Day 15: Background Subtraction & Motion-Based Tracking

Outcomes:

- Understand motion detection vs color-based detection
- Learn how background subtraction works conceptually
- Detect moving objects without HSV
- Know when background subtraction is the right tool

Motion Detection vs Color-Based Detection

Motion Detection	Color-Based Detection
Appearance-based tracking	Motion-based tracking
Detect a specific color	Detect what change over time

Motion Detection

- Camera is mostly static
- Background is learned over time
- Moving objects = foreground
- Foreground → mask → contours → box (same pipeline!)

So, the downstream pipeline stays familiar:

> Foreground mask → contours → largest contour → box / center / trail

Only the **mask source changes.**

Tool used: `BackgroundSubtractorMOG2`

Conceptually:

- Builds a statistical model of the background
- Updates slowly
- Highlights moving regions in white

No HSV. No trackbars.

Why Motion Detection

Color tracking fails when:

- lighting changes
- object color blends with background
- corners weaken detection

Motion tracking doesn't care about color — only movement.

Professionals **combine both**.