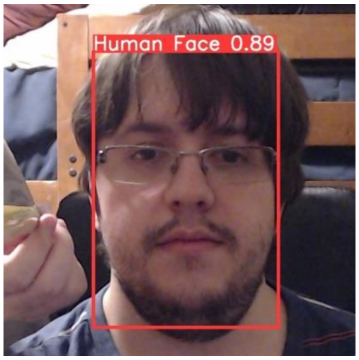

Face (Working Distance) (in) = 24

Face (Width, Height) (in) ≈ (5.125, 7.25)

Face (Width, Height) (pixels) = (289, 430)

Width Ratio: 1 in = 56.39 pixels

Height Ratio: 1 in = 59.31 pixels

$$\text{Camera Width} = 1920 \text{ pixels} * \frac{1 \text{ in}}{56.39 \text{ pixels}} = 34.048 \text{ in}$$

$$\text{Camera Height} = 1080 \text{ pixels} * \frac{1 \text{ in}}{59.31 \text{ pixels}} = 18.209 \text{ in}$$

$$\text{Horizontal FOV (Camera)} = 2\text{Tan}^{-1}\left(\frac{34.048 \text{ in}}{2 * 24 \text{ in}}\right) = \mathbf{70.70}° \approx \mathbf{70.42}° \ (\textbf{Camera Specs})$$

$$\text{Vertical FOV (Camera)} = 2\text{Tan}^{-1}\left(\frac{18.209 \text{ in}}{2 * 24 \text{ in}}\right) = \mathbf{41.55}° \approx \mathbf{43.3}° \ (\textbf{Camera Specs})$$

The FOV calculated is close to the FOV from the camera specifications. The measured FOV differs due to error from measurement of my face.

Using the FOV from the camera specifications, the angular resolution can be calculated for each camera distance.

Camera Distance (2 ft):

$$\text{Angular Resolution (Width)} = \frac{70.42°}{2\text{Tan}\left(\frac{70.42°}{2}\right) * \frac{2\text{ ft}}{1\text{ ft}} * 12\text{ in}} = 2.079\ (°/\text{in})$$

$$\text{Angular Resolution (Height)} = \frac{43.3°}{2\text{Tan}\left(\frac{43.3°}{2}\right) * \frac{2\text{ ft}}{1\text{ ft}} * 12\text{ in}} = 2.273\ (°/\text{in})$$

Angular Resolution (2 ft) = (2.079 x 2.273) (°/in)

Camera Distance (6 ft):

$$\text{Angular Resolution (Width)} = \frac{70.42°}{2\text{Tan}\left(\frac{70.42°}{2}\right) * \frac{6\text{ ft}}{1\text{ ft}} * 12\text{ in}} = 0.693\ (°/\text{in})$$

$$\text{Angular Resolution (Height)} = \frac{43.3°}{2\text{Tan}\left(\frac{43.3°}{2}\right) * \frac{6\text{ ft}}{1\text{ ft}} * 12\text{ in}} = 0.758\ (°/\text{in})$$

Angular Resolution (6 ft) = (0.693 x 0.758) (°/in)

Camera Distance (9 ft):

$$\text{Angular Resolution (Width)} = \frac{70.42°}{2\text{Tan}\left(\frac{70.42°}{2}\right) * \frac{9\text{ ft}}{1\text{ ft}} * 12\text{ in}} = 0.462\ (°/\text{in})$$

$$\text{Angular Resolution (Height)} = \frac{43.3°}{2\text{Tan}\left(\frac{43.3°}{2}\right) * \frac{9\text{ ft}}{1\text{ ft}} * 12\text{ in}} = 0.505\ (°/\text{in})$$

Angular Resolution (9 ft) = (0.462 x 0.505) (°/in)