

② 3D World Coordinates

	x (mm)	y (mm)
①	0	0
②	24	24
③	48	48
④	72	72
⑤	96	96
⑥	120	120
	144	144

Image coordinates:-

①	81	62
②	157	110
③	<del>189</del> 218	196
④	250.3	226
⑤	325	297
⑥	364	327

Homography:

$$\begin{bmatrix}
 x_1^{(1)} & y_1^{(1)} & 1 & 0 & 0 & 0 & -x_1^{(1)}x_2^{(1)} & -x_1^{(1)}y_2^{(1)} & -x_1^{(1)} \\
 0 & 0 & 0 & x_1^{(1)} & y_1^{(1)} & 1 & -y_1^{(1)}x_2^{(1)} & -y_1^{(1)}y_2^{(1)} & -y_1^{(1)} \\
 \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\
 x_n^{(1)} & y_n^{(1)} & 1 & 0 & 0 & 0 & -x_n^{(1)}x_2^{(1)} & -x_n^{(1)}y_2^{(1)} & -x_n^{(1)} \\
 0 & 0 & 0 & x_n^{(1)} & y_n^{(1)} & 1 & -y_n^{(1)}x_2^{(1)} & -y_n^{(1)}y_2^{(1)} & -y_n^{(1)}
 \end{bmatrix} \cdot \begin{bmatrix} h_{11} \\ h_{12} \\ h_{13} \\ h_{21} \\ h_{22} \\ h_{23} \\ h_{31} \\ h_{32} \\ h_{33} \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}$$

$$\begin{bmatrix} h_{11} \\ h_{12} \\ h_{13} \\ h_{21} \\ h_{22} \\ h_{23} \\ h_{31} \\ h_{32} \\ h_{33} \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}$$



After calculating above matrix:-

$$\begin{bmatrix} 92 & 86 & 1 & 0 & 0 & 0 & -6396 & -5070 & -81 \\ 0 & 0 & 0 & 92 & 86 & 1 & -4675 & -3575 & -62 \\ 200 & 245 & 1 & 0 & 0 & 0 & -23640 & -21225 & -157 \\ 0 & 0 & 1 & 200 & 245 & 1 & -17400 & -15275 & -110 \\ 242 & 287 & 1 & 0 & 0 & 0 & -49952 & -41687 & -218 \\ 0 & 0 & 1 & 242 & 287 & 1 & -41867 & -36247 & -196 \\ 309 & 324 & 1 & 0 & 0 & 0 & -67421 & -62810 & -253 \\ 0 & 0 & 0 & 309 & 324 & 1 & -57548 & -55450 & -226 \\ 400 & 401 & 1 & 0 & 0 & 0 & -114580 & -9970 & -325 \\ 0 & 0 & 0 & 400 & 401 & 1 & -96428 & -92118 & -297 \\ 489 & 475 & 1 & 0 & 0 & 0 & -136804 & -12984 & -364 \\ 0 & 0 & 0 & 489 & 475 & 1 & -122124 & -12142 & -327 \end{bmatrix}$$

To get Eigen vector, we need to calculate

$$A^T \cdot Ah = \lambda h$$

$$b = \text{transpose}(a)$$

$$c = b \times a$$

$$H = \min(c);$$

$$\text{Homogenous matrix} = \text{transpose}(H)$$

Homogeneous-matrix =

$$\begin{bmatrix} -130532326 \\ -131087470 \\ -568276 \\ -115231765 \\ -98499571 \\ -362770 \\ -118764406 \\ -139326523 \\ -383360 \end{bmatrix}$$