



## Time and Space in Broken Panorama

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### Abstract

This pictorial intends to show a usage-hacking case of everyday technology for creating visual narratives. Storytelling through visual appearance could be significantly relevant and inspirational to design and HCI. This technique is also a design approach in itself; by deliberate navigation and control, the user breaks the panorama view. In this pictorial, we demonstrate examples and show the process of creating our digital photography art project "Panorama Time". In this project, a mobile phone camera's panorama mode is used to tweak time and space. By showing how we hacked the digital artefact, we also discuss insights from several experiments, thereby considering possibilities of establishing such digital experiments in their own right. A presented technique could also be a method for sketching ideas through the photographic medium.

### Author Keywords

Digital photography; panoramic image; panorama camera; glitch aesthetics; fault aesthetics.

### ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous;

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DIS 2017, June 10-14, 2017, Edinburgh, United Kingdom © 2017  
Association for Computing Machinery.  
ACM ISBN 978-1-4503-4922-2/17/06...\$15.00  
<http://dx.doi.org/10.1145/3064663.3064793>



Figure 1. On top, “The Short Boat”. This is captured part of the boat, while it was passing by the still photographer. Figure 2. Bellow, “An Elongated Trailer”.

### Introduction

Through our project “Panorama Time”, we discuss how to reach significant and aesthetically appealing but “broken” results through hacking the use of our everyday device – a mobile phone camera. In this project, we try to break the concept of panorama, which might be referred to as an unbroken view in front of the viewer.

Digital photography is a unique technology that increasingly appears in our daily lives. Mobile phone cameras occupy our time without drawing any notice to possible dangers or loss of previous traditions, and all these new technologies are constantly opening up new, unmapped possibilities for us to explore.

As photography in general is a time- and space-oriented medium, we have chosen to focus on and examine it from this perspective. This project concentrates on a medium-based approach, so the medium’s features are enhanced and the work is produced with a focus on the specificity of the particular medium. By choosing a panorama mode, which simultaneously combines two slightly different techniques of one medium – still photography and cinematography (i.e., filming) – we expect to explore time and space in a particular way. In this application, time passes noticeably on the screen, and the user can control the process through the time-space dimensions by capturing what is relevant to that moment (by freezing the time-space moment), while also embracing the on time construct controversially, for example, waiting for some scenes to pass without being captured (deleted from the final image). See Figure 1 for deleted

parts of the photographed object and Figure 2 for the duplicated parts.

In this pictorial, we explore and shape our understanding of digital photography as artistic practice to find new ways of expression and possibilities of tweaking time and space. We practice hacking of digital photography and try new ways to achieve expressive artistic results. Focusing on both artistic and technological discourses, we conducted practice-based experiments.

By hacking new technology and techniques, we explore the different ways in which hacking may act and create new aesthetics, even without knowing the structural components of them or how the hardware and software work. Consequently, we learn how the unknown world unfolds in action, and we may use those discoveries for our artistic and design purposes.

### Background

The synthesis of two different practices in creating respective outcomes is a core feature in this project from a design perspective. First of all, it is a digital photographic technique, and secondly, glitch aesthetics appearing from its practice. Glitch practices are design-driven efforts in themselves. According to Rosa Menkman [12], “Glitch-Alike” tendencies refer to deliberate, planned, created, designed and artificial results, and depend on the intentional decisions of the user. However, the other, more passive approach is referred to as “Pure Glitch” with accidental, coincidental, appropriated, found and real practices. In our research, we label a passive and accidental glitch approach that results from malfunctioning or error – *fault aesthetics*, though *glitch aesthetics* is more of a

conscious act. Iman Moradi [13] describes visual glitch characteristics as follows: fragmentation, repetition [8], linearity and complexity, and those qualities are apparent in our work.

In regard to visual art history [17], Cubism intentionally breaks the perspective and the view, Futurism questions how it is possible to visualize movement and dynamics, and those artists succeeded in delivering the outstanding results by choosing several perspectives in time and space. There are also other references to traditional techniques, as composing of the image by shaking the camera is akin to brush strokes on a canvas. This physical interaction with the digital device thus appears to be a bricolage practice.

Historically, glitch aesthetics surfaces from machines, industrialization and Futurism and their close relationship to technology. As far as the sound of the machine is concerned, Italian futurist and composer Luigi Russolo (1883-1947) noted in his manifesto *L'Arte dei Rumori* (The Art of Noises) from 1913: "With the invention of machines, noise was born" [14]. The meaning of this notion extends so all those noises may be tuned. From a hacker perspective, new forms of expression originate from the constant acceleration of technological development. Software-driven artists generate glitch aesthetics through data and pixel bending [11] techniques by corrupting digital code or physically manipulating electronic devices.

By introducing aesthetics of failure in music production, Cascone [3] focuses on the post-digital, a term gaining popularity in contemporary art. The discussed post-digital condition relates to digital technology involved in

production through various forms of fabrication; in addition, the boundaries of the digital and physical get blurred; failure and glitch, however, arrive directly from it. The interaction with the phone and panoramic camera also relates to the post-digital condition with its use of the physical and digital at once.

In the field of glitch aesthetics, there are many other ways to explore time and space in the digital realm; artist Jaak Kaevats presented his "Street-Scape" work at the ISEA2014. He visualises the speed of people passing-by; while some people walking at 5km/h stay in their original proportions, applied distortion on others depends on their speed. Another great example is 3D printed sculptures, "Truths Unveiled by Time", which are assembled from scans of moving people captured by a new type of 3D slicing data camera, all produced by Australian artist Daniel Crooks and exhibited at Ars Electronica 2014. In addition, there are impressive previous video works by Crooks treating time itself as a medium. The paper by photographer Murat Germen was published at the EVA London 2014 conference on digital aesthetics in mobile photography with a few hacking techniques for mobile apps.

While they are few, there has been some work done within the HCI discourse that focus on glitches and aesthetics: Davis introduces glitch in relation to digital image [4], the Softimage book explains new ways of understanding the digital image [9], Gross expands on the datamoshing technique [7], and Mason combines narrative and visual art through data bending [11]. As with the works on glitches and glitch art, there are varying degrees of direct relevance across these works, and they all help to further develop and situate the

contribution of glitch and this work in a manner directly relevant to DIS discourse.

The experiments with “accidentally” produced panoramic images produced by the public have taken over the Internet and expanded in the meme culture. The panoramic shots with glitches that create alien-like faces, animals or unbelievable scenes can be found on social media and photo-sharing sites.

While there are varying degrees of relevance to the work at hand, they help to guide thinking about how glitches fit within the overall HCI discourse. Other relevant practices, techniques and qualities are extracted from the experiments and introduced below.

### **Qualities of the process**

To begin, the approach to the use of photography is appreciated as both a kind of rethinking about digital images as well as illustrating different means in considering how time and space can be represented. As such, the images have a unique quality that makes them intentionally difficult to evaluate in terms of more traditional photography, but this presents them in terms of how this can be a benefit and not a detriment. A few significant qualities were taken into consideration in the process, and we expand on them below.

#### *Sketching*

The work presents an interesting notion regarding how this photographic glitch approach could be used as a form of sketching. There has been considerable work done in HCI on different approaches to sketching including the value of sketching [2], novel approaches to sketching with stop-motion animation [6], sketching in sonic interactions [5], and collaborative sketching of

user interfaces [15]. It is important to notice how sketching refers to the ideation process and challenges creation of new concepts as well as development of projects. In this regard, visual images of our project might open new previously untapped areas for design implications.

#### *Introducing chance*

To a great degree, a moment, is involved in the photographic process, and we also find that improvisation and chance [16] play important roles in this process. Although some types of professional photography such as advertising are turning away from the fortuitous moment and mainly working with pre-constructed and designed sets for scenes, such instances work in artificial settings, deliberately eliminating chance, which is the most recognizable natural attribute in the documentary. On the other hand, everyone might have opportunities for manipulating the parameters in both live- and post-processing. However, in our project, we do it all in real-time and without post-production.

#### *Immediacy*

This experimental practice contains aspects of collage and employs principles of remix culture [8]. It is, in a sense, a collage in real-time and remix of real situations and environments through their immediate appearance. Immediacy, when the action happens here and now, in front of the photographer, we argue that is of main importance to our work. The glitch, however, could distance the natural and immediate appearance of the scene for the photographer or viewer, or at least distract and shift the focus on glitch parts of the image. The immediate situations open up and unfold in front of the photographer; they demand immediate reactions



Figure 3. The moment of capturing the passing car. "Vertical Scan" experiment.

and seek aesthetic decisions. In Figure 3, the temporal dimension of the situation requires lively improvisation and following the moving objects, in this case, moving cars, to create glitched and extended forms.

The first experiments of the project "Panorama Time" began a few years ago, and, by increasingly engaging in this activity, the artist started adapting technology and creating experiments related to real and documentary situations. In turn, several photographic series were produced. Those series might be seen as personal travel diaries, since most of them were created while traveling. This also raises questions regarding memory issues since bringing distorted images home could relate to a different type of remembering and disruptive experience. Let us first, however, discuss those instances from the production side.

### "Panorama Time" Experiments

In this chapter, we want to show the most successful glitch experiments with the panorama camera on the iPhone. First, however, we introduce the process behind the features of the mobile panorama camera. The main action of capturing a panoramic image with such a handy device is to pan the camera by following the landscape. Pan camera to the side (left or right) and the iPhone camera app will stitch together multiple images into a single photograph. The thickness of the lines of stitches is originally narrow, but those can also be controlled through the speed of the movement. A final panoramic image will be long, covering a wide field of view. The iPhone supports a 240° panorama in one shot. It is a digital process, and a final result is generated by a camera app by using a video-like

stream of successive frames and stitching them together.

### *Rational Break*

The very first experiments with the panorama camera were based on trying to hack the technique and technology by using it in unorthodox ways. The aim was to create the most extreme images and reach limits in manipulation of the application. Various radical motions like spinning, rotating, shaking, and following the scene line were tested (see Figure 4). As the software was constantly crashing, the artist had to refine the movements and find an intuitive connection with the app. Despite the sensitive software and the struggle with the extremes of usage-hacking a few "broken" images were saved and collected.



Figure 4. Contextually distorted river. Image of extreme use of the camera, trying to break the algorithm and crash the program, experiment "Rational Break".

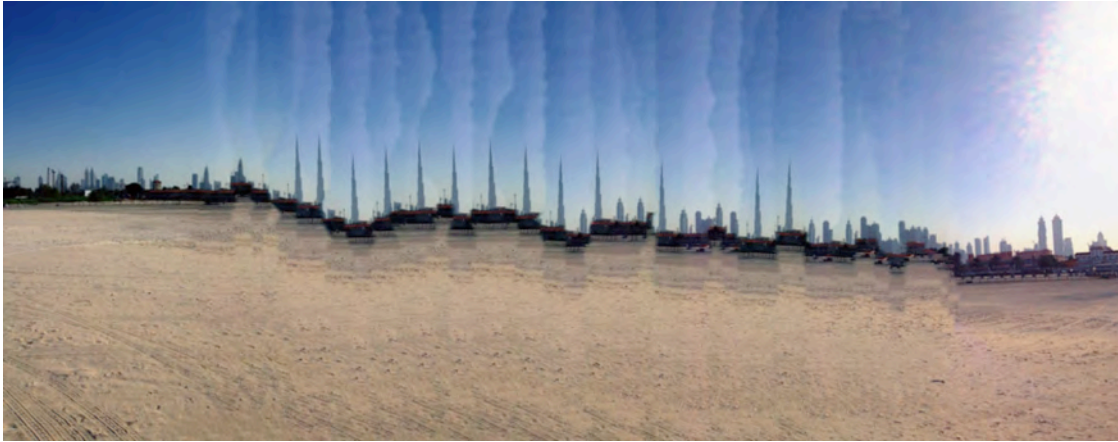


Figure 5. The shaking motion was activated in this experiment, so duplication of a tower and broken horizon appeared. The shaking motion and its angle is important, in this case, the motion was diagonal so it caught the tower several times. “Khalifa City” digital photography, Dubai, 2014. Project “Panorama Time”, experiment “Variable Horizons”.

#### *Variable Horizons*

The second discovery in hacking the mobile panoramic camera was trying to simulate the movement of the camera so that the software would get a signal of a moving camera (to trigger motion/movement sensor), but the actual camera would stay at and focus on the same point. All types of shaking the camera were investigated to fake the movement, to trick and trigger the camera to start its software move without an actual

camera movement. By shaking the camera up and down, the device receives an input like the camera is moving and the image automatically starts moving forward, while software collects the upcoming bits in frames and stacks them together into one image.

The cursor starts moving forwards and stitching the upcoming parts of the image, at the same time repeating the scene: hacking of movement of the panorama camera without actually moving the camera itself to the side. For example, in Figure 5, as a result, several of the same towers appear side by side. However, from the camera movement we get natural distorting glitch – not a straight line and level of the horizon.

#### *Vertical Scan*

Disadvantages and failures from the professional perspective are turned into advantages of this photographic technique. They relate to the mechanics of a rolling shutter and the work of temporal-spatial dimension in a panorama app. In such cases, the image is captured not by taking a snapshot of the entire scene at once, but rather by rapidly scanning across the scene. Interesting results were achieved in capturing movement and using a panorama camera vertically. The examples of passers-by and passing cars (see all vertical Figures, including 3, 6 and 7) in such a context depict digital leftovers of moving objects.



Figure 6. "Vertical Scan" experiment, cars passing by, in the image only the traces left from the subjects in movement.

The temporal-spatial dimension directly influences the image. In different scenes, different tactics were considered: in most cases, the improvisation between the scene and the movement of the camera and object in the scene was taken into account. The improvisation happens live, and the photographer can follow the scene on the monitor and control the speed, directions and motions. Several iterations with different tactics were employed till the substantial image got produced.

#### *Linear Space*

The substantial results were gained after continued experimenting with the movement: at this time keeping the camera still but creating movement from mounting a camera on wheels. In some cases, the camera was stably placed on the side of a car window. So there was a movement of the camera in space, but not proceeded by the user's hand. The iPhone panorama camera is built for rotary movement; thus the camera becomes the centre of the photograph – and we know that such a view is the most natural and pleasant for the human eye. So, in this experiment, the camera movement was based on a steady linear movement (along the image

scene and picture plane) instead of revolving the camera on the axis. It results in a straightening up the circular movement of the user and a flattening of the image.



Figure 7. Traces of passing people, "Vertical Scan" experiment.



Figure 8. "Concept Cars", Dubai, 2014. Project "Panorama Time", experiment "Linear Space".

### Insights from "Linear Space"

We want to share some generative findings from our experience in the connection to time and space.

Basically, the panorama software stacks frames vertically, that is, by panning the camera horizontally, over time, and, during that process, many activities are happening, some of them being caught by the camera, some of them missed.

- The distance between point-of-focus erases closer objects or replicates the farther ones, for example the background clouds. If the focus is far, closer objects will be deleted. Farther objects move more slowly and closer objects move faster, an aspect, which is clearly seen in Figure 8.

- The speed of the moving camera will impact the photograph and the thickness of the stacking lines: the image will stack more details inside (the camera will stack a longer distance) or the opposite.

- Faster or slower objects (e.g., the direction, speed of the cars passing by) in relation to the moving camera will be influenced, deleted or repeated several times.

- Turning the camera (the car) into an inner angle makes the app crash and turning the camera to the outer angle gives more space in the image.

- The broken perspective is an effect of capturing the artefact from several sides, for example, the front of a building might be set upright to the lens, but the side wall can also be turned and straightened up along the façade.

- The feature of the flattening of the perspective occurs, that is, all artefacts look flat if directed perpendicularly up front to the camera, because of the spreading of the angle in a line, not revolving the camera on an axis and making the viewing from one point, but moving along the picture plane (see Figures 8 and 9).





Figure 9. Photograph taken from the car window, experiment “Linear Space”.

- One single reflection might be captured in the entire image (the same, repeated in all frames), if the shooting happens straight in front of the reflective object. It can be either light (the sun) or the reflection of the photographer. It is possible to follow the light and get the same lighting conditions on different objects in one image (see Figure 9).

In sum, combining several of these techniques and insights in future work would increase chances for greater results. In addition, by sharing the production process, the artist opens up the project’s generativity for others to apply them in other works and continue explorations on the technique.

### Fault and Glitch Aesthetics

In our work, we find the way results appear intriguing. The first experiments were made by accident. In the process, the artist has to somehow capture the moment and that particular glitch unintentionally. It just happens. It is to some extent to appropriate the technical fault, malfunctioning or error, for one’s artistic pursuits. The results pursued from this unintentional process we call *fault aesthetics*. *Glitch aesthetics* is related to design and craft practices in a slightly different way, where the artist focuses on a particular technique by knowing it in advance, and by incorporating the scenario, the scene and the view into the production process. However, here is no dichotomy in the process of the two contrasting aesthetic values; everything comes merged in an assemblage with an attitude of a concept of rhizome. So, in all cases, it is important how chance is involved in the immediate processes of photographic image production, which also involves a passive and an active approach towards the glitch practices.

It is also important to mention that both fault and glitch aesthetics come together. One is that there is no sharp division between the two in the production process; both intertwine and overlap. Secondly, they merge together in the result, and it is impossible to notice which part of the work is generated by technological fault, mistake, and failure, and which is produced with a more deliberate involvement of a creator.



Figure 10. In these images, the composition is made in a selective way and distributed through several uses of the camera; in particular spots, the “broken” hack-uses were applied, while, in the rest of the image, an ordinary use of the panorama camera was used. In the images with the Supertrees the emphasis is on the trees and redirecting the viewers focus on them and their new designs, the trees get multiplied, the environment as artificial clouds get generated by the unorthodox use of the app. Singapore, 2016.

### Discussion

In this work we engage in creating visual narratives in our daily lives, to the extent that storytelling is an important instrument for creating strong concepts [10] and designs. From another perspective, storyforming is

a way to enrich a design object with narratives and meaningful experiences [1], which might come from the broken panoramic image as a sketch and fulfill its aims in the shape of an interactive prototype.



Figure 11. Creating various atmospheres with glitches, in this picture the vertical lines created by glitch look like falling rain, however, it was no rain at that day. Malaysia, 2015.

The presented technique is related to interaction with technology through the usage-hacking of everyday technologies in our daily lives. Another aspect in the process is the glitch approach, which is related to design through creating *glitch aesthetics*. The glitch creative process, however, is relatively connected to improvisation and brings chance into design and HCI.

This pictorial and project presentation has a direct relation to HCI and shows generalized tactics by which the same results could be reached. In a way, our work is an opening of a design space in several proposed directions. We tried to emphasize some of the qualities of the specificity of the technique, which appear in relation to capturing a passing time and space.

Through working with "Panorama Time" and the proposed technique, the usage-hacking approach

discussed here turns the view into a broken panorama. We show how we can draw on such practices to inspire design processes from the hacking of everyday technology.

Through sketching alternative realities, the project offers the community some benefits of adopting these kinds of techniques as ways of promoting reflection or critique of current situations and environments. Such techniques could also be integrated into a cultural probe type investigation for designers to use as a design probe: panoramic camera with its unorthodox use for enabling new designs.

We want to engage people to use their everyday technologies for creative activities and sketch alternative realities, and also to make use of them in order to create substantially new results, which might

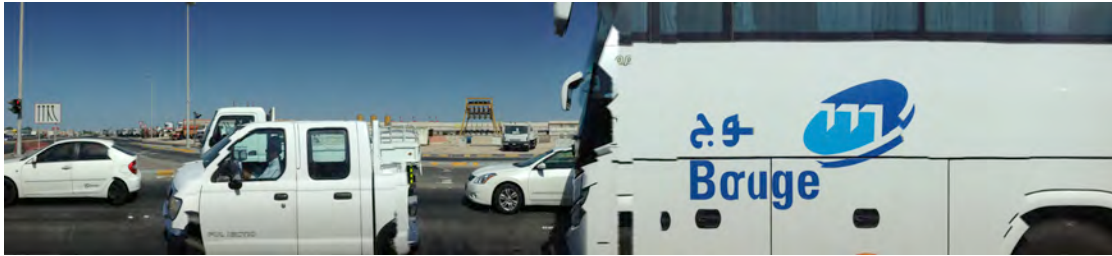


Figure 12. The technique used to break text and create distorted combinations into new signs. Sketching as a way of inspiration for graphic designers.

be inspirational for other fields as well. Firstly, the process is important in regard to creating substantial outcomes, which could take a sketching path. Secondly, by exposing the process and its generality, both the process and the results become inspirations for designers in creating their own projects and provide implications for HCI. Thirdly, the visuality in those images stands by its own right and is an art project in itself.

The readers might find more value in a presentation that includes implications for practice, but this paper and its presentation does not have such an aim, although it tries to allow readers to make their own connections to the techniques or to simply enjoy as an open-ended provocation. Beyond what has already been said, we might find direct implications on the mobile camera and panoramic app itself by implementing the insights in the app. Those instances might prove to be an easy way of generating glitches, for example, without even making the camera shake or applying different motions and have a more consistent interaction. The different direction of a rolling shutter,

the thickness of the stitching line and other parameters could implicate the way we see and use our panoramic cameras. The other design improvement could be implementation of the endless image of the panorama, which might bring an endless enjoyment of the process and generate numerous various situations in an infinite manner.

The sketching approach of working with such technique might bring us to a more direct designing and form-making, as in Figures 8 and 12 – the photograph “Concept Cars” suggest us unreal new designs to reimage the existing ones or dive deeper into speculations of alternative realities. Another example, by glitching the text we might capture an abstract shape, which could bring us to new ideas for a logo (see Figure 12). Those both direct sketching design cases relate to gestalt theory through which it opens up a design space for the designer and suggests multiple interpretations.

Finally, we try to dissolve boundaries between several disciplines involving art, design and artistic activities, which dynamically imply hacking practices and discussions on the technological discourse through several aesthetic perspectives.

### Summary

The pictorial invites artists and designers to engage in hacking new technologies and using them in a way they are not built for. In this particular case, we open the design space for others to engage and create their own narratives. Those narratives could be inspirations or practices of sketching for other design disciplines, including HCI and interaction design.

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