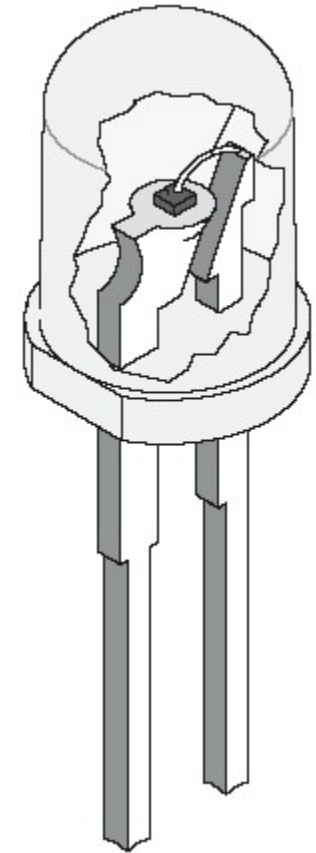


Infrared Sensor Simulation with Breve

Marc Waldenberger

The real sensor

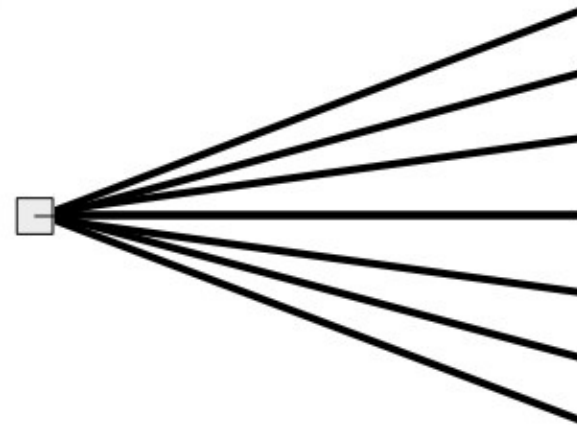
- ◆ TEFT4300
- ◆ High radiant sensitivity
- ◆ Wide viewing angle $\pm 30^\circ$
- ◆ Fast response times



Vishay.com
datasheet

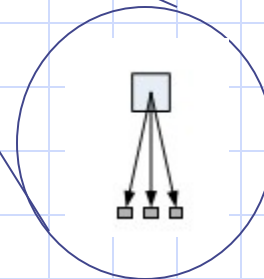
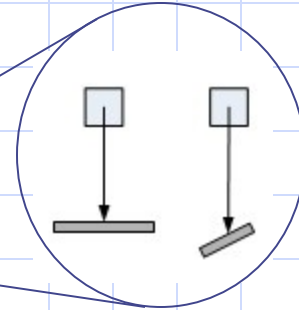
Sensor approximation

- ◆ Array of rays
- ◆ Intersection of rays and obstacles
- ◆ Apply sensor specific functions
- ◆ Sum all resulting ray values



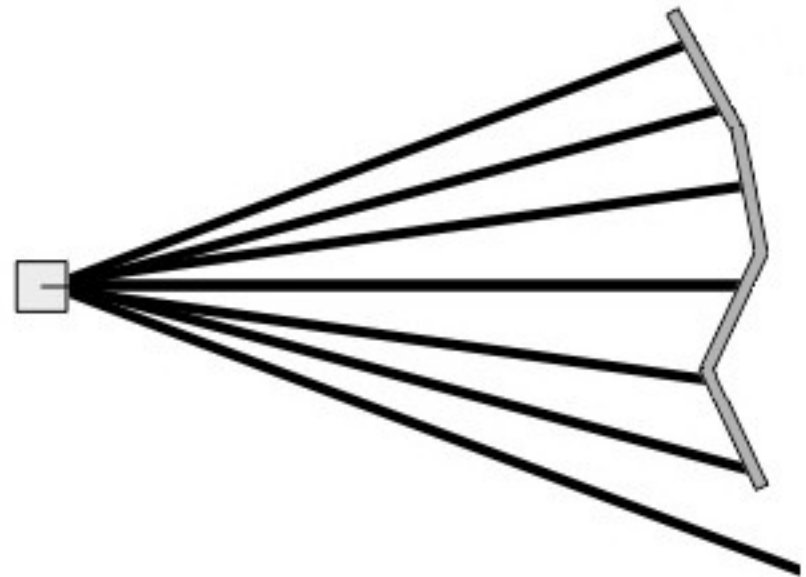
Factors influencing the signal

- ◆ Reflecting area
- ◆ Distance
- ◆ Angle of incidence
- ◆ Angular displacement
- ◆ Environment
- ◆ Surface
 - Color
 - Material



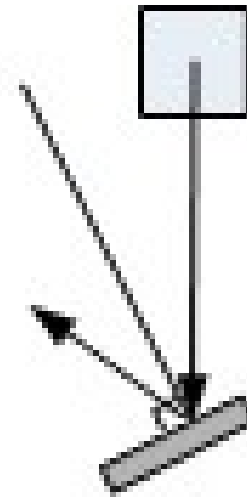
Intersection of rays and obstacles

- ◆ For each plane of the shape
- ◆ For each ray
- ◆ Calculate intersection point
- ◆ Test if the point is inside the face



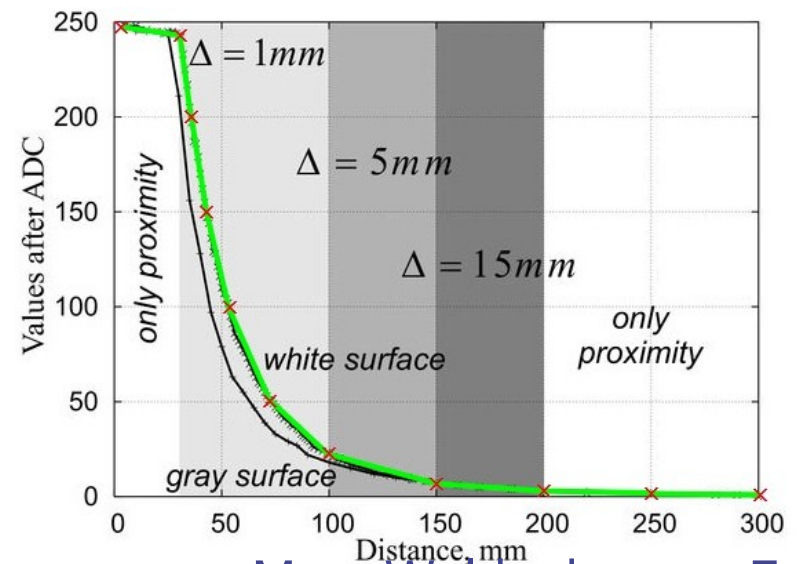
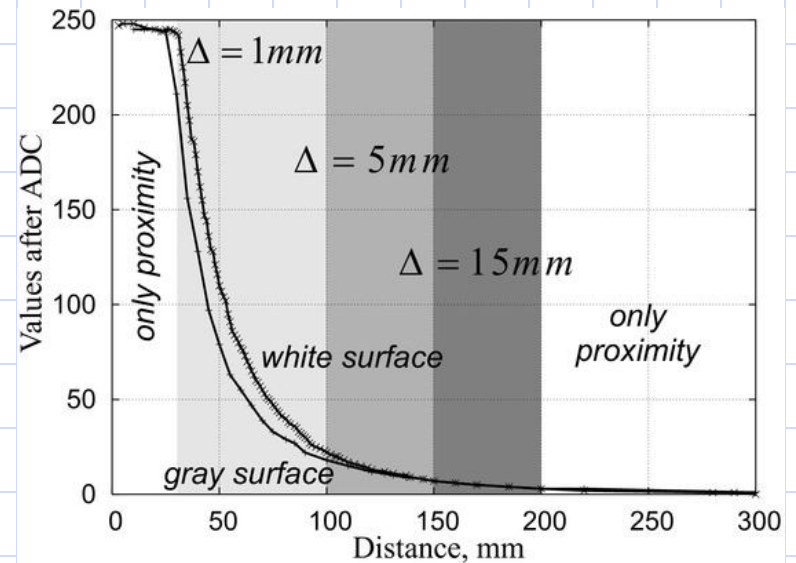
Angle of incidence

- ◆ Diffuse fraction
- ◆ Specular fraction



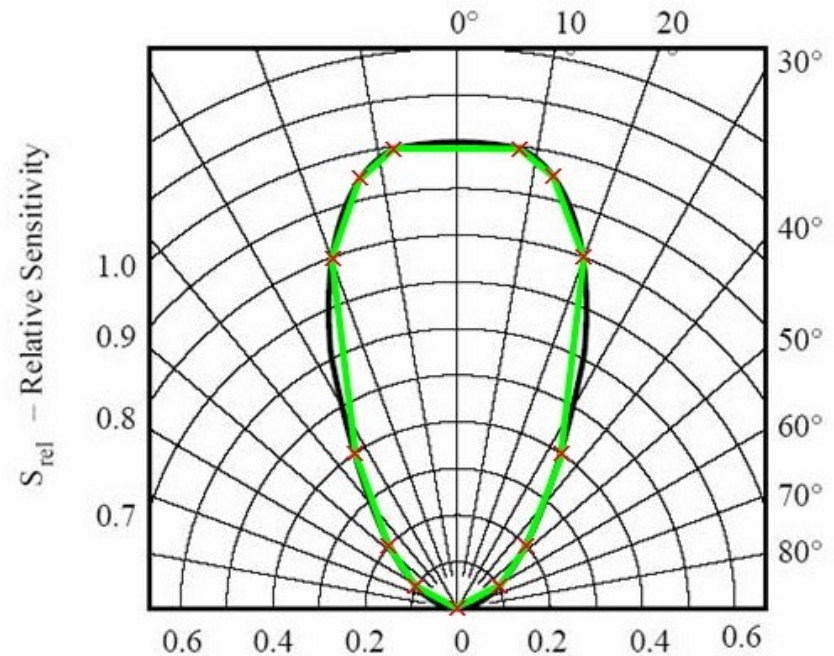
Distance

- ◆ Signal weakens over the distance
- ◆ Linear approximation



Angular displacement

- ◆ Sensor sensitivity changes with the angle between the ray and the central sensor line

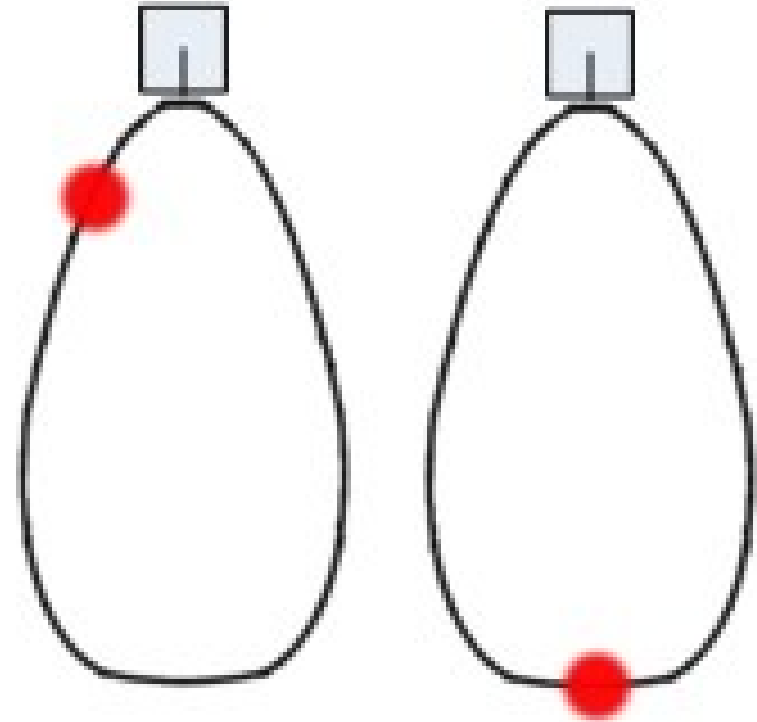


94 8303

Figure 9. Relative Radiant Sensitivity vs. Angular Displacement

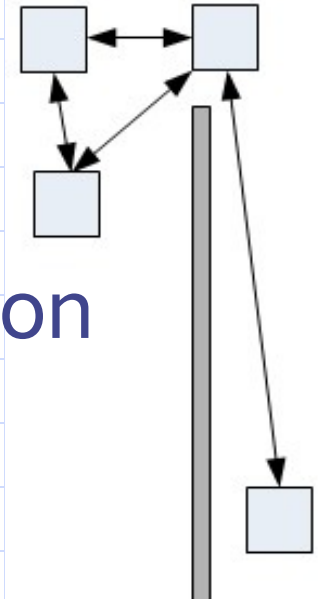
Indiscernible distance

- ◆ Central line but in a large distance
- ◆ Or small distance but displaced from the central line



Communication

- ◆ Robots can „see“ each other
- ◆ sensor in the appropriate direction
- ◆ Quality
 - Distance
 - Angular displacement
 - Other signals



Speedup

- ◆ Boundingboxes
- ◆ Objects behind the sensor are ignored
- ◆ Maybe you have some good ideas

