

## IN-PLANE ROTATION

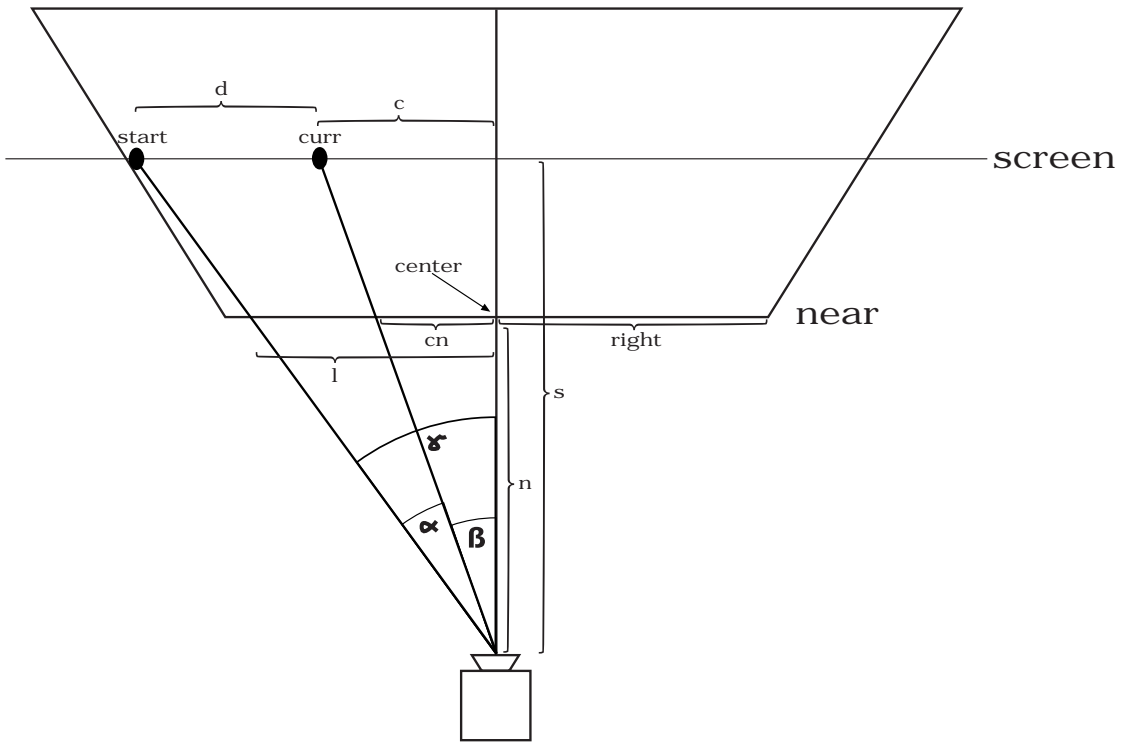


FIGURE 1. in-plane rotation angle calculation, horizontal part (the vertical part can be calculated using *top* instead of *right* and the respective vertical touch coordinate calculations)

We want to calculate  $\alpha$  using the theorem on intersecting lines:

$$\begin{aligned}
\alpha &= \gamma - \beta \\
\gamma &= \text{atan}\left(\frac{d}{s}\right), \beta = \text{atan}\left(\frac{c}{s}\right) \\
center &= (0.5, 0.5) \\
d &= start - center \\
c &= curr - center
\end{aligned}$$

$d$  in world coordinates:

$$\begin{aligned}
\frac{d}{s} &= \frac{l}{n} \\
d &= \frac{s \cdot l \cdot 2 \cdot right}{n}
\end{aligned}$$

$c$  in world coordinates:

$$\begin{aligned}
\frac{c}{s} &= \frac{cn}{n} \\
c &= \frac{s \cdot cn \cdot 2 \cdot right}{n}
\end{aligned}$$