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import cv2
import numpy as np

cap = cv2.VideoCapture(0)

if not cap.isOpened():
    print("Error: Could not open webcam.")
    exit()

while True:
    ret, frame = cap.read()

    if not ret:
        print("Error: Could not read frame.")
        break

    # Convert to grayscale to reduce noise
    gray = cv2.cvtColor(frame, cv2.COLOR_BGR2GRAY)
    gray_blurred = cv2.GaussianBlur(gray, (9, 9), 2)

    # Detect circles in the blurred grayscale frame
    circles = cv2.HoughCircles(
        gray_blurred,
        cv2.HOUGH_GRADIENT,
        dp=1.2,
        minDist=30,
        param1=50,
        param2=30,
        minRadius=15,
        maxRadius=40
    )

    # Check if circles were detected
    if circles is not None:
        circles = np.round(circles[0, :]).astype("int")

        for (x, y, r) in circles:
            # Print the center and radius
            print(f"Circle detected: Center = ({x}, {y}), Radius = {r}")

            # Draw the circle and center on the frame
            cv2.circle(frame, (x, y), r, (0, 255, 0), 4)
            cv2.rectangle(frame, (x - 5, y - 5), (x + 5, y + 5), (0, 128,
255), -1)

            # Display the radius on the frame
            cv2.putText(frame, f"Radius: {r}", (x - 50, y - r - 10),
cv2.FONT_HERSHEY_SIMPLEX, 0.6, (255, 0, 0), 2)

        # Show the frame with circles
        cv2.imshow('Webcam Circle Detection', frame)

        # Break loop on 'q' key press

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if cv2.waitKey(1) & 0xFF == ord('q'):  
    break  
  
# Release resources and close windows  
cap.release()  
cv2.destroyAllWindows()
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