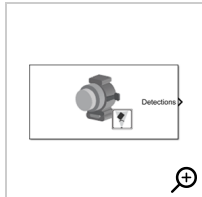


Resources

Simulation 3D Ultrasonic Sensor

Ultrasonic sensor model in 3D simulation environment

Since R2022b

**Libraries:**

Automated Driving Toolbox / Simulation 3D
Aerospace Blockset / Animation / Simulation 3D
UAV Toolbox / Simulation 3D
Simulink 3D Animation / Simulation 3D / Sensors

Description

i Note

Simulating models with the Simulation 3D Ultrasonic Sensor block requires Simulink® 3D Animation™.

The Simulation 3D Ultrasonic Sensor block generates detections from range measurements taken by an ultrasonic sensor mounted on an ego vehicle in a 3D simulation environment rendered using the Unreal Engine® from Epic Games®. The block calculates range measurements based on the distance between the sensor and the closest point on the detected object.

If you set **Sample time** to -1, the block uses the sample time specified in the Simulation 3D Scene Configuration block. To use this sensor, you must include a Simulation 3D Scene Configuration block in your model.

i Tip

The Simulation 3D Scene Configuration block must execute before the Simulation 3D Ultrasonic Sensor block. That way, the Unreal Engine 3D visualization environment prepares the data before the Simulation 3D Ultrasonic Sensor block receives it. To check the block execution order, right-click the blocks and select **Properties**. On the **General** tab, confirm these **Priority** settings:

- Simulation 3D Scene Configuration — 0
- Simulation 3D Ultrasonic Sensor — 1

For more information about execution order, see [How Unreal Engine Simulation for Automated Driving Works](#).

Examples

Build Occupancy Map Using Simulation 3D Ultrasonic Sensor

Build an occupancy map of a US city block using a Simulation 3D Ultrasonic Sensor block and Unreal Engine simulation environment.

Ports

Output

expand all

- > **Detections** — Object detections
scalar
- > **Has object** — Detectable object present in sensor field-of-view
scalar
- > **Has range** — Range measurement possible for object present in sensor field-of-view
scalar
- > **Range** — Distance measurement to closest object
scalar
- > **Translation** — Sensor location
real-valued 1-by-3 vector
- > **Rotation** — Sensor orientation
real-valued 1-by-3 vector

Parameters

expand all

Mounting

- > **Sensor identifier** — Unique sensor identifier
1 (default) | positive integer
- > **Parent name** — Name of parent vehicle
Scene Origin (default) | vehicle name
- > **Mounting location** — Sensor mounting location
Origin (default) | Front bumper | Rear bumper | Right mirror | Left mirror | Rearview mirror | Hood center | Roof center | ...
- > **Specify offset** — Specify offset from mounting location
off (default) | on
- > **Relative translation [X, Y, Z] (m)** — Translation offset relative to mounting location

[0, 0, 0] (default) | real-valued 1-by-3 vector



Relative rotation [Roll, Pitch, Yaw] (deg) — Rotational offset relative to mounting location
[0, 0, 0] (default) | real-valued 1-by-3 vector



Sample time — Sample time
-1 (default) | positive scalar

Sensor Parameters



Detection ranges (m) — Detection range vector of ultrasonic sensor (m)
[0.03 0.15 5.5] (default) | 1-by-3 nonnegative real-valued vector of form [minDetOnlyRange minDistRange maxDistRange]



Horizontal field of view (deg) — Horizontal field of view of ultrasonic sensor
70 (default) | positive real scalar



Vertical field of view (deg) — Vertical field of view of ultrasonic sensor
35 (default) | positive real scalar



Use bus output — Output signals together as bus
on (default) | off

Ground Truth



Output location (m) and orientation (rad) — Output location and orientation of sensor
off (default) | on

Version History

Introduced in R2022b

[expand all](#)

- > **R2024a:** Requires Simulink 3D Animation ⚠
- > **R2023b:** Addition of ground truth parameter

See Also

Simulation 3D Scene Configuration

Topics

Unreal Engine Simulation for Automated Driving