2D Line Of Sight Detection System

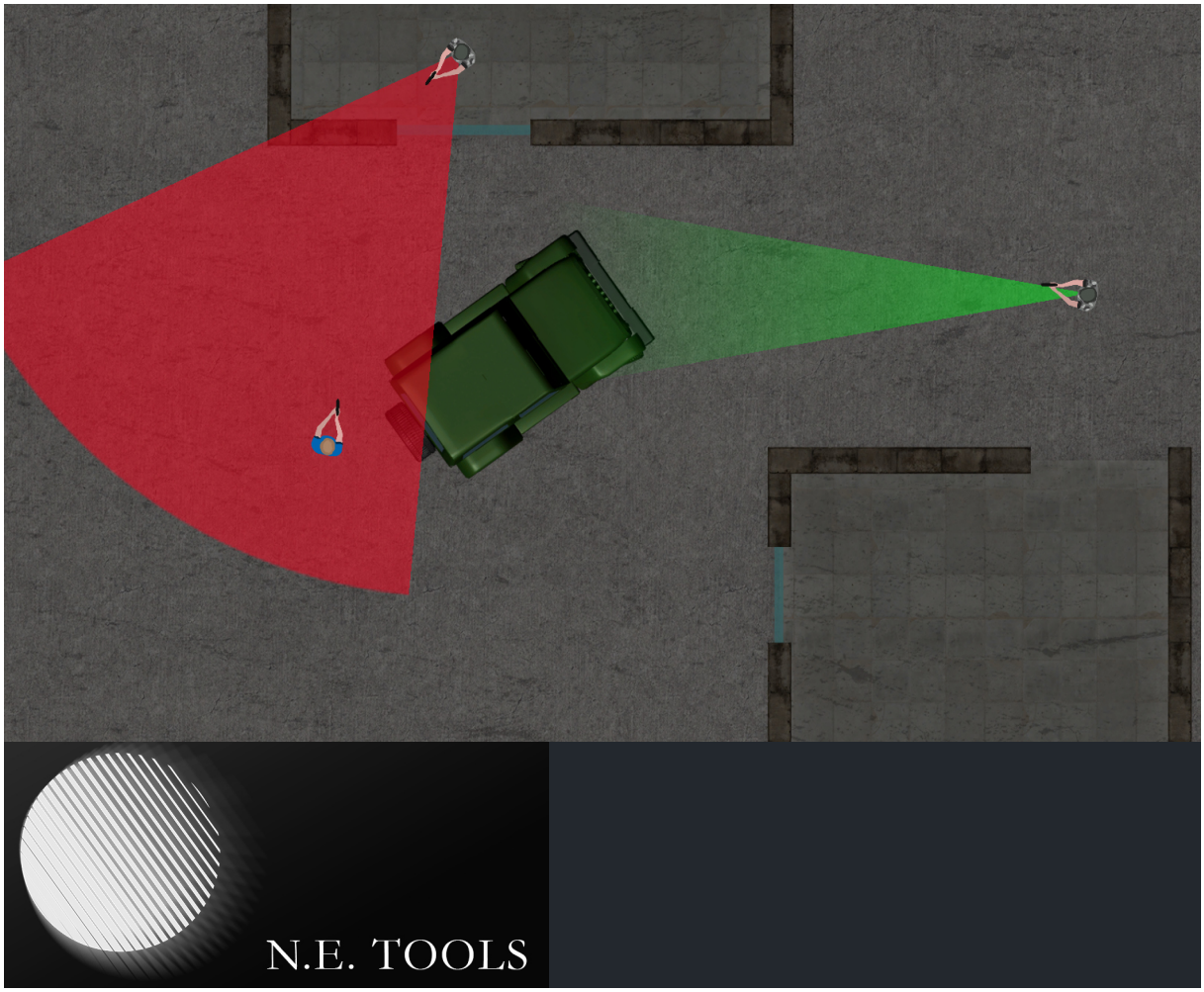
v. 1.0

N.E. Tools 2020

For questions, bugs or other wishes contact me at: info@leo-bergmann.de

Documentation / Setup guide

Setup Video:
https://youtu.be/p_U5HYWWPJI



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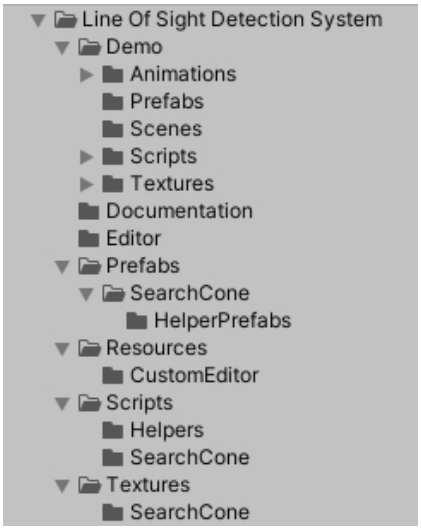
1. About/Readme

This asset package contains scripts/prefabs to help you build you Canvas based 2D games that need line of sight detection with visible/invisible FOV cones. The asset includes 2 demo scenes one for top-down, one for sidescrolling behavior. The system is designed to be variable in it's performance impact and runs well on mobile as well on Pcs.

Features:

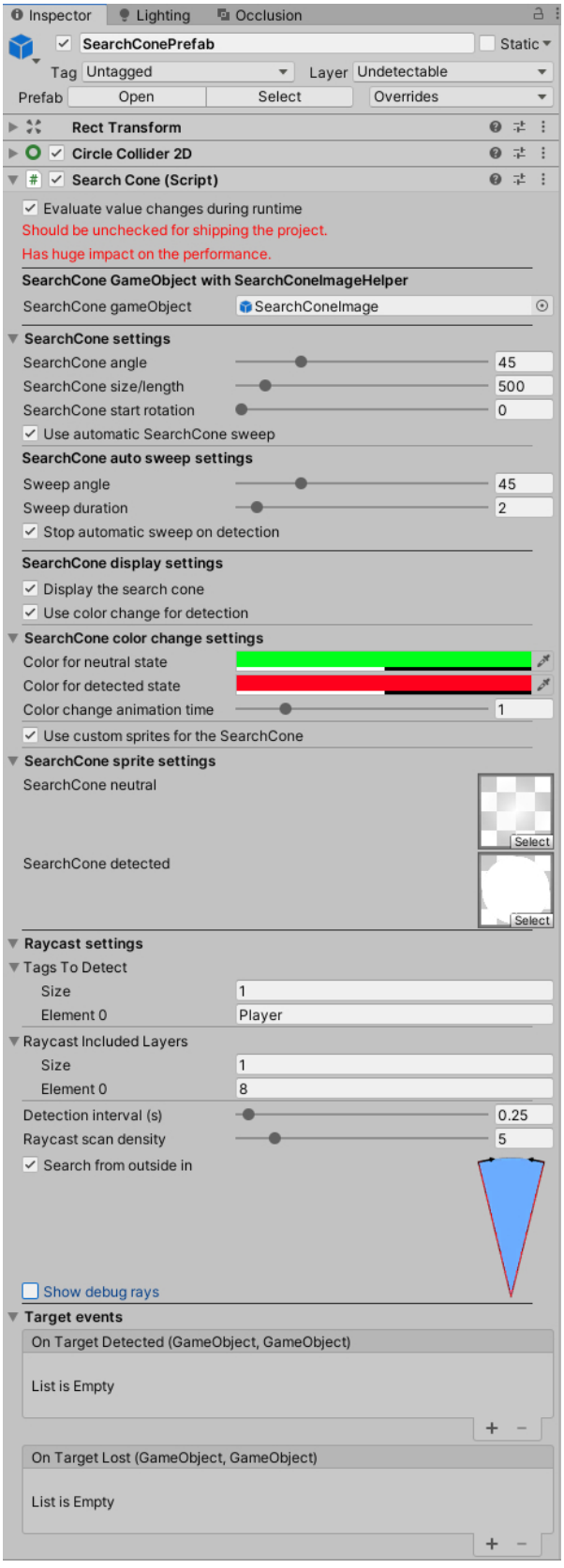
- Custom Editor for easy setup
- Variable FOV from 1 - 180 degrees
- Variable detection distance
- Automatic rotation from 1° - 180° degrees to the left/right (can stop on detection) with variable speed
- The search FOV cone can be set to visible/invisible
- Color for detected/undetected can be set and animated
- Custom sprites for detected/undetected state can be set for the FOV cone
- Multiple tags which trigger detection can be set
- Multiple layers on which the raycast for the line of sight detection is being made can be set
- Raycast only happens when a target object enters the detection radius of the search object
- Detection interval (when the raycast is made) can be set between 0.1 and 5.0 seconds to save on performance
- The density of the rays used for the raycast is variable to save on performance
- The search direction can be toggle from middle to the outside or outside to the middle
- In the editor debug rays can be drawn during gameplay to help debugging gameplay
- Custom Unity Events can be added via the editor when an object is detected or has been lost by detection. The events pass the GameObject of the detector as well as the detected object to easily implement further functions
- Helper function to rotate elements with the FOV cone is included
- The code is extensively commented and a pictured pdf documentation is included

2. Package content

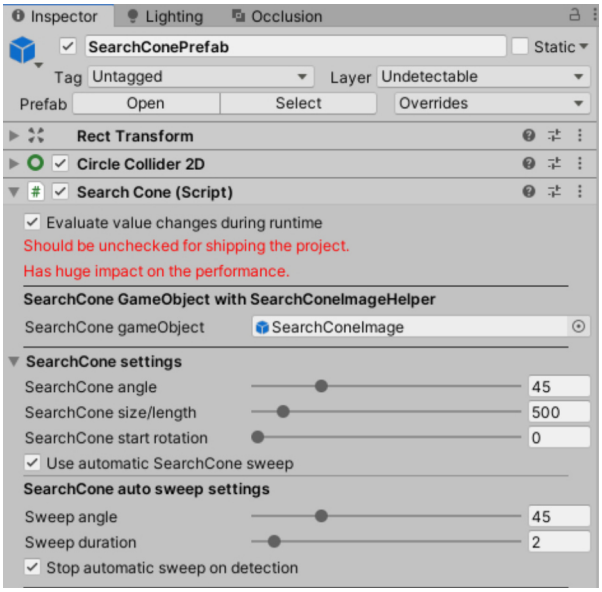


- **Demo/Scenes:** Contains 2 demo scenes with setup for top-down and sidescroller games as well as all assets used by the demo scenes.
- **Documentation:** Contains this pdf documentation as well as the readme and version history.
- **Editor:** Contains the scripts for the custom editor.
- **Prefabs:** Contains the readily setup SearchCone prefab which can be integrated into your game.
- **Prefabs/HelperPrefabs:** Contains the SearchRaycastHolder which is used by the SearchCone prefab.
- **Resources:** Contains the images used by the custom editor.
- **Scripts/Helpers:** Contains the SearchHeadRotator script which can be used to rotate GameObjects with the SearchCone.
- **Scripts/SearchCone:** Contains all scripts (except the custom editor) used by the SearchCone prefab.
- **Textures/SearchCone:** Contains 3 sprites for different SearchCone look.

3. SearchCone settings

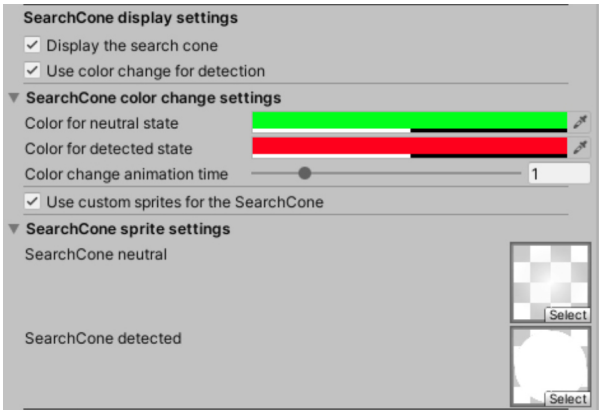


3. SearchCone settings



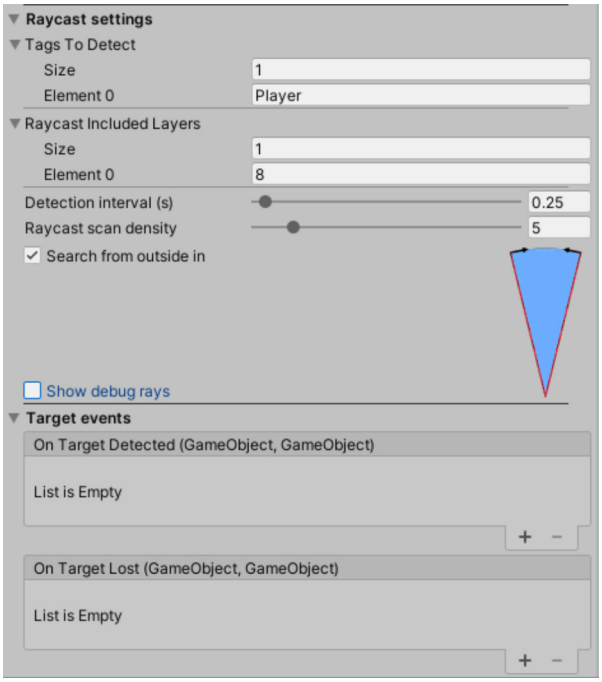
- **Evaluate value changes during runtime:** While setting up the SearchCone, keep this ticked on to see immediate changes in the editor. Remove the checkmark for shipping the project or even better if you've finished setting up the SearchCone since it takes lot's of performance to check for changes and apply them.
- **SearchCone gameObject:** The image object that contains the SearchConeImage script has to be set here, if you use the SearchConePrefab this is already set up.
- **SearchCone angle:** Set the FOV angle of the SearchCone, can vary between 1° and 180°.
- **SearchCone size/length:** Set distance/length of the FOV SearchCone.
- **SearchCone start rotation:** Here you can define the start rotation of the SearchCone. *Use this to setup a special rotation direction instead of rotating the SearchConePrefab GameObject!*
- **Use automatic SearchCone sweep:** If you want the SearchCone to ping-pong rotate automatically, select this.
- **Sweep angle:** Set the angle for the automatic sweep motion. Can vary between 1° and 180° for clockwise and counterclockwise.
- **Sweep duration:** Sets the duration a sweep motion takes.
- **Stop automatic sweep on detection:** If this is selected and a valid target get's detected by the SearchCone, the automatic motion is paused as long as the target is being seen by the SearchCone.

3. SearchCone settings



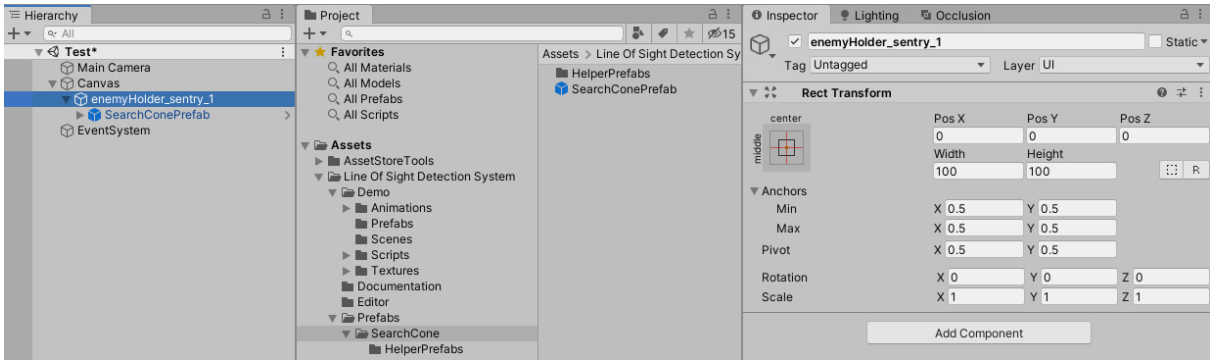
- **Display the search cone:** If this is selected, the FOV SearchCone is visible, if deselected, the detection functions but the FOV SearchCone is not visible to the player.
- **Use color change for detection:** You can define two colors for the different states. If this is deselected the color for the neutral state is used for the SearchCone.
- **Color for neutral state:** Set the color for the neutral state during a search. If „Use color change for detection“ is turned off, this is the only color that is displayed.
- **Color for detected state:** Set the color the SearchCone takes on when a detection of a valid target has happened.
- **Color change animation time:** When „Use color change for detection“ is selected, the animation between the two color values takes this long to tween the values.
- **Use custom sprites for the SearchCone:** You can define two sprites for the different states. If this is deselected the sprite for the neutral state is used for the SearchCone.
- **SearchCone neutral:** Set the sprite for the neutral SearchCone. If „Use custom sprites for the SearchCone“ is deselected this sprite is used both for the neutral and detected state.
- **SearchCone detected:** Set the sprite for the detected SearchCone when a valid target was identified.

3. SearchCone settings

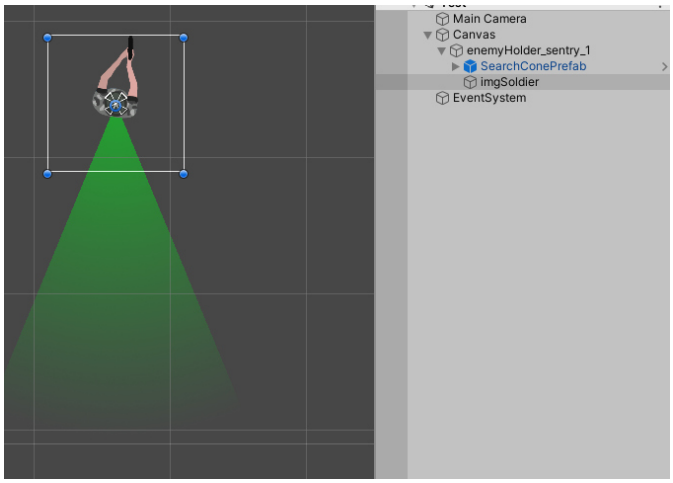


- **Tags To Detect:** Set the tags of objects that should be detected by the SearchCone.
- **Raycast Included Layers:** Set the ID numbers of the layers on which the SearchCone should look for target. By default the SearchCone script creates a „Detectable“ and „Undetectable“ layer. The SearchCone rests on the Undetectable layer. Objects that should be recognized can be set on the Detectable layer or others (if defined in the SearchCone).
- **Detection interval (s):** Set the interval between raycast detections of the SearchCone. The higher the interval, the less performance impact the SearchCone has but the higher the chance to miss a target becomes.
- **Raycast scan density:** Sets the density/amount of rays that get cast out during a detection. 1 means 1 ray per degree of the SearchCone angle, a value of 5 means 1 ray every 5 degrees of the SearchCone angle. Higher density (lower value) has a higher performance impact but gets better detection results (especially on larger SearchCones).
- **Search from outside in:** If this is selected the raycasts that get cheched wander from the outside to the middle. Use this if you want to trigger the detection as soon as the target might hit the outer walls of the FOV SearchCone. The effect is minimal but in some cases a reverse search direction (middle to the outside) might get you faster detection results.
- **Show debug rays:** For debugging purposes you can display DebugRays during GamePlay in the Editor View. This is helpful to get the right scan density set up.
- **On Target Detected:** When an object gets detected, this event fires and hands over the GameObject of the detecting SearchCone as well as the GameObject of the detected target. This helps to implement further handling.
- **On Target Lost:** When an object gets lost, this event fires and hands over the GameObject of the SearchCone that lost the target as well as the GameObject of the previously detected target.

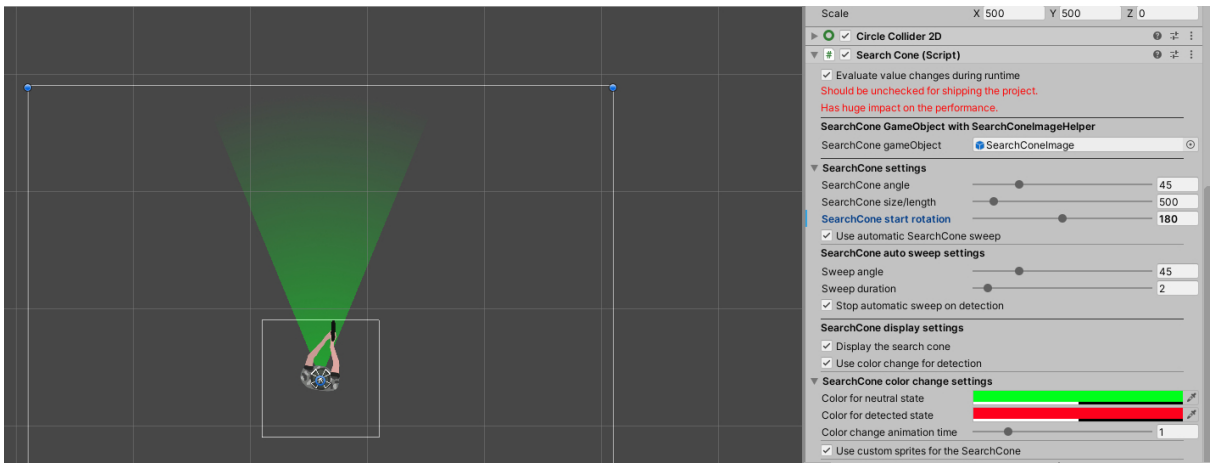
4. SearchCone setup



1. Create an empty object in your Canvas.
2. Drag the SearchConePrefab under the newly created empty.

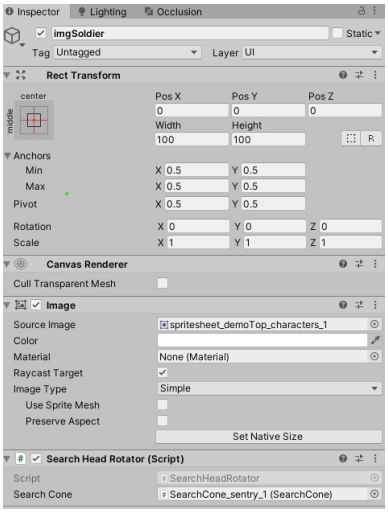


3. Create the image for your detector unter the previously created empty object.

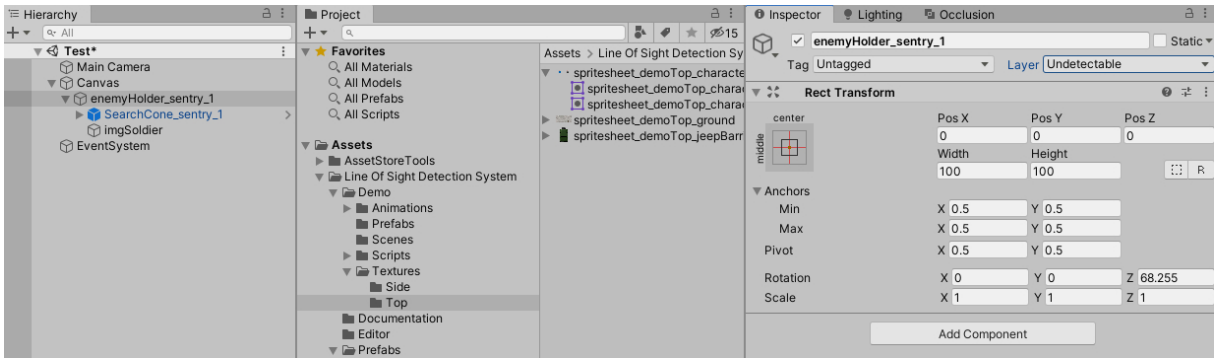


4. Select the SearchCone under the empty and adjust the SearchCone start rotation to match the viewing direction of your character sprite.

4. SearchCone setup



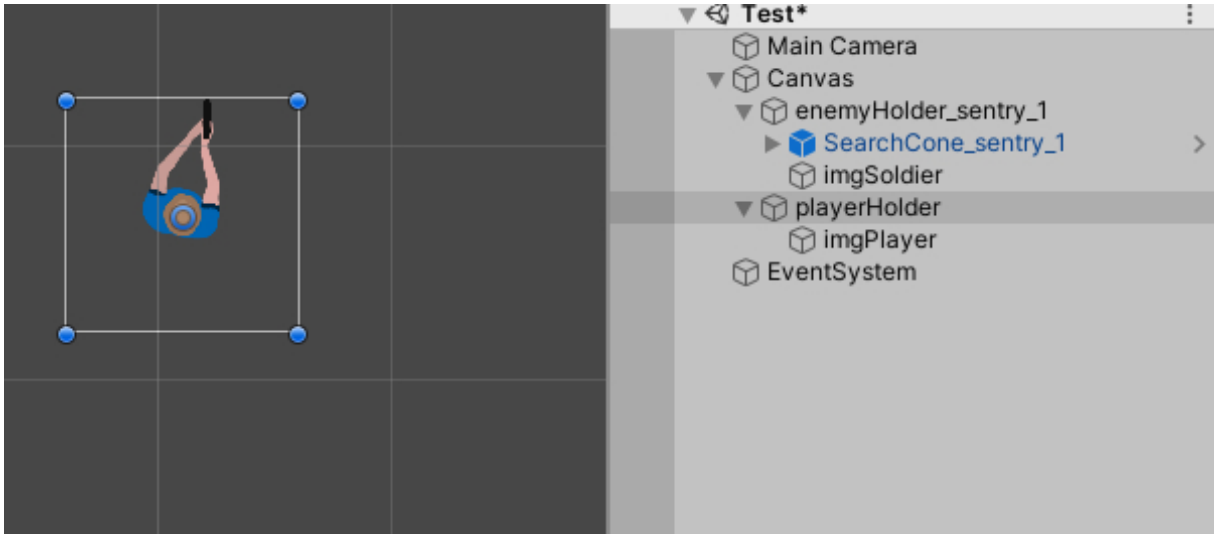
5. To let your image rotate with the SearchCone, select the image GameObject and add the script „SearchHeadRotator“ (Scripts/Helpers(to it. Under „SearchCone“ drag in the SearchCone object that is designated to this image.



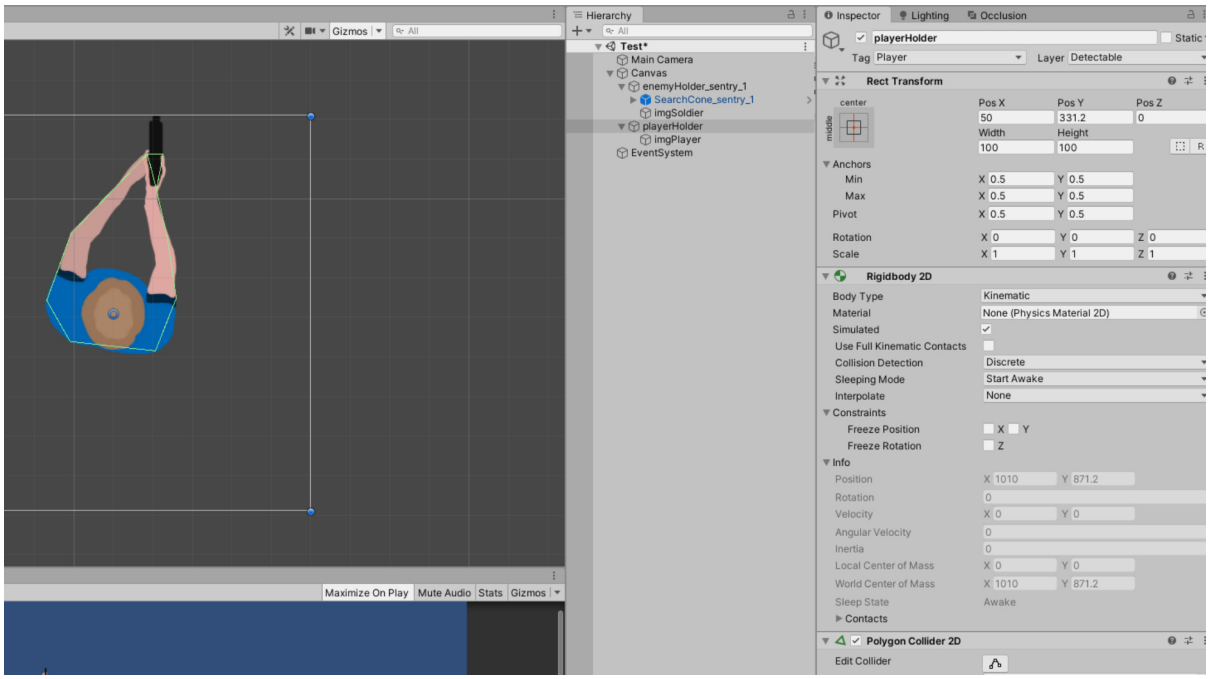
6. You can now move and rotate the holder object wich contains the SearchCone and your image where you want in the canvas. You can also add an Animator and add Animations to it.

7. At last select the holder object and set it’s layer to „Undetectable“. In the upcoming dialogue box select to affect the children as well.

5. Player setup



1. Create an empty object on your canvas. Under the newly created object create an Image with the sprite of your player.



2. On the holder object, create a Rigidbody2D (can be set to Kinematic or Dynamic, whatever your player controller requires.

3. Create a Collider2D that works for your player, in this case I used a simple Polygon collider.

4. Set the Tag of the holder object to a registered on from the SearchCone (default is Player) and set it's Layer to one that is registered by the SearchCone (default is Detectable). Check if the layer number corresponds to the registered in the SearchCone (Raycast Included Layers).