Structure from Motion Problem

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Topic: Structure from Motion, Module: Reconstruction II

First Principles of Computer Vision

Feature Detection and Tracking

- Detect feature points: Corners, SIFT points, ...

Feature Detection and Tracking

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Feature Detection and Tracking

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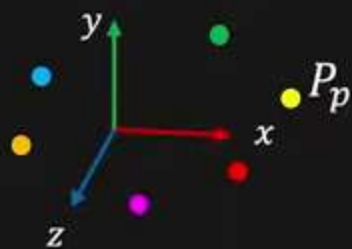
- Track feature points: Template Matching, Optical Flow...

Feature Detection and Tracking

- Detect feature points: Corners, SIFT points, …

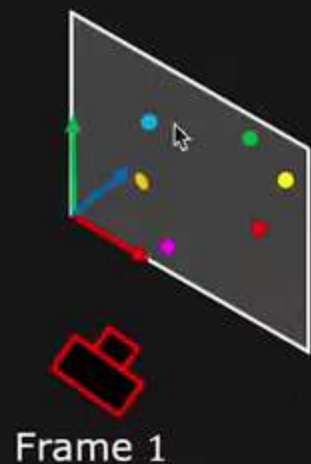- Track feature points: Template Matching, Optical Flow…
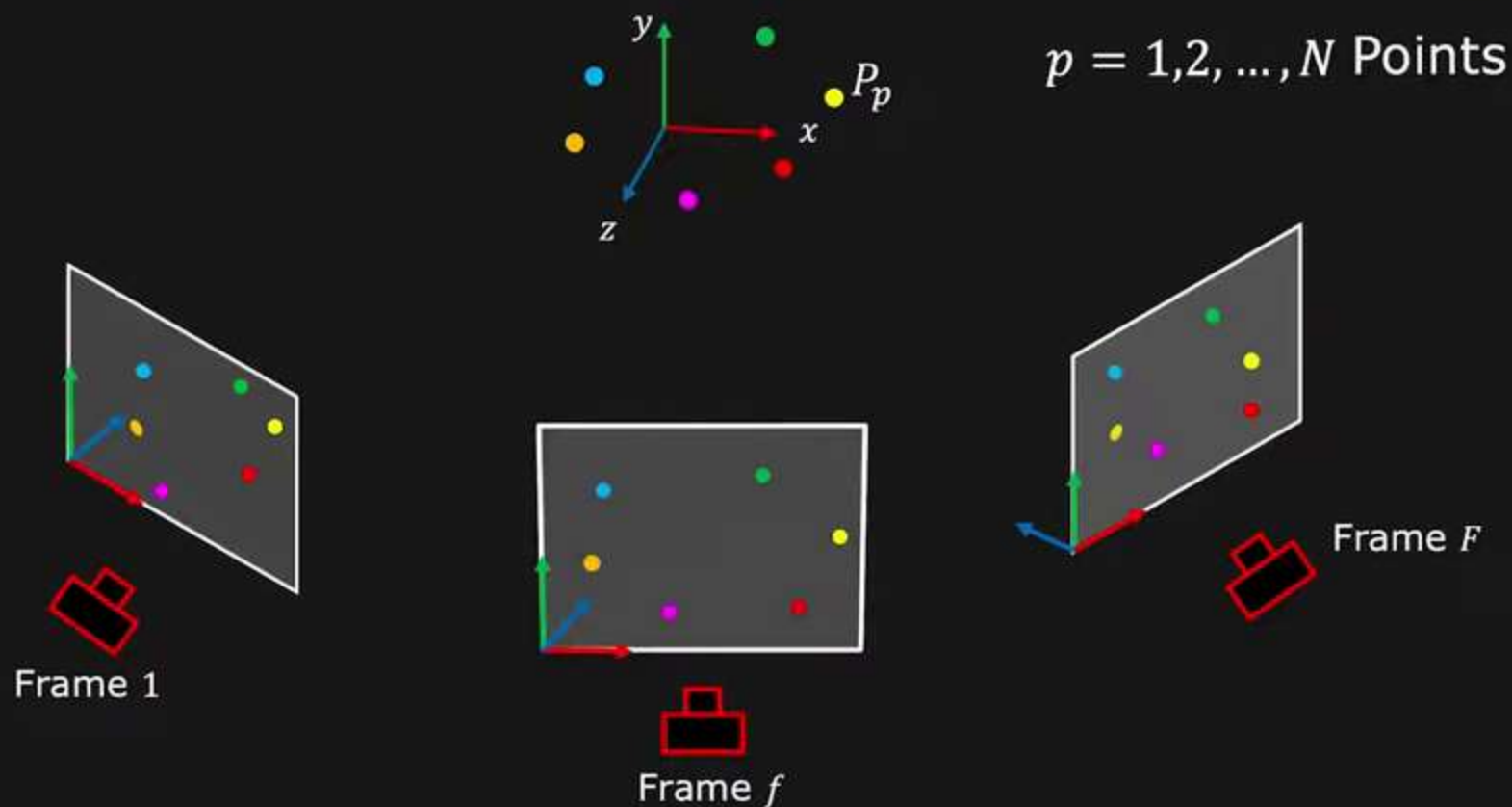
Structure From Motion

$p = 1, 2, \ldots, N$ Points

Structure From Motion

$p = 1, 2, \ldots, N$ Points

P_p

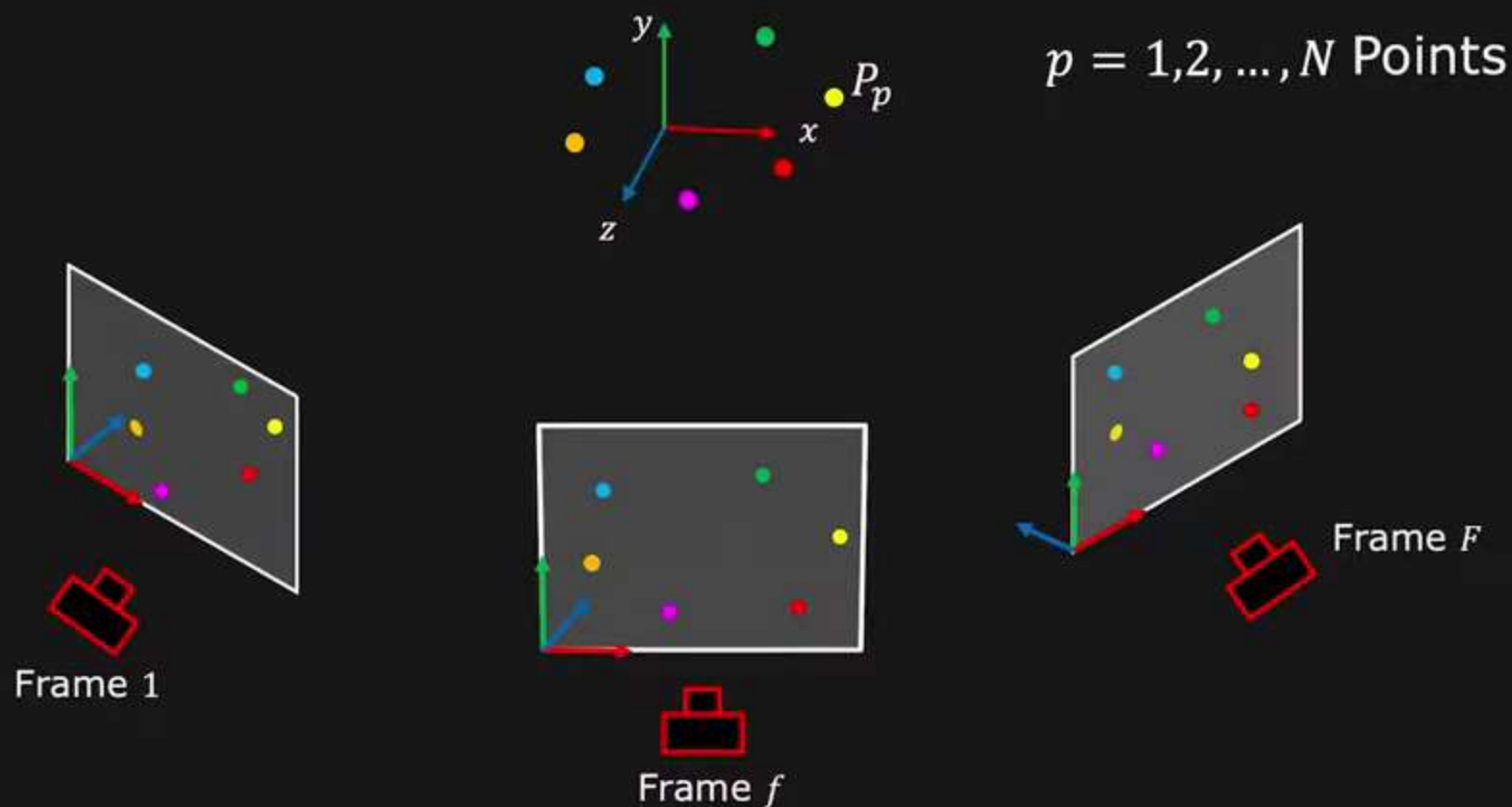Frame 1

Structure From Motion

$$p = 1, 2, \ldots, N \text{ Points}$$

Given sets of corresponding image points (2D): $(u_{f,p}, v_{f,p})$

Find scene points (3D): P_p

Structure From Motion

$$p = 1, 2, \dots, N \text{ Points}$$

Frame 1

Frame f

Frame F

Given sets of corresponding image points (2D): $(u_{f,p}, v_{f,p})$

Find scene points (3D): P_p

Structure From Motion

$$p = 1, 2, \dots, N \text{ Points}$$

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Structure From Motion

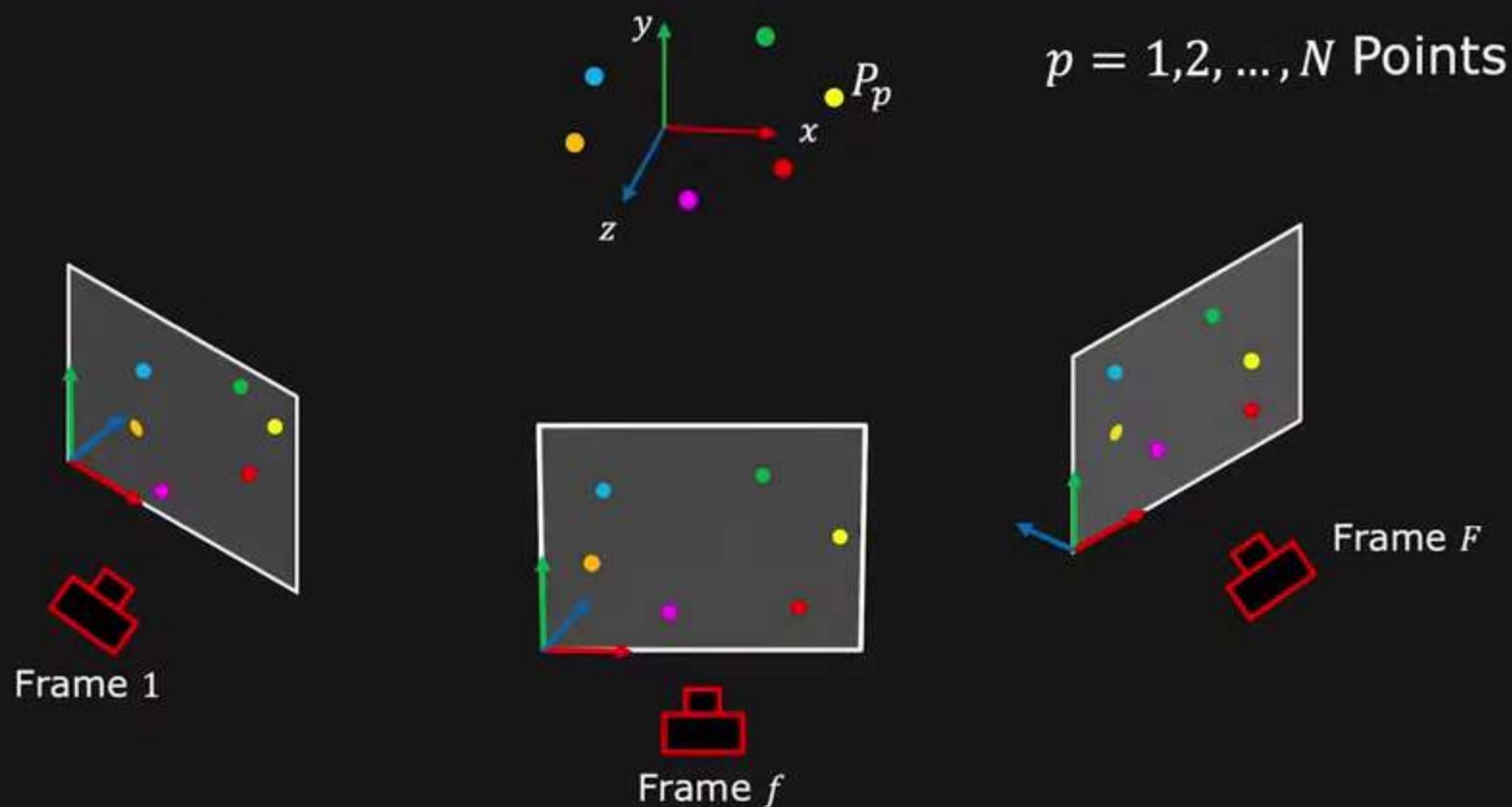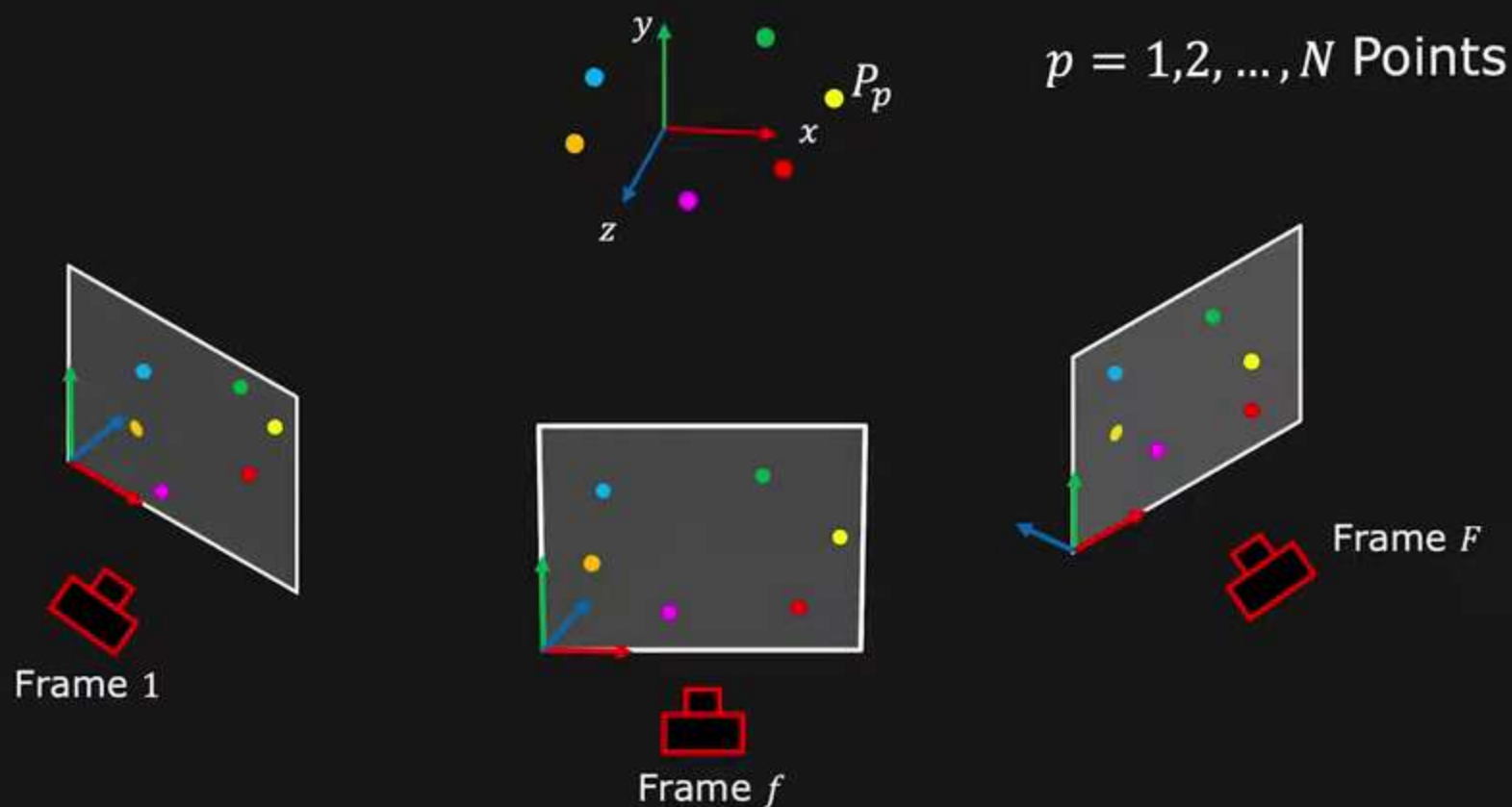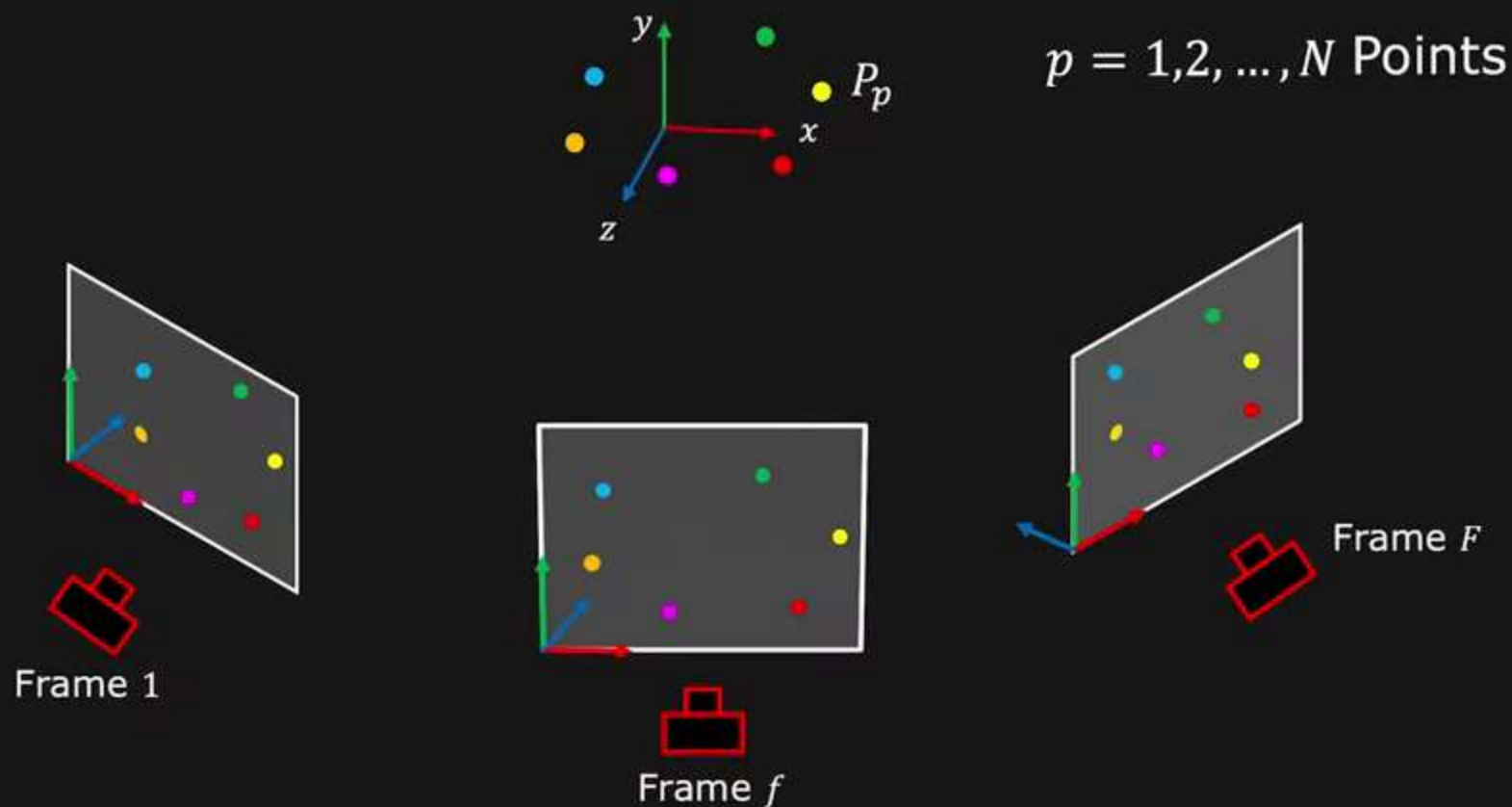$$p = 1,2,\ldots,N \text{ Points}$$

Frame 1

Frame f

Frame F

Given sets of corresponding image points (2D): $\left(u_{f,p}, v_{f,p}\right)$

Find scene points (3D): P_p

Orthographic Structure from Motion

$p = 1, 2, \dots, N$ Points

P_p

Frame 1

Frame f

Frame F

Given sets of corresponding image points (2D): $(u_{f,p}, v_{f,p})$

Find scene points (3D) P_p, assuming orthographic camera.

[Tomasi 1992]

Orthographic Structure from Motion

$p = 1, 2, \dots, N$ Points

P_p

Frame 1

Frame f

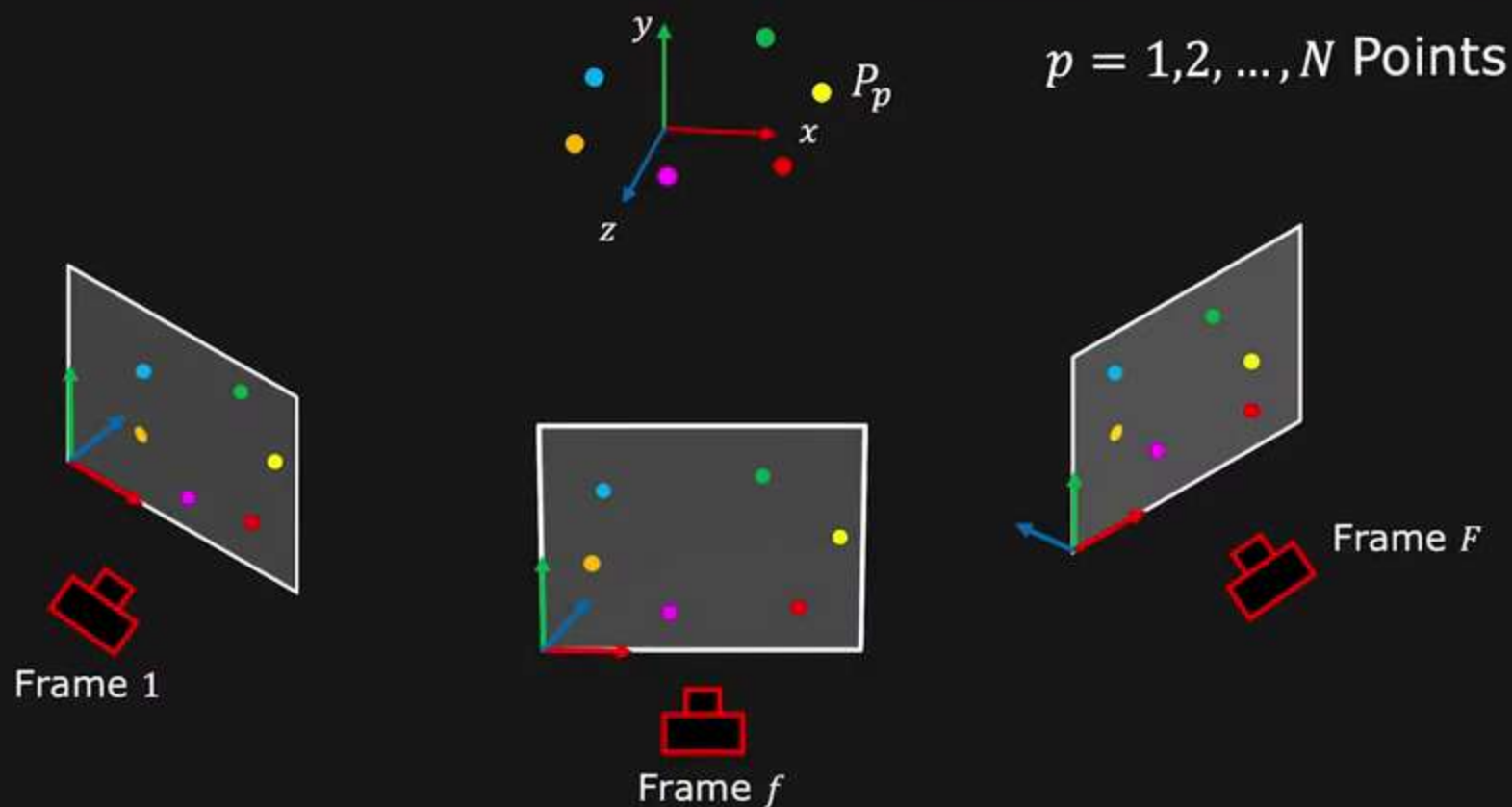Frame F

Given sets of corresponding image points (2D): $(u_{f,p}, v_{f,p})$

Find scene points (3D) P_p, assuming orthographic camera.

[Tomasi 1992]

Orthographic Structure from Motion
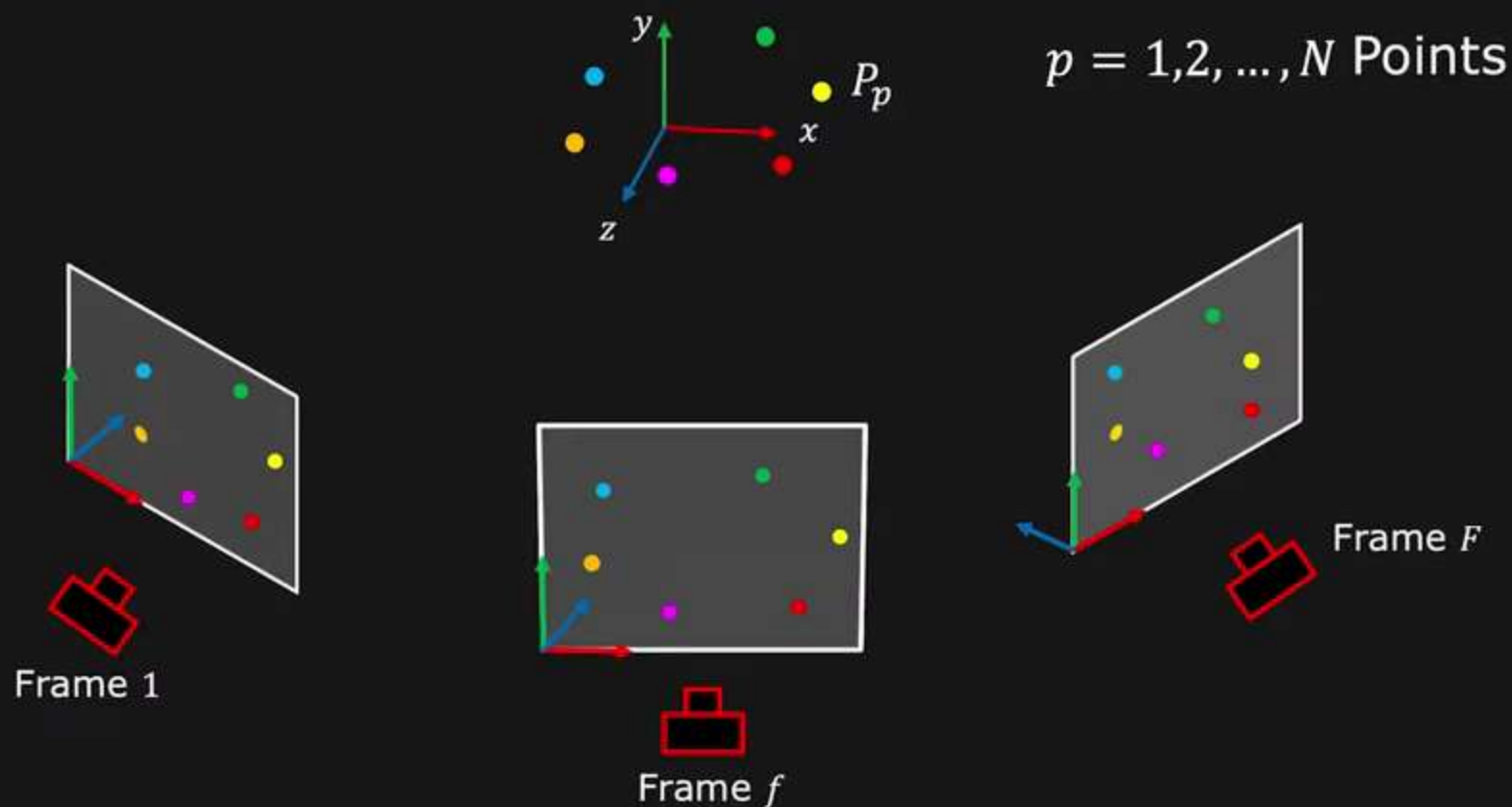

$p = 1, 2, \ldots, N$ Points

P_p

Frame 1

Frame f

Frame F

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[Tomasi 1992]
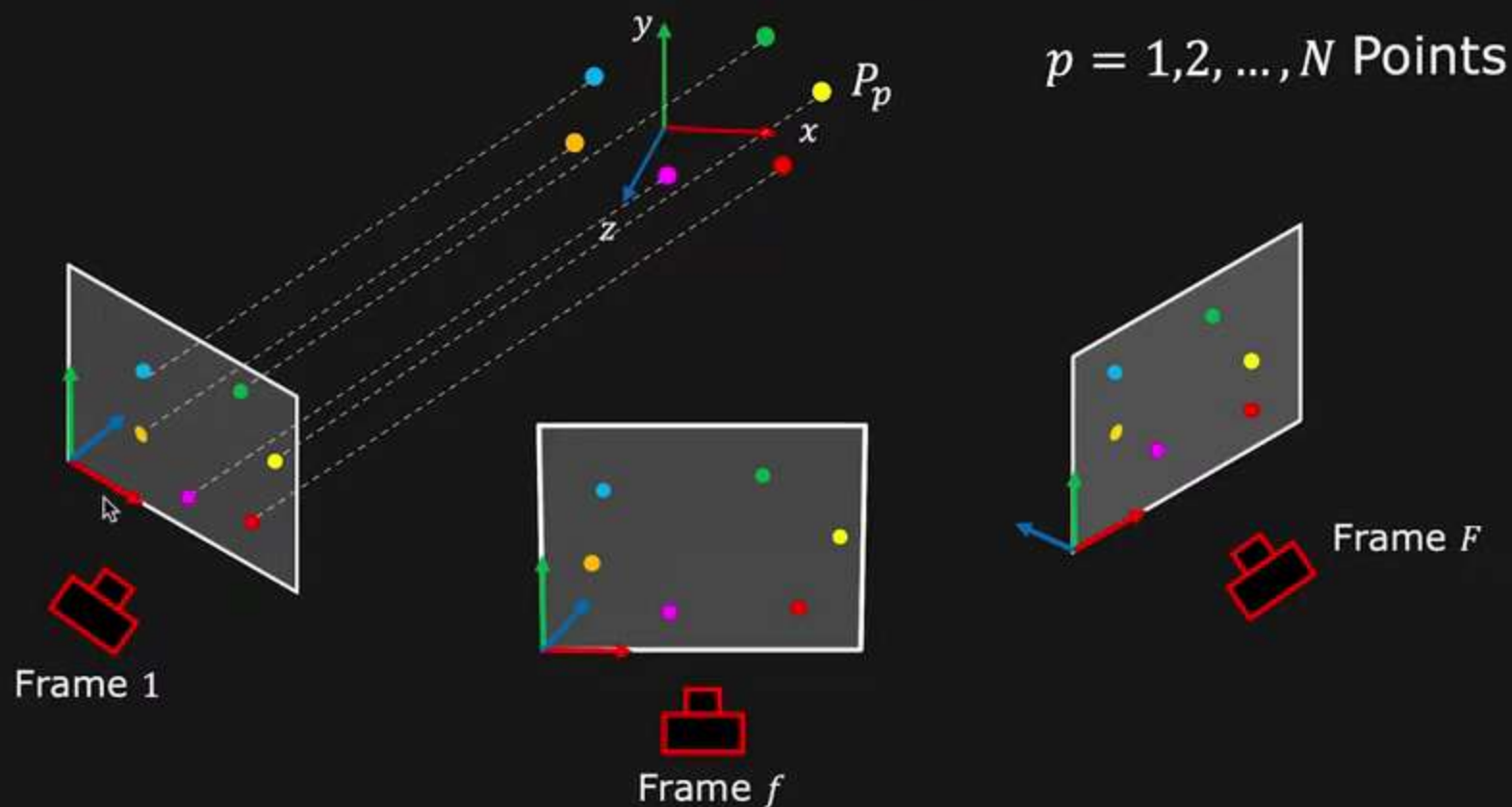
Orthographic Structure from Motion

$p = 1, 2, \ldots, N$ Points

Given sets of corresponding image points (2D): $(u_{f,p}, v_{f,p})$

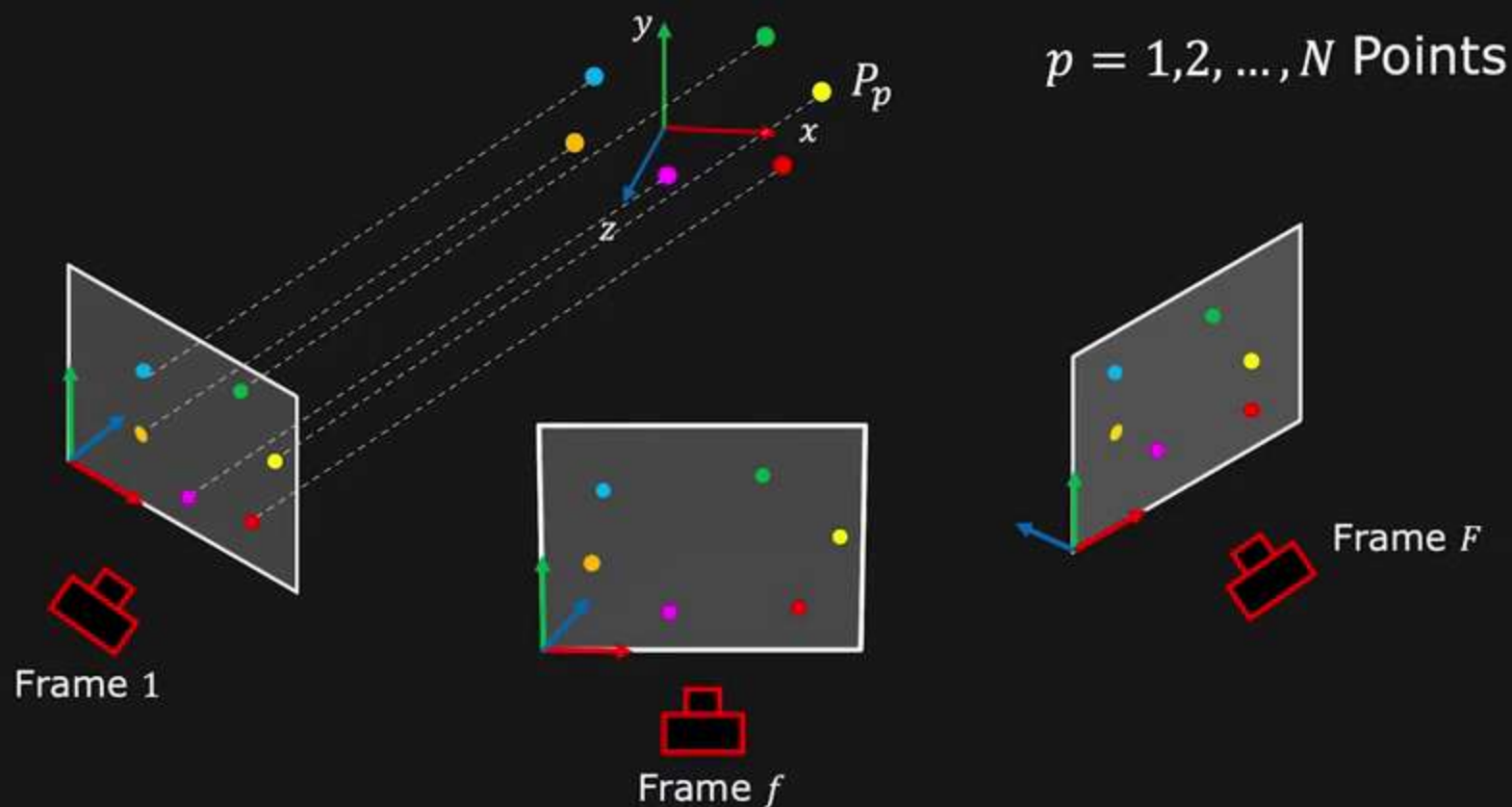Find scene points (3D) P_p, assuming orthographic camera.

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Orthographic Structure from Motion

$p = 1, 2, \ldots, N$ Points

P_p

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Orthographic Structure from Motion

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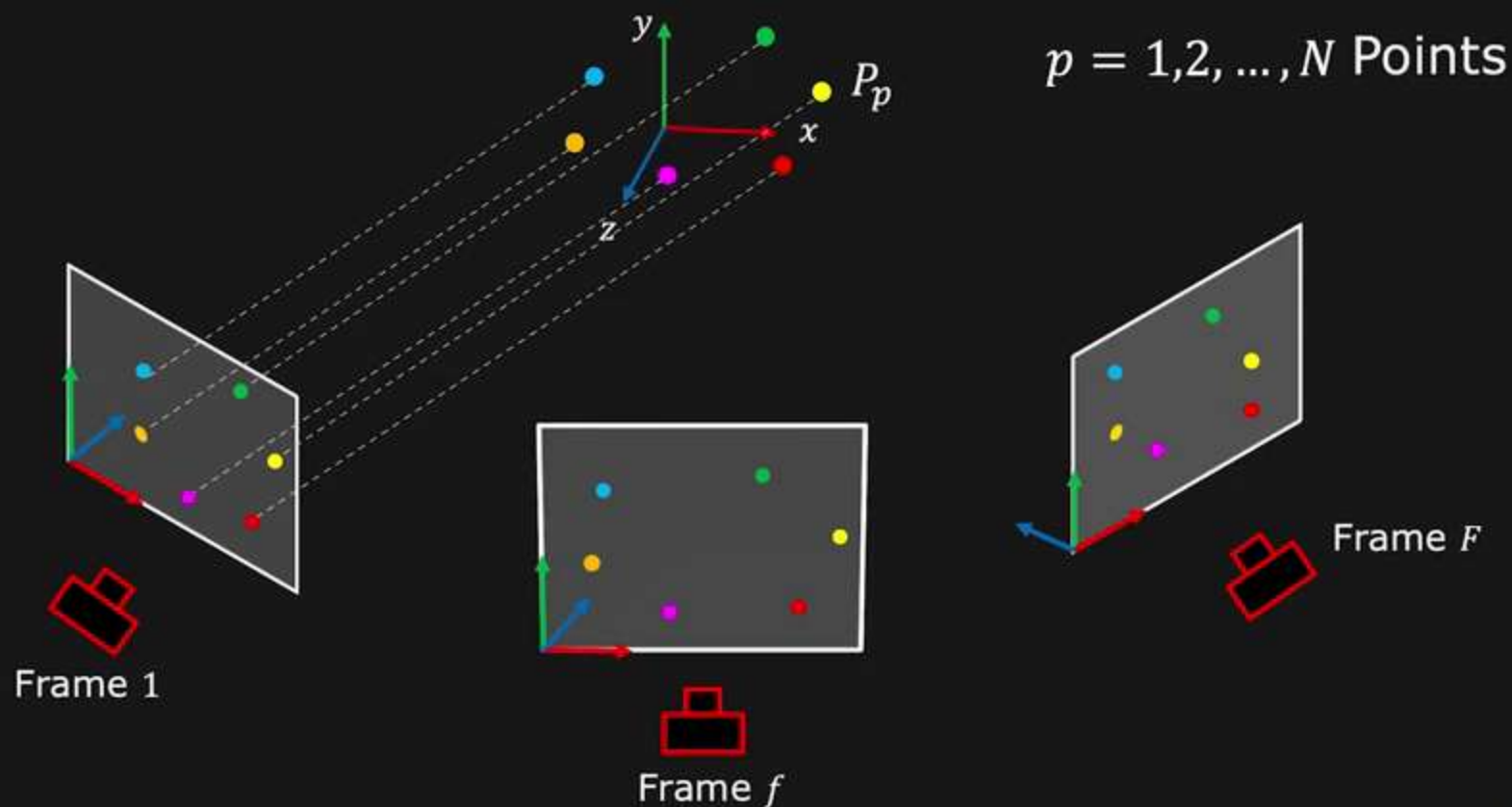Find scene points (3D) P_p, assuming orthographic camera.

[Tomasi 1992]