

Range - Measuring System (**SMARTCANE**[®])

The range-measuring system operates by projecting an IR light beam onto the obstacle and detecting the place where the reflected light falls on along the length of the Position Sensing Detector (PSD). When the position of the **SMARTCANE**[®] light source changes towards the obstacle the reflected light spot changes its location on the PSD.

The range-measuring system presented is capable of measuring the distance of a diffuse reflective object from 200 mm to 2000 mm (Figure 1).

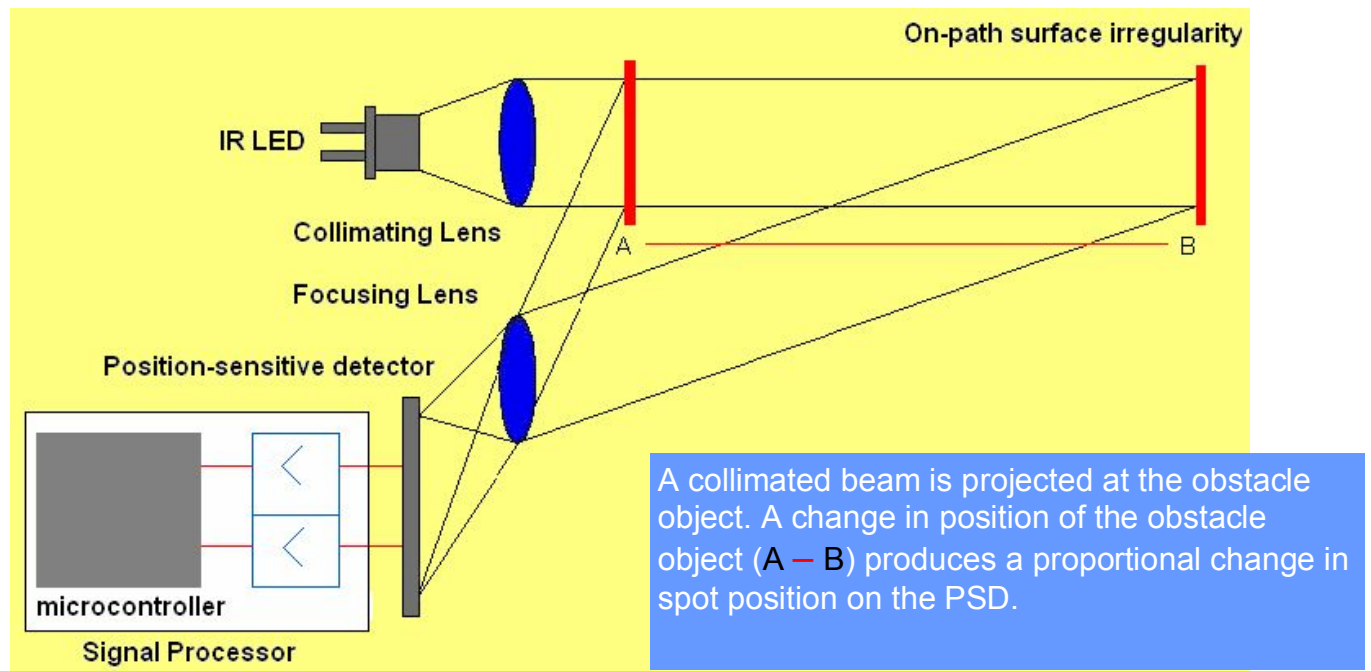


Figure 1.

The range-measuring system consists of three subsystems:

- Transmitter (IR LED),
- Position-Sensitive Detector (PSD),
- Signal processor.

The Transmitter

The light source chosen for our device is a GaAIAs infrared LED.

The Receiver

The PSD is a special silicon photodiode. When a spot of light falls on the detector's surface, the current from each anode is proportional to the relative position of the

spot. If the spot is centered, the currents will be equal. As the spot moves, the output currents change.

Because the output is based on the centroid of the light spot, the light does not have to be focused tightly to obtain a valid distance reading.

The PSD produces an analog output that is directly proportional to the position of a light spot on the detector active area.

The output signal produced by PSD is practically independent of the light spot intensity, the profile and the obstacle reflection coefficient.

The Signal processor

The PSD outputs are fed into the amplification stage and then into signal processing electronics, which produces the control signal.

The SMARTCANE optical system (Figure 2.)

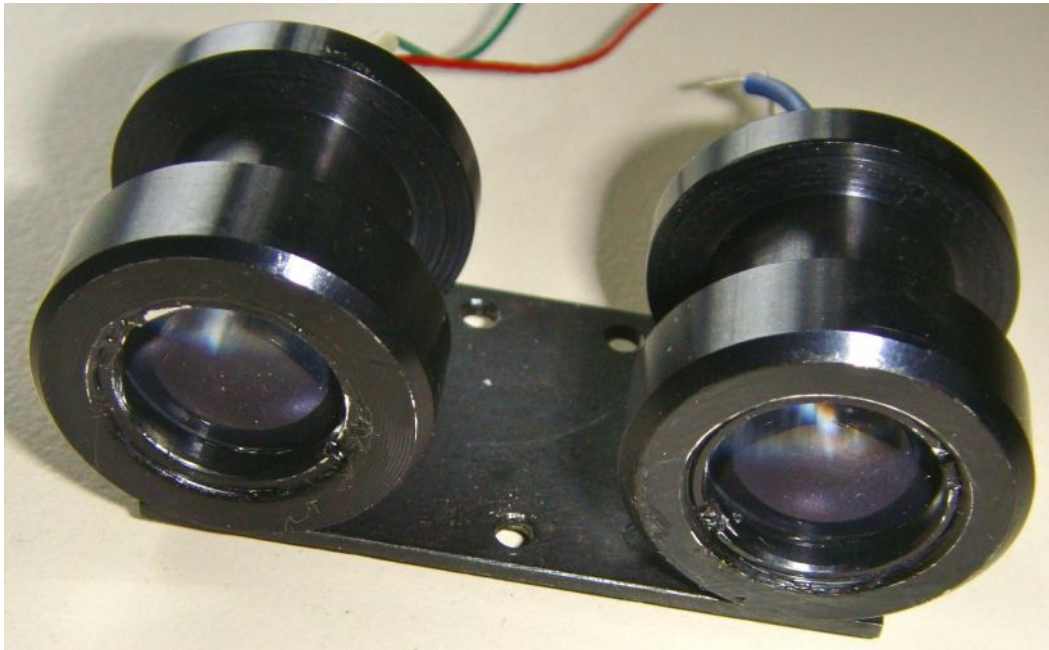


Figure 2.

The present state of the SMARTCANE project:

The SMARTCANE device prototype and the production file of the optical system are ready for production.