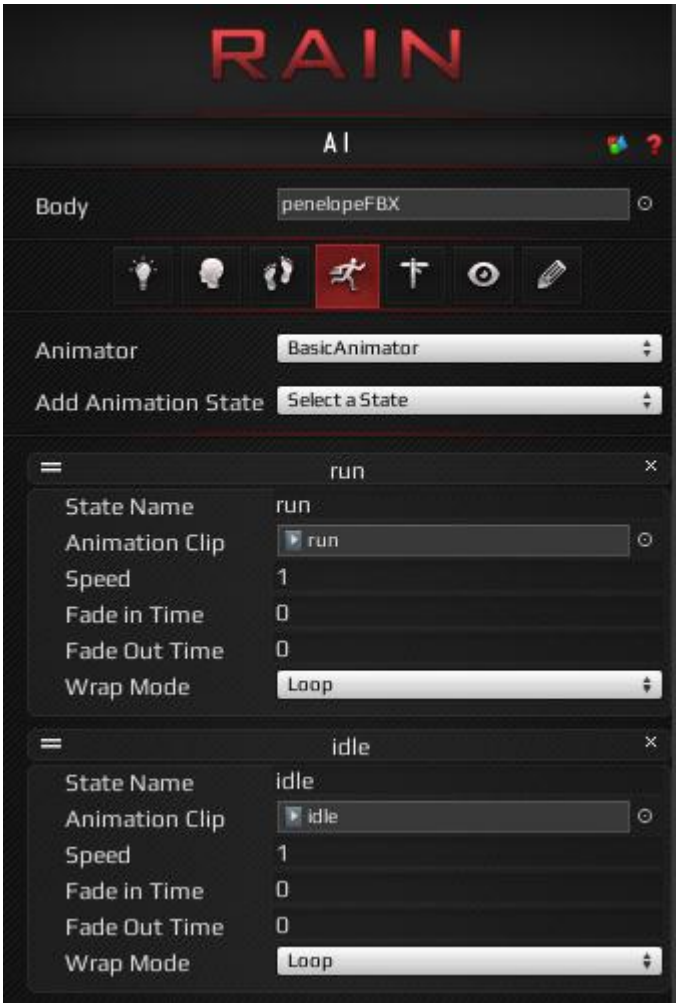

Inspector
Navigation
Tags & Layers
Tags
Sorting Layers
Layers
Builtin Layer 0
Default
Builtin Layer 1
TransparentFX
Builtin Layer 2
Ignore Raycast
Builtin Layer 3
Builtin Layer 4
Water
Builtin Layer 5
UI
Builtin Layer 6
Builtin Layer 7
User Layer 8
obstacles
User Layer 9
User Layer 10
User Layer 11
User Layer 12
User Layer 13
User Layer 14
User Layer 15
User Layer 16
User Layer 17
User Layer 18
User Layer 19
User Layer 20
User Layer 21
User Layer 22
User Layer 23
User Layer 24
User Layer 25
User Layer 26
User Layer 27
User Layer 28
User Layer 29
User Layer 30
User Layer 31

Chapter 10: Animation and AI

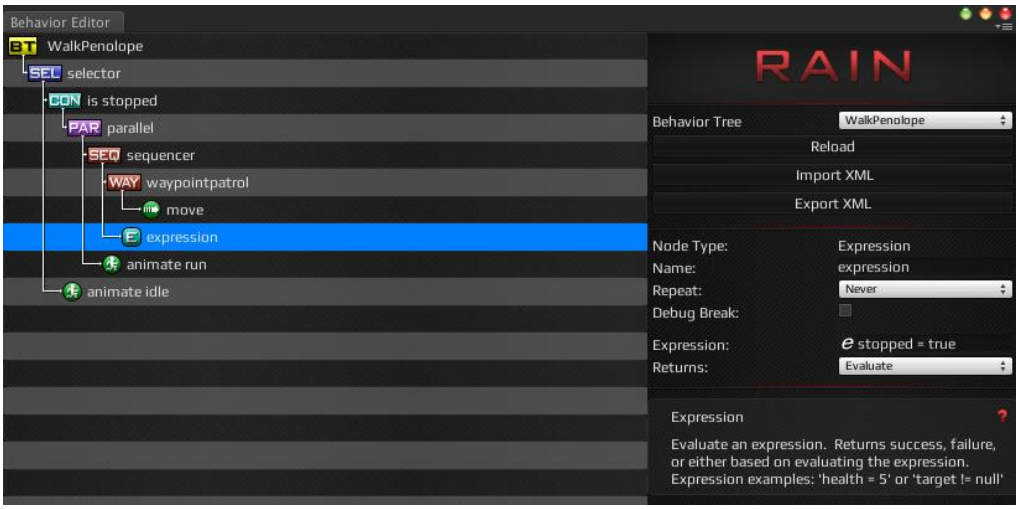


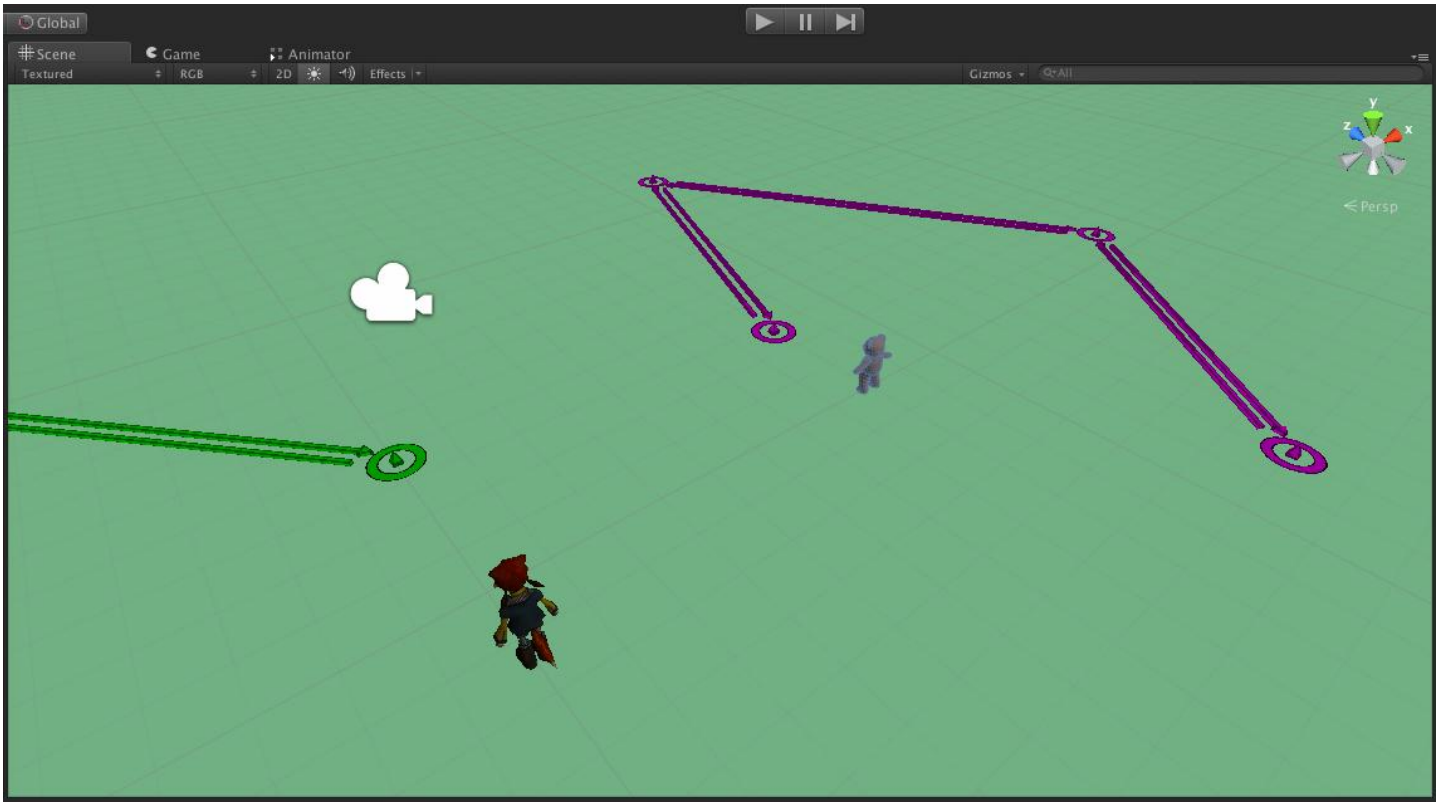
The scene for the AI animation demo

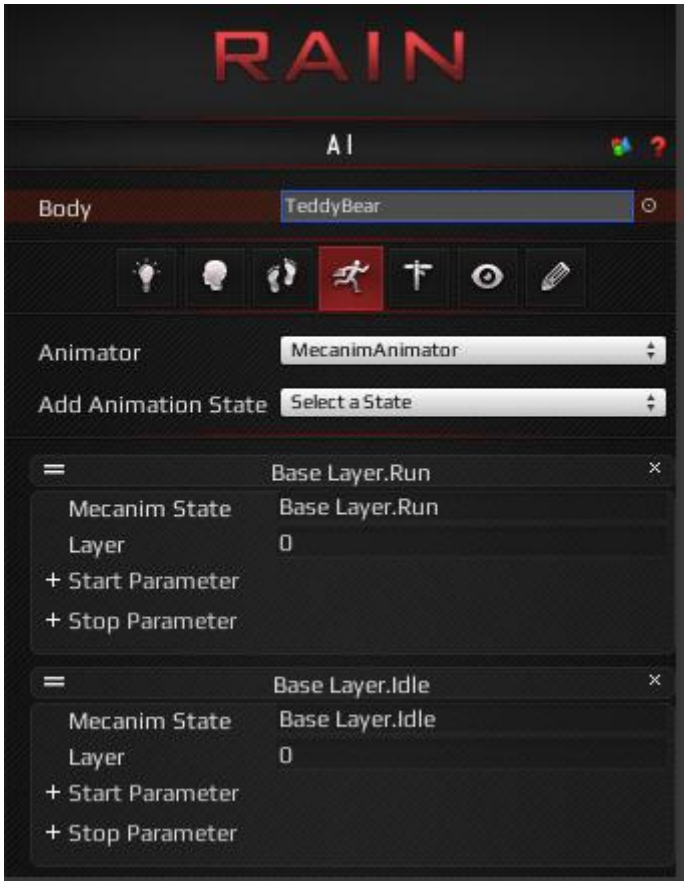

Behavior Editor
BT WalkPenolope
SEQ root
WAY waypointpatrol
move
RAIN
Behavior Tree
Current AI (penelopeFBX)
Node Type:
Patrol Route
Name:
waypointpatrol
Repeat:
Never
Debug Break:
Waypoint Route:
"PenelopeRoute"
Loop Type:
One Way
Direction:
Forward
Move Target Variable:
moveTarget
Patrol Route
Iterate through a set of Waypoint Route patrol points. Add a child Move action to create a patrol behavior.

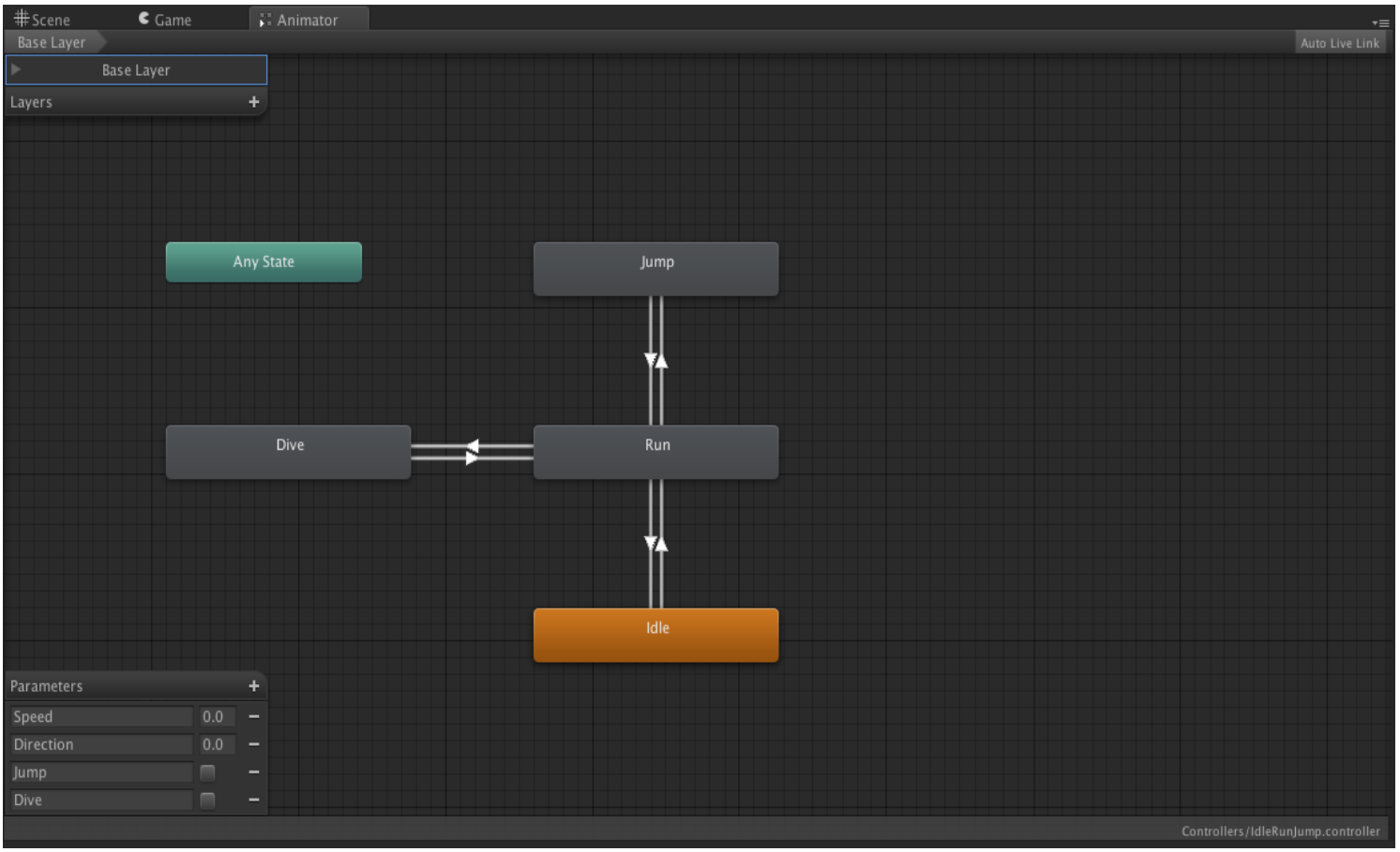

RAIN
AI
Body
penelopeFBX
Animator
BasicAnimator
Add Animation State
Select a State
run
State Name
run
Animation Clip
run
Speed
1
Fade in Time
0
Fade Out Time
0
Wrap Mode
Loop
idle
State Name
idle
Animation Clip
idle
Speed
1
Fade in Time
0
Fade Out Time
0
Wrap Mode
Loop

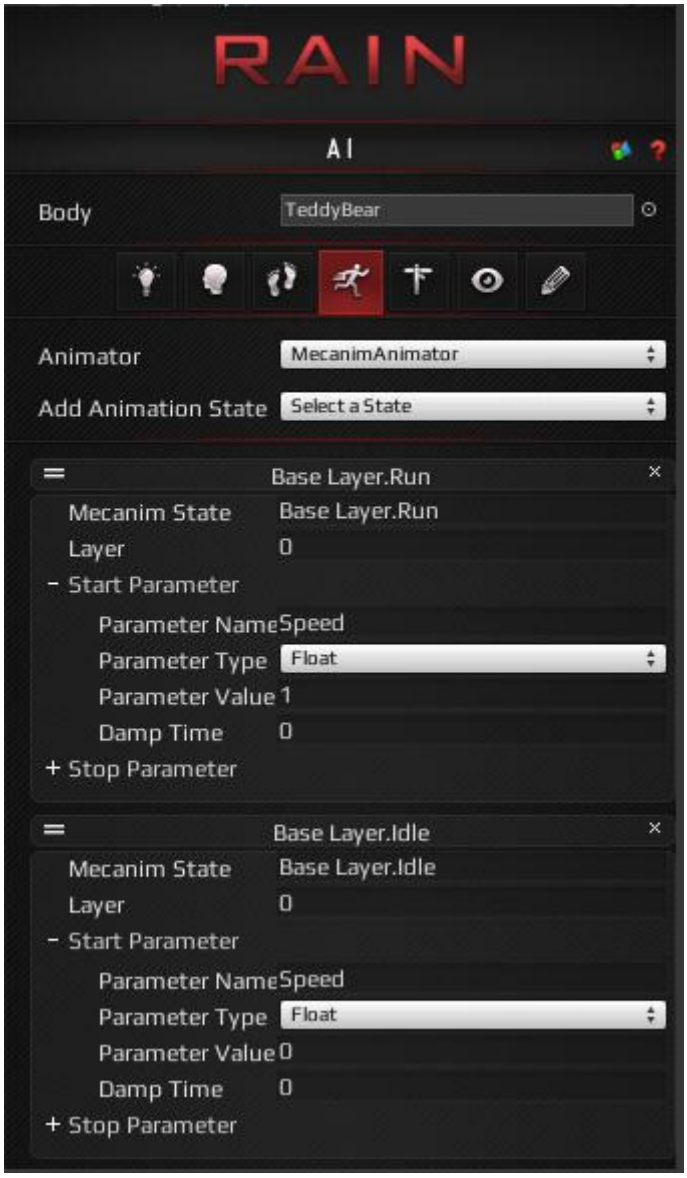

Behavior Editor
BT
WalkPenelope1
PAR
parallel
WAY
waypointpatrol
move
animate run
RAIN
Behavior Tree
WalkPenelope1
Reload
Import XML
Export XML

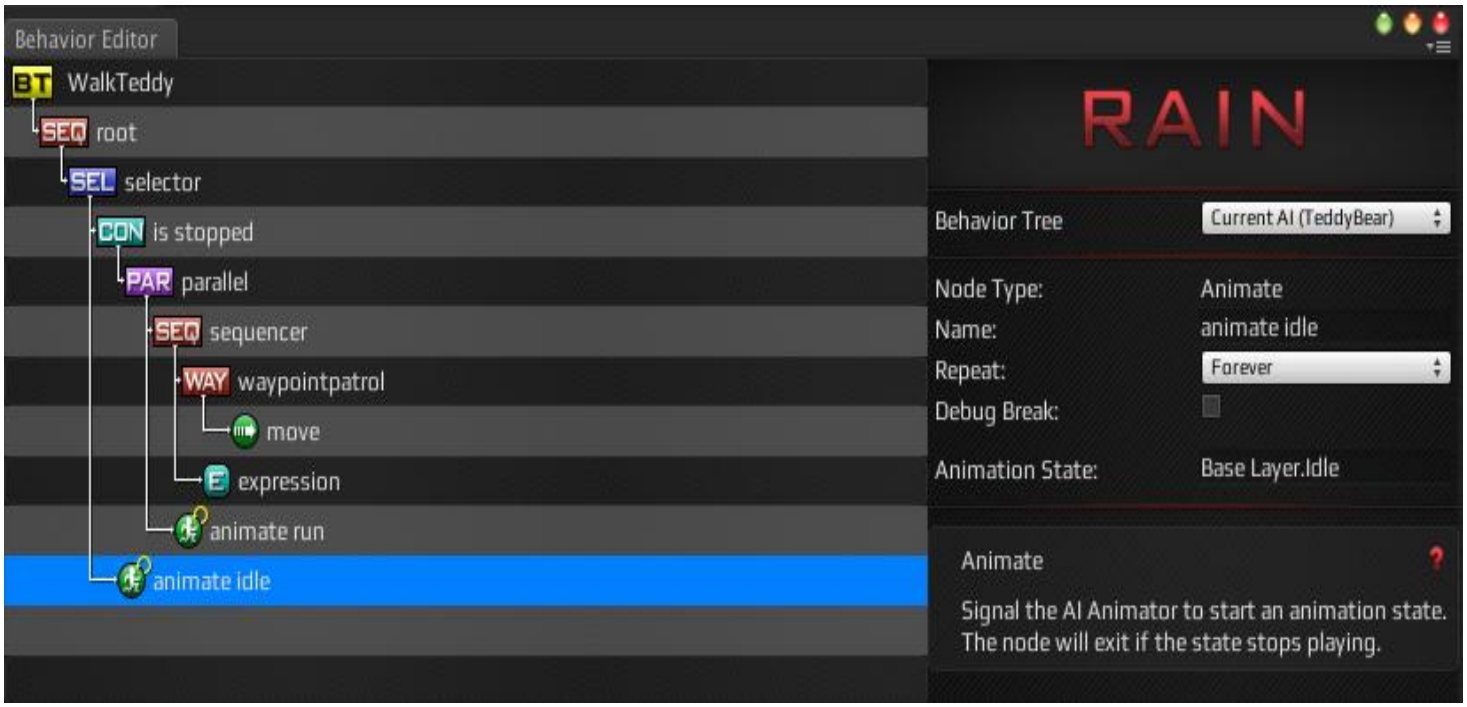

Behavior Editor
WalkPenolope
selector
is stopped
parallel
sequencer
waypointpatrol
move
expression
animate run
animate idle
RAIN
Behavior Tree
WalkPenolope
Reload
Import XML
Export XML
Node Type:
Expression
Name:
expression
Repeat:
Never
Debug Break:
Expression:
stopped = true
Returns:
Evaluate
Expression
Evaluate an expression. Returns success, failure, or either based on evaluating the expression.
Expression examples: 'health = 5' or 'target != null'


Global
Scene
Game
Animator
Textured
RGB
2D
Effects
Gizmos
Persp

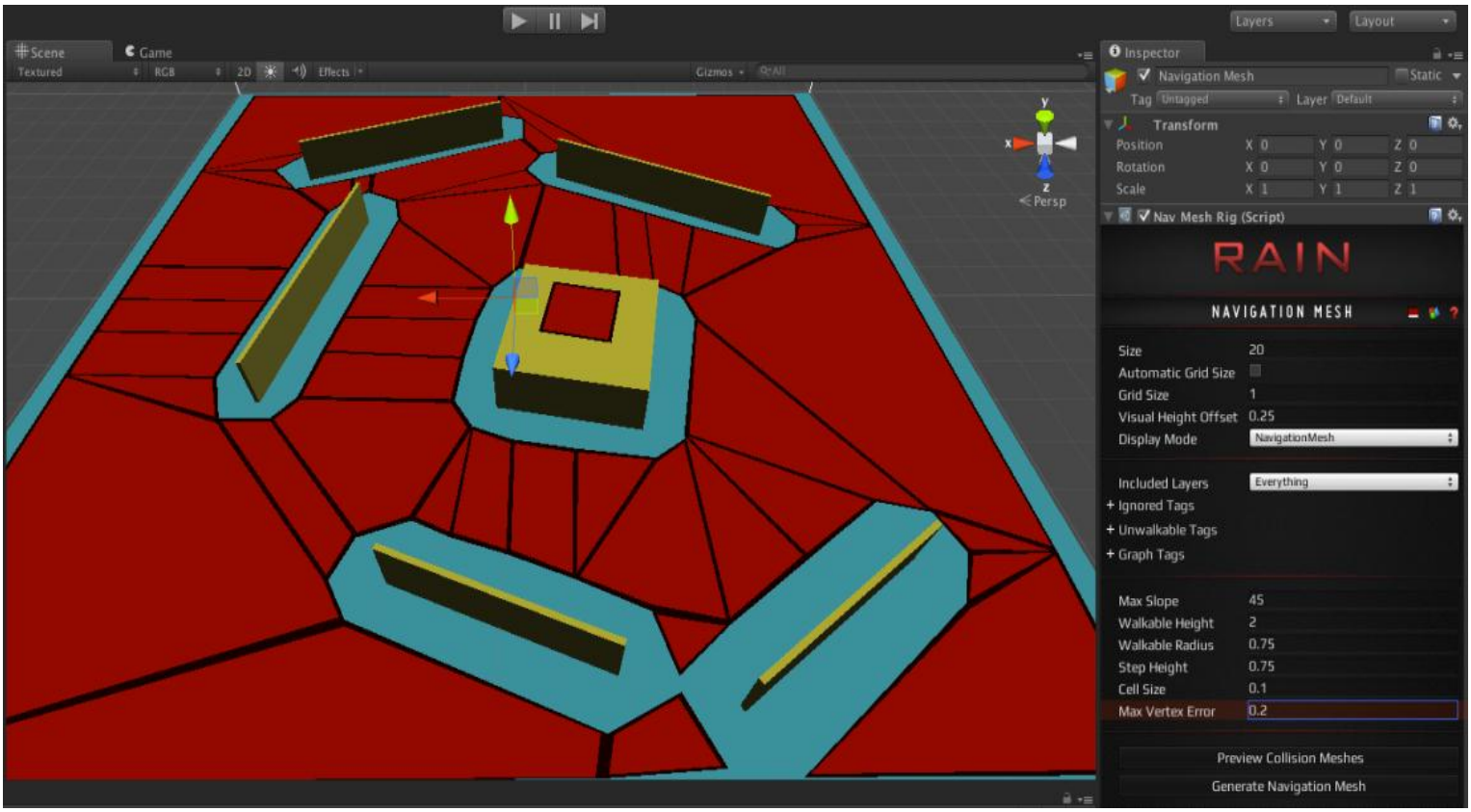

RAIN
AI
Body
TeddyBear
Animator
MecanimAnimator
Add Animation State
Select a State
Base Layer.Run
Mecanim State
Base Layer.Run
Layer
0
+ Start Parameter
+ Stop Parameter
Base Layer.Idle
Mecanim State
Base Layer.Idle
Layer
0
+ Start Parameter
+ Stop Parameter


Scene
Game
Animator
Base Layer
Auto Live Link
Base Layer
Layers
Any State
Jump
Dive
Run
Idle
Parameters
Speed
0.0
Direction
0.0
Jump
Dive
Controllers/IdleRunJump.controller

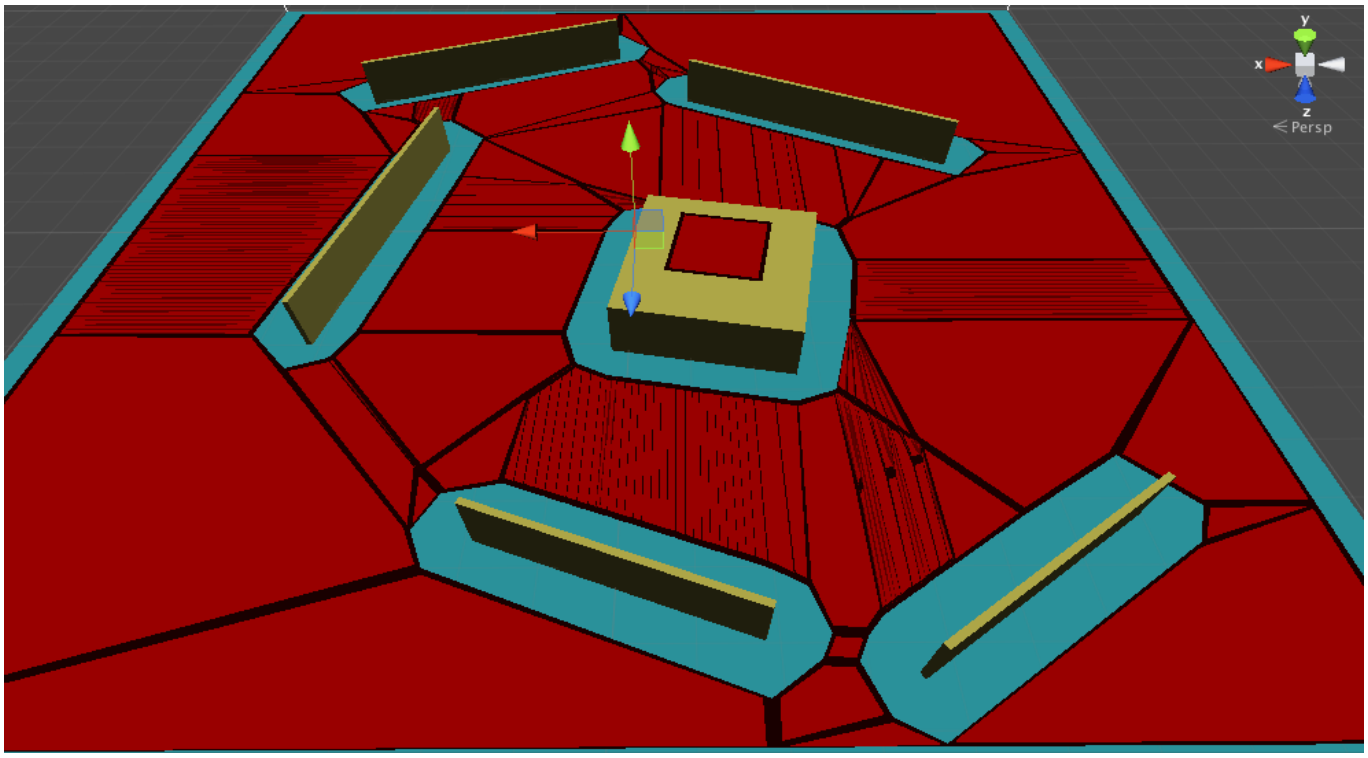

RAIN
AI
Body
TeddyBear
Animator
MecanimAnimator
Add Animation State
Select a State
Base Layer.Run
Mecanim State
Base Layer.Run
Layer
0
- Start Parameter
Parameter Name
Speed
Parameter Type
Float
Parameter Value
1
Damp Time
0
+ Stop Parameter
Base Layer.Idle
Mecanim State
Base Layer.Idle
Layer
0
- Start Parameter
Parameter Name
Speed
Parameter Type
Float
Parameter Value
0
Damp Time
0
+ Stop Parameter

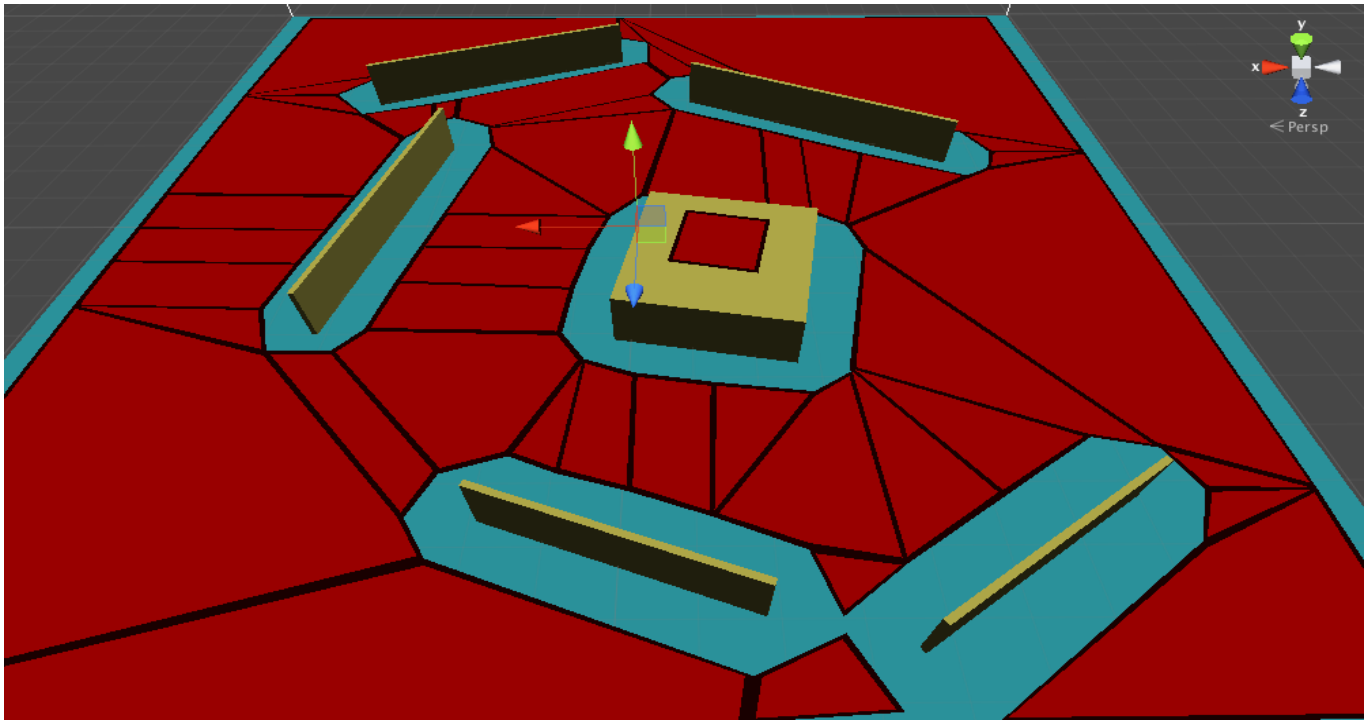

Behavior Editor
BT WalkTeddy
SEQ root
SEL selector
CON is stopped
PAR parallel
SEQ sequencer
WAY waypointpatrol
move
E expression
animate run
animate idle
RAIN
Behavior Tree
Current AI (TeddyBear)
Node Type:
Animate
Name:
animate idle
Repeat:
Forever
Debug Break:
Animation State:
Base Layer.Idle
Animate
Signal the AI Animator to start an animation state.
The node will exit if the state stops playing.

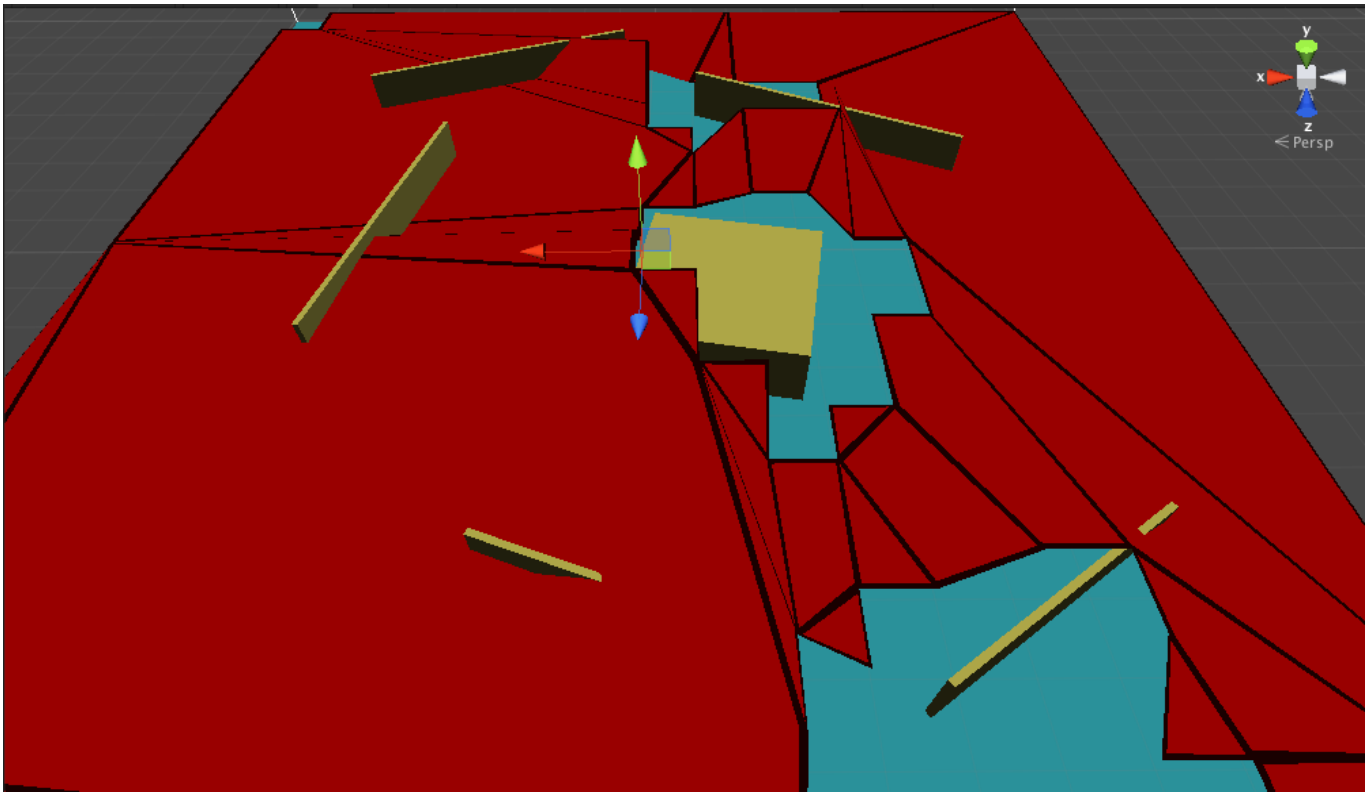
Chapter 11: Advanced NavMesh Generation

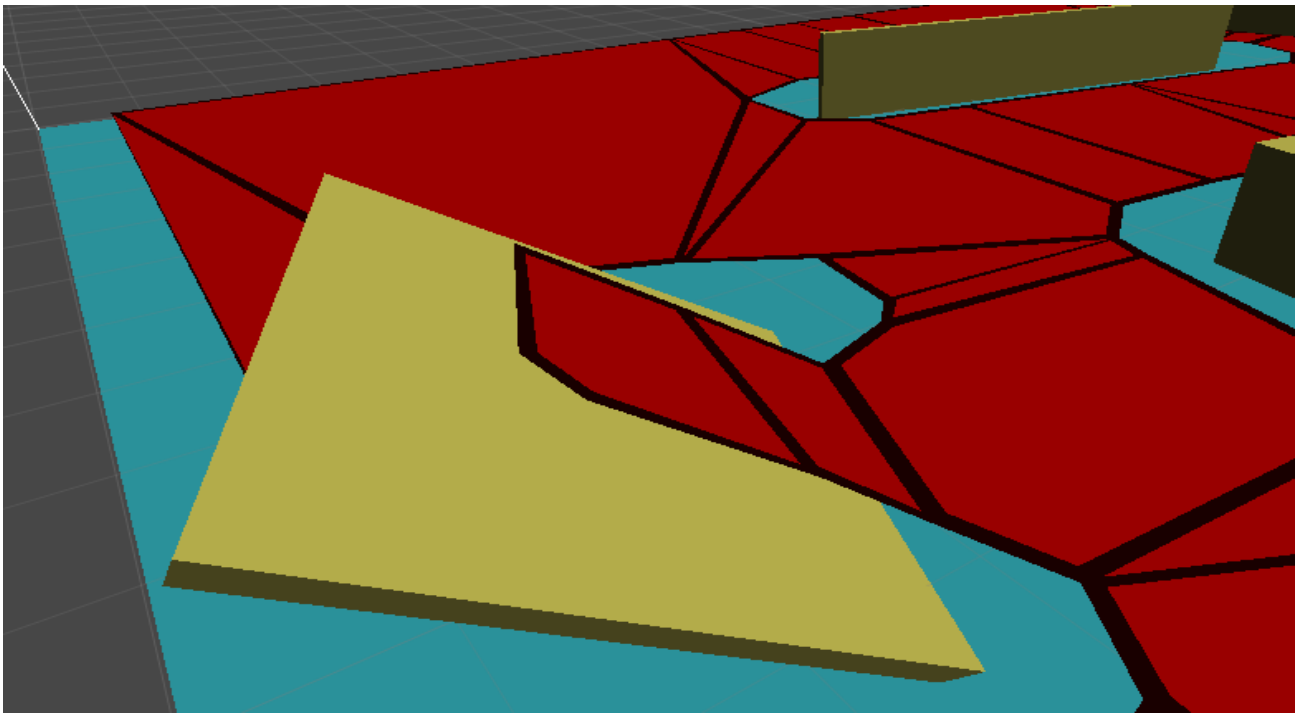


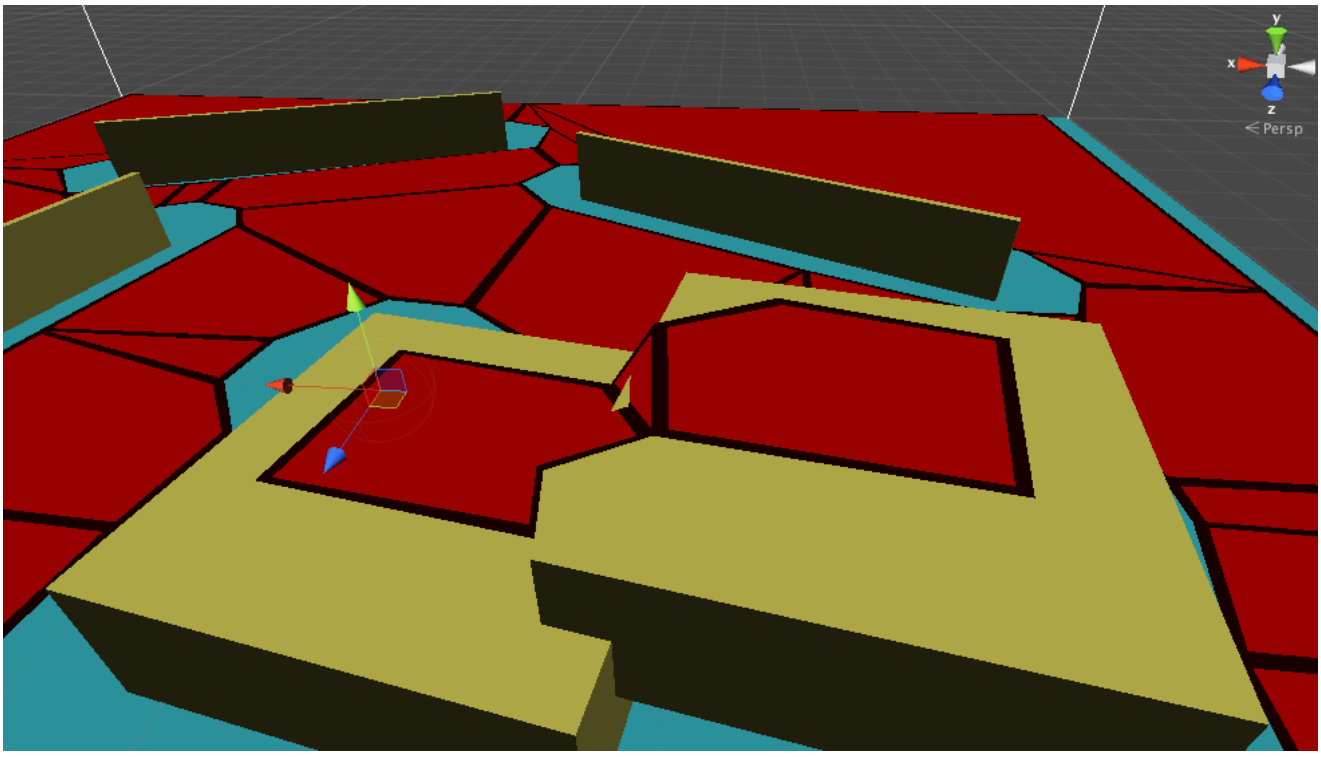
The NavMesh setup

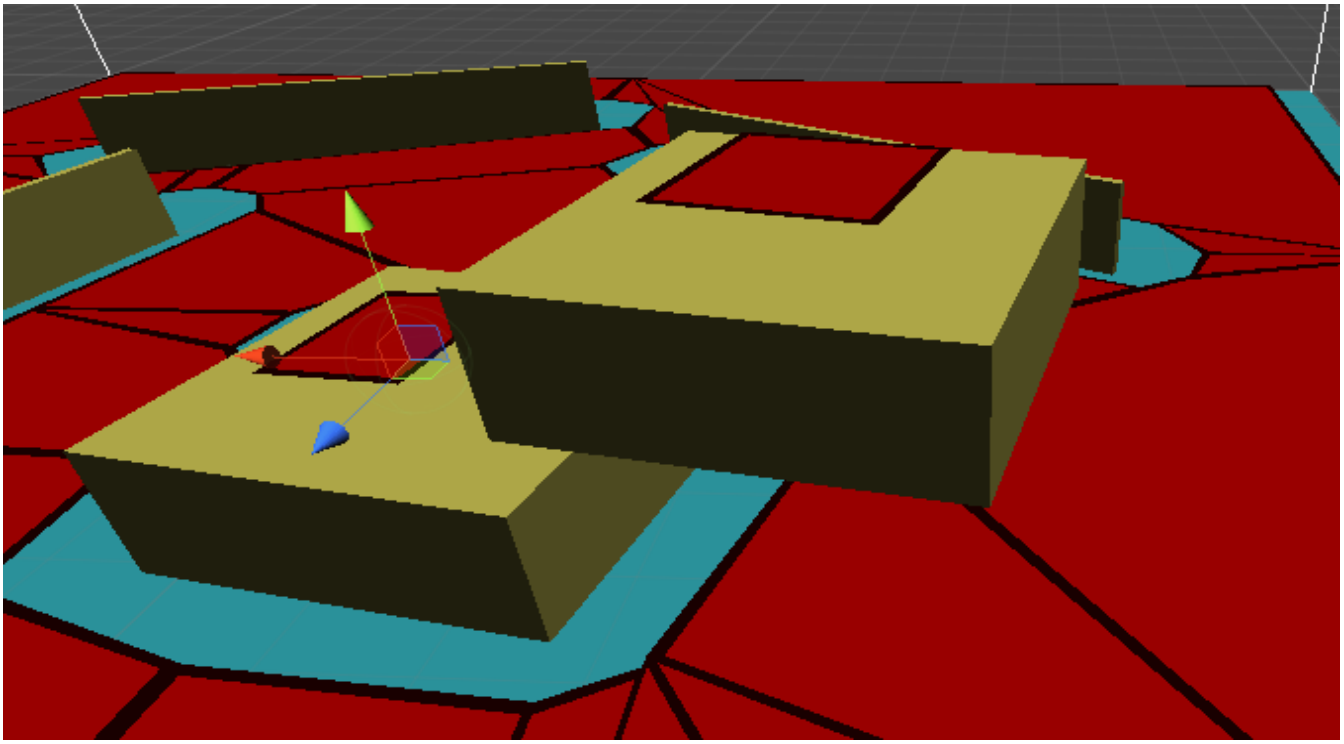

y
x
z
Persp

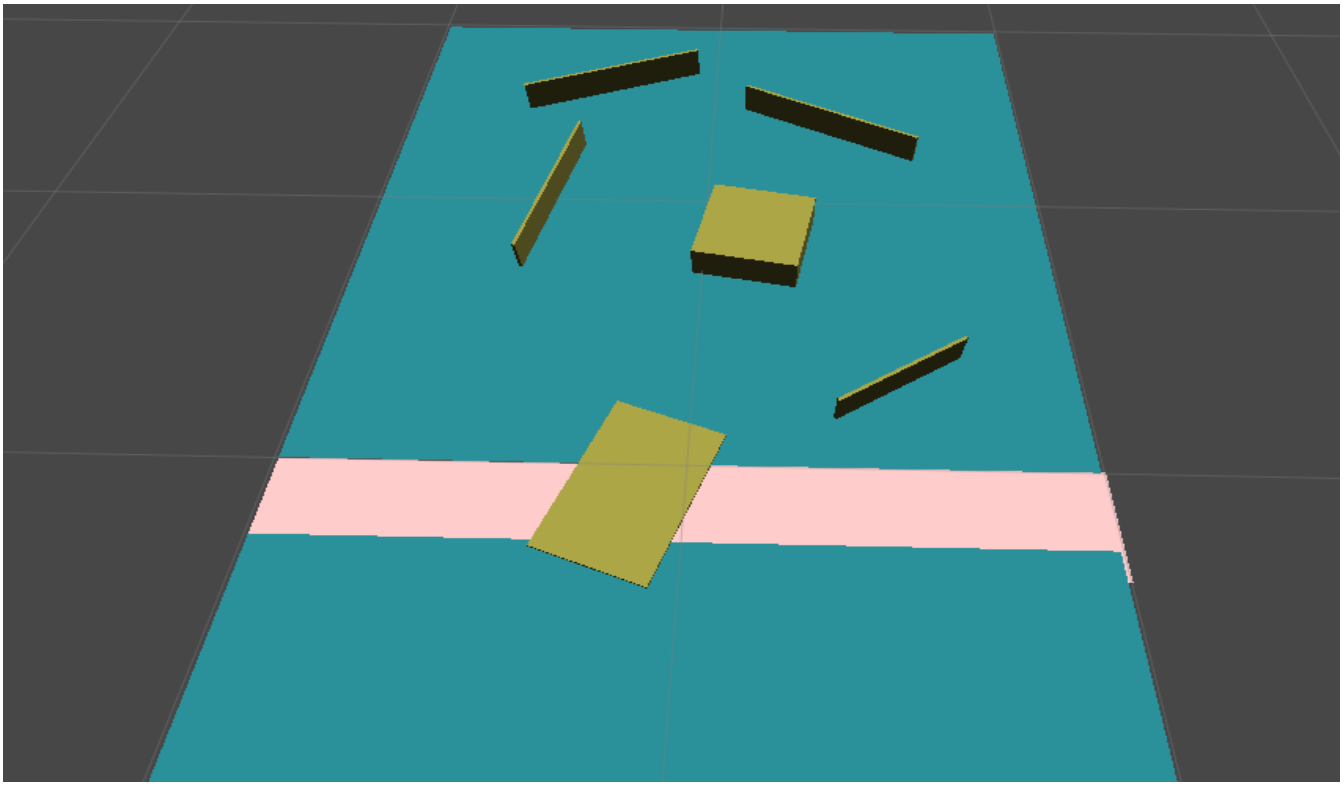

y
x
z
Persp

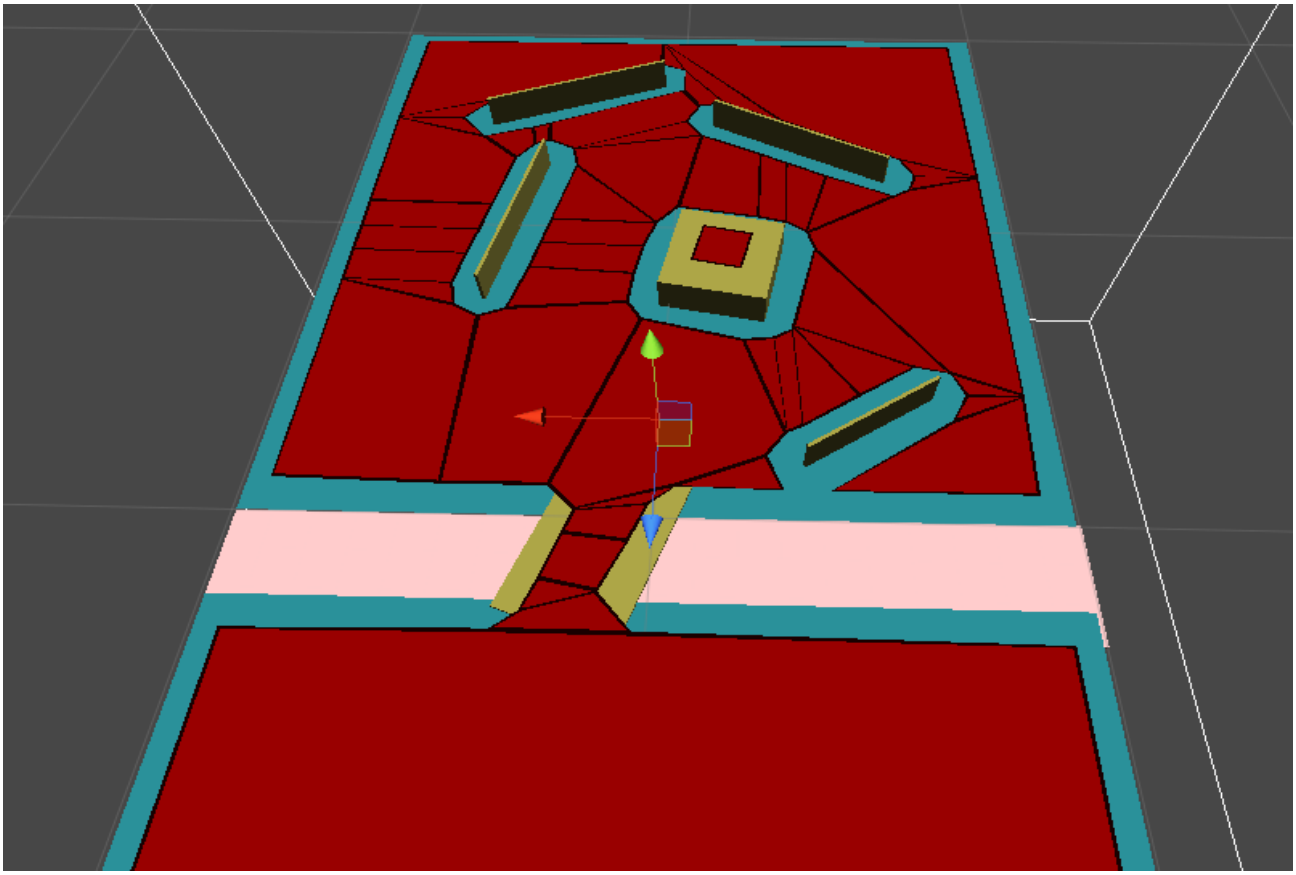

y
x
z
Persp



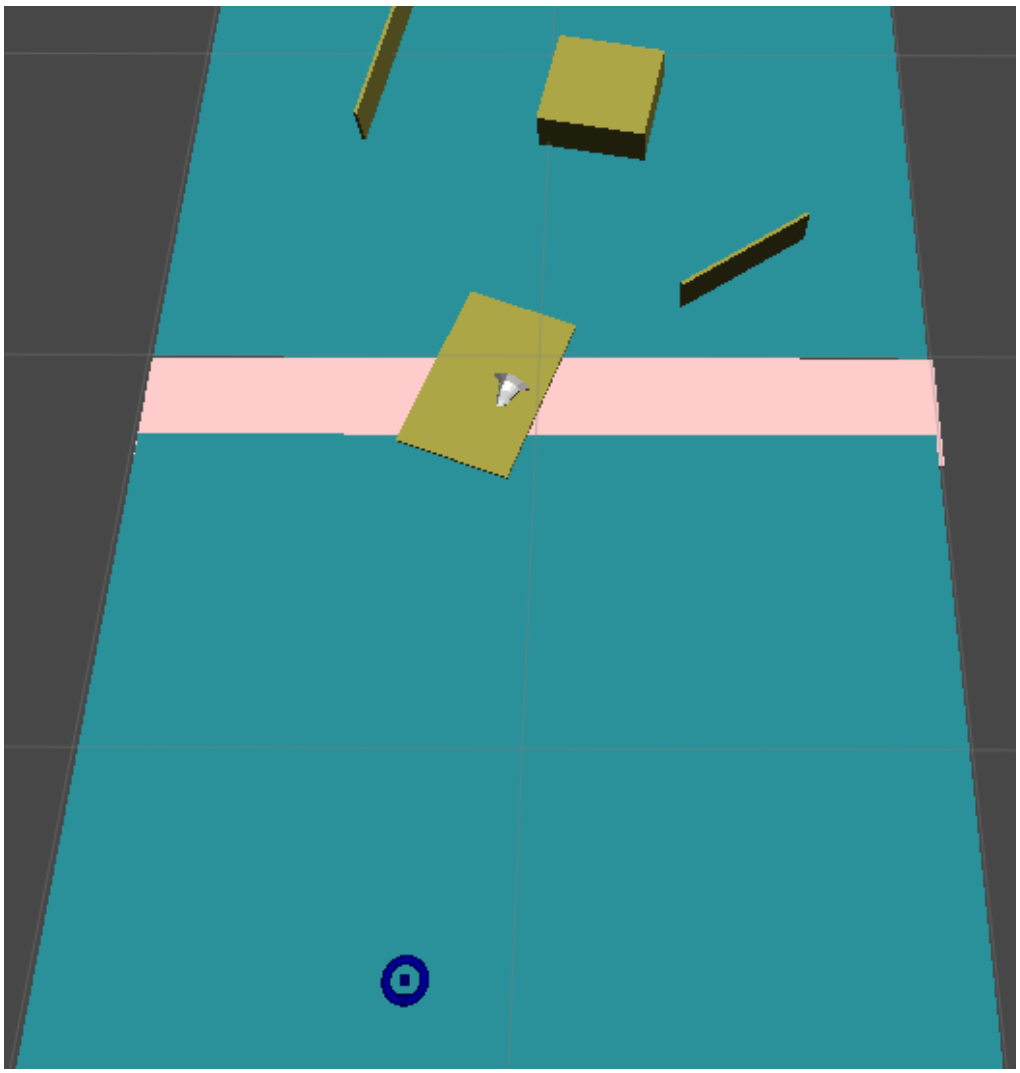

y
x
z
Persp

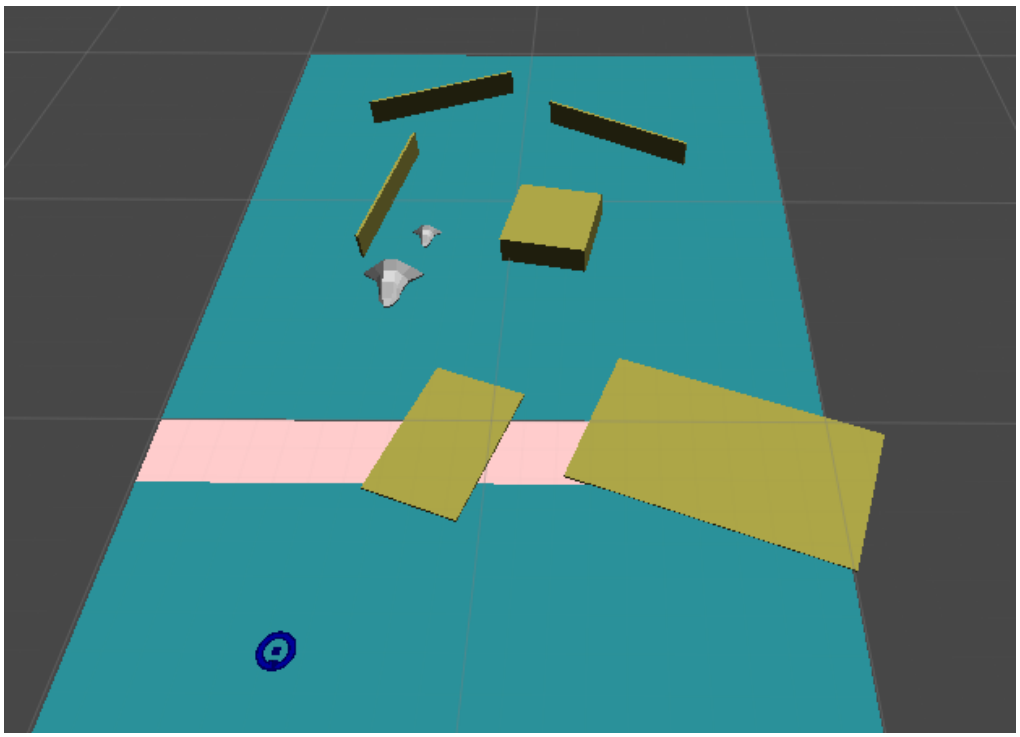


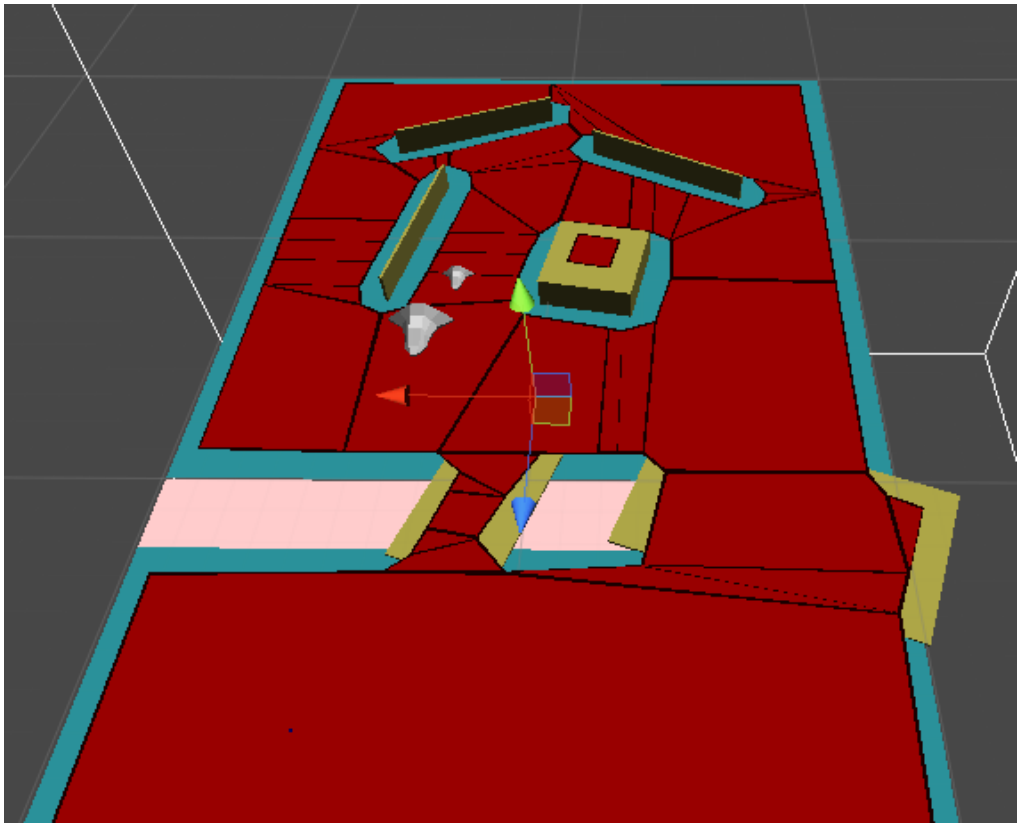


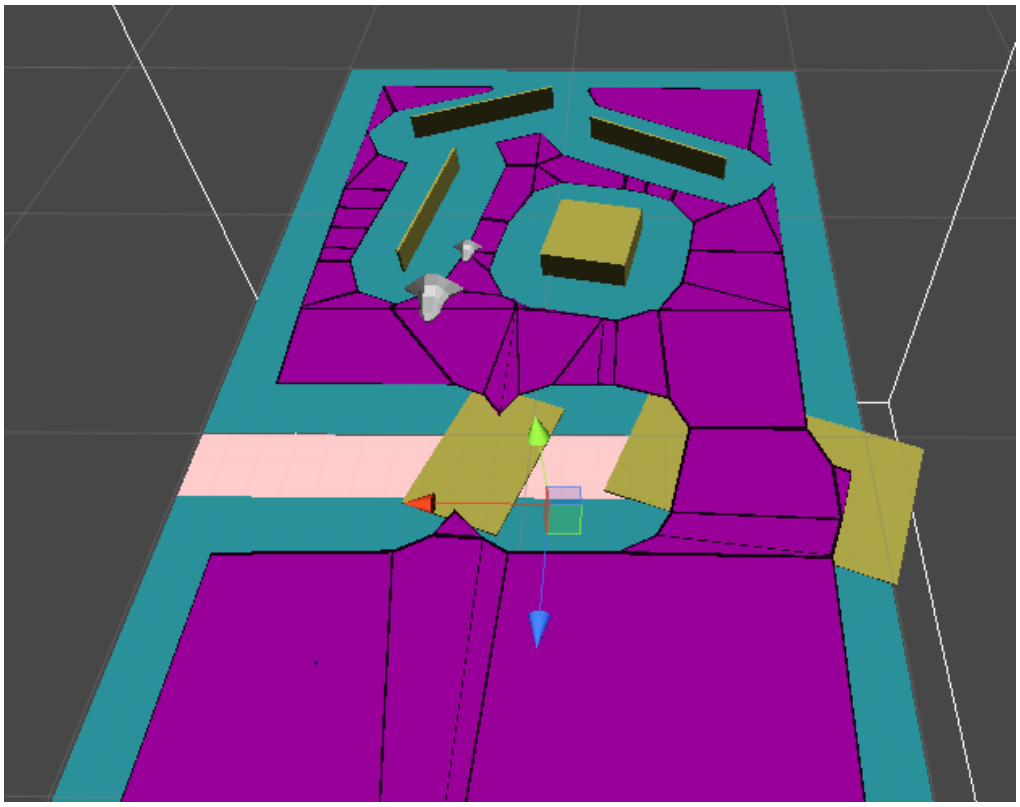



Behavior Editor
BT shipDemo
SEQ root
move
RAIN
Behavior Tree
Current AI (Enemy)
Node Type:
Move
Name:
move
Repeat:
Forever
Debug Break:
Move Target:
"MoveTarget"
Move Speed:
10
Face Target:
Turn Speed:
Close Enough Distance:
Close Enough Angle:
Move
Move to a target location and/or turn to face a target. Target can be a the name of a Navigation Target (in quotes), a vector, or a variable expression representing an object or location.










RAIN
NAVIGATION MESH
Size
50
Automatic Grid Size
Grid Size
1
Visual Height Offset
0.25
Display Mode
NavigationMesh
Included Layers
Everything
+ Ignored Tags
+ Unwalkable Tags
- Graph Tags
Size
1
Element 0
Small Ship
Max Slope
45
Walkable Height
2
Walkable Radius
0.75
Step Height
0.75
Cell Size
0.1
Max Vertex Error
0.2
Preview Collision Meshes
Generate Navigation Mesh


RAIN
AI
Use Unity Messages
Use Fixed Update
Is Active
Body
Enemy
Navigator
BasicNavigator
Draw Paths
Max Pathfinding Step: 100
Graph Tags
Size
1
Element 0
Small Ship