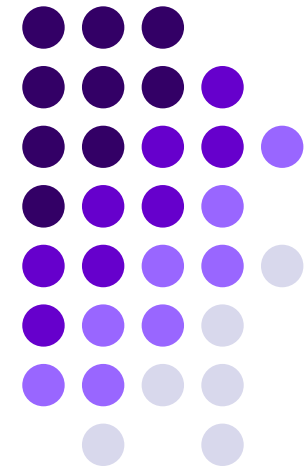
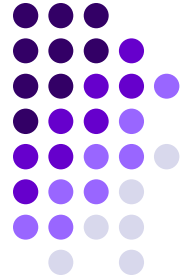


Senzori si traductoare



Cuprins 13

Senzori de locatie



Senzori de locatie acustici

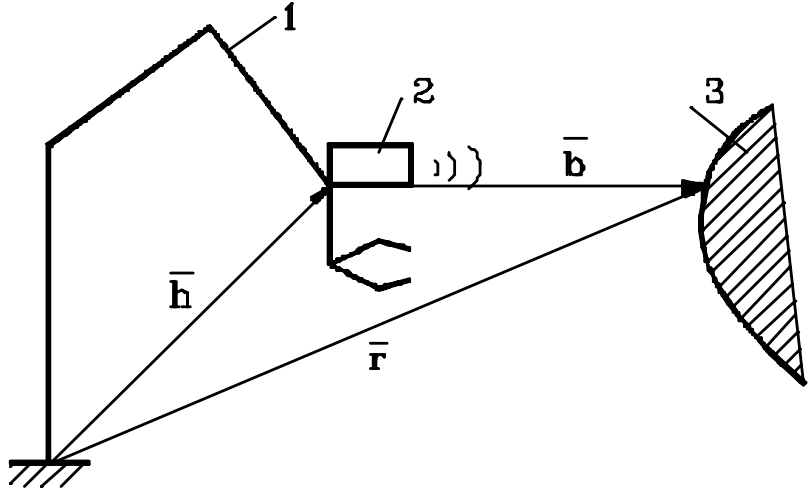
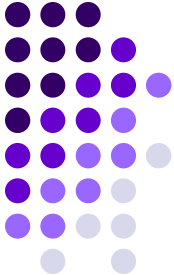


Fig.6.1 Principiul de măsurare acustică a distanței: 1- RI; 2- senzor; 3-obiect;

$$L = \frac{C \cdot T}{2}$$

$$C = 331.5 + 0.61 \cdot t \quad [m / s]$$

$$\bar{r} = \bar{h}(q_1, q_2, q_3, q_4, q_5, q_6) + \bar{b}(\phi_x, \phi_y, \phi_z, l)$$

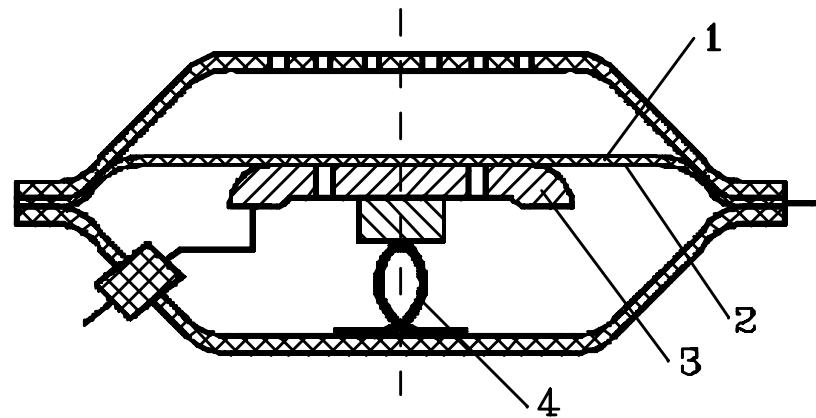
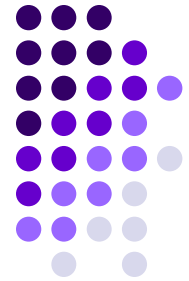


Fig.6.2 Elementele componente ale unui senzor acustic:1-armătura mobilă; 2-armătura fixă; 3-folie izolantă elastică; 4-arc

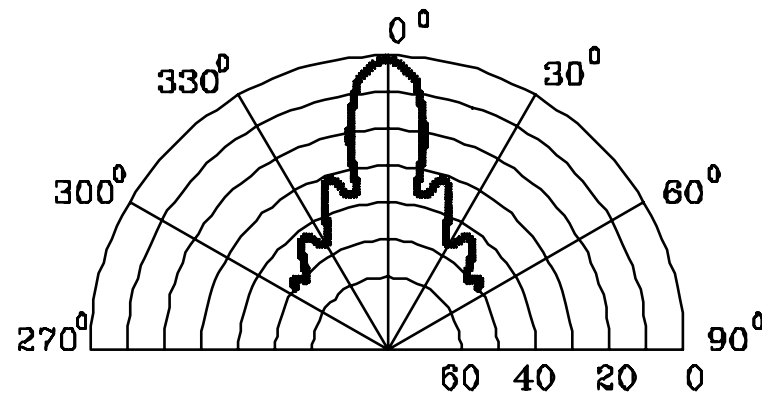
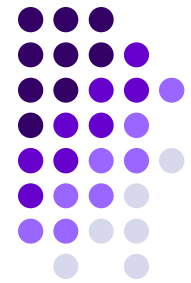
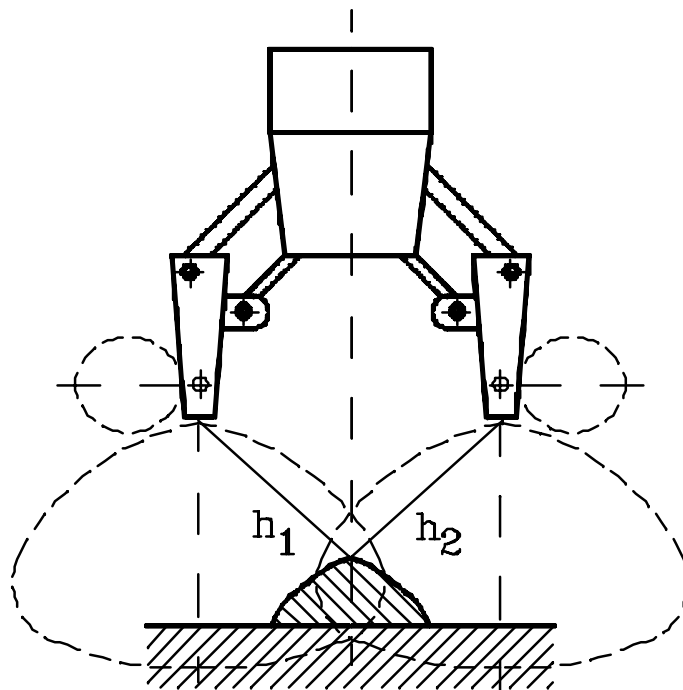
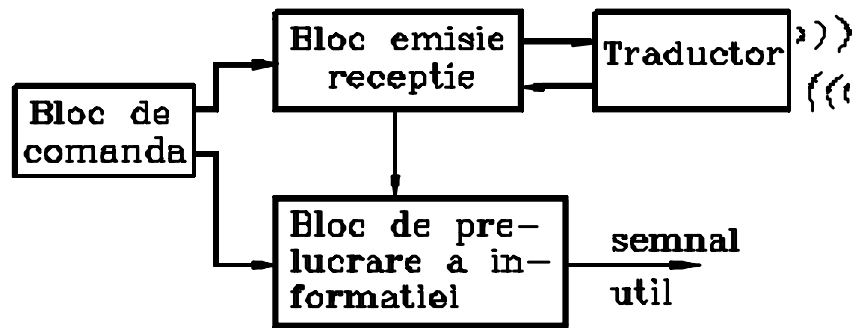


Fig.6.3. Diagrama de directivitate a senzorului



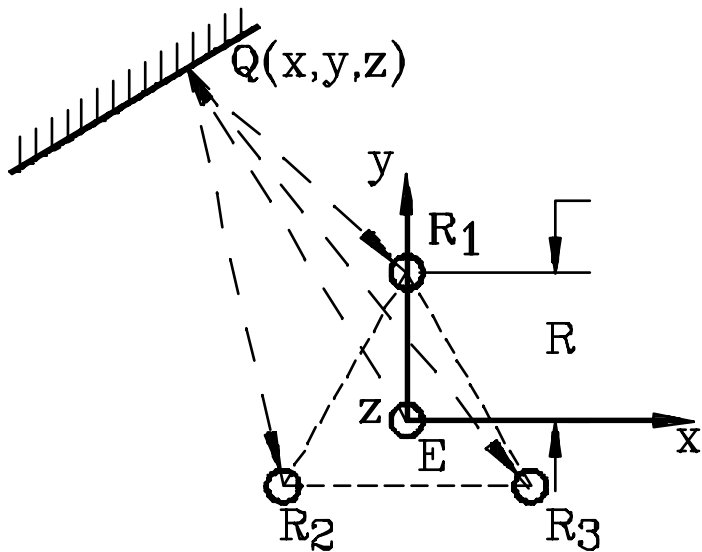


Fig.6.7 Structura unui sistem senzorial acustic: E-emitor; R1, R2, R3-receptor

$$x = \frac{d_3^2 - d_1^2}{2\sqrt{3} R} \quad y = \frac{d_1^2 + d_3^2}{6R} - \frac{d_2^2}{3R}$$

$$z = \sqrt{d_2^2 - x^2 - (y - R)^2}$$

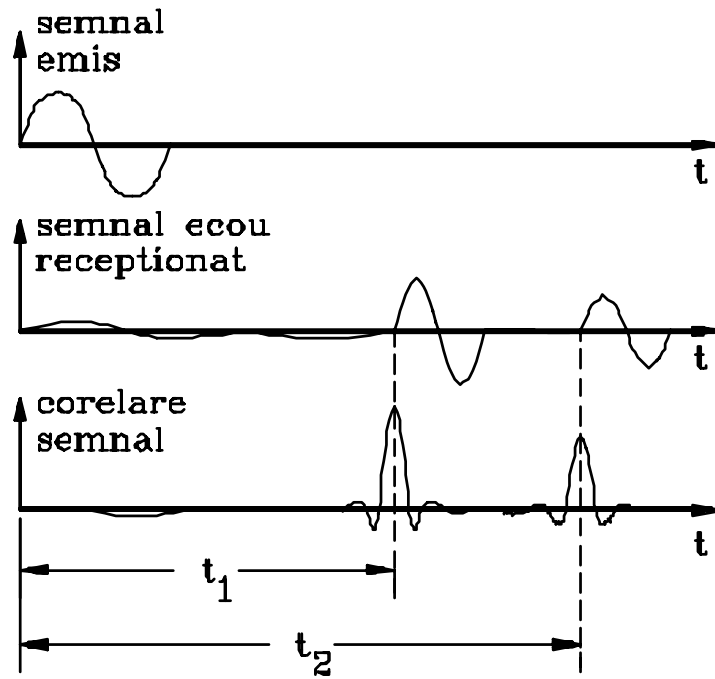
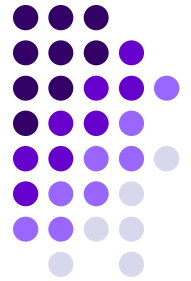
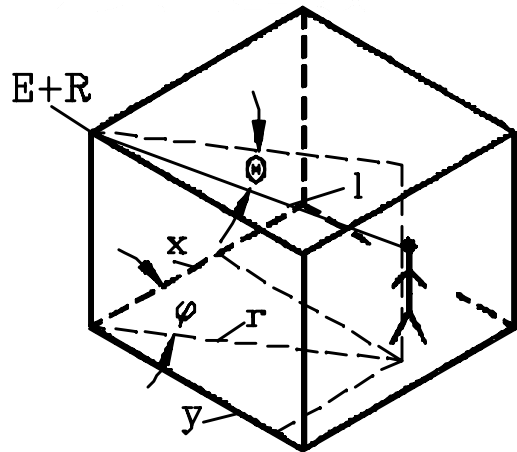


Fig.6.8. Corelarea semnal acustic emis - ecou receptionat (t_1, t_2 - intervalul de timp emisie –recepție pe cele 2 obstacole)

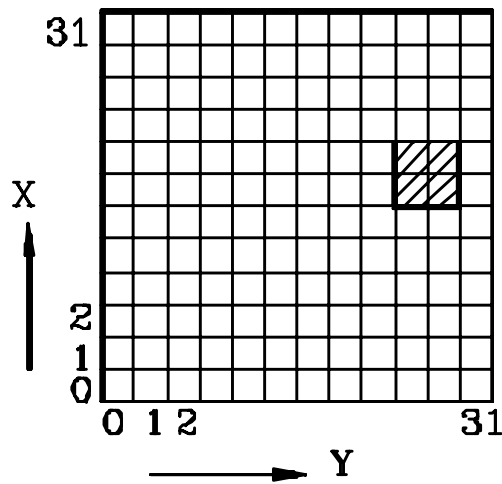
$$d_i = (d + d_i) - d \quad (i = 1, 2, 3)$$

$$d = \frac{\Sigma(d + d_i)^2 - 3R^2}{2 \cdot \Sigma(d + d_i)}$$





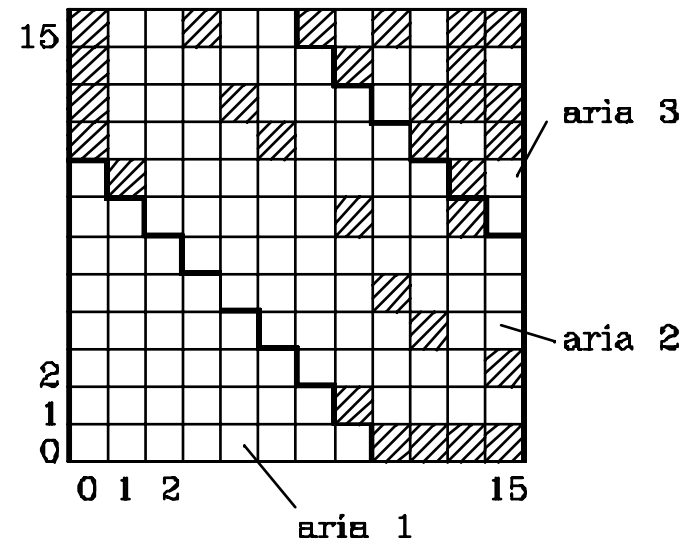
a)



b)

$$l = \frac{c \cdot t}{2} \quad r = l \cdot \cos \theta$$

$$x = r \cdot \cos \Phi \quad y = r \cdot \sin \Phi$$



a)

b)

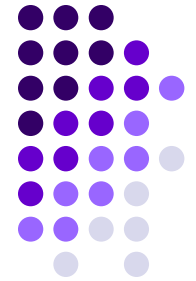
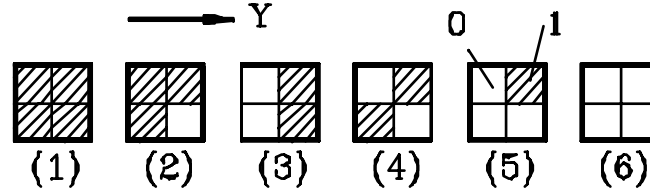


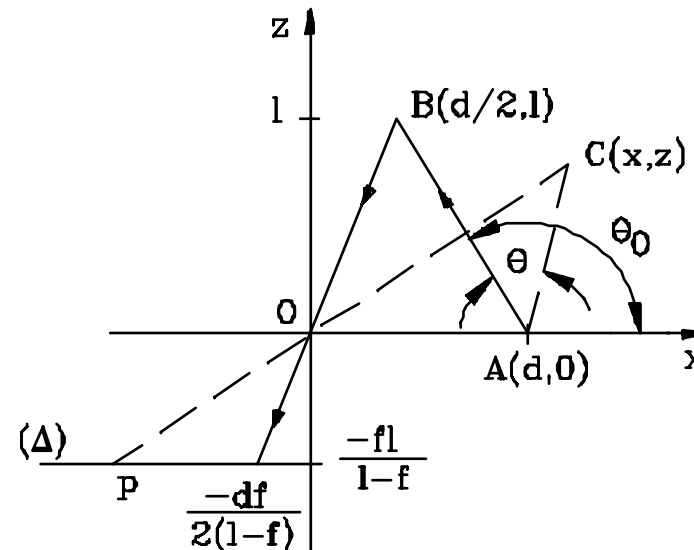
Fig.6.9 Zona de locatie: a - spatiul obiect b - proiectia discretizata a spatiului obiect

Geometria triangulației

Punctul $A(d,0)$ punctul de poziționare a unei surse luminoase

Raza luminoasă proiectată sub unghiul Θ_0 se reflectă în punctul $B(d/2, l)$.

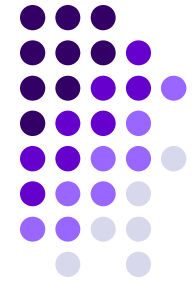
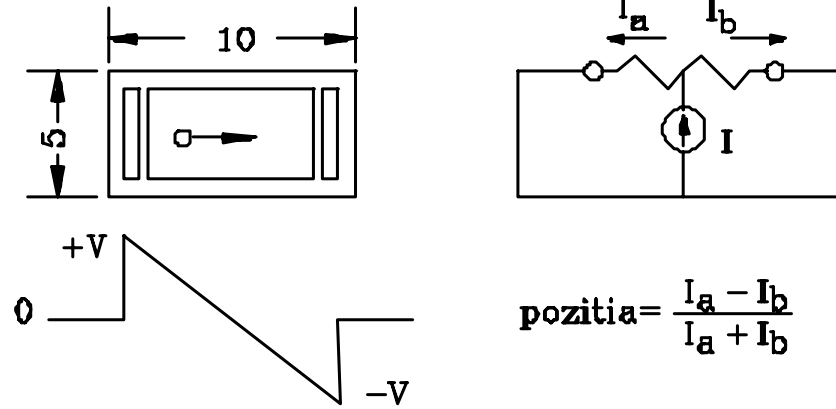
În originea sistemului de axe se găsește o lentilă (cu distanța focală "f") care concentrează fluxul luminos într-un punct al unei drepte (Δ) (paralelă cu axa x).



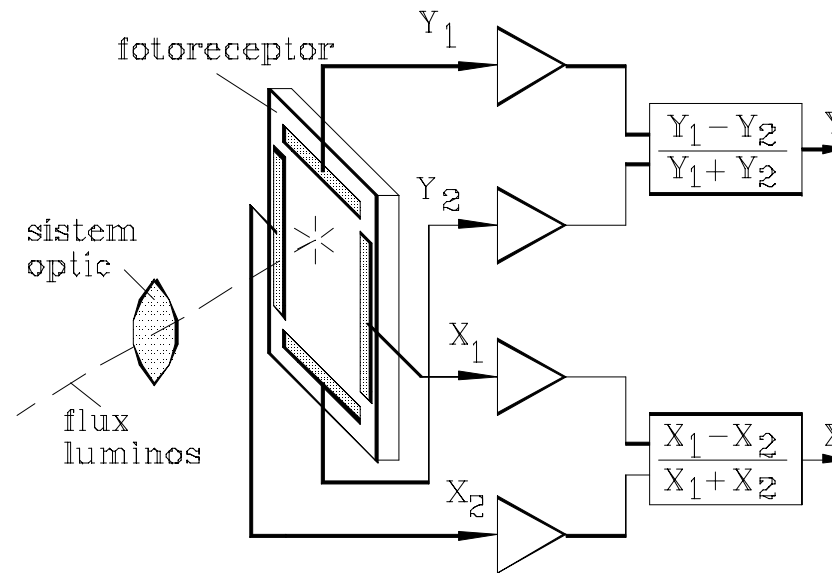
$$x = d \cdot p \cdot \left[p + \frac{f \cdot l \cdot (2l \cdot \operatorname{tg} \theta + d)}{(l - f) \cdot (d \cdot \operatorname{tg} \theta - 2l)} \right]^{-1}$$

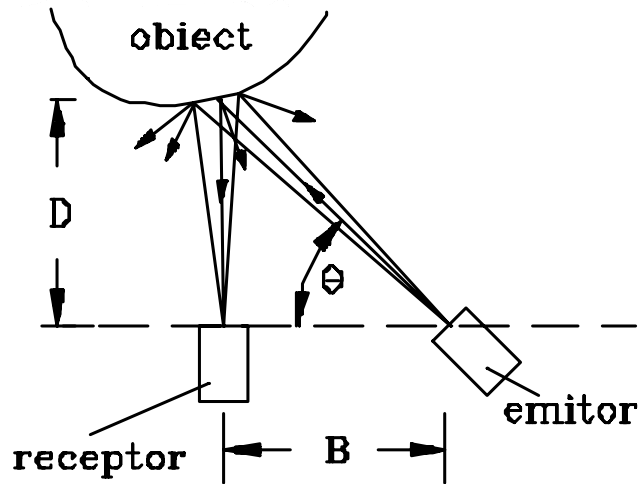
$$z = -d \cdot \left[\frac{p \cdot (l - f)}{f \cdot l} + \frac{2l \cdot \operatorname{tg} \theta + d}{d \cdot \operatorname{tg} \theta - 2l} \right]^{-1}$$

Circuitul echivalent al fotodiodei cu efect lateral

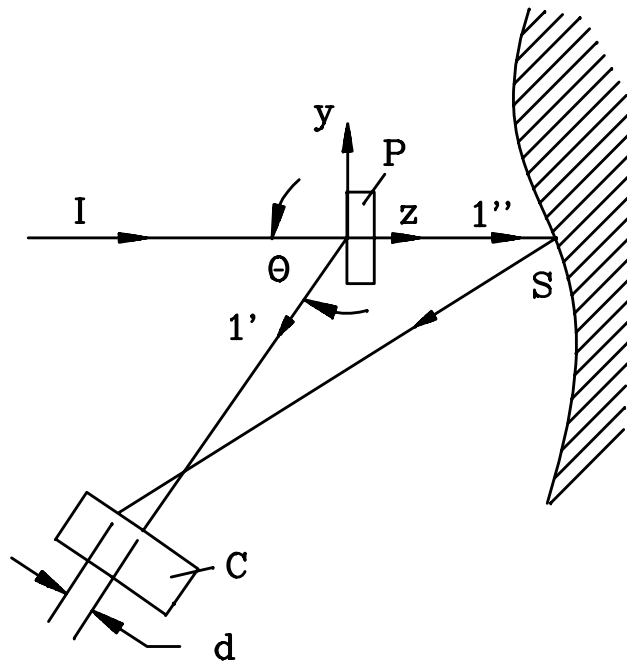


Prelucrarea informației la un senzor bidimensional

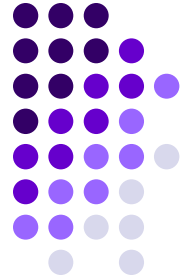


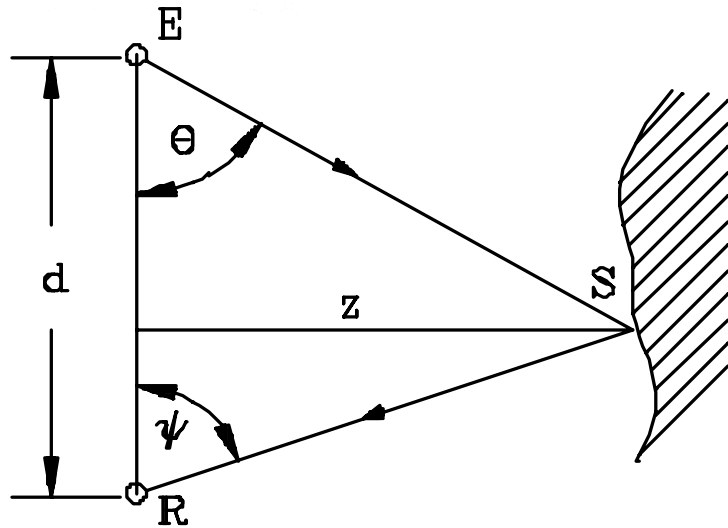


$$D = B \cdot \operatorname{tg} \theta$$

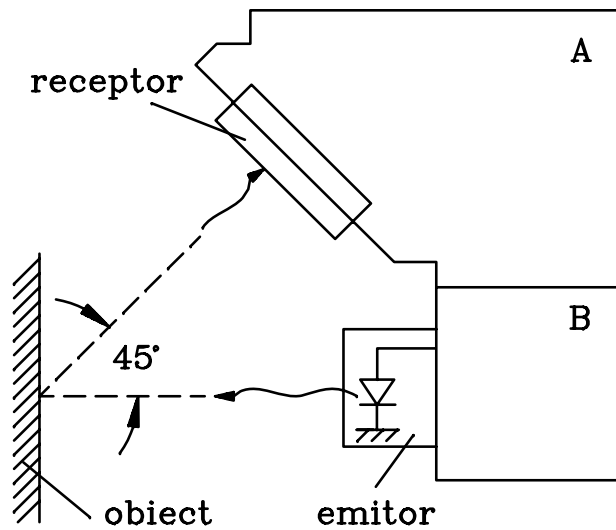
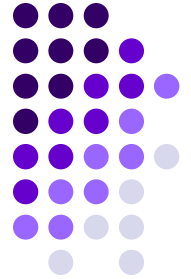


$$z = \frac{d}{\sin \theta}$$

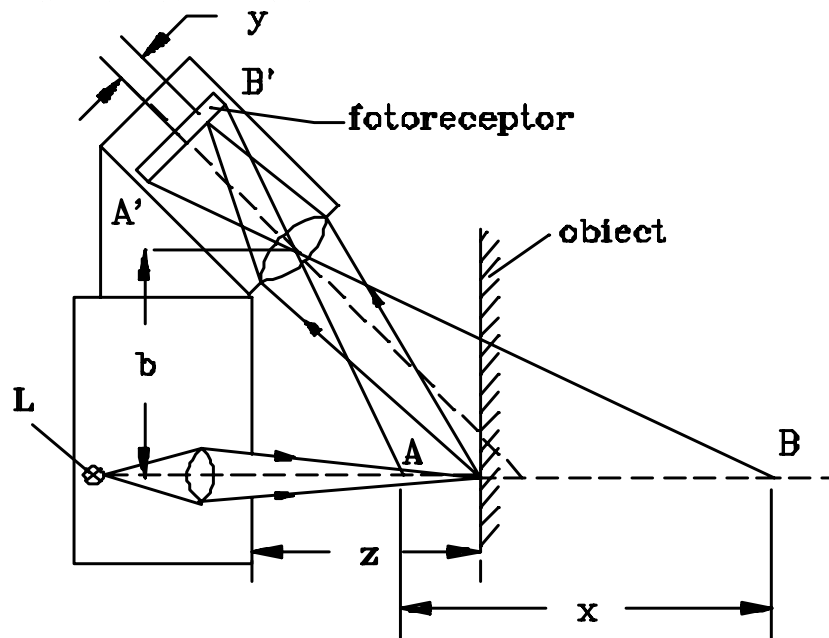




$$z = \frac{d}{\text{ctg } \Theta + \text{ctg } \psi}$$

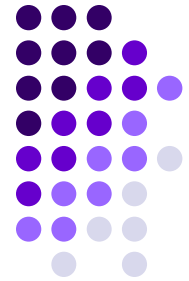
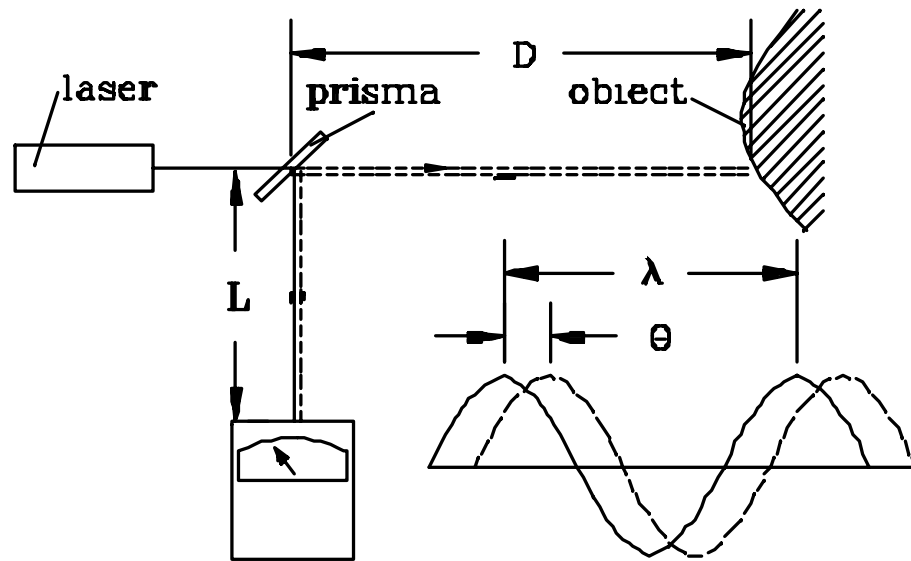


Schema senzorului firmei SELCOM



$$z = b \cdot \frac{f - y}{f + y}$$

Sursa luminoasă este un LED (în infraroșu) sau o diodă laser (Ga-As). Între axa optică a blocului receptor și cea a sursei este un unghi de 45° .



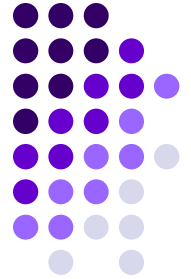
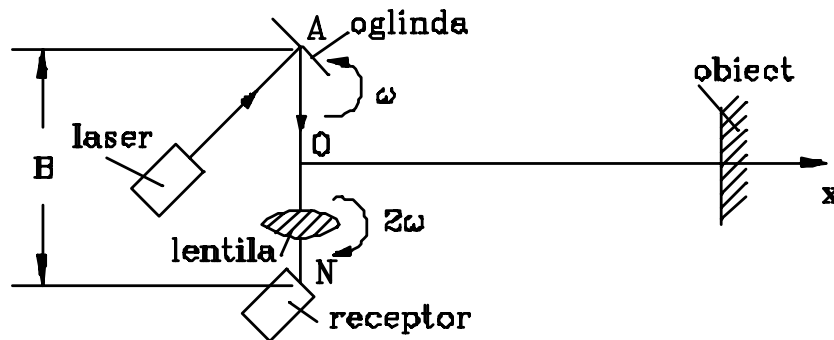
$$D = \frac{c \cdot T}{2}$$

$$D' = L + 2D$$

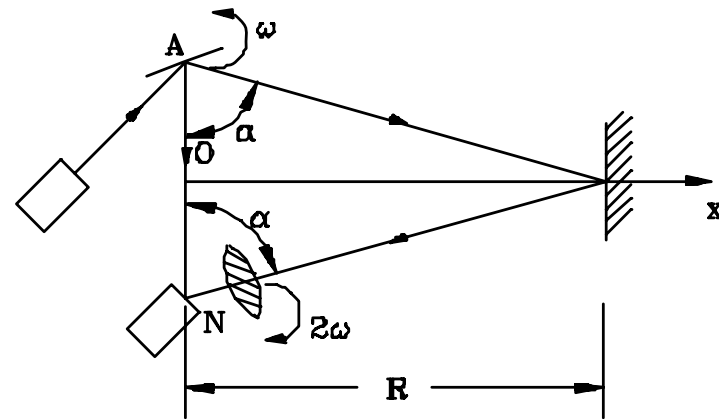
$$D' = L + \frac{\theta}{360^\circ} \cdot \lambda$$



$$D = \frac{\theta}{360^\circ} \cdot \frac{\lambda}{2}$$



$$R = \frac{B}{2} \cdot \operatorname{tg} \left(4 \pi \cdot \frac{T_A}{T_C} \right)$$

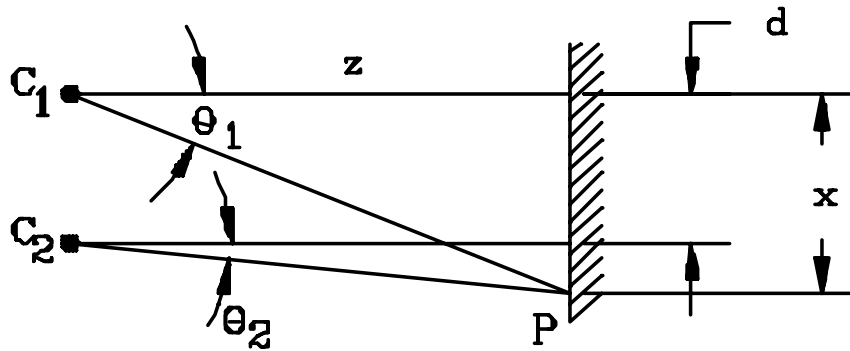


T_A – timpul de recepționare al semnalului reflectat pe obiect

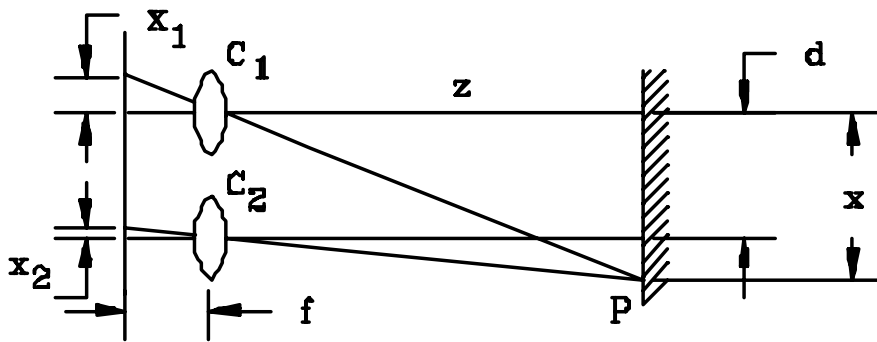
T_C - durata ciclului de scanare

Rotația oglinzii și a lentilei este asigurată de un servomotor electric și transmisii cu roți dințate

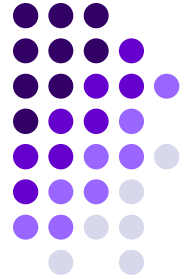
Stereoscopia

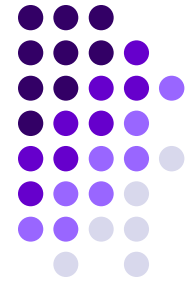


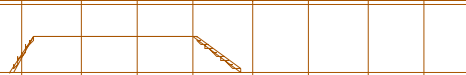









































$$z = \frac{d}{\operatorname{tg} \theta_1 - \operatorname{tg} \theta_2}$$



$$z = \frac{d \cdot f}{x_1 - x_2}$$





Senzor	Domeniu de lucru [mm]	Sensibilitate la perturbatii					
pneumatic							
capacitiv							
inductiv							
magnetic							
acustic							
optoelec.							
	0.001 0.01 0.1 1 10 100 1000 10000	Temperatura	Lumina	Zgomot	Praf	Cimp magn.	Cimp elec.