Autonomous Mobile Robotics

Environmental Mapping

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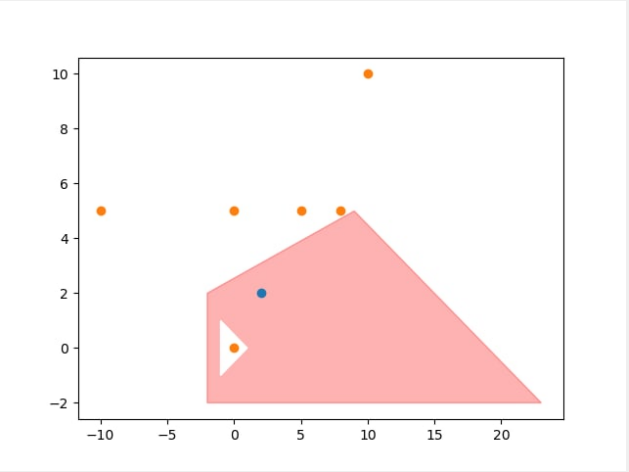

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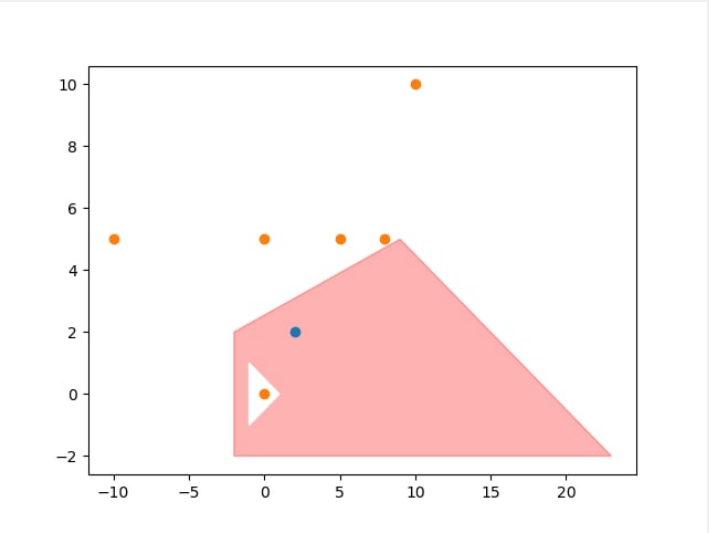
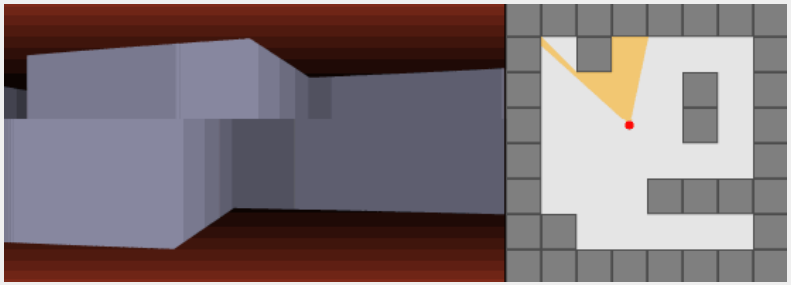
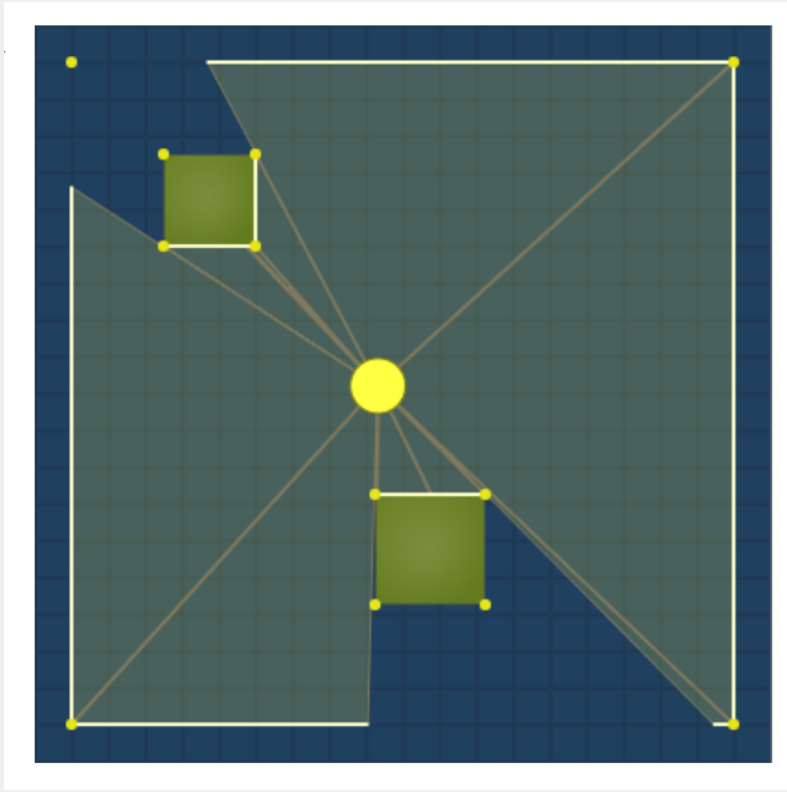


Ray casting

Raycasting, in general, is a rendering technique to create a 3D perspective in a 2D map. In autonomous navigation context, this technique can be used for obstacle detection in concave shapes.

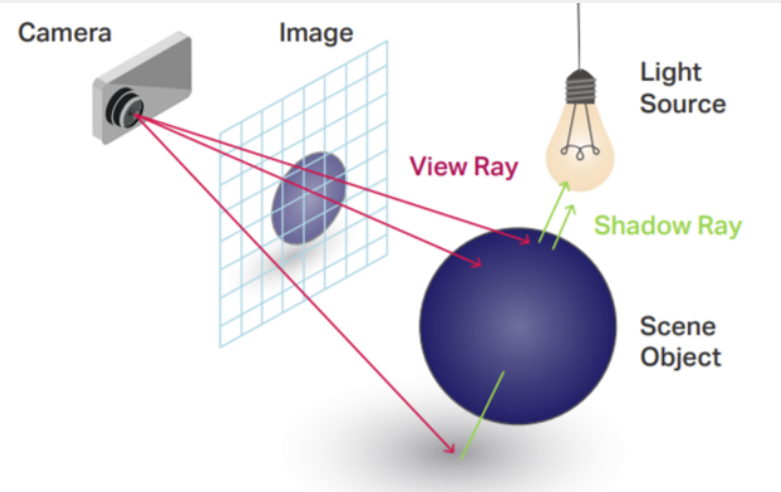




https://pl.wikipedia.org/wiki/Ray_casting

Ray casting and ray tracing

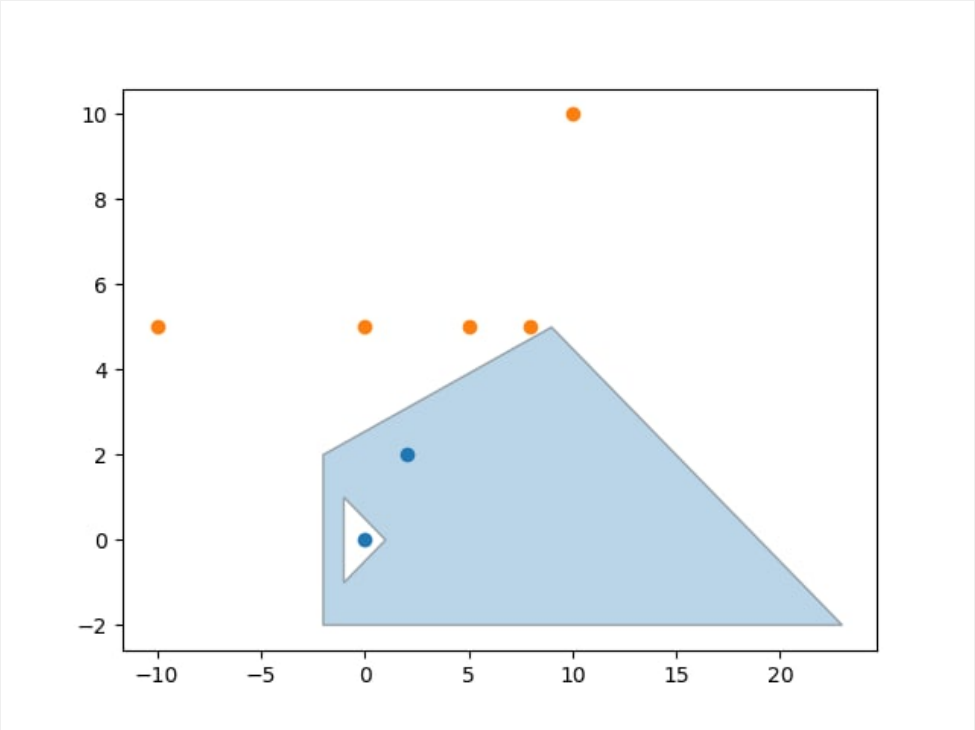
Ray casting is one of the rendering algorithms that use the geometric algorithm of ray tracing. Ray tracing is used to project three-dimensional scenes to two-dimensional images

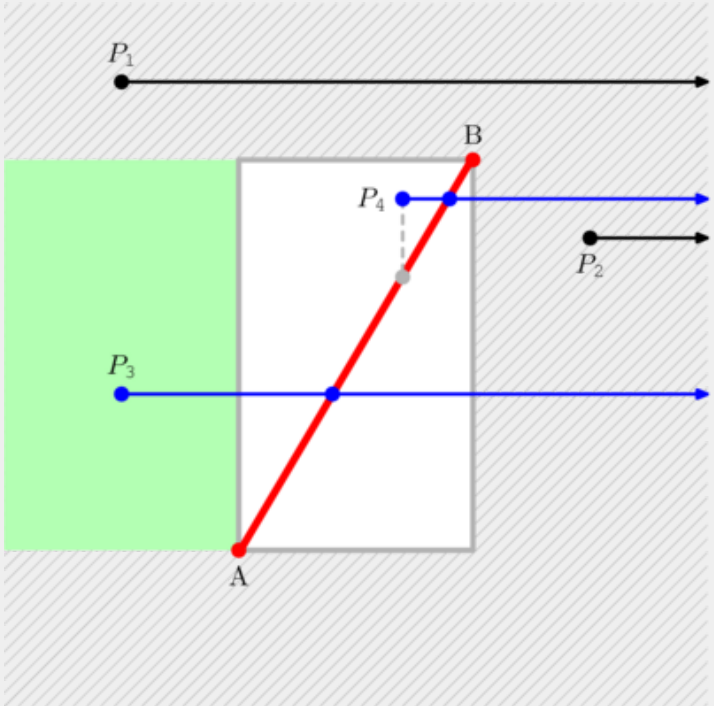


https://cs.stanford.edu/people/eroberts/courses/soco/projects/1997-98/ray-tracing/alternatives.html,https://gfxspeak.com/2020/09/28/the-levels-tracing/

Ray-casting algorithm

Given a set of points, check if each point is inside or outside the provided polygon using the ray-casting algorithm [1]

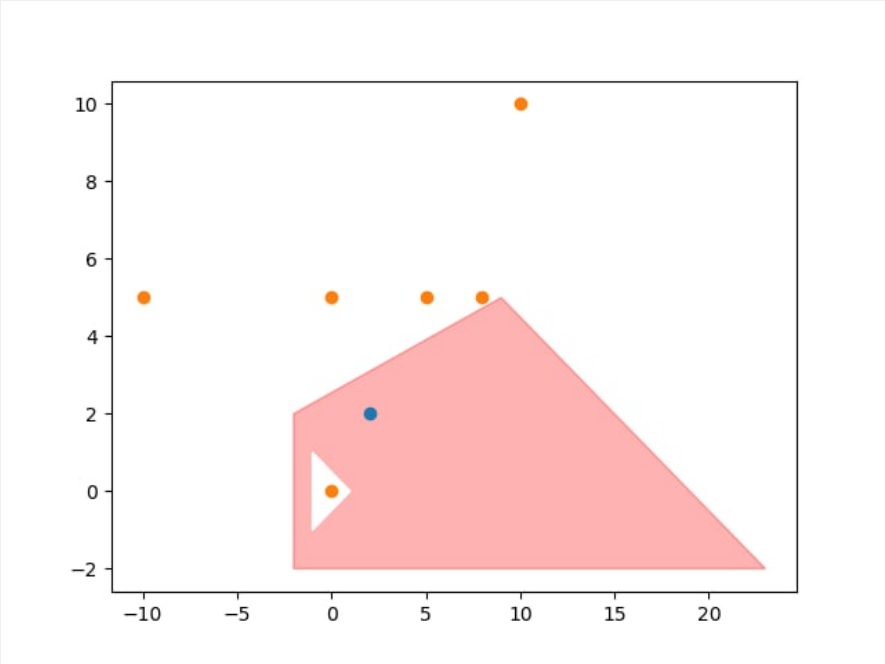


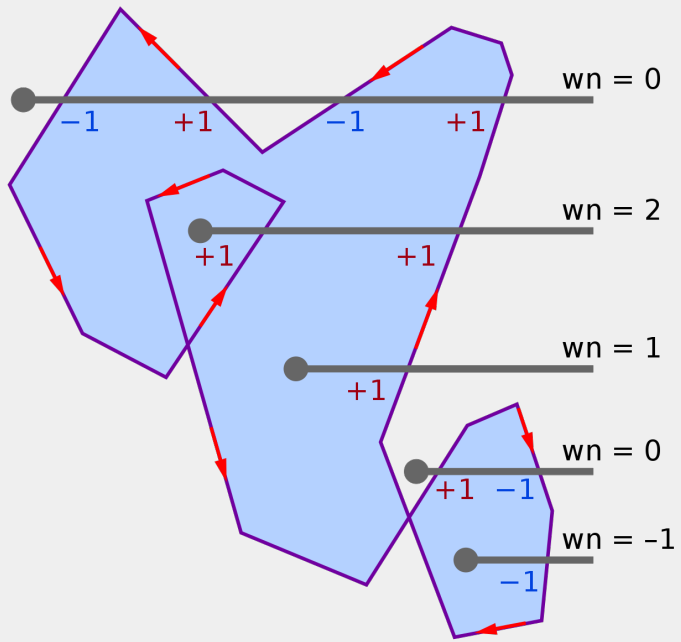


[1].https://rosettacode.org/wiki/Ray-casting_algorithm

Winding number algorithm

Check if a point is inside a polygon is to compute the given point's winding number with respect to the polygon. If the winding number is non-zero, the point lies inside the polygon using the winding number algorithm [2]





[2].https://en.wikipedia.org/wiki/Point_in_polygon

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