

# Roadmap

## Week 1 — Absolute Foundations

**Goal:** Learn how images, video streams, and colors work in OpenCV, and confidently perform basic image manipulation.

### Day 1: Understanding the basics

- Be able to capture video from a camera
  - Understand what a frame is
  - Know how pixels and arrays represent images
  - Display frames in color and in grayscale
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### Day 2: Understanding Video Streams in OpenCV

- Understand how frames are read from a camera
  - Know what ret and frame mean
  - Understand how OpenCV creates live video using frames
  - Clearly know why while True is mandatory
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## Day 3: Controlling Playback & Exiting Video

- Understand how keyboard input is captured in OpenCV
  - Know what `cv2.waitKey()` does and what it returns
  - Understand ASCII values and why keys are represented as numbers
  - Understand bitwise AND (&) and why `0xFF` is used
  - Implement a keyboard-controlled exit from a video loop
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## Day 4: Images as NumPy Arrays

- Understand images as NumPy arrays in OpenCV
  - Read and display images using OpenCV
  - Understand image shape, channels, and pixel values
  - Differentiate between grayscale and color images
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## Day 5: Drawing on Images with OpenCV

- Draw **lines, rectangles, circles, and text** on images
  - Control **color, thickness, and position** of drawings
  - Modify an image array directly
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## Day 6: Image Resizing, Cropping, and Copying

- Resize images using OpenCV
  - Crop images using array slicing
  - Copy and modify image regions
  - Understand how image dimensions change after resizing and cropping
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## Day 7: Image Color Spaces

- Understand what a color space is
  - Know the difference between BGR, Grayscale, and HSV
  - Convert images between color spaces using OpenCV
  - Understand when and why different color spaces are used
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## ◇ Week 2

### Day 8: Color Detection using HSV

- Detect a specific color in an image
  - Use HSV ranges to isolate colors
  - Create and apply masks
  - Understand how color-based segmentation works
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### Day 9: Trackbars for real-time HSV tuning

- Create trackbars in OpenCV
  - Adjust HSV values in real time
  - Tune color detection interactively
  - Understand how real-time parameter control works
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### Day 10: Color Detection in Live Video

- Capture live video from a webcam
  - Apply HSV-based color detection on video frames
  - Combine trackbars + video feed
  - Perform real-time color segmentation
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## Day 11:

- Understand what **noise** is in images and masks
  - Clean binary masks using **morphological operations**
  - Use **erosion, dilation, opening, and closing**
  - Improve color detection results
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## Day 12:

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## Day 13:

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## Day 14:

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## ◇ Week 3

Day 15:

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Day 16:

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Day 17:

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Day 18:

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Day 19:

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Day 20:

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Day 21:

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## ◇ Week 4

Day 22:

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Day 23:

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Day 24:

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Day 25:

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Day 26:

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Day 27:

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Day 28:

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Day 29:

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Day 30: