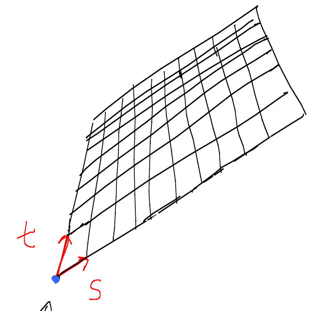
lecture 19 part 2

homographies
(introduction)

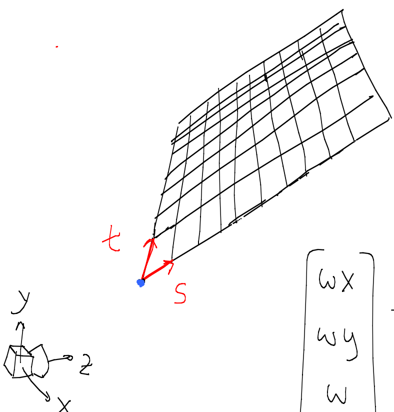
Suppose we have a scene plane.



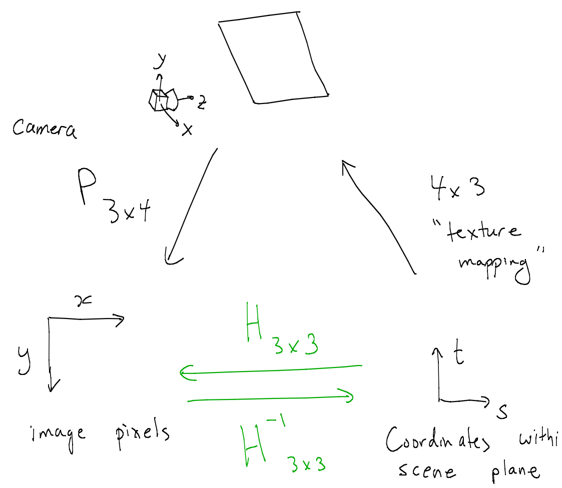
Vectors corresponding to unit s and t steps

$$\begin{bmatrix}X\\Y\\Z\\1\end{bmatrix} = \begin{bmatrix}a_x & b_x & X_0\\ a_y & b_y & Y_0\\ a_z & b_z & Z_0\\ 0 & 0 & 1\end{bmatrix}\begin{bmatrix}s\\t\\1\end{bmatrix}.$$

origin $(s,t)=(0,0)$
is at $(X_0\ Y_0\ Z_0)$

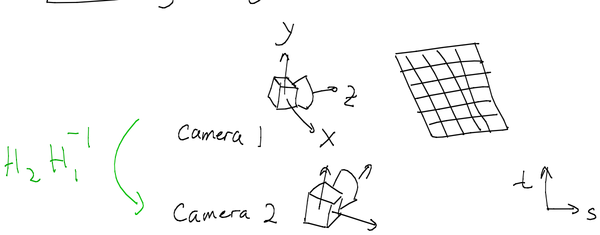


$$\begin{bmatrix}wx\\wy\\w\end{bmatrix} = \overbrace{\underbrace{\underbrace{P}_{3\times 4}\ \underbrace{\begin{bmatrix}a_x & b_x & X_0\\ a_y & b_y & Y_0\\ a_z & b_z & Z_0\\ 0 & 0 & 1\end{bmatrix}}_{4\times 3}}_{3\times 3}}^{H\ \text{"homography"}}\begin{bmatrix}s\\t\\1\end{bmatrix}$$



See lecture notes for a discussion of when H is invertible.

Homography - Example 2



We now have H_1 and H_2.
Each takes (s,t) to (x,y).
Thus, H_1^{-1} and H_2^{-1} take (x,y) to (s,t)

Thus, $H_2 H_1^{-1}$ takes (x^1, y^1) to (x^2, y^2).