In [ ]:
```python
#Import libraries

from mediapipe.tasks import python
from mediapipe.tasks.python import vision
import cv2
import mediapipe as mp

from mediapipe.python.solutions.pose import PoseLandmark
import numpy as np
from google.colab.patches import cv2_imshow
from google.colab import files

from cvzone.PoseModule import PoseDetector
import math
```

```
Requirement already satisfied: cvzone in /usr/local/lib/python3.10/dist-packages (1.6.1)
Requirement already satisfied: opencv-python in /usr/local/lib/python3.10/dist-packages (from cvzone) (4.8.0.76)
Requirement already satisfied: numpy in /usr/local/lib/python3.10/dist-packages (from cvzone) (1.25.2)
```

In [ ]:
```python
## Data
cap = cv2.VideoCapture('/content/drive/MyDrive/Dataset/document_6224009744844066547.mp4')
```

In [ ]:
```python
# Create a VideoWriter object to save the processed video
output_video_path = 'output_video.mp4'
fps = int(cap.get(cv2.CAP_PROP_FPS))
width = int(cap.get(cv2.CAP_PROP_FRAME_WIDTH))
height = int(cap.get(cv2.CAP_PROP_FRAME_HEIGHT))
fourcc = cv2.VideoWriter_fourcc(*'mp4v')
out = cv2.VideoWriter(output_video_path, fourcc, fps, (width, height))

# Create a pose landmarker instance with the video mode:
pose_landmarker = mp.solutions.pose.Pose(static_image_mode=False, model_complexity=0, min_detection_confidence=0.5, min_tracking_

def analyze_squat(pose_landmarks):
    """Analyze squat movement based on pose landmarks."""
    # Extract landmark points for relevant body parts
    left_hip = pose_landmarks.landmark[PoseLandmark.LEFT_HIP]
    left_knee = pose_landmarks.landmark[PoseLandmark.LEFT_KNEE]
    left_ankle = pose_landmarks.landmark[PoseLandmark.LEFT_ANKLE]
    right_hip = pose_landmarks.landmark[PoseLandmark.RIGHT_HIP]
    right_knee = pose_landmarks.landmark[PoseLandmark.RIGHT_KNEE]
    right_ankle = pose_landmarks.landmark[PoseLandmark.RIGHT_ANKLE]
```

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    # Calculate the angle between hips, knees, and ankles
    left_angle = calculate_angle(left_hip, left_knee, left_ankle)
    right_angle = calculate_angle(right_hip, right_knee, right_ankle)

    # Provide feedback based on the angle
    if left_angle < 25 and right_angle < 25:
            feedback = "Your body posture resembles standing rather than squatting. Focus on bending your knees and lowering your
    elif 25 <= left_angle < 90 and 25 <= right_angle < 90:
        feedback = "Good squat form"
    elif 90 <= left_angle <= 115 and 90 <= right_angle <= 115:
        feedback = "You're squatting with a moderate range of motion. Aim for a deeper squat for better muscle engagement."
    elif 115 <= left_angle <= 150 and 115 <= right_angle <= 150:
        feedback = "Your squat depth seems shallow. Try lowering your hips further down for a deeper squat and better engagement
    else:
        feedback = "Maintain proper posture"

    return feedback

def calculate_angle(a, b, c):
    """Calculate the angle between three points."""
    ab = (b.x - a.x, b.y - a.y)
    bc = (c.x - b.x, c.y - b.y)
    dot_product = ab[0] * bc[0] + ab[1] * bc[1]
    magnitude_ab = (ab[0] ** 2 + ab[1] ** 2) ** 0.5
    magnitude_bc = (bc[0] ** 2 + bc[1] ** 2) ** 0.5
    cos_angle = dot_product / (magnitude_ab * magnitude_bc)
    angle_rad = np.arccos(cos_angle)
    angle_deg = np.degrees(angle_rad)
    return angle_deg

while cap.isOpened():
    ret, frame = cap.read()
    if not ret:
        break

    # Convert the frame to RGB for processing by MediaPipe
    rgb_frame = cv2.cvtColor(frame, cv2.COLOR_BGR2RGB)

    # Perform pose landmarking on the frame
    pose_landmark_results = pose_landmarker.process(rgb_frame)

    # Check if pose landmarks are detected
    if pose_landmark_results.pose_landmarks:
```

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        # Analyze the movement and provide feedback
        feedback = analyze_squat(pose_landmark_results.pose_landmarks)
        # Display feedback on the frame
        cv2.putText(frame, feedback, (50, 50), cv2.FONT_HERSHEY_SIMPLEX, 1, (0, 255, 0), 2)

    # Draw pose landmarks on the frame (optional)
    mp.solutions.drawing_utils.draw_landmarks(frame, pose_landmark_results.pose_landmarks, mp.solutions.pose.POSE_CONNECTIONS)

    # Write the frame with landmarks to the output video file
    out.write(frame)

    # Display the frame
    cv2_imshow(frame)

    # Break the loop if 'q' is pressed
    if cv2.waitKey(1) & 0xFF == ord('q'):
        break

# Release the VideoCapture, VideoWriter, and destroy all OpenCV windows
cap.release()
out.release()
cv2.destroyAllWindows()

# Download the output video
files.download(output_video_path)
```
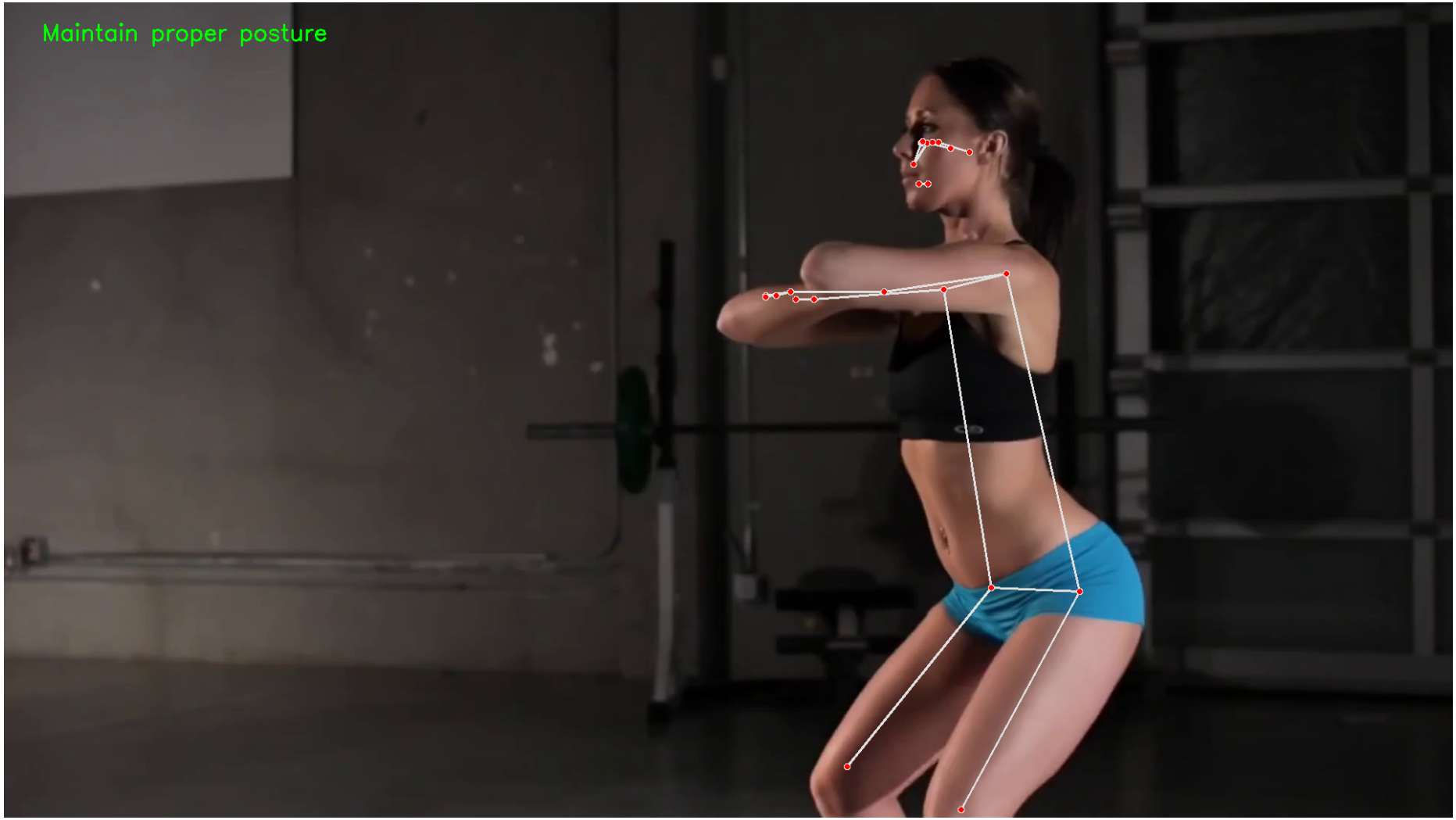
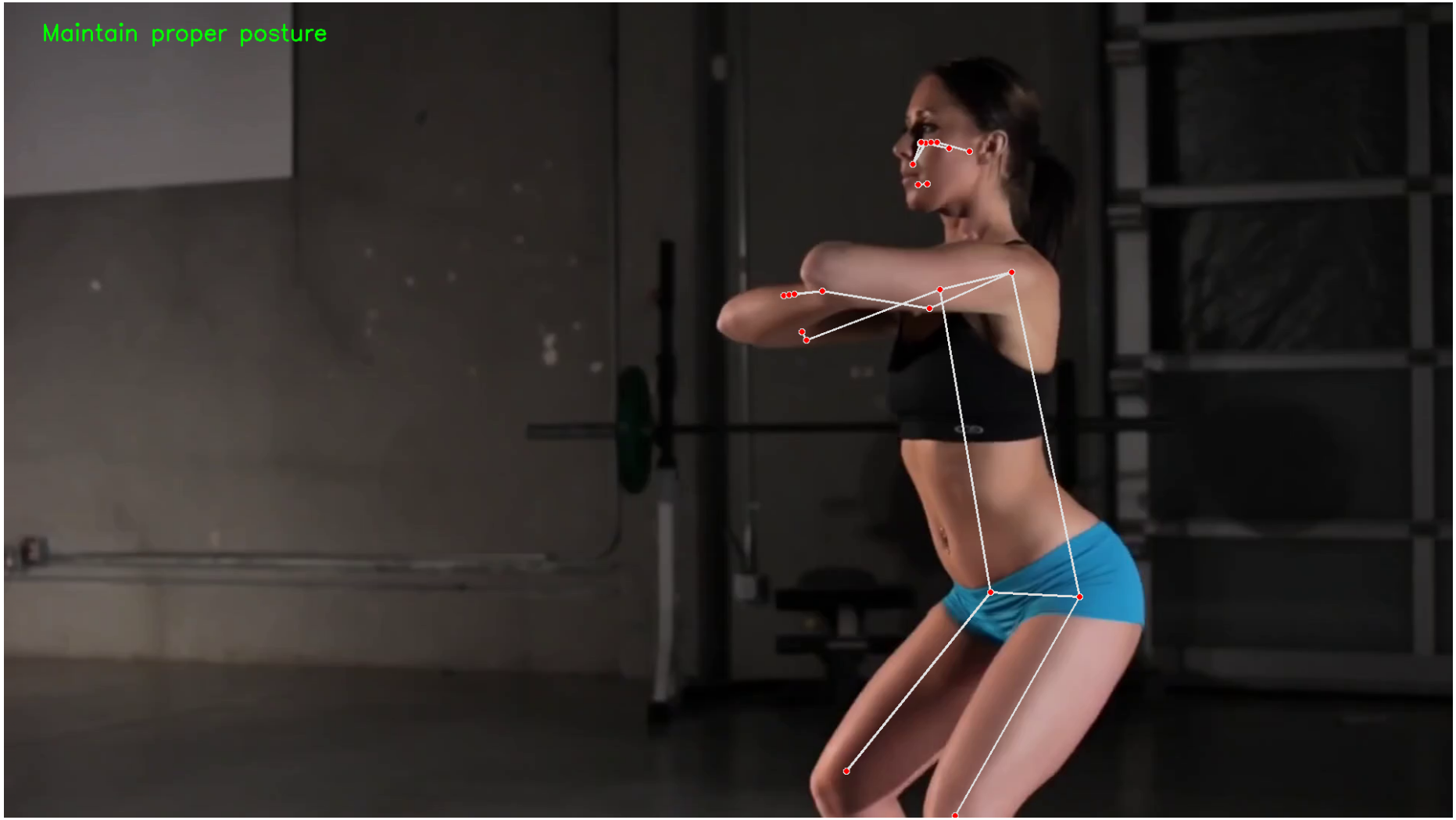
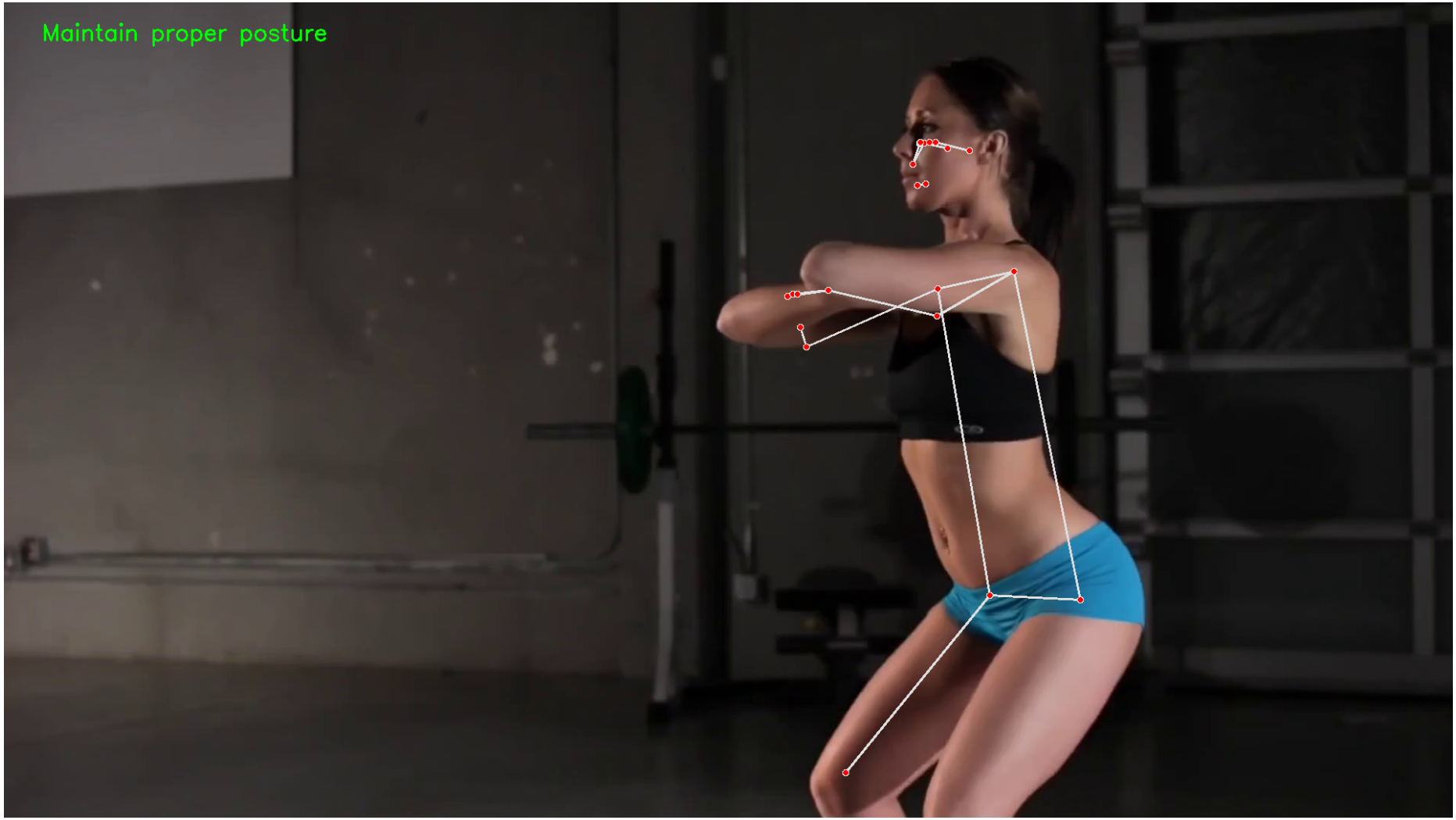
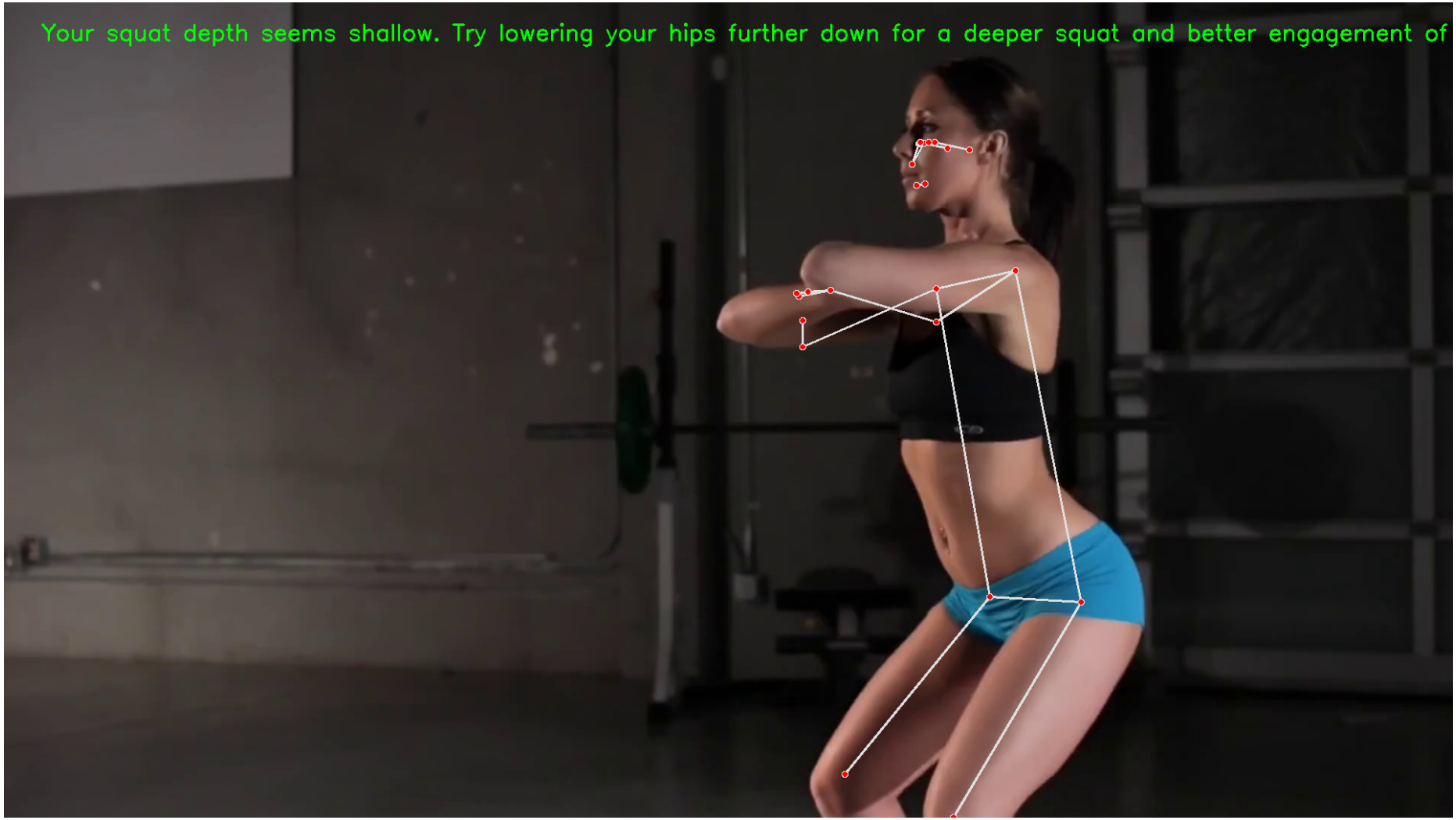
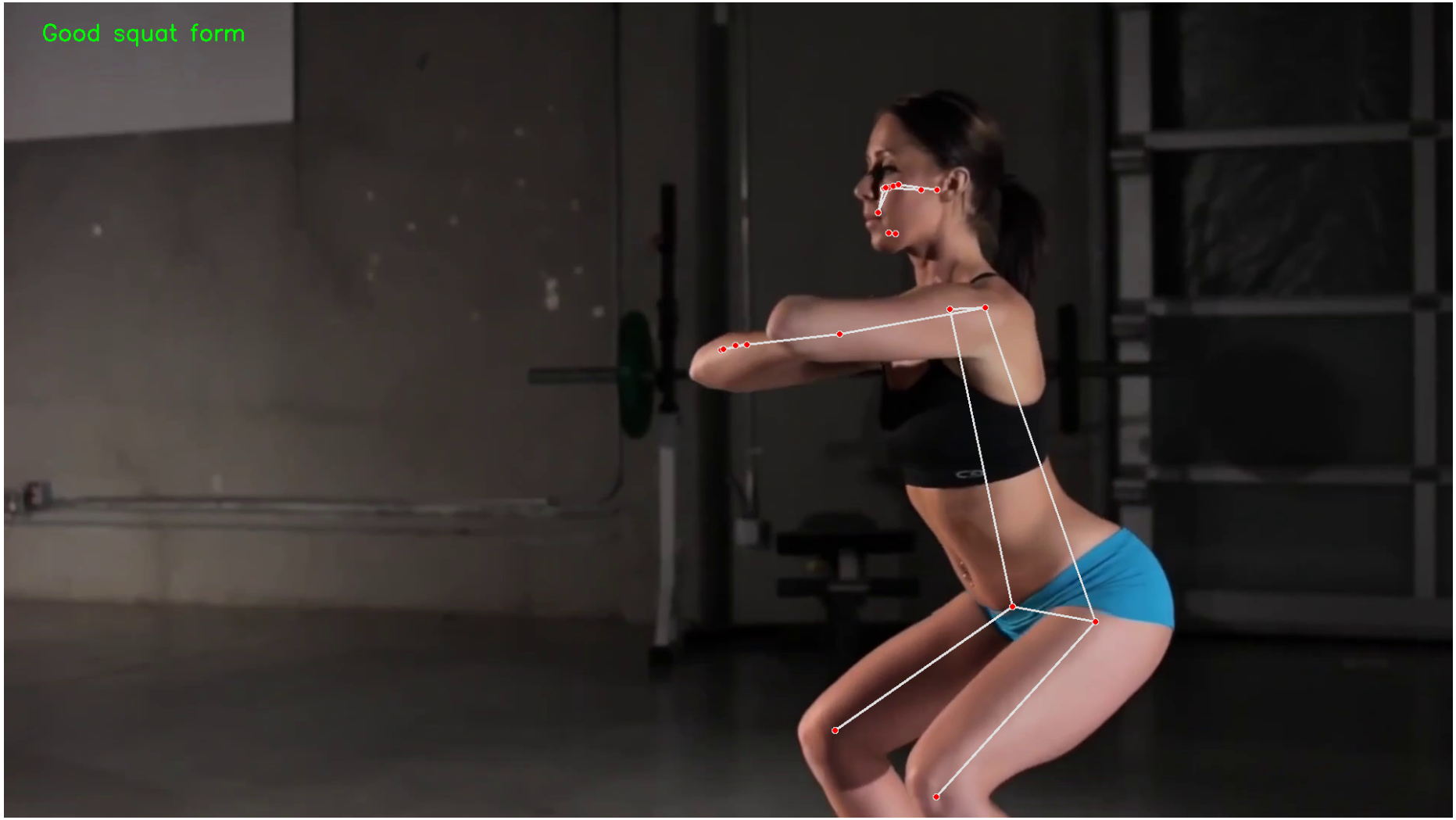
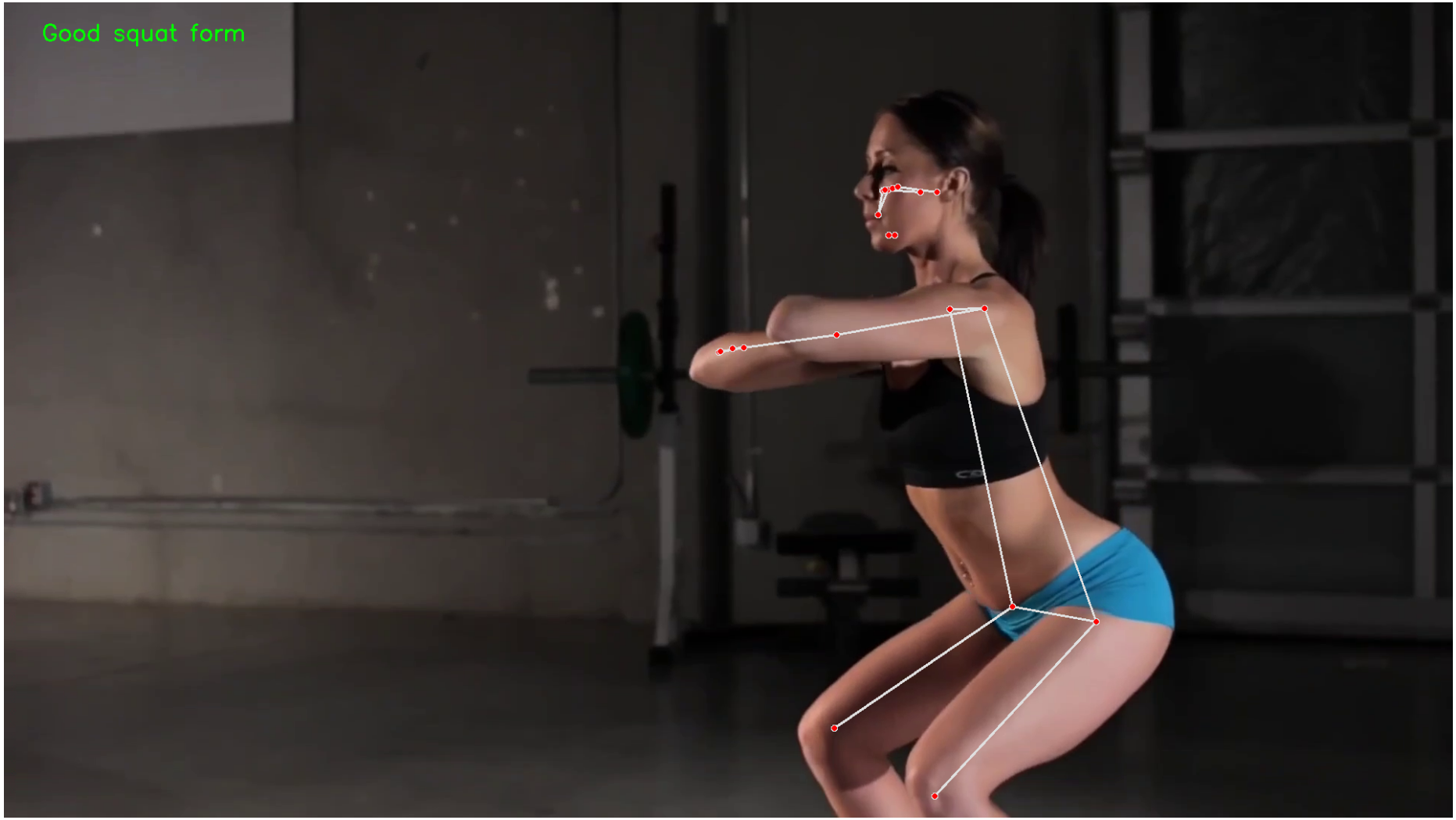


Maintain proper posture

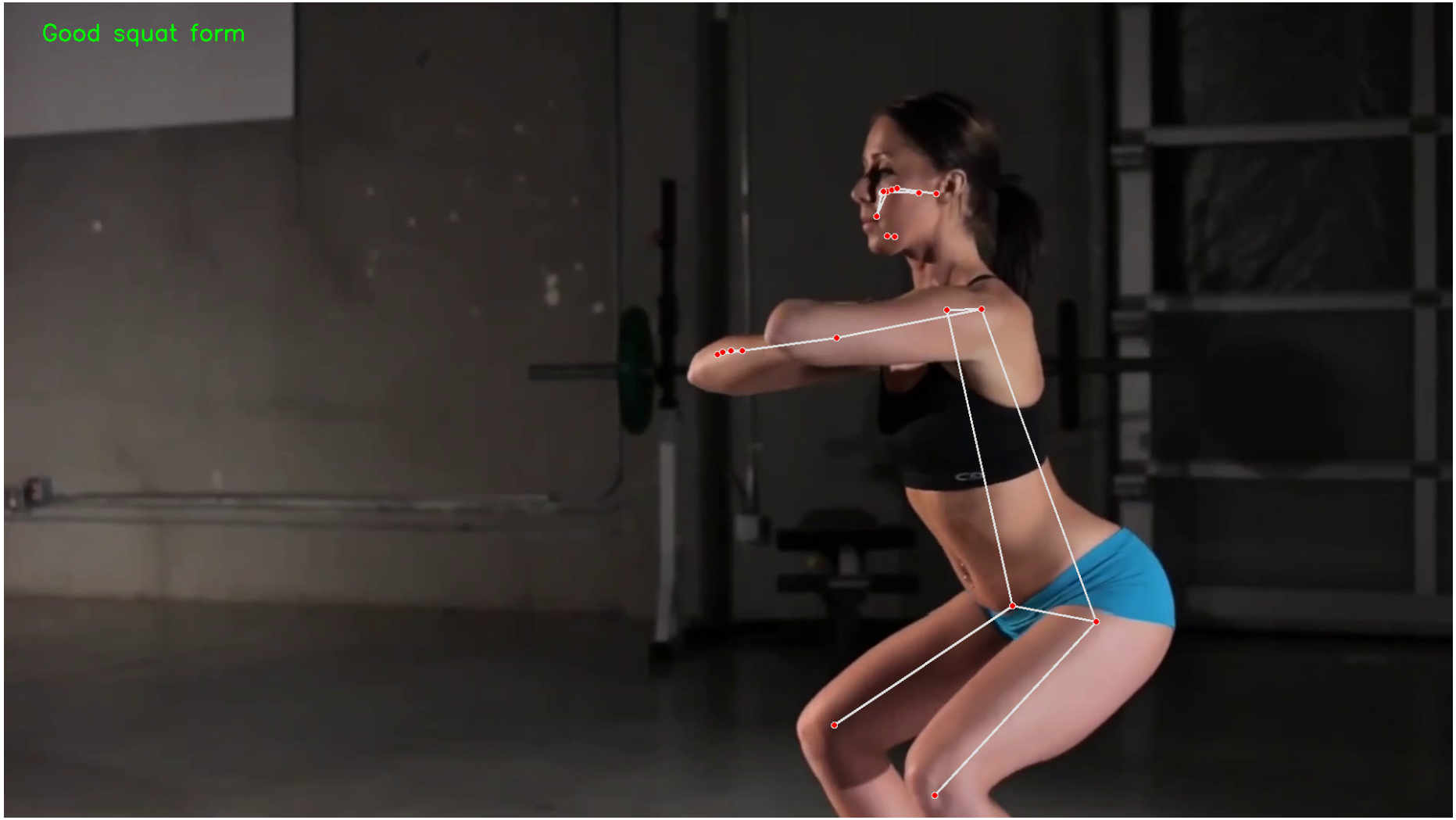

Maintain proper posture

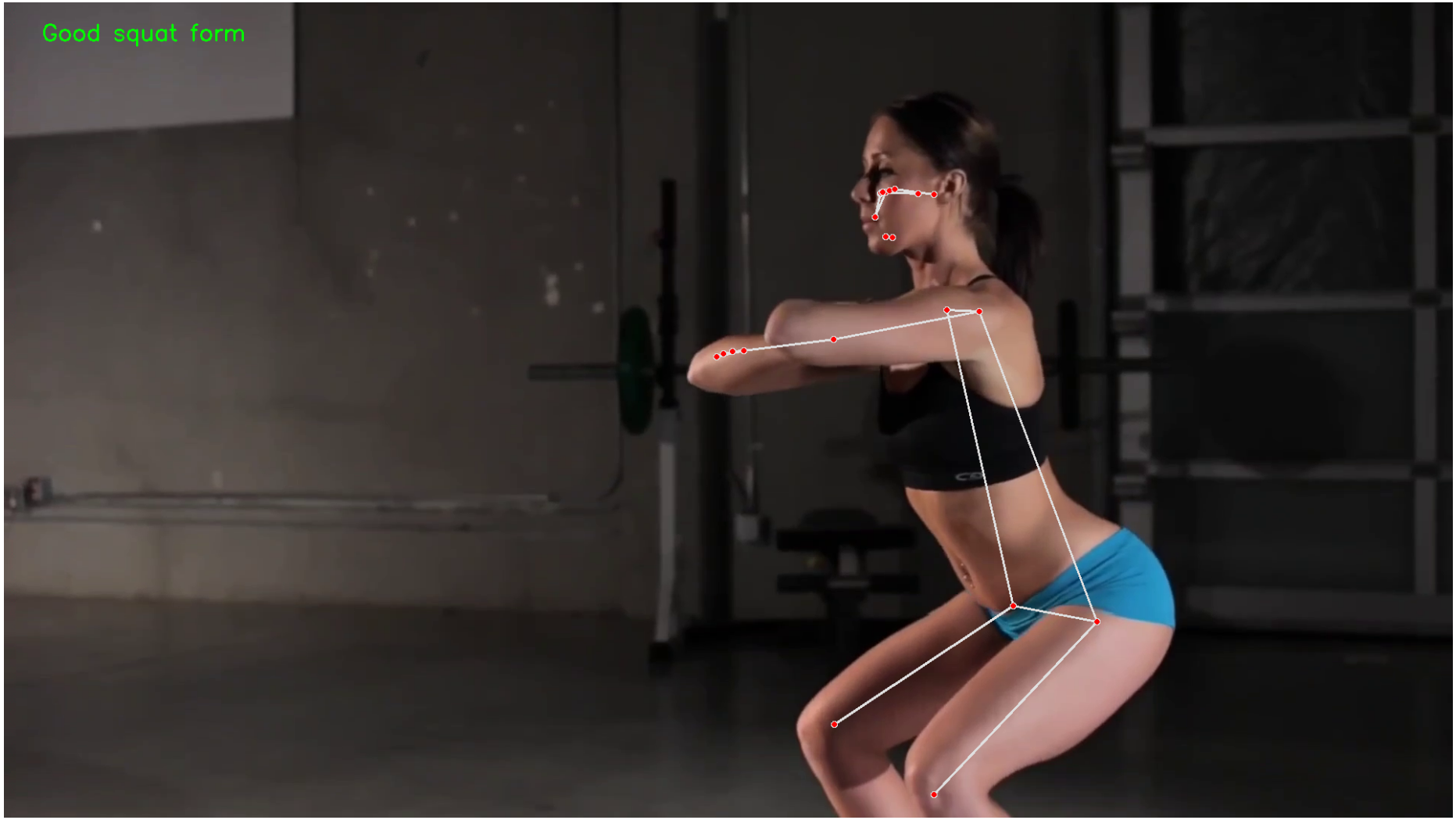

Maintain proper posture


Your squat depth seems shallow. Try lowering your hips further down for a deeper squat and better engagement of


Good squat form


Good squat form


Good squat form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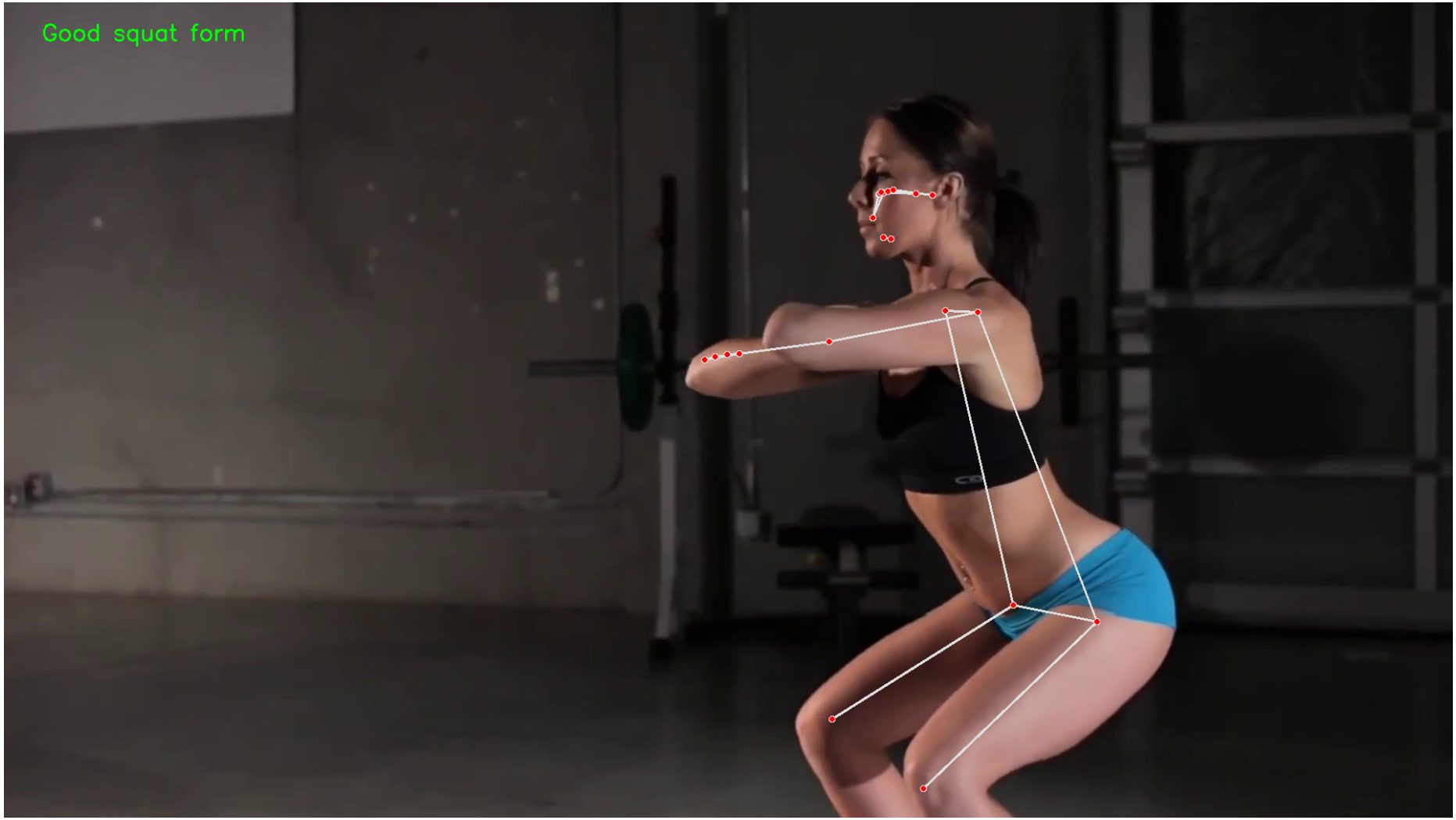
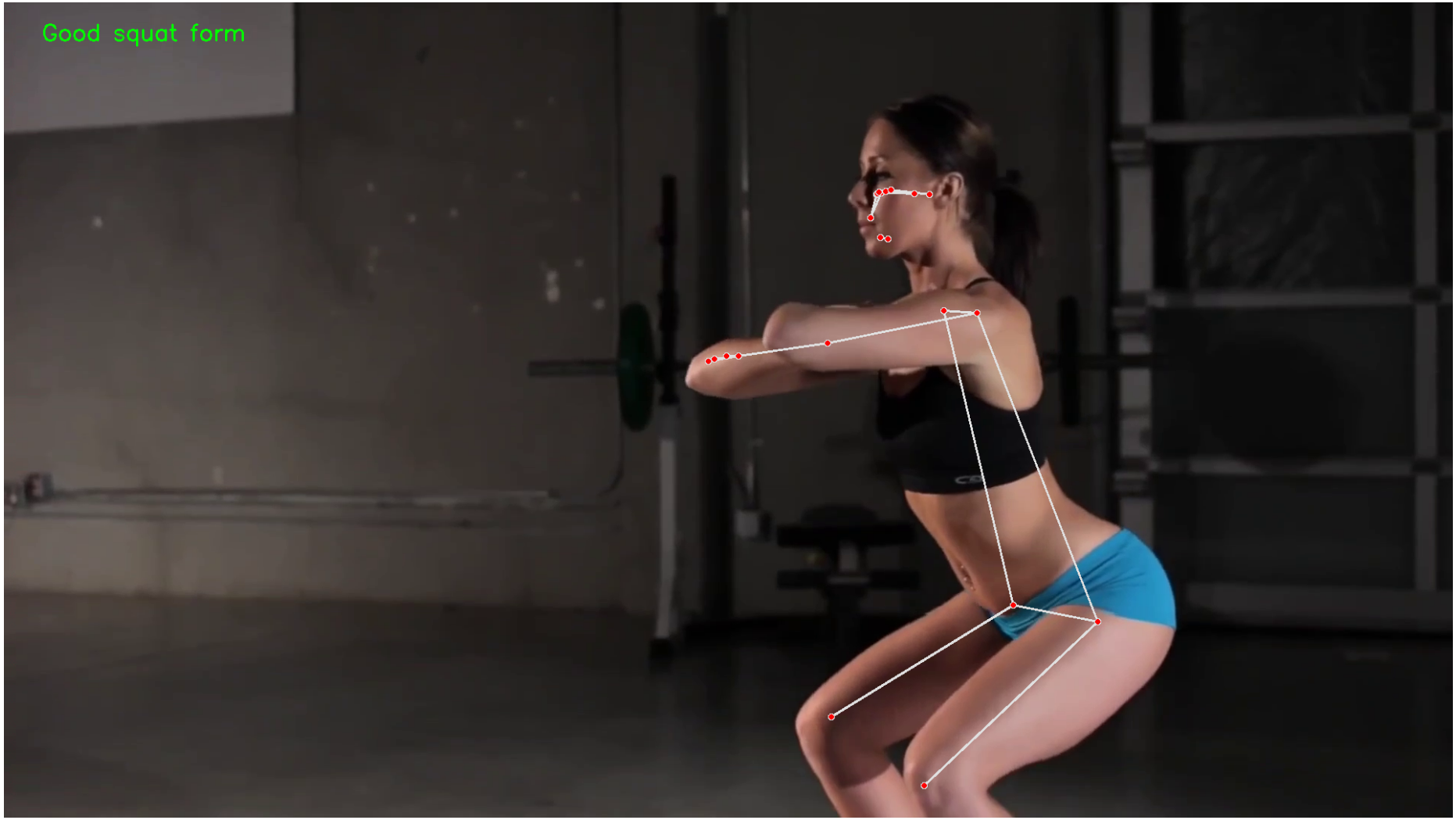

Good squat form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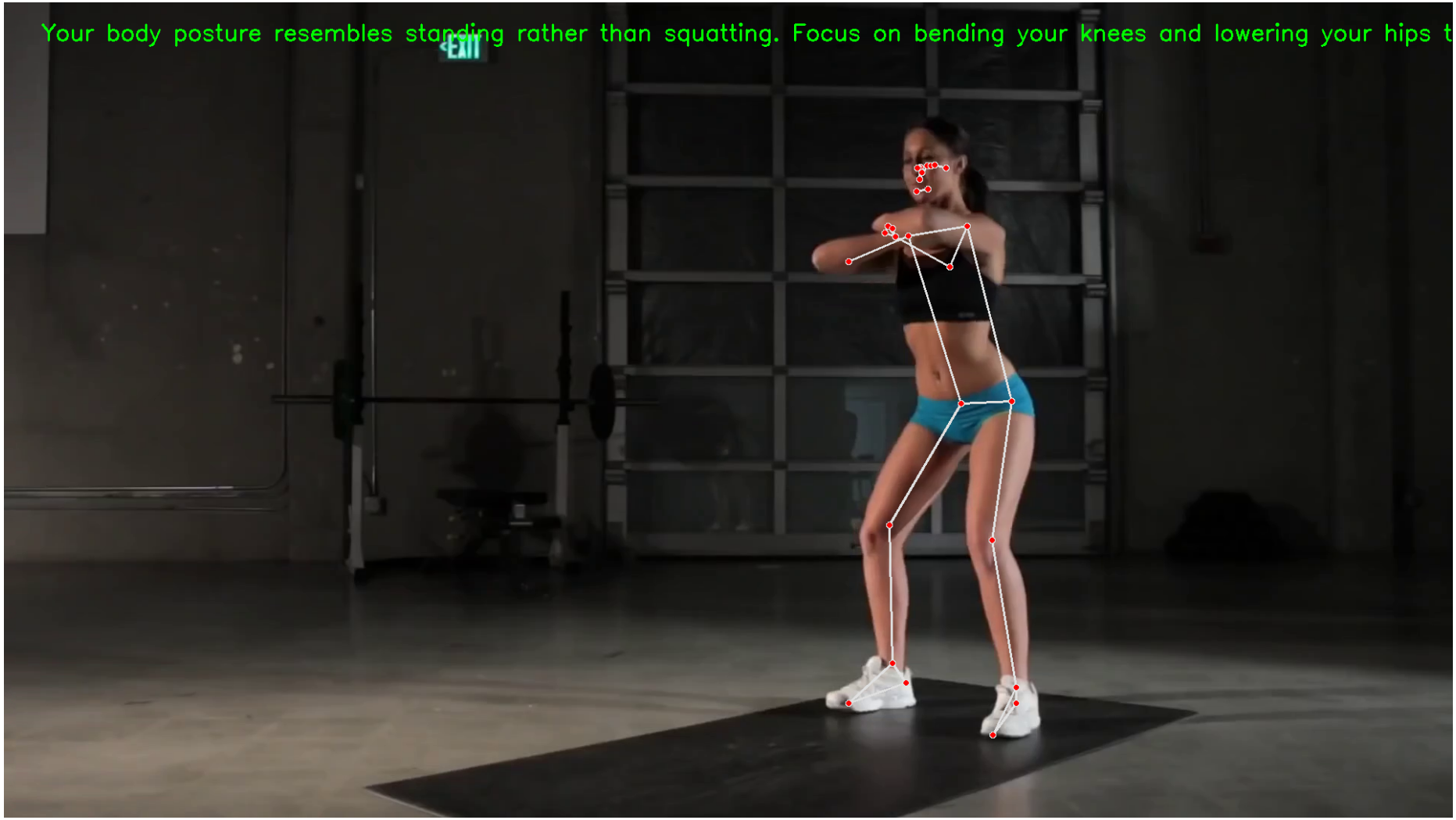
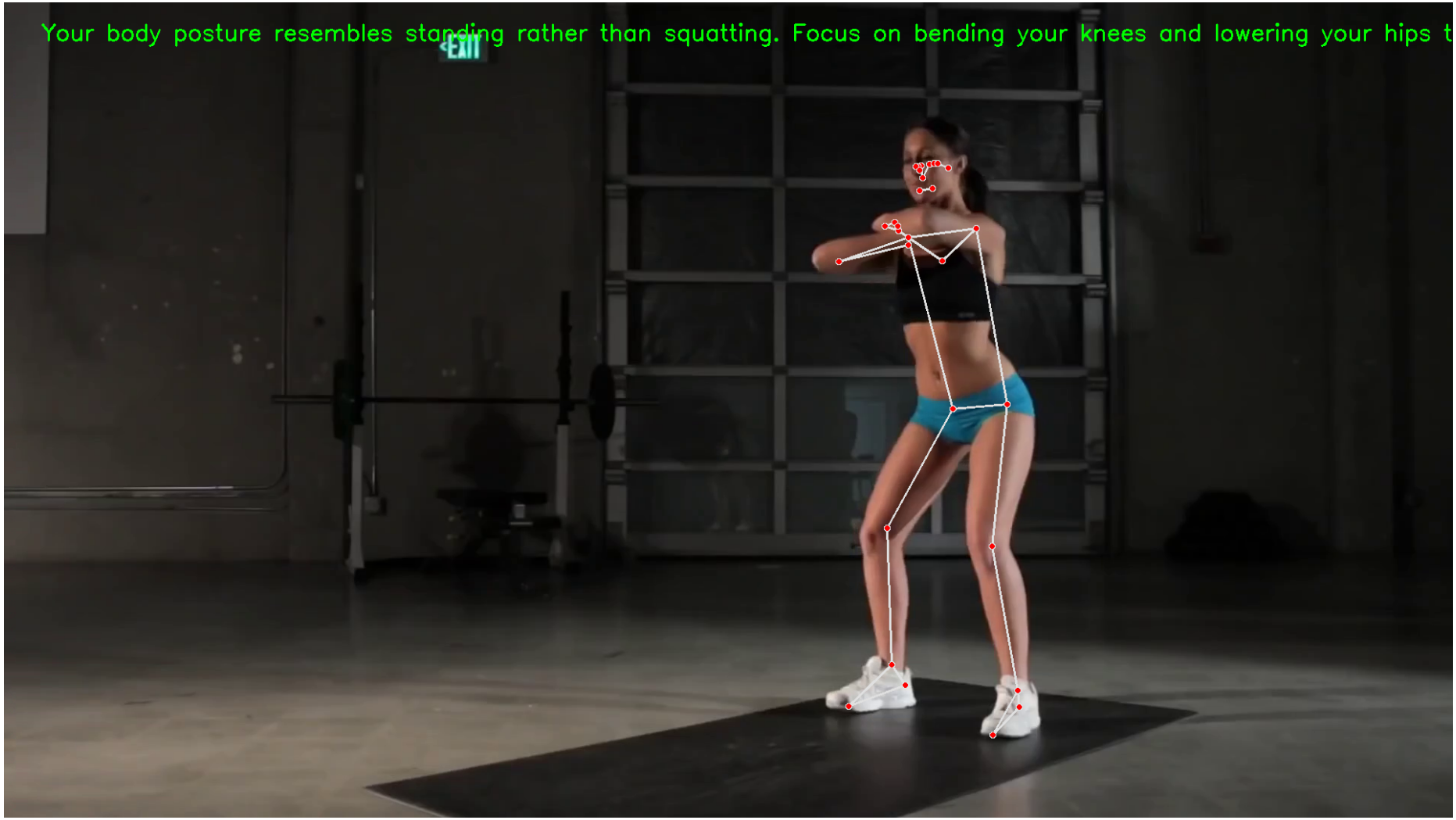

Your body posture resembles standing rather than squatting. Focus on bending your knees and lowering your hips t
EXIT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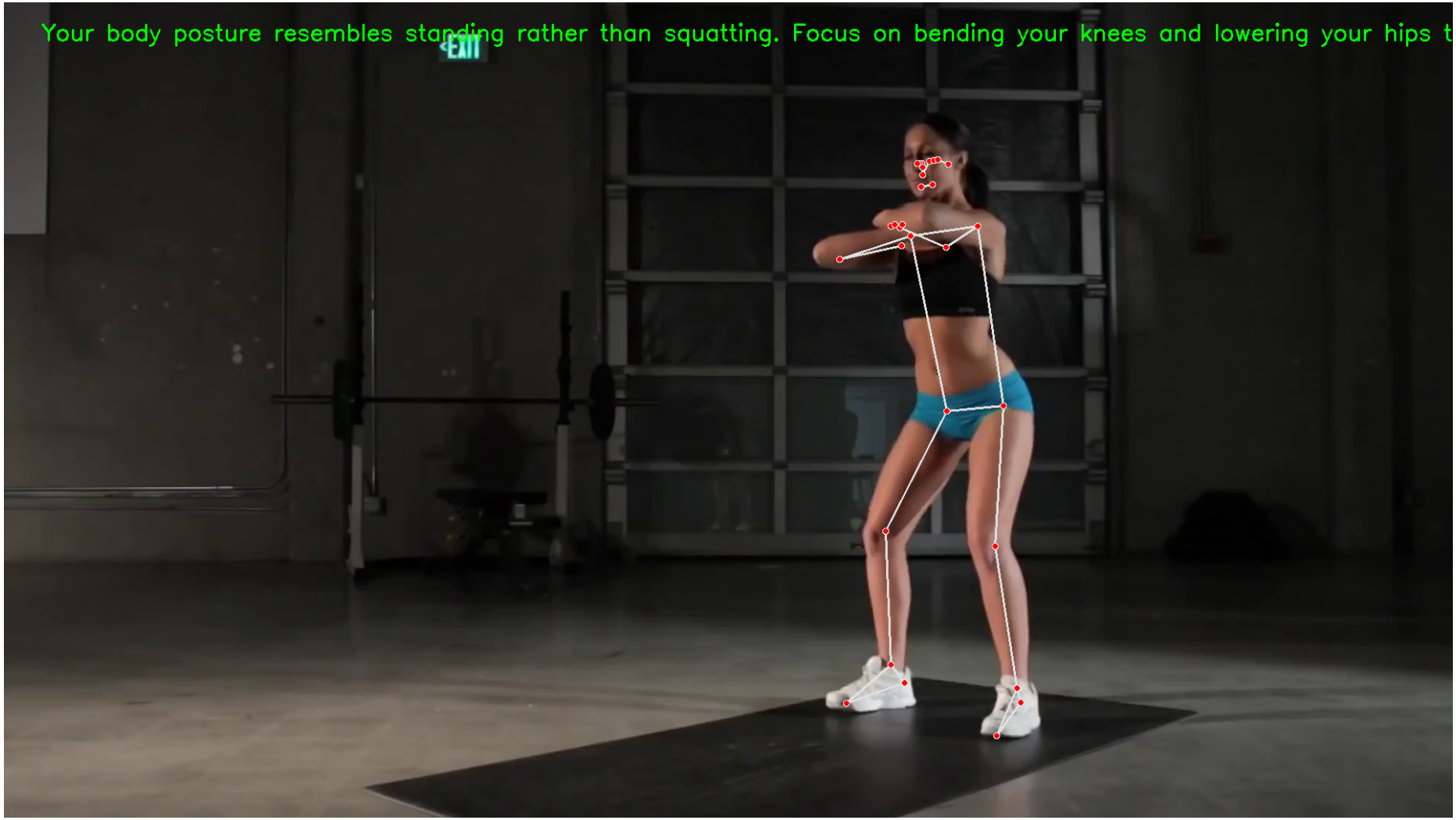
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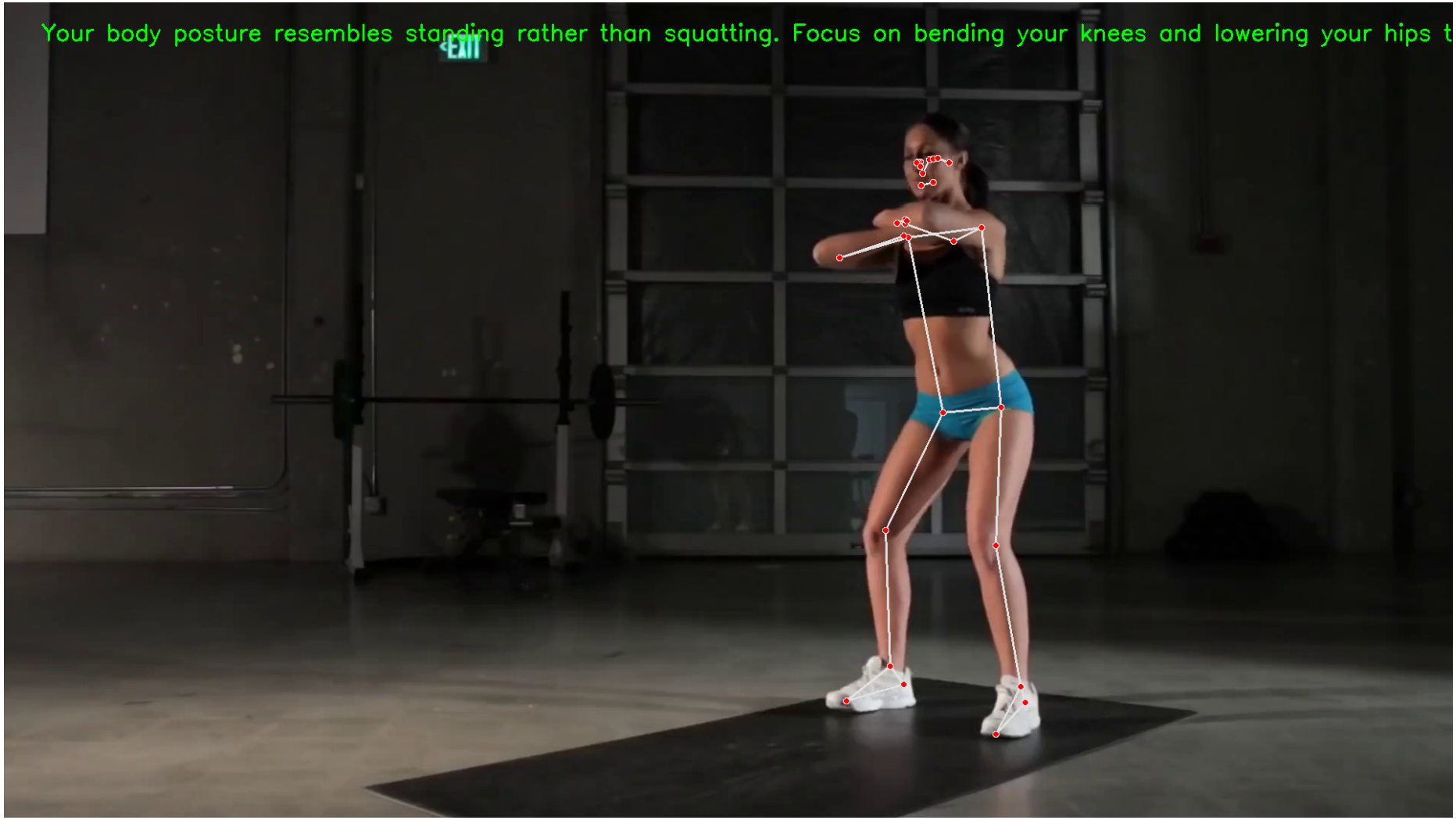
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