AI Perception Turret Pro

Documentation

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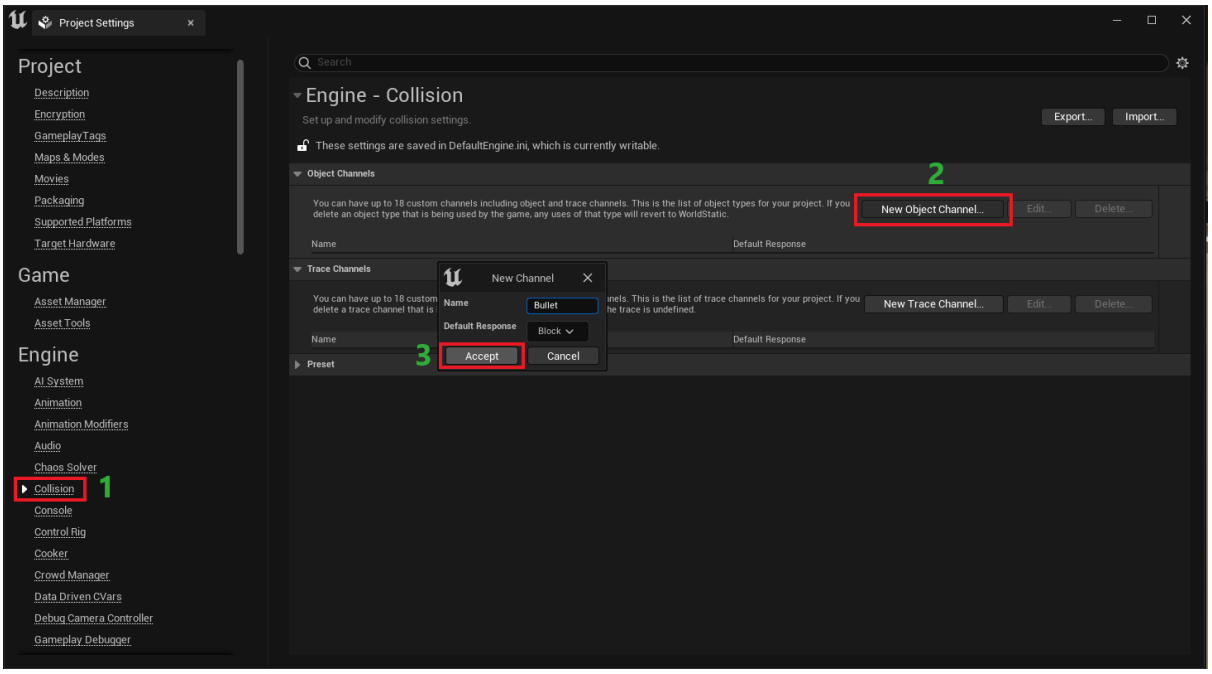
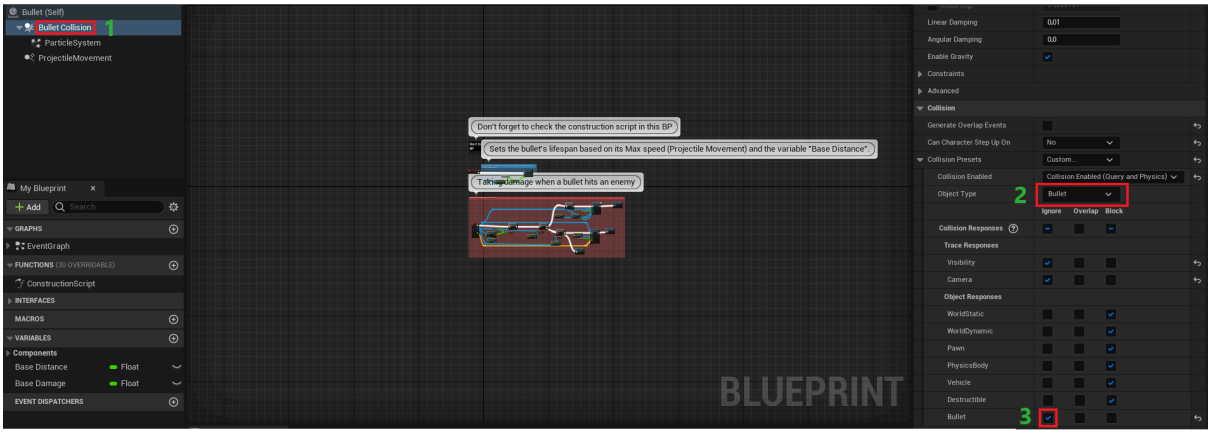
Implementation guide

Video tutorial: https://youtu.be/wP-d7158tDY

1. Go to Project Settings > Collision (1) > Add New Object Channel (2), Set: Name “Bullet”, Default Response “Block” > Accept (3);



2. Go to BP Bullet > Components > Bullet Collision > Details > Collision > Collision Presets, Set: Object Type “Bullet” (2), Object Responses Bullet “Ignore” (3);



3. Go to BP Turret > Components, for each of the following components - *“Turret Collision (include AI Perception Touch)”, “Bot HealthBar Display Radius”, “Lose Sight Sphere”* - go to Details > Collision > Collision Presets, set Object Responses Bullet “Ignore”;
4. Go to BP Friend > Components > Bot HealthBar Display Radius > Details > Collision > Collision Presets, Set: Object Responses Bullet “Ignore”. Repeat this step for BP Enemy and BP Character_Demonstration as well.

Customization settings

Turret BP

Main Settings:

Turret Health - Turret health value.

HealthBar Display Radius - The range at which the bot's health widget appears when the player approaches it.

Friend Detection Tag - The tag by which the bot will identify its allies and its faction membership.

Enemy Detection Tag - The tag by which the bot will identify its enemies.

Rule Of Target Selection - The rule by which a turret chooses a target for its attack.

Duration of Turret Hacking - The duration of the hacking period of the turret, when it does not react to enemies.

Rotation Settings:

Patrolling Rotation Curve - The curve responsible for rotating the turret when it is patrolling. You can add any external curve you wish, but note that the start and end of your curve must be 0.5, and all values on the curve must be in the range 0 to 1.

Min Patrolling Angle (Yaw) - The minimum rotation angle of the turret when it is patrolling, the value of the variable must be negative.

Max Patrolling Angle (Yaw) - The maximum rotation angle of the turret when it patrols, the value of the variable must be positive.

Turret Patrol Speed - Options for turret patrolling speed (set by "Set Top Turret Speed Patrolling" macro). You can set your own speed options by setting "True" in the "Set Custom Speed?" variable and then setting the value in the "Custom Speed" variable.

Set Custom Speed? - The value "True" allows you to set your own turret rotation speed when patrolling, don't forget to set your own value for the variable "Custom Speed".

Custom Speed - Allows you to set your own turret rotation speed when patrolling. Before doing so, check the variable “Set Custom Speed?”.

Searching Rotation Curve - The curve responsible for rotating the turret when it is searching. You can add any external curve you wish, but note that the start and end of your curve must be 0.5, and all values on the curve must be in the range 0 to 1.

Min Searching Angle (Yaw) - The minimum rotation angle of the turret when it is searching, the value of the variable must be negative.

Max Searching Angle (Yaw) - Maximum rotation angle of the turret when it is searching, the value of the variable must be positive.

Search Time (in sec) - Time to search for a lost enemy before the turret returns to patrol mode.

Cooldown Before Searching (in sec) - Cooldown Before Searching (in sec).
Target Search Speed Multiplier - Multiplies the base length of the selected external curve by the given multiplier.
Min Targeting Angle (Pitch) - The minimum angle at which a turret can descend when targeting an enemy. The value of the variable must be negative.
Max Targeting Angle (Pitch) - The maximum angle at which a turret can ascend when targeting an enemy. The value of the variable must be positive.
Targeting Interpolation Speed - Interpolation speed of targeting the enemy.

AI Perception Settings:

Sight Radius - The max distance over which this sense can start perceiving.
Lose Sight Radius - The max distance in which a seen target is no longer perceived by the sight sense.
Peripheral Vision Half Angle Degrees - How far to the side the AI can see in degrees. The value represents the angle measured in relation to the forward vector, not the whole range.
Lose Peripheral Vision Half Angle Degrees - How far to the side the AI can see in degrees in combat mode (turret has detected an enemy). The value represents the angle measured against the forward vector, not the entire range.
Auto Tracking Previously Seen Enemy - The AI will always be able to see a target that has already been seen if it is not behind cover.
Sight Max Age (sec) - Determines the duration in which the stimuli generated by sight sense becomes forgotten.
Automatically Detect Nearby Targets - If "True", adds a second sight radius for targets close to the turret. The radius and angle of this sense are set by the variables "Automatic Detection Radius Of Close Targets" and "Close Peripheral Vision Half Angle Degrees" respectively. Prevents the enemy from getting close to the target undetected (if the enemy does not use cover).
Automatic Detection Radius Of Close Targets - How far to the side the AI can see in degrees at close range. The value represents the angle measured in relation to the forward vector, not the whole range. Prevents the enemy from getting close to the target undetected (if the enemy does not use cover).
Close Peripheral Vision Half Angle Degrees - How far to the side the AI can see in degrees at close range. The value represents the angle measured in relation to the forward vector, not the whole range. Prevents the enemy from getting close to the target undetected (if the enemy does not use cover).
Draw Sight Debug? - If the value is "True", display the sight sense debugger.
Sight Debug Colour - Sight sense debugger color. Remember to set "True" in the "Draw Sight Debug?" variable.
Frequency Of Perception Update (sec) - Perception point update frequency.

Cached Max Age (sec) - Determines the length of time that stimuli generated by Hearing/Damage/Touch/TeamSight senses are forgotten.
Draw Cached Debug? - If the value is "True", display the Hearing/Damage/Touch/TeamSight senses debugger.
Cached Debug Colour - Hearing/Damage/Touch/TeamSight senses debugger color. Do not forget to set "True" in the "Draw Cached Debug?" variable.
Block Turret Patrol? - The turret will not patrol, but will continue to track and attack the enemy. Helps to debug AI Perception. Do not forget to set "True" for "Draw Sight Debug?" and "Draw Cached Debug?".
Block All Attacks? - The turret will not attack the enemy, but will continue to track him. Helps for debugging AI Perception. Do not forget to set "True" for "Draw Sight Debug?" and "Draw Cached Debug?".
Draw Turret's Debug? - If the value is "True", it shows simplified turret sight data (data of variables "Sight Radius", "Lose Sight Radius", "Peripheral Vision Half Angle Degrees"&"Lose Peripheral Vision Half Angle Degrees", "Automatic Detection Radius Of Close Targets", "Close Peripheral Vision Half Angle Degrees").
Alarm Frequency (sec) - Frequency of passing information to allies about the enemy while the turret sees him.

Shooting Settings:

Damage - Damage dealt by the turret to the enemy.
Rate Of Fire (sec) - The variable determines at what interval the next bullet will be fired.
Accuracy (Shooting Angle) - If the turret barrel is left to turn at this angle or less to the enemy, the turret begins to fire.
Bullet Initial Speed - Initial speed of projectile.
Bullet Max Speed - Limit on speed of projectile (0 means no limit).
Max Distance Of Damage - The maximum distance to the target at which it receives damage from bullets.

Assets Settings:

Bullet Sound - The sound of a bullet firing.
Muzzle Flash Ref - The muzzle flash effect when the bullet is firing.
Friendly Team Affiliation Colour - The color of the Top Turret if it is an ally of the player.
Enemy Team Affiliation Colour - The color of the Top Turret if it is an enemy of the player.
Friendly Patrolling Colour Laser Beams - The color of the laser beams when the turret is patrolling, if the turret is an ally of the player.
Enemy Patrolling Colour Laser Beams - The color of laser beams when a turret is patrolling, if the turret is an enemy of the player.

Friendly Combat Mode Colour Laser Beams - The color of the laser beams when the turret is in combat mode (detected the enemy), if the turret is an ally of the player.
Enemy Combat Mode Colour Laser Beams - The color of the laser beams when the turret is in combat mode (detected an enemy), if the turret is an enemy of the player.
Display laser beams? - If "True", allows laser beams to be displayed in the game.
Laser Beams Scale Multiplier - Thickness of the turret laser beams.
Spawn Burning After Death Ref - The burning effect will spawn immediately after the turret is destroyed.
Spawn Explosion After Death Ref - The explosion effect of a turret will spawn as soon as it is destroyed.

Terminal BP

Hack These Turrets - To hack a turret, add it to this variable.
Select Menu - Play sound when hacking.

Friend&Enemy BP

Bot Health - Bot health value.
HealthBar Display Radius - The range at which the bot's health widget appears when the player approaches it.
Friend Detection Tag - The tag by which the bot will identify its allies and its faction membership.
Enemy Detection Tag - The tag by which the bot will identify its enemies.

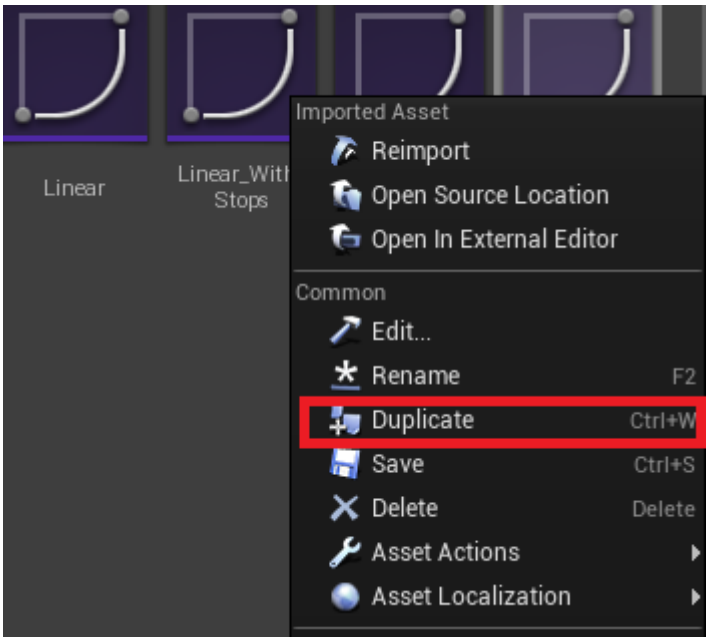
Player BP

Player Health - Player health value.
Friend Detection Tag - The tag identifying a player's faction affiliation.
Enemy Detection Tag - The tag that determines which faction is hostile to the player.

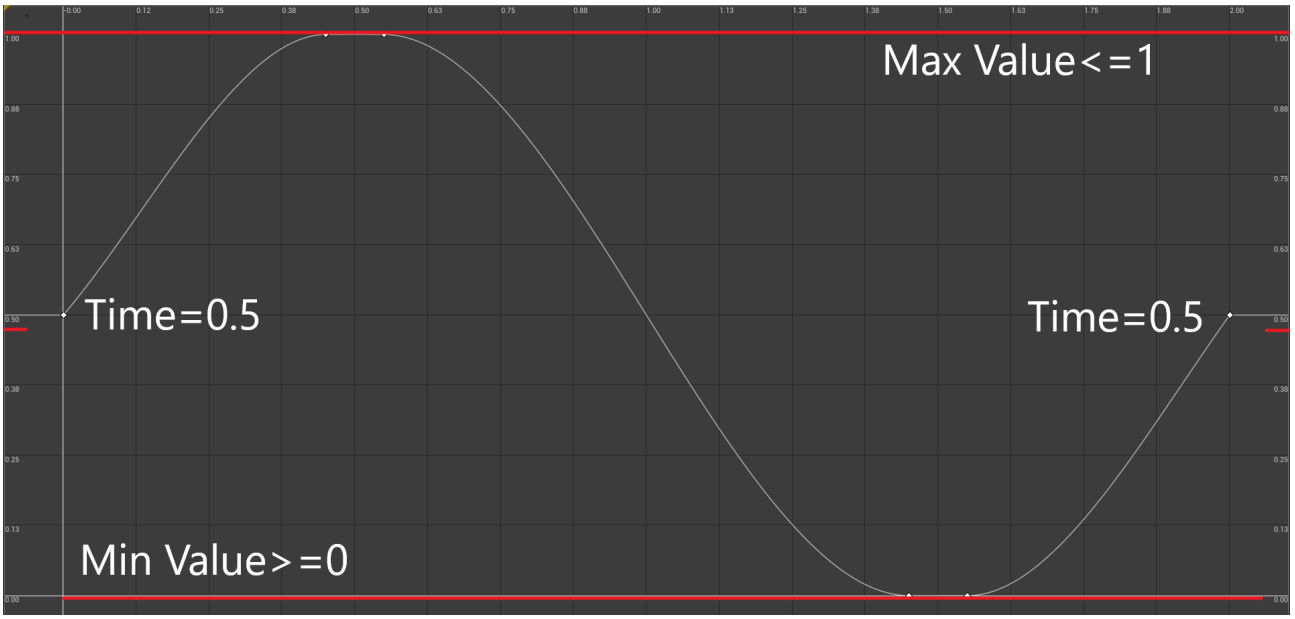
Adding your own turret rotation style

To add your own turret rotation style you need to do the following:

1. Add a new External Curve in the Blueprints > Curves folder (you can duplicate an existing one)



2. Create your own external curve as desired. Note that there are some simple limits for the values: Clamp Time=0.5; Min Value>=0; Max Value <=1! A value of 0 corresponds to the variable "Min Patrolling Angle (Yaw)" (patrolling mode) or "Min Searching Angle (Yaw)" (enemy search mode), a value of 1 corresponds to the variable "Max Patrolling Angle (Yaw)" (patrolling mode) or "Max Searching Angle (Yaw)" (enemy search mode). The length of your external curve can be any.



3. Add your new external curve to the "Patrolling Rotation Curve" / "Searching Rotation Curve" variable as desired. You can add to both of these variables either the same curve or a different one for each. Note that the speed of your new external curve

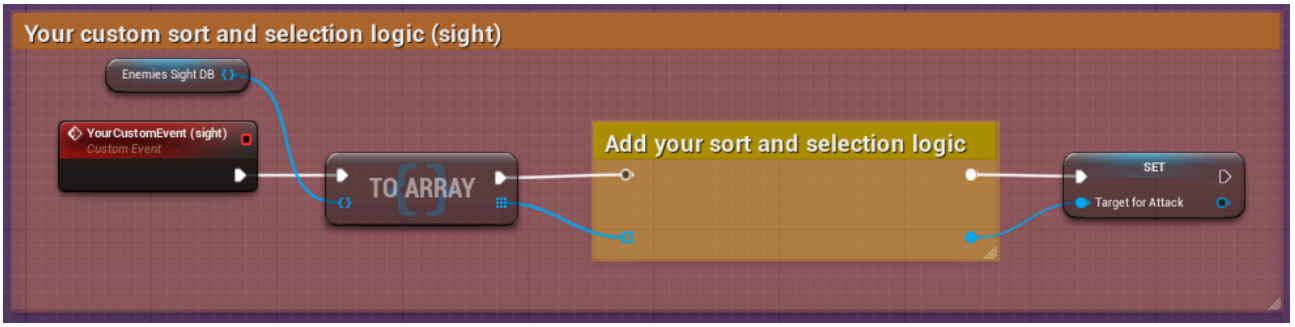
is set by the variables "Turret Patrol Speed" or "Custom Speed" (remember to set "True" for the variable "Set Custom Speed?") for Patrolling mode or by the variable "Target Search Speed Multiplier" for enemy search mode.

Creating your own rules for sorting and selecting targets to attack

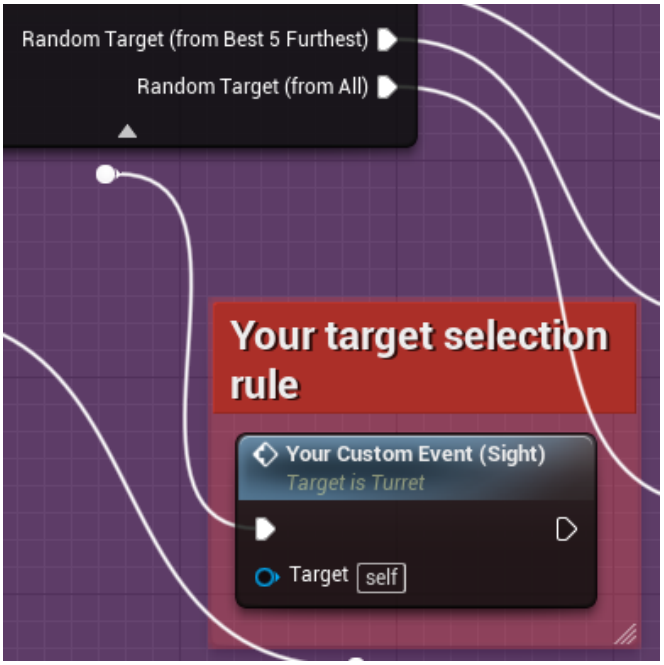
The project supports easy addition of your own rules for sorting and selecting targets to attack. To add your own rules, do the following:

1. Add a new "Display Name" to the file "Rule_Of_Target_Selection" (enum) in the Blueprints folder

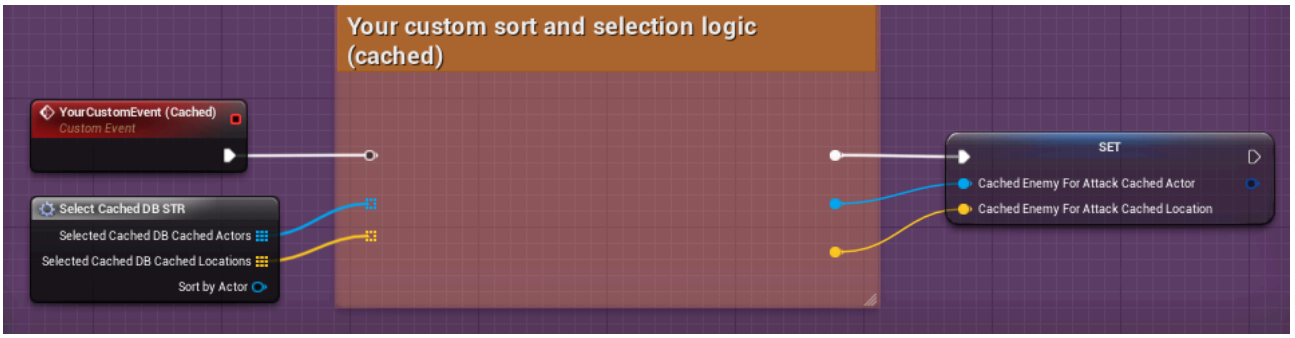
2. In the BP Turret file, go to the comment box for "Update the target for the attack from the target selection rules. Add a custom event with the name of your new rule (for example, "YourCustomEvent (sight)"). Create your own sorting and target selection logic for the attack. To do this, your logic should connect to the "Enemies Sight DB" array on one side (the array includes all enemies that the turret sees right now), and on the other side to the "Target For Attack" (SET) variable.



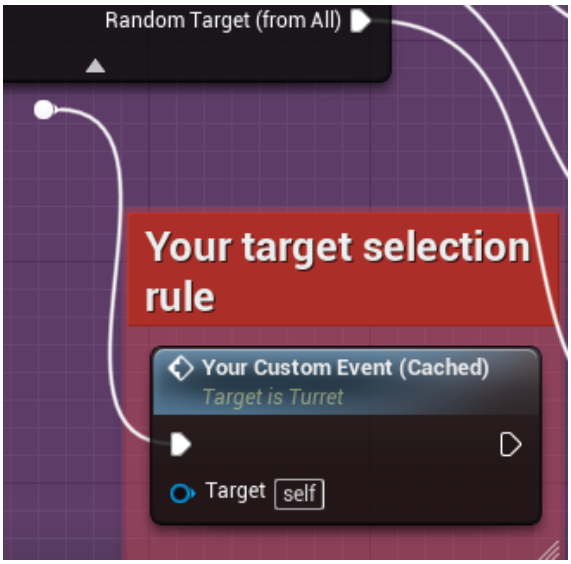
3. Connect the call function of your custom event with the previously added "Display Name" ("Rule_Of_Target_Selection" enum)



4. In the BP Turret file, go to the comment box for "Updates the coordinates for the attack from the target selection rules". Add a custom event with the name of your new rule (for example, "YourCustomEvent (cached)"). Create your own sorting and target selection logic for the attack. To do this, your logic should connect to the "Select Cached DB STR" macro arrays on one side (the "Cached Actors" and "Cached Locations" arrays store previously detected enemies and their last locations, respectively), and to the "Cached Enemy For Attack" (SET) variable on the other side.



5. Connect the call function of your custom event with the previously added "Display Name" ("Rule_Of_Target_Selection" enum)



6. Done! Now you can choose your own sorting and target selection rule with the "Rule Of Target Selection" public variable.

Factions

Adding a faction affiliation to an actor and defining a faction that is enemy to it

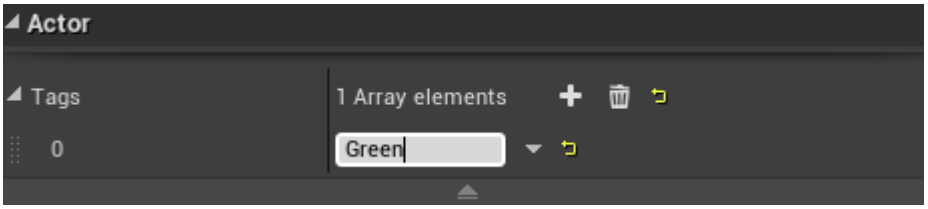
To add a faction affiliation to an actor and define a faction that is enemy to it, go to the public variables "Friend Detection Tag" and "Enemy Detection Tag", specify the values "Green" and "Red" at your discretion.

1. "Friend Detection Tag (value "Green") - the actor is an ally of the player;
2. Friend Detection Tag (value "Red") - the actor is an enemy of the player;
3. Enemy Detection Tag (value "Green") - the actor will attack the player and his allies;
4. Enemy Detection Tag (value "Red") - the actor will protect the player and his allies and attack his enemies.

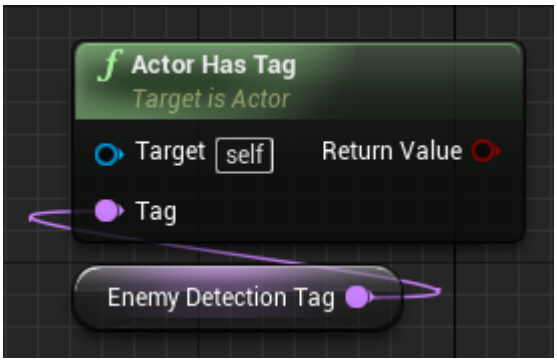
I plan to expand the functionality of this mechanic in the future, but for now I want to collect feedback from the buyers of my project

Adding your own factions

If you want to add faction affiliation for your own BPs, you can add the appropriate faction tag to YourActor BP > YourActor (self), component > Actor > Tags, or for each actor in the scene individually. You can also create a public variable “Friend Detection Tag” and create a logic for automatically adding this variable to the actor's tags (there is an example of how to do this in the Enemy/Friend BPs files).

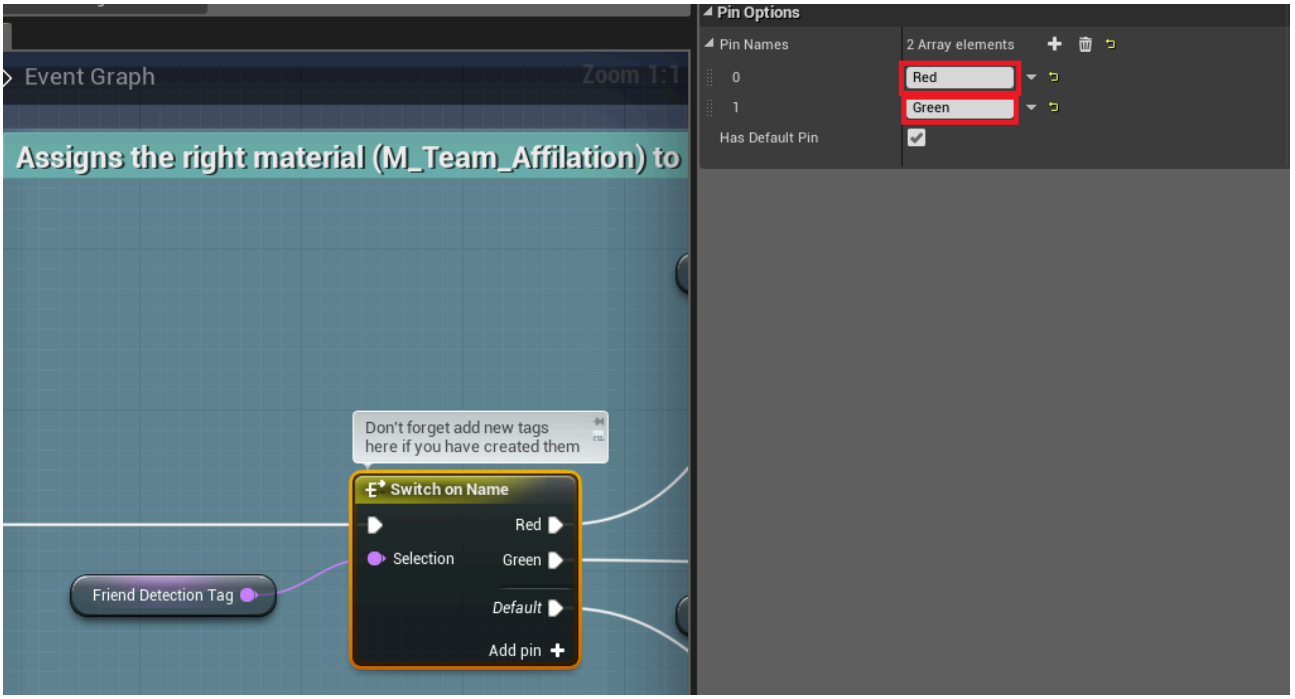


If you want to add an enemy faction for your own actor, add this node (screenshot below) to your logic (don't forget to create a public variable “Enemy Detection Tag” for convenience). You can find an example of how to use it in the Turret BP file.



Note that you can create your own pair of faction tags, but they will need to be specified for all actors. Don't forget to change the “Switch on” node values for your

new tags in the BP Turret file, comment field “Assigns the right material…” (screenshots below).

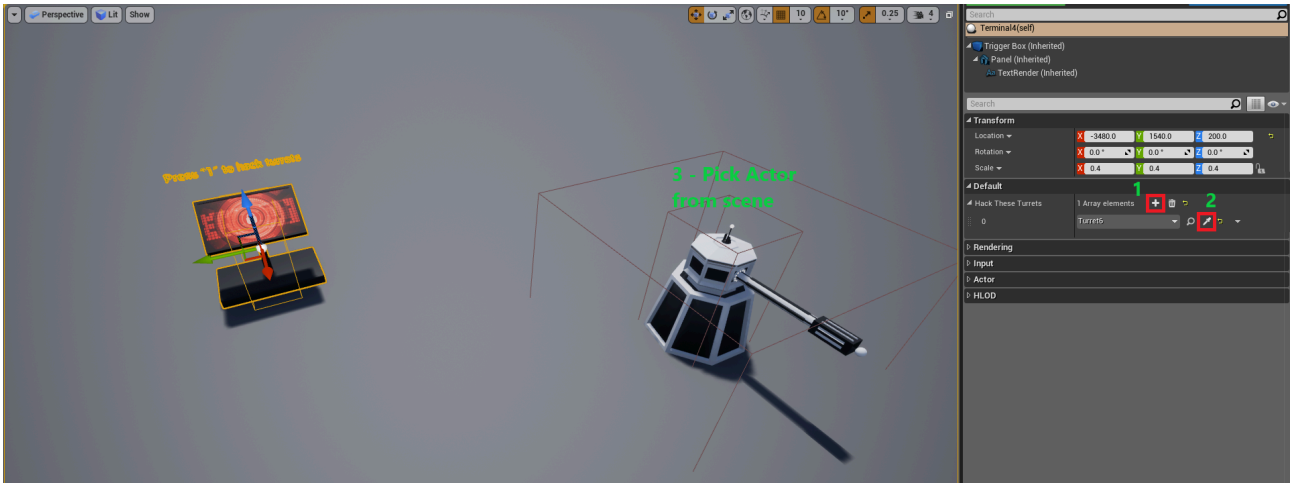


Hacking turrets

Video tutorial: https://youtu.be/UhlkcPwEZ54

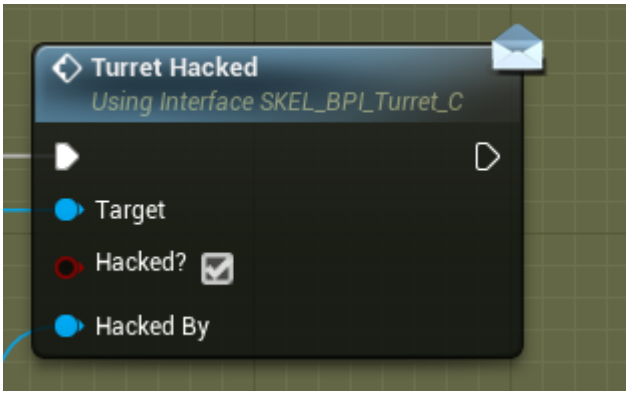
In order to hack a turret, it must be added to the database of the terminal (BP Terminal). To do this, do the following steps:

1. Add a new item to the public variable "Hack These Turrets" (BP Terminal);
2. Use the eyedropper to add an actor from the scene.



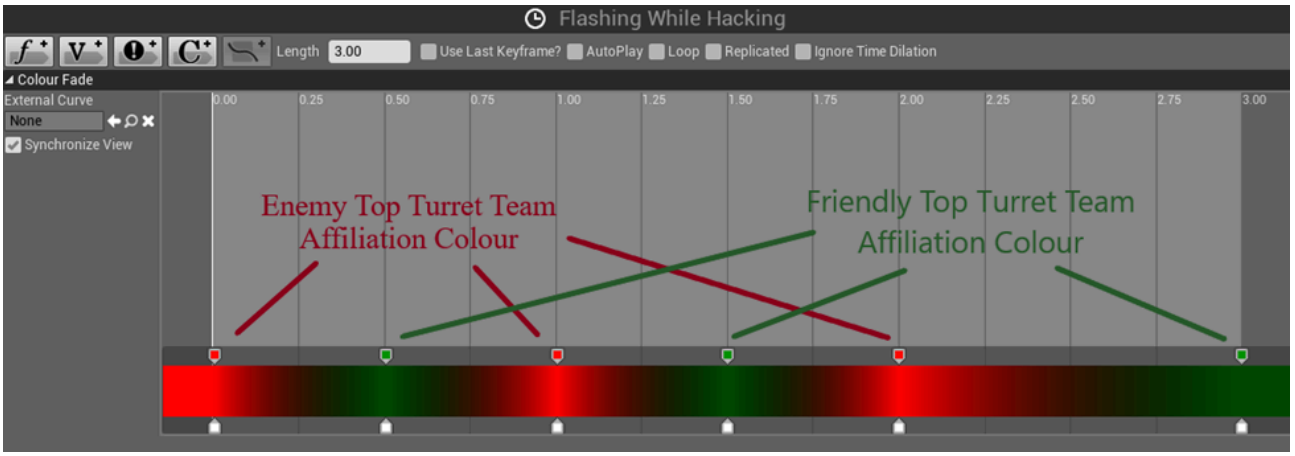
Create your own conditions for turret hacking

This project allows you to easily add your own logic for turret hacking: it may be necessary for the player to enter the password, picking up the keys from the terminal, mini-games during the hack, etc. Everything is limited only by your imagination! To successfully integrate your hacking conditions, you should add "Turret Hacked" BPI function at the end (don't forget to add BPI Turret interface to "class settings" of your BP). This function tells the selected turret ("target" pin) that it has been hacked ("True" value of "Hacked?" pin), you can also add a hack instigator ("Hacked by" pin).



Flashing while hacking

While a turret is being hacked, its top flickers. To make the flicker colors the same as the selected colors for the "Enemy Top Turret Team Affiliation Colour" and "Friendly Top Turret Team Affiliation Colour" variables, change the key colors in the Timeline "Flashing While Hacking" as shown in the image below.



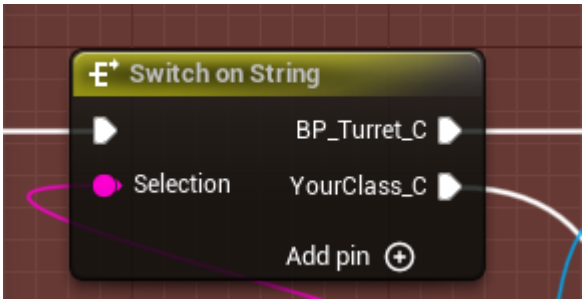
Setting up unique bullet properties for each class individually

The project supports the possibility of creating unique bullet properties for any of your classes, you can set the range of the bullet, the damage it inflicts on the enemy, initial and maximum speed for each class separately. If you want, you can adjust other bullet parameters from ProjectileMovement, etc.

In order to create unique bullet settings for the class you want, go to BP Bullet > Construction Script and add for the node "Switch on" the pin name "*YourClass*_C", then connect it to the variables "Base Distance", "Base Damage", "InitialSpeed" and "MaxSpeed". If you want to control the values of these variables from YourClass BP, connect the "Switch on" node to the "Cast to" node.

Known issues

1. Setting damage amount via public variable for BP_Turret does not work. The problem occurred because Turret BP was renamed. I will fix it in the next patch. For now, the problem can be fixed by going to Bullet BP > Construction script and editing the pin in the "Switch on" node as in the picture below.



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