## Understanding Interactions Between Multiple Wearable Cameras for Personal Memory Capture

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A recent trend in mobile computing is the increasing use of worn devices for data capture. Wearable lifelogging cameras such as the SenseCam and Narrative Clip reflect this trend, allowing mobile users to continuously capture images for later review. Image streams provided by these mobile devices can be used in a range of applications, but are commonly used as a way of capturing personal memories for subsequent recall, reflection and sharing. However, wearable and mobile devices are by no means the only mechanism for collecting data on behalf of mobile users. Existing fixed camera infrastructure is common in everyday environments (e.g. security systems, video conferencing) and our prior work has proposed use of these cameras as a complementary tool for lifelogging data capture [1].

The qualities of lifelogging data gathered by fixed and wearable cameras are illustrated in Figure 1. Each image from the worn device provides considerable detail, with the wearer's changing focus clearly represented by a variable field of view. However these images also suffer from blurring, occlusion and poor image framing. By contrast, fixed camera images provide a wide field of view that can be carefully framed but typically remain static. In general, experiences with lifelogging devices show that a photograph captured by a worn camera provides a considerably poorer representation of a situation than a corresponding fixed camera image.

As lifelogging devices increase in popularity, scenarios in which multiple individuals simultaneously use wearable cameras to capture their experiences are highly likely. To date, there has been no work in the mobile computing community that has attempted to understand how accurately a situation is represented when lifelogging streams from multiple device wearers are combined. Such an understanding would help shape future research in mobile lifelogging devices.

We ran a unique multi-person data collection study with thirteen participants each wearing a Narrative Clip for 2.75 days in a shared hostel space, capturing a total of 26,218 images and have used this dataset to explore facets of multiple device lifelogging such as reciprocity. Studying 142 images containing at least one identifiable participant (images selected from a larger sample distributed across one day of data), we looked for patterns of reciprocal image capture. To find reciprocity, for each sample image containing a person we then extracted a larger sample from the featured individual's Narrative Clip data for the ten minutes either side of the timestamp of the original photograph. We examined this new sample to identify whether any of the images featured the image of the original photographer. In approximately 10% of cases individuals photographed by



Figure 1: Infrastructure camera photos (top) and Narrative Clip photos (bottom) capturing the same mealtime scene.

a Narrative Clip recorded for themselves an image of the photographer within a period of 10 minutes, but over a shorter period very few reciprocal relationships can be seen (less than 1% within a period of 2 minutes).

The lack of reciprocity seen in our dataset illustrates that practical results with lifelogging devices do not always match user expectations – most participants in a conversation would be likely to expect their devices to capture each other but our data suggests that this is rarely the case. A variety of factors could potentially explain the observed lack of reciprocity, for example the tendency for the cameras to capture irrelevant portions of the field of view (e.g. floor, ceiling) and the complexity of human interactions (i.e. group conversations). Future work exploring factors influencing these findings may help to understand the value and limitations of worn cameras for the capture of group interactions.

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## REFERENCES

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