IR Sensors
IR Sensor Applications

- Security/Motion Detector
- TV Remote Control
- Night Vision
- Range Finding
SumoBot
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Two Types of IR Sensors

- **Transmissive**
  - Emitter and Detector face one another

- **Reflective**
  - Emitter reflects IR light off of target to Detector
QRB1134: Reflective IR Sensor

- Diode Emits IR light
- IR light reflects off of surface
- IR light activates phototransistor
- Output voltage responds accordingly
Ways To Measure Range

- **Time of Flight (TOF)**
  - Time it takes for signal to return

- **Return Signal Strength**
  - Amplitude of returning signal

- **Triangulation**
  - Angle at which signal returns
GP2D12: Triangulation

- IR emitting diode is located at the focal point ($F_o$), producing a parallel rays on the output.
GP2D12: Triangulation
GP2D12: Triangulation
GP2D12: Triangulation
GP2D12: Triangulation

- PSD is located at back focal plane ($f$)
GP2D12: Limitations

<table>
<thead>
<tr>
<th>Draft</th>
<th>Reflectivity</th>
</tr>
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<tbody>
<tr>
<td>White</td>
<td>90%</td>
</tr>
<tr>
<td>Gray</td>
<td>18%</td>
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The graph shows the analog output voltage $V_o (V)$ as a function of distance to reflective object $L (cm)$. The reflectivity of different surfaces is indicated.
What About Background IR Interference?

- Filter out all but transmitted frequencies