Sensor Fusion HW. #1

DATE. NO.

· Azimuth Angle ($\theta$)

$$\theta = \tan^{-1}\left(\frac{y_c - p_y}{x_c - p_x}\right)$$

$(0,0)$ $\theta_1 = \tan^{-1}\left(\frac{0-p_y}{0-p_x}\right)$

$(L,0)$ $\theta_2 = \tan^{-1}\left(\frac{0-p_y}{L-p_x}\right)$

$(0,L)$ $\theta_3 = \tan^{-1}\left(\frac{L-p_y}{0-p_x}\right)$

$(L,L)$ $\theta_4 = \tan^{-1}\left(\frac{L-p_y}{L-p_x}\right)$

· Elevation ($\phi$)

$$\phi = \tan^{-1}\left(\frac{z_c - p_z}{\sqrt{(x_c-p_x)^2+(y_c-p_y)^2}}\right)$$

$(0,0,0)$ $\phi_1 = \tan^{-1}\left(\frac{0-p_z}{\sqrt{p_x^2+p_y^2}}\right)$

$(L,0,0)$

$\phi_2 = \tan^{-1}\left(\frac{-p_z}{\sqrt{(L-p_x)^2+p_y^2}}\right)$

$(0,L,0)$ $\phi_3 = \tan^{-1}\left(\frac{-p_z}{\sqrt{p_x^2+(L-p_y)^2}}\right)$

$\vdots$

$(L,L,L)$

$\phi_8 = \tan^{-1}\left(\frac{L-p_z}{\sqrt{(L-p_x)^2+(L-p_y^2)^2}}\right)$

$$g(x) = \begin{bmatrix} \theta_1 & \phi_1 \\ \theta_2 & \phi_2 \\ \theta_3 & \phi_3 \\ \theta_4 & \phi_4 \\ \theta_1 & \phi_5 \\ \theta_2 & \phi_6 \\ \theta_3 & \phi_7 \\ \theta_4 & \phi_8 \end{bmatrix}$$

$$y = g(x) + r$$

$$= \begin{bmatrix} \tan^{-1}\left(\frac{-P_y}{-P_x}\right) & \tan^{-1}\left(\frac{-P_z}{\sqrt{P_x^2+P_y^2}}\right) \\ \tan^{-1}\left(\frac{-P_y}{L-P_x}\right) & \tan^{-1}\left(\frac{-P_z}{\sqrt{(L-P_x)^2+P_y^2}}\right) \\ \tan^{-1}\left(\frac{L-P_y}{-P_x}\right) & \tan^{-1}\left(\frac{-P_z}{\sqrt{P_x^2+(L-P_y)^2}}\right) \\ \tan^{-1}\left(\frac{L-P_y}{L-P_x}\right) & \tan^{-1}\left(\frac{L-P_z}{\sqrt{(L-P_x)^2+(L-P_y)^2}}\right) \\ \tan^{-1}\left(\frac{-P_y}{-P_x}\right) & \tan^{-1}\left(\frac{L-P_z}{\sqrt{P_x^2+P_y^2}}\right) \\ & \vdots \\ \tan^{-1}\left(\frac{L-P_y}{L-P_x}\right) & \tan^{-1}\left(\frac{L-P_z}{\sqrt{(L-P_x)^2+(L-P_y)^2}}\right) \end{bmatrix} + \begin{bmatrix} r_1 \\ r_2 \\ r_3 \\ r_4 \\ r_5 \\ \vdots \\ r_8 \end{bmatrix}$$