# A Virtual Reality Reminiscence Interface for Personal Lifelogs

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**Abstract.** Letters, diaries, postcards, photo albums, home videos, and lifelogs! These are artefacts of our personal history, they represent how we cherish and preserve memories, re-engage with our past and share our experiences with others. In this demonstration paper, we explore an Virtual Reality (VR) approach to help people reminisce about the past through lifelogs. Our user study found that most participants enjoyed the experience, although for some, the VR environment was overwhelming.

**Keywords:** Lifelogging · Virtual Reality · Multimedia

## 1 Introduction

Sharing life experiences allows individuals to form connections both across memories and with other people [7]; such memory connections support the discovery of meaning from the past that may have gone unrecognised; and shared memories could help individuals to feel alive, loved, and cared for. An example of traditional reminiscing activities could be storytelling, flipping through photo albums, or sharing recorded videos with contacts on social media. While technologies such as Google Photos can present collages of captured photos in various ways, what they do not capture are memories that have not been expressly captured, whose significance only becomes evident with the passage of time. For example, the first moment that we meet our significant other is unlikely to be on a traditional photo album. Lifelogging offers us the ability to look back to our past experiences in a more thorough and more authentic way.

Due to the growing popularity of wearable technologies and improved storage capabilities, lifelogging has become more accessible to many. According to the 5R's defined by Sellen and Whittaker [9], lifelogs are valuable for human memory-related processes defined by their 5R's: recollecting, reminiscing, retrieving, reflecting and remembering intentions. Although lifelogging has attracted many works from the research community in recent years, the majority of them

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focus on retrieval; few of them address what happens *after* retrieving the needed information. In this demonstration, we focus on the challenge of *reminiscing* using lifelog data.

With Virtual Reality (VR) Head Mounted Displays (HMDs) becoming more available, this medium offers some advantages compared to other media due to its ability to facilitate an immersive experience. Thus, research has explored on how VR could aid reminiscence [4,12]. In this demonstration paper, we explore an VR approach to help people relive past events in an immersive way using a conventional lifelog collection captured by wearable cameras. Specifically, we describe how the prototype is designed in Sect. 3 and the details of our user study in Sect. 4.

## 2 Related Works

In 1945, Vannevar Bush described a blueprint of a personal information system called *Memex* [2]. This system, *Memex*, was described as an in-depth extension of an individual's memory. Bush's vision has inspired MyLifeBits [6], a Microsoft Research project started by Gordon Bell in 2001, which has helped lifelogging attract more attention from the research community. Lifelogs contain large amounts of data gathered from different streams of information such as photos taken from wearable cameras, geo-location, biometrics data, food diaries, or social media activities. While showing great potential in various domains [1,5,10], lifelogging poses many practical challenges, such as effectively searching through large archives of lifelog data. Virtual Reality has been used in the task of lifelog retrieval [3,11] and has been shown to be a viable method of navigating through multimedia archives. However, as the objectives of such systems are to retrieve lifelog photos in a fast and accurate manner, there is little attention to reminiscence factors such as optimising the sharing of data with others, surprising, or provoking emotions in users.

## 3 System Prototype Design

The idea of this prototype was inspired from various science fiction works, for example, *Doctor Who*'s Time Vortex, which describes a medium which the Doctor used to travel through time and space. The user explores lifelog photos in a VR environment designed to be a time vortex. Revisiting lifelog photos in this case is analogous to traveling back in time. The prototype system is built using lifelogs captured by wearable cameras. All lifelog photos in the VR space are represented as a rectangular floating object, as seen in Fig. 1, which has been arranged in 12 columns forming a 'vortex'. The user navigates through different years following a looping path inside. Each photo appears in small 'memory' fragments which are gradually united into a whole photo. As the users move forward in the vortex, more 'memories'/photos are uncovered.

The user enters the visualisation at the latest year in the lifelog (in our case 2020). In the vortex, the user can choose to move forward or backward. As they

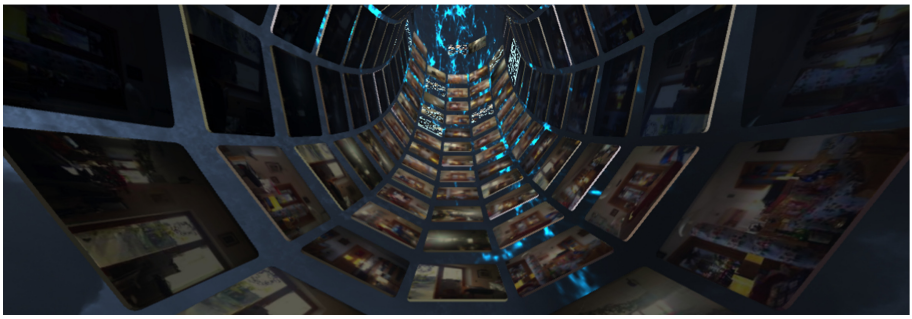

**Fig. 1.** A shot of lifelog images in the VR Interface prototype.

move forward, they go back through time, year by year, seeing images and videos (called memories) from that year temporally organised and selected for relevance (some assumed information need) or memorability. The year they are currently viewing is displayed in the middle of the vortex in front of the user. When they want to watch the montage of the current memory, the vortex will dissolve and disappear, leaving a large screen in space playing the required video (in this case, a stop-motion video of wearable camera images). After the video stops, the user is transported back to the vortex for further exploration.

## 4 User Study

In order to judge how attractive the VR lifelog interface was, we devised a small user study. For this study, the memorable events for the vortex were manually chosen by the lifelogger (just one per year for the demo), but these could be automatically chosen by a lifelog management system. The list of events are shown in Table 1.

**Table 1.** Events chosen in this prototype.

| Year | Event description |
|---|---|
| 2012 | Being on a plane going on holiday |
| 2013 | Christmas shopping with family |
| 2014 | Giving lectures in China |
| 2015 | Driving up a volcano in Iceland with friends |
| 2016 | Having lunch with family |
| 2017 | My wedding day |
| 2018 | A Queen concert in Dublin |
| 2019 | Christmas Day with family |
| 2020 | Building the floor of a new house with a friend |

### 4.1 Experimental Procedure

In all, 9 participants agreed to participate in our study. The participants represented a variety of backgrounds including computer science (6), engineer (1), chemistry (1), and web design (1). Out of these, 5 users did not know the lifelogger personally and have little to no prior knowledge of lifelogging.

For the participant to interact with the interface, we used an Oculus Quest 2 HMD. Each user was given an approximate time of 10 min for the experience. After getting used to the control of the system, the participants were asked to explore the VR space freely and find at least one memorable detail from the list above. Upon completion, participants were asked to rate the demonstration based on the short version of the User Experience Questionnaire (UEQ-S) proposed by Schrepp et al. [8]. We also presented open questions for comments and suggestions.

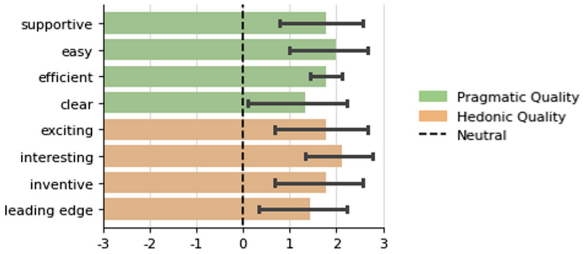


**Fig. 2.** UEQ-S results with 95% confident interval. Each criteria was rated on a scale of −3 to 3, with 0 being neutral.

### 4.2 UEQ-S Results

Despite different backgrounds, most participants provided better than neutral ratings on the criteria provided, which are *supportive*, *easy*, *efficient*, *clear*, *exciting*, *interesting*, *inventive*, and *leading edge*. The mean scores are shown in Fig. 2. The *interesting* factor achieved the best score at 2.1. Meanwhile, the *clear* factor was the lowest at 1.3. This is due to one participant being concerned about the lack of textual context of the events causing considerable difficulty in understanding. It is worth noting that in an anticipated use of lifelogs, that it would be the lifelogger themselves who would be exploring the lifelog in the VR system, so such concerns are unlikely to arise in a real-world application.

Based on Schrepp et al.'s process, the scores were transformed and categorised into two categories: pragmatic quality (*supportive*, *easy*, *efficient*, and *clear*) and hedonic quality (*exciting*, *interesting*, *inventive* and *leading edge*). Figure 3 illustrates the relative quality of the system compared to other products in a benchmark dataset provided by the original authors. The score for Pragmatic Quality falls into the Good category, which is in the range of 25%

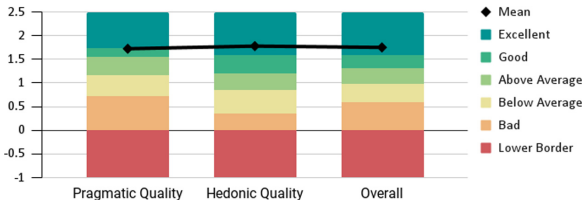


**Fig. 3.** UEQ-S benchmarks. The line represents the mean results for this prototype.

best results. Hedonic Quality and Overall scores fall into the Excellent category, which is in the range of the 10% best results.

### 4.3 Feedback

Most of the participants found the vortex visualisation in VR interesting. According to one participant, '*it was like a dream*'. An interesting observation is more than half of the participants thought that the field trip in Iceland in 2015 was the most interesting memory; they were amazed at the scenery. The second popular choice was the lifelogger's wedding day, for which one user expressed his feeling: '*it made me tear up*'.

On the other hand, some criticised the visualisation being overwhelming and causing dizziness. One participant noted the interface '*requires the user to move their head around frequently, hence it is easy to miss an event if they are not aware of it*'. Another commented '*it can be a bit overwhelming to have some many pictures around you it is sometimes tempting to focus more on the pictures in front [instead of where you are standing]*'.

## 5 Conclusions and Future Work

As lifelogging becomes more accessible to many, it is important to explore different ways a lifelogger could reminisce on past events and share them with others. In this paper, we developed a VR prototype for viewing past events using personal lifelogs, focusing on the reminiscent factor of Sellen and Whittaker's 5R's [9]. The prototype received generally good responses from participants in our user study. However, there are potential improvements in future work. For example, the vortex in this prototype could be redesigned to help with orientation and reduce the number of photos shown at a single time. Incorporating textual descriptions for each event is necessary for the understanding of lifelogs. Other information such as heart rate could also be used to illustrate the importance of an image and potentially help guiding the user's focus. Another way we can utilise this interface is to integrate a lifelog search engine for choosing events.

This work was featured in a short film called Eternal Memory by Diarmuid Kennedy with the involvement of a Ballymun Community Group, the Setanta Strings Ensemble. The film was officially selected for Montreal Independent Film

Festival 2021, Cannes Short Film Festival 2021, and Kerry International Film Festival 2021.

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