# MAPI - Computer Vision 

Multiple View Geometry

## Geometry of Multiple Views

- 3-Camera Geometry: Epipolar Geometry
- The scene is imaged with three cameras perhaps simultaneously in a trinocular rig, or sequentially from a moving camera: $\mathrm{O}_{3}$



## Geometry of Multiple Views

- 3-Camera Geometry: Epipolar Geometry



## Geometry of Multiple Views

- Trifocal Plane

$\mathrm{O}_{2}$


## Geometry of Multiple Views

- 3-Camera Geometry



## Geometry of Multiple Views

- 3-Camera Geometry
- The fact that the projection of any point $\mathbf{P}$ on $\mathbf{L}$ in image $i$ belongs to the line $l_{i}$ can be written as: $l_{i}^{\top} \mathbf{M}_{i} \mathbf{P}=0$



## Geometry of Multiple Views

- 3-Camera Geometry
- The fact that the projection of any point $\mathbf{P}$ on $\mathbf{L}$ in image $i$ belongs to the line $l_{i}$ can be written as:
$l_{i}{ }^{\top} \mathbf{M}_{i} \mathbf{P}=0$
Since this is true for any point $\mathbf{P}$ on $\mathbf{L}$, the matrix
have rank 2

$$
\left[\begin{array}{l}
l_{1}^{T} \mathrm{M}_{1} \\
l_{2}^{T} \mathrm{M}_{2} \\
l_{3}^{T} \mathrm{M}_{3}
\end{array}\right]
$$



This is expressed by an expression linear in $11,12,13$ - the trilinear (trifocal) tensor

