

# PukaPuCam: Enhance Travel Logging Experience through Third-Person View Camera Attached to Balloons

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**Abstract.** PukaPuCam is an application service that utilizes a camera attached to balloons, to capture users' photo continuously from a third-person view. Then, users can glance through their photos by using PukaPuCam Viewer. PukaPuCam records the interaction between users and their surrounding objects or even with the people they meet. As balloon experiences air resistance, it can change its inclination according to the user's speed and thus, capture pictures from different direction or angles. This gives rise to interesting and unusual records to be added to the user's collection. As compare to other similar devices, PukaPuCam uses a common design people are familiarize with – a balloon; making it an interesting application to be used at tourist spots. As balloons are cute, we aim to give users a more enjoyable, delightful experience.

**Keywords:** life logging, third-person view, balloon, sightseeing.

## 1 Introduction

People goes through many daily experiences which invokes numerous emotions – from happy, sad, angry etc. One way to express themselves is through logging their daily events; either through a blog, diary or other archives. As technology advances, there exist many networking services that help people connect with each other through these loggings such as Twitter and Facebook.

Sumi et al. mentioned that one of the meanings to recording experience is to share the records of memories [7]. Yamashita et al. mentioned that the popularization of the web log or web diary is to allow one to learn more and to understand oneself -- to express their satisfaction or emotion. They analyzed that feedbacks from the readers can result in satisfaction psychologically [10]. In recent times, contents through SNS such as daily recordings or pictures have been developing at great speed as it holds great values and high demands from the society. Especially interesting contents or experiences such as travelling, visits to the museum, or even outing at an amusement park. Through these activities, we can observe new sceneries and meet new people

from different places. From these experiences, we build up new emotions, reactions and expressions. When we look back at those times, we can recall the feelings we felt.

In this project, we call these experiences as a “Journey”. Normally, when one look back at their albums, most pictures found have similar sceneries, poses or facial expressions. Many of these pictures do not reflect the interaction that took place at that time. Therefore, we propose PukaPuCam, a camera to capture pictures of different moments, from different angle and direction, to give the user a better recap of those moments when they view the pictures. This camera would capture the user’s pictures from a third-person view without the user being conscious about them. As the camera is placed on a balloon, it enhances an exciting journey experience (Fig.1).



**Fig. 1.** PukaPuCam is a service to capture users’ photo continuously from a third-person view

## 2 Related Work

There are several attempts to record user’s activity from a third-person view. Flying Eyes is a system that utilizes AR.Drone to follow and record user’s activity by recognizing their cloth’s color [2]. However, as the system requires lots of power to keep flying, it faces challenges to follow the user for a long period. Hasegawa et al. developed a system whereby a camera is mounted at the end of a pole that is attached to skydiver’s waist, to capture the user and project it real-time in a HMD [1]. This way skydiver can see and adjust his body movement accordingly. Pfeil et al. created ball camera, a throw-able sphere device embedded with 36 small cameras to shoot from a panorama view when the user throws the ball [5]. Sugimoto et al. designed Time Follower’s Vision, a robot control interface based on third-person view which combines past images taken by a camera mounted on a robot with CG [6]. Dog-Leash Interface is a robot that follows its user to capture the user’s image. Similar to walking a dog, user will pull its string to control its route [11].

NHK Balloon Camera is an anchored floating body system with a camera mounted on a balloon ship to take pictures from a birds-eye view without the need of a crane [4]. Our approach differs from these researches, as our system is not proposed to act together with users in their everyday environment. Floating Eye is known as a media

art, equipped with a spherical dome screen to project images in the sky, taken from a camera attached to an airship in real-time [3]. Although these systems are similar to our study, our aim is to give user a new travel logging experience. Therefore, our system differs in terms of user experience awareness.

In terms of life logging, Vicon Revue is a wearable camera system equipped with different sensors (temperature, luminance, accelerator etc.), which automatically captures the user's pictures [9]. This system is suspended on the neck and captures from a first-person view at every 30 seconds intervals or from the influences of the surroundings it detects.

While most experience recording system's approach is to take videos and images from a first-person view, Sumi et al. proposed a combination of wearable sensors and environmental sensors to provide multiple camera view system: first-person view (mounted on the user), second-person view (mounted on the person the user is interacting with) and third-person view (placed in the surrounding environment) [8]. They observed that pictures from first-person view lack many things for users to learn more about their behavior and expression. Second and third-person view are equally important to remind users of their feelings and actions at a particular situation.

However, most of the proposed system faces challenges to be used frequently when user goes for a walk. Or it may be hard to blend in with the surroundings. Among the researches in life logging, many can be mounted on the neck or blend into daily wearable. However, most of these systems captures from a first-person view and thus, one's own figure is hardly reflected in the shots. Our thought of an ideal life logging system is where users are projected in the pictures while is unconscious about being photographed. This way, the records reveal the user's natural expression. To achieve this, we propose the design of a camera system that captures in a third-person view and can blend easily into the surroundings.

## 3 Concept

### 3.1 PukaPuCam's Concept

This project aims to create a “Camera that continuously records your journey”. PukaPuCam is a design service to create a personal photographer that will capture the users' journey experience and fun interactions between the users and their best friends. Here, we emphasize on three main design guidelines.

- (1) Users can take pictures that differs from the common first-person view camera – pictures from a bird's-eye view
- (2) Users can easily look back at their journey and explain to others.
- (3) Users can enjoy a fun journey experience.

From these aim, we aim to accomplish (1) with a system utilizing a camera attached to balloons, (2) with a viewer where users can glance through back at their recorded pictures to recall their surrounding environment as well as the route they have taken and lastly (3), by using balloon to increase the fun experience.

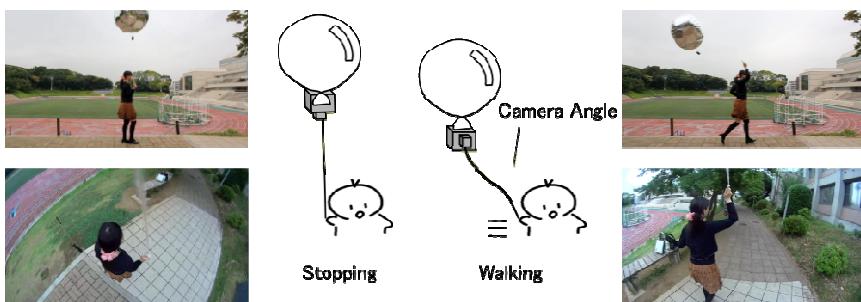
### 3.2 Balloon

Our proposal of using a balloon to generate a third-person view is mainly because

- Balloon does not produce any sound and it is non-disturbing to the surroundings.
- Balloon can easily blend in the surroundings, preventing user to feel out of place.
- Majority has held a balloon during their childhood period. Therefore, its usage allows easy prediction of behavior.

PukaPuCam will fit into places where balloons are commonly used such as theme park or tourist attractions. One advantage is that a balloon has high resistance against air resistance as it is filled with helium gases. This is beneficial to record the surrounding environment and the users' behavior at that moment, such as their interest or interactions. In addition, it can also capture the surrounding conditions, such as the wind's direction or weather. Besides that, people have different curiosity, actions or expression which many would not take notice of normally. These unusual moments would too be a great part of the users' collection.

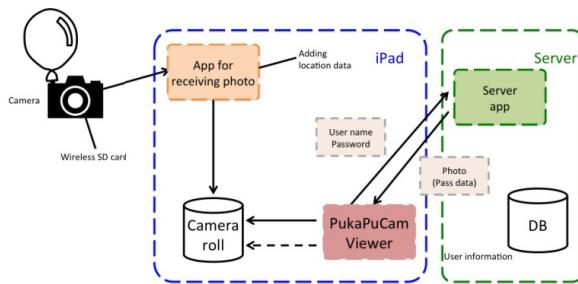
An example of an interaction with the PukaPuCam system is shown in Fig. 2 whereby when the user stops, the balloon will be on top of the user (Fig.2 left), or when the user moves, the balloon incline backwards and record sceneries from the user's back (Fig.2 right). The angle will change according to the user's walking speed. In order for the balloon to automatically record form a third-person view at any place, there are 2 design points needed to be taken into account: the mooring method for the camera to capture the user's field of view continuously and the length of the string.



**Fig. 2.** The camera angle will change depending on the user's walking speed

## 4 Implementation of PukaPuCam

Fig. 3 shows the configuration of PukaPuCam system. This system is composed of "PukaPuCam" (the balloon and a camera) and "PukaPuCam Viewer" (iPad application). By attaching a SD memory card "Eye-fi", the picture data will be transferred to the iPad whenever the camera captures a picture. These data will then be arranged on "PukaPuCam Viewer" in combination with the GPS information.

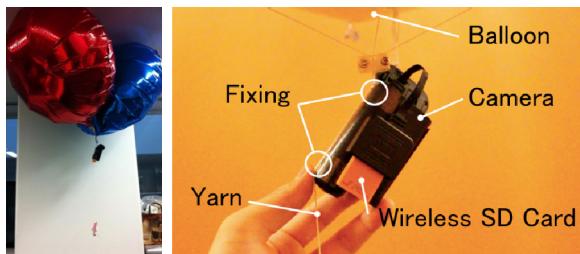


**Fig. 3.** System configuration of PukaPuCam

#### 4.1 Design and Implementation for Spontaneously Shooting

Balloon is highly influenced by air resistance. Due to this, the balloon may waver and cause blurriness effects to the shootings. If the recordings are in video form, the user may feel sick when they glance back at the records. In addition, many may skip forward bits and parts of the video. Therefore, we decided to test with short interval shootings while placing importance on the journey's time. To find an optimum timing for each shot so that user can feel the journey's flow when they look at the records, we decided to experiment with 5 seconds intervals. For example, if users look at 4 continuous pictures taken at a similar scene, it reflects that they were there for 20 seconds or so.

We want to implement a camera that captures at a wide angle and is less affected by vibration. Our selection for the experimentation is Digital HD Video Camera Recorder Action Cam "HDR-AS15" -- weighing about 109g in addition of the Eye-fi. The balloons are two circular aluminum evaporated balloons, each filled with 80l of Helium gas. The buoyant force of the balloons is approximately 172g at 10°C temperature and 1 atm. The camera is fixed at 2 points to make its lens parallel to the string (Fig.4). This allows it to capture the users regardless of the balloon's position.



**Fig. 4.** Overview of balloon system (left), detail of camera (right)

#### 4.2 Design and Implementation of the String's Length

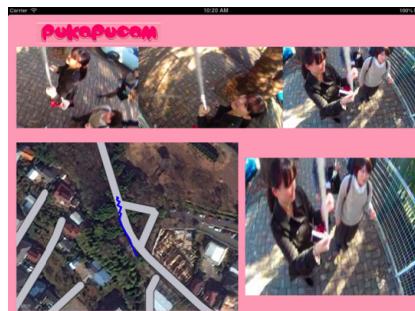
The string's length places much importance in the system as it determines the angle of the camera's view. To find the optimum length, we did an experimentation with 3

volunteers in their 20's. During this experiment, the angle was fixed at  $120^\circ$ . Here, the users will adjust the string's length accordingly and from these records, we will decide the maximum length by calculation.

Then, from the results, we developed a hand-held device whereby user can adjust the string's length up till 210 [cm] (between the camera and the spool). If the thread is extended to its limit, and the height of the hand from the ground is 1[m], it is possible to shoot approximately 532 [cm] ( $310 \text{ [cm]} \times \sqrt{3} = 532 \text{ [cm]}$ ) radius around the users, assuming that the balloon and the camera are right above the users.

### 4.3 PukaPuCam Viewer

PukaPuCam Viewer is an iPad application, consisting of 2 main pages: My Page and pictures inspection. When users log in, My Page screen will appear and there will be folders indicating the place and time of the journey. The main screen of the viewer is illustrated in Fig. 5. It consists of 3 elements: a scroll view, map and main view. In the map view, the route the users took will be shown, whereby each picture is placed at the location it was taken. Therefore, by touching and tracing the route, user can see the pictures like a flipbook. Thumbnail images are arranged on top in a scroll view and users can zoom in the picture when they tap it.



**Fig. 5.** PukaPuCam Viewer: Scroll View (above), Map View (left), Enlarge View (right)

## 5 User Experience

We conducted a user study, to observe how PukaPuCam can enhance the user's journey experience. In this study, participant will use PukaPuCam and the viewer during their journey. We will observe their interaction and receive their feedback of the system.

### 5.1 Participants

**H:** Female in her 20s. She loves travelling around by train.

**B:** Female in her 20s. She hardly takes a walk but she loves places with lots of nature.

**M:** Male in his 20s, H's best friend. He learns about the journey from H's user study.

## 5.2 User Study Contents

On 12th December 2012 (sunny), H visited the Yume Migasaki Zoo. During her visit, she used both PukaPuCam and her own digital camera to take pictures (Fig. 6). After walking for 10 minutes, she met up with B and they walk together. We observed the whole situation. Four days later, H explained her journey using pictures from both her own digital camera and the viewer app “PukaPuCam Viewer”. We observed the situation again and lastly we interviewed her for her feedback.



**Fig. 6.** Scenes of user experience recorded by PukaPuCam

## 5.3 Result of Interview

We interviewed the participants about their experience of using PukaPuCam, focusing on both the usage of PukaPuCam and PukaPuCam Viewer, which will be discussed in section 6.

## 6 Discussion

PukaPuCam is a service proposal, to give users a new journey experience never experienced before. Here, we will discuss the results from the user study dividing them into 3 main points.

### (1) Users can take pictures which differs from the common first-person view camera – pictures from a bird's-eye view.

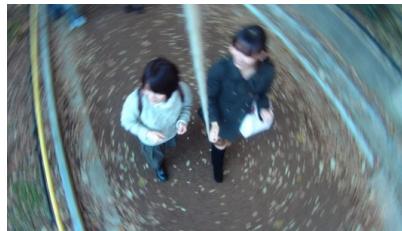
#### Air resistance and wind

As balloon receives air resistance, it changes direction depending on the wind and the user's walking speed. However, thanks to this, when the balloon moves to the front, H was able to get a shot of a pose with her friend as shown in (Fig. 7). H was really fond of this picture when she looked through the viewer. H also mentioned that the balloon was really easy to use. Even situations where the wind was strong, she can intuitively aim to record different scenes.



**Fig. 7.** Photo taken by PukaPuCam when participants were posing

Due to the wind, some of the pictures taken were blurred. However, this blurriness gave a touch of difference to the pictures such as in Fig. 8 where both users introduced the picture to M as “interesting pictures”. They mentioned happily, “*It doesn't feel look like a picture taken when it is windy right?*”



**Fig. 8.** Blurred picture

### Natural Expression

As PukaPuCam captures from a third-person view, it can capture pictures of oneself naturally – to capture the expressions of the users, giving great pictures where the users can learn more about themselves. For example, “*the type of expressions the user usually have*” or “*how the user smiles in daily conversations*” etc. From this, users can learn the type of atmosphere that can lift up their own happiness.

When H met up with B, many of the pictures captured reveals their smile and happy faces. H mentioned, “*I am really glad to be able to capture my natural smile, as I am quite camera shy and I hardly smile in most pictures.*” She also added, “*If the picture was taken from my own camera, most of the time I will not be part of the picture. However, when taken from a third-person view, both our pictures and the surroundings are taken as well. We can really feel the atmosphere of the journey.*”

Besides, some of the other interesting pictures which were captured unexpectedly by the camera are such as, user looking up at the balloon when the wind blows slightly, or when there was a strong wind, user was pulling and looking at the direction of the balloon. Therefore, PukaPuCam allows capturing these interesting expressions caused by the balloon.

### Interest

PukaPuCam can capture scenes which the users themselves hardly notice, such as what type of objects which the user are interested in or when user sees object which do not catch their interest, they would just walk by them quickly. Some examples are B’s figure who was engross in taking pictures or H’s figures peeping at the animals.

## Cute

This attracts a lot of attention from females and children as by using balloons, PukaPuCam can capture pictures which can increase the cuteness values. Balloon can capture pictures such as H's face looking up (Fig. 9) or H posing with her friend B (Fig.7). The two participants really like these two pictures. Other than that, as the camera follows and captures a lot of picture from the back of the participant, it was able to capture the "cute unprepared moments". Fig. 10 shows the picture taken from the front by the user's camera where the user posed for it together with a picture of back captured by PukaPuCam.



**Fig. 9.** User looking up at the balloon



**Fig. 10.** Photo by the user's camera (Left), Photo by PukaPuCam at same place (Right)

## (2) Users can easily look back at their journey and explain to others.

### Video sequence

The pictures captured by the camera shows the subtleties of emotion, movement and behavior of the users with the surrounding. While browsing through the viewer, M said, "*As PukaPuCam captures the pictures at short intervals, we can feel the flow of the journey recorded.*" He added that, "*I can really understand their interaction and relationship such as how did they feel when they were walking or what interests them the most.*" H commented, "*It was really fun to look at pictures taken at different moments as there are many interesting things I had missed or had never known.*"

Participants reviewed that the Viewer was really smooth and interesting to use. They also commented that this system really guides them to explain their journey to people. Therefore, from our observation, having interval shot recorded from a third-person view supports the story telling of the users' behavior in their journey.

### Indexing the Location

The MapView on the PukaPuCam Viewer record the location and each picture taken will be added to the photographing point using GPS information. By having an index

of the location, it can easily help recollect one's memories. We questioned H on her opinion on whether is it a useful guide for explanation. H replied, "*It was a great assistance. The viewer shows the whole map of Japan and when you click on the zoo's location, it will zoom in and show the route that you have taken in your journey.*"

### **Feedback due to Limited Field Vision**

However, there were feedbacks that participants had challenges in explanation due to limited field of vision captured. At places where people tend to stop often, the balloon captures pictures from right above the head. These pictures do not reflect the reason the user stopped as the scene is outside the camera's field of view. Although, it advantages over first-person view pictures, as the recordings were interesting and users are always reflected in the pictures. Therefore, a combination of both will be a great complementary to the journey's story telling. For example, (Fig. 11 left) shows the user pointing her finger, taken at a third-person view and (Fig. 11 right) which is taken a while later by the user. From the combination of both pictures, we can tell that the user is really interested in flamingo and was telling her friend about it.

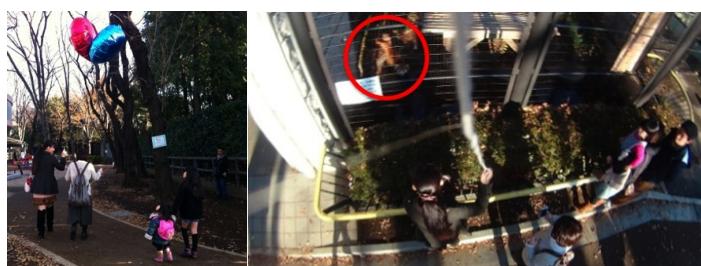


**Fig. 11.** Photo by PukaPuCam (left), Photo by user's camera at the same place (right)

### **(3) Users can enjoy an exciting journey experience**

#### **Reaction from Children and Animals**

Among the pictures taken by PukaPuCam, many reveal that children were gazing at the balloon from afar. Fig 12 (left) shows a picture of a child following behind. Animals too, gain interest in the balloon. For example, a deer was staring and moving its eyes according to the balloon's movement and a lesser panda was climbing to the edge of the cage while staring at the balloon (Fig.12 right). Therefore, thanks to the balloons, we are able to capture these kind of interesting animal reactions.



**Fig. 12.** Reactions from children and animals

### Heart-shape balloon

We also observed that when the participants noticed that the shadow of the balloon was a heart shape, they jumped with excitement and took a picture together with their shadow (Fig.13). This lifted up the atmosphere of the journey.



**Fig. 13.** Balloon makes a heart-shaped shadow

### Usability

H gave some feedbacks regarding the length of the string whereby she mentioned, *“As there is wind and lots of trees at the surroundings, it was hard to handle the string as it may get entangled between the trees. However, it was easy to get used to it after a while.”* We questioned H and M that from their short experience, would they be interested to use PukaPuCam service in the future or would they recommend the service to others. Both excitedly replied *“Yes, we would love to.” “Especially, if we go to theme parks such as Disney Land, it would be really cool to take recordings of when we meet and shake hands with the characters. We would like many people to use it as well.”*

### Summary

To summarize the above, participants were really happy with the pictures and when others look at the pictures, they get to learn about their journey, their expression, the surroundings etc. without asking the participants beforehand. From our user study, walking with a balloon can produce a fun experience for users as they can have new interaction with children and animals. Therefore, by using PukaPuCam, it is possible to record a new journey experience that differs from recordings from a first-person view.

## 7 Future Work

First, many pictures do not reflect the surrounding environment as it was taken from straight up or when the users walked by too fast. Therefore, the combination of both first and third-person view images will be a great tool for journey logging. A second possible future work is to share the pictures with friends. This way, it may lead to a new perspective or findings. Finally, one of the participant commented that it would

be a great motivation for travelling if users can save and store the picture on a national map, rather than just the route they have taken.

## 8 Conclusion

In this project, we propose a balloon camera system PukaPuCam to give users a new journey experience that differs from the ordinary way of travelling. As a result of our user study from both interview and observation, PukaPuCam has exceeded our expectation. Participants had a fun journey and PukaPuCam was very useful for participants to glance back through their journey. Furthermore, this system can record the atmosphere and can bring out the “cuteness” of the users.

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