



CoCapture: Group Photo App without Assistants

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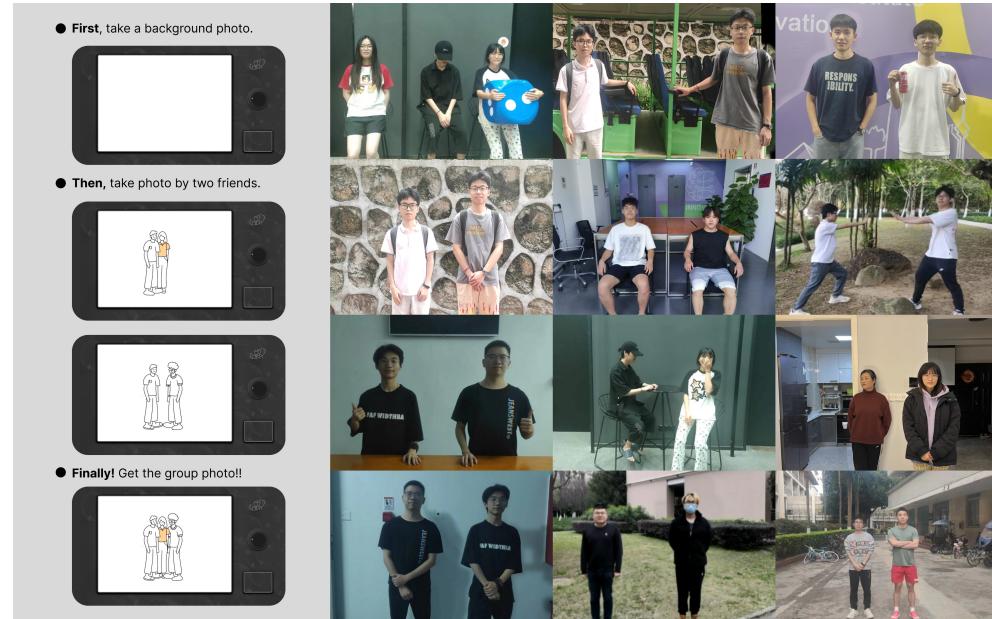


Figure 1: The left side of this image shows the steps for taking group photos using CoCapture, mainly divided into three steps; the right side displays some group photos taken by CoCapture.

ABSTRACT

CoCapture is a mobile app tailored for group photography, allowing users to easily take great group photos and stunning scenic shots during travels, outings, or social events without the need for selfie sticks, tripods, or external help. This application assists in capturing cherished moments, ensuring our unforgettable experiences endure. CoCapture's innovative method involves users first capturing a background shot, then taking turns photographing the rest of the group with the individual who needs the group photo. Once three photos are taken, CoCapture allows users to seamlessly merge these images into a complete group photo that includes all members.

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CCS CONCEPTS

• Computing methodologies → Computational photography.

KEYWORDS

mobile devices, group photo, man-machine interaction, background subtraction

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1 INTRODUCTION

In today's world of mobile applications, advanced technologies for computational photography and image processing are extensively utilized to improve the quality of personal selfies [Petrov et al. 2020; Trenz et al. 2021]. Yet, enhancing group photos remains equally essential. Capturing the perfect group shot without assistants can

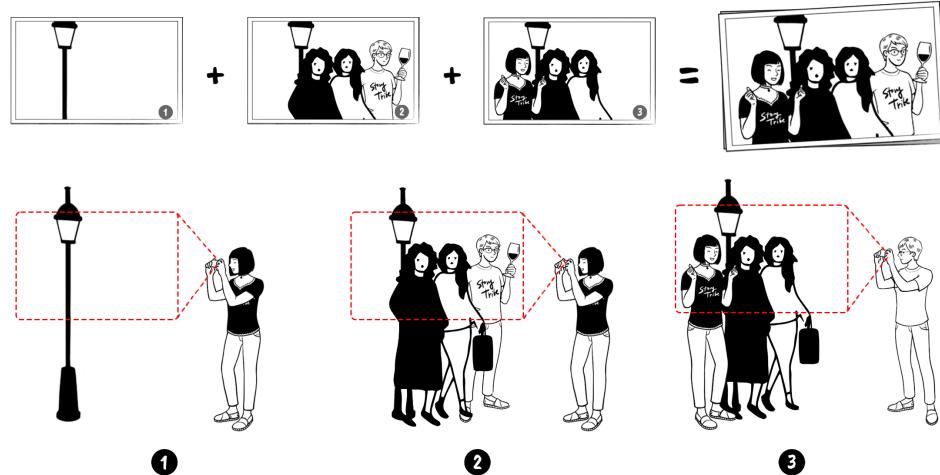


Figure 2: The CoCapture shooting process. Step 1: One person who needs a group photo takes a background image. Step 2: The same person takes a foreground image. Step 3: Another person captures a second foreground image. These three images will ultimately be used to compose a photo that includes all group members.

be challenging. When individuals use a front-facing camera for selfies, it's tough to fit everyone into the frame due to the camera's close proximity, and aligning with the background scenery becomes even more difficult.

People frequently depend on others to take their photos or resort to using camera tripods to overcome these difficulties. But sometimes, there might not be someone available, able, or willing to assist. Moreover, group photo opportunities often arise unexpectedly when no one has thought to bring along a tripod or selfie stick, rendering these traditional solutions impractical in some scenarios.

To overcome these challenges, we introduce a novel solution: By promoting teamwork and coordination among individuals needing a group photo, such photos can be easily taken without the need for external help or extra equipment, as shown in Fig. 2.

2 APP DESIGN

CoCapture consists of a camera module, an image processing module, a user interface module, and a storage module.

In addition, since the user needs to take three photos, we added guidance text below the viewfinder to assist the user. The guidance text is shown as below:

- (1) Please take a background shot.
- (2) Please take a group photo (1/2).
- (3) Please take a group photo (2/2).

Additionally, when taking of the second group photo, the first group photo will be overlaid as a semi-transparent overlay in the viewfinder to help the user align the images. The APP interface schematic and some photos taken by CoCapture are shown in Fig. 1.

3 IMPLEMENTATION

During the development phase, we employed the Unity3D engine along with the Unity plugin OpenCV for Unity as our primary tools for image processing. Leveraging Unity3D's cross-platform capabilities, CoCapture can conveniently transition to various operating systems, including iOS. The application employs background subtraction and thresholding techniques[Elgammal et al. 2000; Piccardi 2004; Qian and Sezan 1999] to distinguish foreground and background elements, maintain swift processing speeds and basic accuracy, and support on-device processing on mobile platforms. CoCapture automatically generates a foreground mask and completes image composition based on the background and two foreground images provided by the user. Additionally, users can access in-app editing tools to fine-tune the composite image to accommodate diverse usage scenarios.

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