CONNECTING CAMERAS

PUTTING A NEW TWIST ON CONNECTED CONSUMER ELECTRONICS.

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ABSTRACT

Camera makers are now increasingly adding WiFi chips to cameras to make transferring photos to smartphones or computers easier. At the same time this new technology brings on the opportunity to rethink what a connected camera could be and how it might shape our relationship with these devices. As the features in our consumer cameras start to move beyond physical constraints of the device itself, we will rely more on the device's inherent character to make sense of it. Through multiple workshops, experiments, mockups and prototypes I explored a set of alternative characters and concepts for our digital consumer cameras and ultimately give an example of how a playful camera might inspire us to look at ourselves and the world around us with new eyes.
**PERSONAL GOAL**

As somebody who comes from the world of software, this project was an opportunity to explore what it means to design a connected device. Of course, outside of design school this type of project would involve a team of people with backgrounds in industrial, interaction, visual, sound and business design and from disciplines such as engineering, electronics and software. Even though I will only get to touch the very surface of all of these areas, my goal was to experience some of these challenges and considerations first hand in order to better understand and empathise with the different tasks involved. This project also represents an opportunity for me to step beyond the design of software and interfaces and start considering how physical objects are designed, prototyped, made and used.

**INTRODUCTION**

The following paragraphs introduce the motivation for taking a new approach to designing connected cameras and gives an overview of relevant academic research and commercial projects.

**DESIGNING CONNECTED DEVICES**

The term connected device or smart device – meaning a device embedded with processors, sensors and software that allows data to be exchanged between products or systems (“Smart, connected products”, 2016) – has been gaining popularity alongside the rise of the Internet of Things. Companies big and small are working on realising Mark Weiser’s idea of the “Computer of the 21st Century” (Weiser, 1991) where essentially “anything that can be connected to the Internet, will be” (Wroblewski, 2012). McKinsey’s analysts are expecting the Internet of Things to generate up to $11.1 trillion a year in economic value by 2025 (Manyika et al, 2015) while the number devices linking up to the Internet is expected to quintuple within the same time frame (Bradley, Barber, and Handler, 2013). After a first wave of failed devices, it is increasingly becoming clear that adding wireless connectivity and a supplementing smartphone app tends to introduce more complexity – paradoxically, requiring more work on the users part. Instead, companies are now realising that connecting a device to the Internet requires rethinking how it works and what it does. This will require interaction and product designers to work together to come up with connected devices that live up to their potential. Unfortunately, it seems nobody really knows how to do that yet. For now, the best approach might just be to learn by designing such a device firsthand. Hence, this project will describe the process and learnings of one such attempt to rethink a very specific product category: consumer cameras.
ABOVE: HOLGA ANALOG FILM CAMERAS, © LOMOGRAPHY

SONY CONNECTED CAMERA APP THAT TRANSFERS PHOTOS TO SMARTPHONE

TOP: STEVE SASSON’S DIGITAL CAMERA PROTOTYPE (1975), © GEORGE EASTMAN HOUSE
BOTTOM: COUNTERFUNCTIONAL CAMERAS THAT NEED TO BE SMASHED TO GAIN ACCESS TO THE MEMORY CARD, © JAMES PIERCE AND ERIC PAULOS
Cameras have long been at the forefront of the computing revolution. While their physical form has had 150 years to mature - their digital interfaces are just a couple of decades old. When Steve Sasson invented the first digital camera in 1975 (Zhang, 2010) – more than a decade before Bill Moggridge and Bill Verplank coined the term ‘Interaction Design’ – he most likely could not have foreseen how much his invention would change the camera industry. Today, one would be hard pressed to find somebody who does not own a device capable to record images or videos.

Software has not only changed how we record the world around us, but also how we experience and preserve our photos and videos. This new complexity has also made for an interesting design challenge: how to best marry the analog controls on the camera with the digital controls on the screen. This is particularly difficult because digital interfaces often can overpower their analog counterparts - as Alan Cooper rhetorically asked in “The Inmates are running the Asylum”; “what do you get when you cross a computer with a camera? A computer!” (Cooper, 1999). The goal is to find that balance where form and digital interface exist in an equilibrium.

When designing a camera interface, Interaction designers today face a more options than ever before. Should the camera settings be controlled by a joystick or a jog wheel? Which action warrants a physical button? Does it make sense to relegate all actions to a touch-screen, a supporting app or even a voice interface? And the extent of these challenges becomes obvious when considering that today’s cameras have features that number in the hundreds - i.e. the top selling consumer camera on Amazon, the Nikon Coolpix L340 (“Best Sellers in Digital Point & Shoot Cameras”, n.d.), comes with a manual with 120 pages.

Janlert and Stolterman recognised that things, too, “appear to have character—high-level attributes that help us understand and relate to them” (Janlert, Stolterman, 1997). They make a point that designers ought to pay more attention to the completeness and coherence of characteristics - and especially so for complex ‘computer artefacts’. The less we can understand a smart thing’s inner workings and reasonings - the more important it is for designers to consider the objects character as a means for users to understand and relate to its actions. In connected products this is becoming even more important as users reach services and functionality that is no longer constrained to the physical device itself - or is even under the control of the designer. Another consequence of this is that an object’s characteristics might now suddenly be split between multiple devices in different locations.

This raises the question of how the character ought to be designed: what tone should the camera take? How chatty is it? How ‘loud’ is it? And does that change with the context of use? These are just some of the new questions that designers of a connected device might need to find answers for. If technology can indeed “both invite and inhibit human action, and amplify or reduce human perception” (Verbeek, 2005), then what actions are cameras currently inviting, what are they inhibiting and which actions could they encourage if they had a very different character?

DESIGNING DIGITAL LIMITATIONS

Previous work in the field of Interaction Design research offers some fresh approaches. Pierce and Paulos’ (2015) work on counter functional cameras argues that technology has given users an abundance of possibilities and that its the designers role to purposefully design digital limitations. While the idea of limitations is often used in a negative way, they believe that it may also serve as an enabler for new, exiting and strange experiences with everyday objects. They describe this process as designing counter functional objects – “a design-oriented concept of creating new functionality by inhibiting or removing common or expected features of a technology” (Pierce and Paulos, 2015). For example, their Obscura 1C concept camera purposefully inhibits access to the recorded media by encasing the camera in solid concrete. To review the media, users need to physically smash the concrete enclosure. Because of its inherent limitation, the entire product is designed to evoke a digital experience around uncertainty, patience and surprise. In their work, Pierce and Paulos focussed primarily on limiting a cameras secondary functions – e.g. reviewing photos – but it is interesting to consider what would happen if their idea of counter functional design stretched to the main purpose of a device itself. What if taking photos or videos was not the most important thing a camera enables?

AESTHETIC INTERACTIONS

Joep Frens’ (2006) work on rich interactions argues that aesthetics do not have to stand in opposition to usability - as long as “from the start both usability (ergonomics/human factors) and aesthetics are used as criteria for form, interaction, and function combination.” He defines aesthetic interactions as “how they impress the senses during interaction” (Frens, 2006). In order for an interaction to be perceived as aesthetic, Frens argues that three things need to be met: the product ought to be usable enough so that the user isn’t frustrated; the product offers expressive interactions at a human scale; and that other forms of aesthetics (i.e. appearance, context and narrative) are being considered. To ensure that all three aspects can be considered within the scope of this project, a constraint is introduced to focus on specific moments before and after a photograph is taken.

THE CAMERA MARKET

The consumer photography market is currently going through some of its biggest changes since the digital revolution. Smartphones have long replaced point and shoot and DSLR cameras as the most popular cameras (“Most Popular Cameras in the Flickr Community”, n.d.). Tellingly, the last three big consumer photography and videography trends have all originated on the smartphone: Instagram made photo editing trivially simple by allowing people to add digital filters to their images, Vine made it easy to share 5 second looping video clips, and Snapchat introduced the idea of ephemeral photos as a means of communication.

This pressure has led startups to reimagining the consumer camera for new contexts and are challenging the relationships we have with them. The rise of the GoPro action camera - which does not feature a display at all - points towards miniaturisation and specialisation of camera technology. The Lytro Illum Light Field Camera introduced a new way of capturing image information, ultimately allowing photographers to refocus their photographs after they were taken, essentially asking the question of when a photograph is actually taken. The Narrative Clip is an almost coin-sized clip-on camera that records photos in half an hour intervals. In doing so it is literally a camera that doesn’t need a photographer.

ANALOG RENAISSANCE

At the same time the industry’s focus on digital technology has also brought to light a counter movement - an analog renaissance of sorts. Recently, Kodak revived its Super 8 business with the support of notable film directors. The Lomography movement, which counts more than a million followers around the world (“What the Hell is Lomography”, n.d.), has been reviving the idea of using distinctly low-tech cameras to move away from the crisp and polished images that modern digital cameras take. The Holga camera is a low-cost medium format camera made of plastic that is popular amongst those looking into creative and experimental film photography. It has also accrued a following because of its tendency to produce a distinct look that includes light leaks and vignetting.
This serves as a reminder that there is still value in the unpredictability, the surprise and the tangible that slabs of glass, chips and software have not replaced. While Instagram offers a way for us to add nostalgia-filters onto our photographs, there is a bigger question of what happens when digital photography is not about ‘best’ or ‘most accurate’ photograph. What is the true digital equivalent of the Holga camera?

**PROJECT GOAL**

Designing a connected device from the ground up represents an opportunity to rethink the main function of the device itself alongside new software and services that are built to support it. As the features in our consumer cameras start to move beyond physical constraints of the device itself, we will rely more on the device’s inherent character to make sense of it. This project will look at what alternative characters near future digital consumer cameras might adopt and how these new characters might influence how we use cameras.

The final result shall be a provocation of what such ‘characterful’ camera might be and hopefully inspire designers to create compelling, understandable and consistent characters in other product categories as well. In order to get to that point the project scope will prioritize the moments before and after a photograph is taken over the mechanics used to take photos. It is also important to note that the term ‘character’ here describes the set of characteristics a device might illicit and should not be confused with giving the device a personality (or an artificial intelligence).
EXPLORING THE DESIGN SPACE

UNDERSTANDING WHAT IS - SURVEY
In order to come up with alternate characters for digital cameras, I first needed to understand what we understand a camera to be, what characters we currently ascribe to them, and when we feel let down by them. To do so I disseminated a survey amongst the students and staff at Umeå Institute of Design and in various social networks. The survey asked participants ten open ended questions about their experiences with their camera. A total of 47 people participated within the first 3 days. A majority of people see their camera as an instrument to capture moments and share them with family or friends. It is seen as way of documenting, of remembering events or things for the future. Even though most respondents are likely to work in a creative field, very few respondents pointed out they used their camera as a means to create, to experiment or to express themselves.

Most respondents had no difficulty ascribing a character to their camera - and the cast of characters was almost as many as there are camera models. A common theme were characters that held a position of authority, but were difficult to communicate with (e.g. “a stubborn little state official that doesn’t speak my language”, “more knowledgeable than I can understand, but also really doesn’t get what I am trying to do”). These communication difficulties manifested themselves in different ways. For some this meant that photos often came out noisy or blurry while for two participants the consequences were more severe: two participants had a story around trying to change the aspect ratio of their photos by using the ‘format’ action, which counterintuitively erased all their photos. Other respondents mentioned that their camera ran out battery or space to store photographs or that they did not understand how to properly use their cameras settings. Some wished that their camera were “better at sorting the pictures out” or helped them find the best photographs.

WHAT MIGHT BE - WORKSHOP
Consumer camera’s are inherently familiar devices – everybody has a preconceived notion of what it is and what it does. While that might make the final concept more reliable, it also poses the danger of not considering enough alternatives in the design process. In order to broaden my own perspective and explore possible futures for the consumer camera, I held multiple ideation workshops with a total of 22 design students with different nationalities and professional backgrounds.

After a quick verbal presentation of the project, participants were asked to imagine what a future connected camera might be. A couple of inspirational prompts were prepared (e.g. ‘consider a day in the life of a camera’, ‘consider what happens if the camera had a community setting’ and ‘consider what happens before and after the moment of recording’). After a quick warm up brainstorm exercise – Crazy Rights according to Knapp (2012) – participants were given approximately forty minutes to make a physical representation of their favourite idea (using pre-made paper templates). Finally, they were asked write a fictional Amazon review of their concept.

The workshop resulted in 162 quick concept sketches and 24 more detailed paper camera mockups. There were agentive and assistive camera concepts that acted on their own behalf or helped guide the user to take better photographs. There were cameras that were contextually aware, or those that recorded more modalities than just video and sound. There were anthropomorphic cameras that each had their own personality, or even cameras that stole material from other things in their surroundings. And there were collaborative cameras that went beyond just one photographer. A basic framework was derived to categorise the concepts (see Appendix).

After reflecting on the resulting concepts and an initial brainstorming session, I decided to pick the the most interesting camera ‘characters’ to move forward with. They were:

- The Camera that teaches: what if a camera could guide its owner become a better photographer?
- The Camera that shares: what if a camera could encourage more people to share their work with others?
- The Camera that remixes: what if a camera could find surprising ways to interpret recorded material in new ways?

A CAMERA THAT TEACHES - INTERVIEWS
Of the three project directions, one merited some immediate further exploration. When considering which camera to buy, we are often presented with beautiful photography – whether that travel, adventure or portrait photography. This marketing of course point out what is possible to achieve with that particular equipment. But as soon as the device is bought, the user is left with a user manual essentially telling them how to figure out how to use the camera on their own.

To validate how a camera might do that, I decided to conduct multiple unstructured interviews with subject
CAMERAS THAT ARE:
AGENTIVE, ASSISTIVE, CONTEXTUALLY AWARE, MULTI-MODAL, COLLABORATIVE, ANTHROPOMORPHIC, KLEPTOMANIC, AND CREATIVE.

The “Pet Camera” has a personality of its own—one that encourages its owner to take certain kinds photographs or buy accessories to keep it happy.

The “Ultimate Event Compilation Camera and Video Editor” allows users to source public videos from social networks and remixes them in Tarantino, Scorsese or Spielberg style.

The “Wind-Up Camera” is great for people who record too much material, because like a Super8 camera it needs to be rewound every time its been used.

The “Dispose-Kam, Pair it - Push it - Share it” is a digital disposable camera for events like weddings that people use to record their perspective of the event and then shares it with all participants.

IDEATION WORKSHOP PAPER CAMERA MOCKUPS
I approached a total of 12 strangers at the Umeå University main campus library and at the local cafeteria and involved them in 5–10 minute discussions on their opinion/first impressions. Since the audience for the proposed camera are amateur photographers, no special attention was paid to finding participants with a particular skill set. Reactions to the mock-ups were generally mixed and the discussion that followed the intercept were not as rich as I had hoped for. However, most people were most interested by the provocation that the camera might inspire them to take photos. For instance, one participant stated that “this is actually a really great idea, because it helps people get over the first and biggest hurdle and I know that artists are often looking to involve the public.”

This was particularly interesting because only 2 out of 12 participants described themselves as being creative.

A study by Adobe (2012) on the global creativity gap shows that this might be a true on a larger scale as well. Many plainly mentioned that “photography is just not for me,” or that they lacked inspiration to get started. Multiple other participants stated similar things, so I took this as a clue to explore this direction further.

**HOW TO INSPIRE? – APP PROTOTYPE**

After deciding to take the idea of a camera that inspires its owners to use it in new ways further the big question is of course how that might be accomplished. One approach often seen in mobile apps is the use of notifications as triggers for action. So in order to explore how people might react to such a device, I decided to develop a small iPhone app prototype (it would have been too time and cost-prohibitive to develop multiple functioning camera prototypes to hand out to people).

The experiment ran for a total of six days and involved 14 test users from the Umeå Institute of Design Interaction Design MFA, Advanced Product Design MFA and Industrial Design Intensive programmes. The purpose of the app was to send one push-notification per day that contained a different challenge for each message. Participants then had 24 hours to complete that task. The recorded photographs or videos were then directly uploaded to a server. The challenges were staggered in perceived effort so that it would get progressively more difficult to perform each challenge. For example, challenges included (in order): taking a selfie, recording a video of the sky outside, recording a stranger and to finally record themselves speaking directly to the camera giving feedback about the app.

After the experiment ended, participants were asked to discuss their experience in a quick 10 minute follow-up interview and were rewarded with Swedish “Fika” (Wenzer, 2010).

The results of the experiment were discouraging: even though the primary goal was not to complete all challenges, only two of the 14 participants held on to the last day. Most participants dropped off after the second or third day and then reported feeling guilty for not submitting enough photos. The reason given was that the notifications felt like a reminder of one more thing to worry about doing each day. Additionally, participants said that the notifications interrupted their daily schedule, which they felt made them less likely to contribute at all. Participants also lamented a lack of context of why they were recording the material in the first place and where it would end up – and wanted to see what other people submitted.

On the positive side, some participants really liked the community aspect of the experiment, remarking that it was interesting to see others get involved from afar. The findings also point to not integrating a connected object’s requests into a channel where people are already flooded with other services fighting for their attention. It seems that a gentle nudge, which can go unnoticed easily, might be more appropriate in this case. Reflecting on the experiment I also noticed that desired characteristics of the prototype were not really considered and therefore resembled ‘a dumb shiny black rectangle that is telling me what to do’. I do believe that by carefully crafting a cameras character to purposefully communicate a certain playfulness will already make a big difference in how these challenges are being perceived, because “purposefully defining expectations in a playful way can often lead to a better experience, snapping people out of their everyday routine to surprise and delight them in some small way.” (King and Chang, 2016)

**OTHER PEOPLE’S CONTENT?**

In the previous prototype (see above) a couple of simple prompts where used in order to see if participants would engage with them. Of course different people would consider very different things to be inspiring - which would mean coming up with a large quantity of inspiring questions is a large challenge in itself. One way of approaching this is to open up both responding to challenges as well as creating challenges to the community.

This is nothing new, many very successful crowdsourcing platforms work exactly in this way. What would need to be validated is if the material generated by the camera owners is interesting to anybody but themselves. To answer that question I had conducted a different experiment earlier in the project.

To do so I paid 50 members of Amazon’s Mechanical Turk crowdsourcing platform to submit a video of themselves answering an emotional question using whatever camera they had at hand. I then manually edited the responses into one video that highlighted the diversity of people around the world answering the same question.

While the process of editing the videos, handling the submissions through email and dealing Amazon’s web application was quite cumbersome, it provided
THIS HELPS PEOPLE GET OVER THE BIGGEST HURDLE: GETTING STARTED.

PHOTOGRAPHY IS JUST NOT FOR PEOPLE LIKE ME

TOP: A COUPLE OF PARTICIPANTS IN UMEÅ UNIVERSITY LIBRARY

TOP: 8 OF THE 14 DESIGN STUDENTS PARTICIPATING IN THE 7 DAY EXPERIMENT

BOTTOM: THE PROTOTYPE APP DISTRIBUTED TO THE STUDENTS
DESIGN A CAMERA THAT EMPOWERS NOVICES TO REDISCOVER THEIR CREATIVE SIDE BY CONNECTING THEM TO THOSE LOOKING FOR CROWDSOURCED CONTENT.

The previous sections described some of the methodologies I have used to whittle down the large design space that is connected cameras. In doing so, I’ve explored different characters for near-future connected cameras in workshops and then got early feedback on what might resonate using different mockups and prototypes. These activities have given me the confidence to move ahead with a concept for a connected camera that inspires its owners to use their cameras in new ways. One property of the Internet is of course that it makes it easy for people to connect to each other – opening up the opportunity that an Internet connected camera might lead people to take more photographs together rather than alone.

The main target group for the concept device will be beginners that do not describe themselves as being artistic, but are looking to get into touch with their creative side. This opportunity was discovered during the guerilla testing (see ‘Early Validation – Mock-Ups’) with people outside of the design school and is backed up by work done by Adobe (2012). I found that although there was a general interest in being more ‘creative’, there was a lack of knowing where to start. This is not something that our digital cameras concern themselves with. However, as the workshop results show (see ‘What Might Be – Workshop’), cameras could potentially be designed differently to invite curiosity, exploration and creativity as part of documenting the world with others.

The manner in which the camera could do that is twofold: first, by ensuring its form and digital interface will communicate a playful character that invites people to help people get started using crowdsourced ‘challenges’. The direction of the crowdsourced challenges came from the Amazon Turk experiment (see ‘Other People’s Content’) that showed that people could be convinced to share stories about themselves or their environment through a basic prompt. In that particular experiment, the participants received a monetary compensation for their involvement. The unproven premise here is that if using a particular product/service system is seen as fun, then the monetary incentive may no longer be necessary. The study on what makes people contribute to Wikipedia (Nov, 2007) is an indication that this approach might work.

The camera will also have to be conscious of how people perceive a devices that flat out asks them to do things. The App Prototype feedback (see ‘How to Inspire – App Prototype’) indicated that participants did not like to be reminded about having to do a ‘creative’ task. It also indicated that people were bothered that these notification arrived with equal importance as a friend’s message and were not sensitive to what they were doing at the time. It is therefore important that design of the camera gives people access to potential starting points on their terms – when they feel like picking up the camera. In regards to how challenges ought to be phrased, the crowdsourcing experiment’s open question phrasing (see ‘Other People’s Content’) showed that those types of questions might be better received than a specific task that does not allow for own interpretation (as in ‘How to Inspire – App Prototype’).

Second, to reduce the barriers that people currently face to spontaneous use: uncharged batteries and overflowing storage. This is based on observations that emerged from user interviews, the initial survey (see ‘Understanding What is – Survey’) and the visual material submitted to during the app prototype challenge week (e.g. the challenge ‘where does your camera live’). It turns out that charging the device’s battery requires doing so in advance and is compounded by the fact charger and camera are often not kept together. Also people reported in the survey that they did not enjoy going through the old photos on their camera to delete them – as cameras are not perceived as being designed around the moment of reviewing media.

1. Design a concept camera device that conveys playfulness without being a toy.
2. Offer starting points in form of community challenges.
3. Invite spontaneous use of the camera by making charging and transferring media easy.
4. Elevate reviewing past moments to the same level as recording new media.

CONCLUSION & DESIGN GOALS:

Most of today’s cameras include WiFi chips to make transferring photos easier. The goal of this project was to explore what other behaviours an Internet connected camera might encourage and then to design a concept for such a near future device.

An early proof that such a question based collection might indeed result in interesting results (see Appendix).

The challenge will be in encouraging people to do so. One possible indicator on how to best do that comes from Nov’s research into what makes people contribute their time to Wikipedia shows that while ideological motivations are often reported to be the primary reason, the biggest factor driving contribution was actually whether the activity felt fun to do (Nov, 2007).

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TOP: PROOF OF CONCEPT BUILD OF A WORKING CLOUD-CONNECTED DIGITAL CAMERA USING A RASPBERRY PI

LEFT: EARLY IDEATION SKETCHES
CONCEPT DEVELOPMENT

CHARACTER-DRIVEN DESIGN
The channel of the final concept is finding an appropriate balance between physical and digital interface that communicates the concepts playful undertones. The idea being that people would rather use a fun device than a neutral one. To ensure that the final design actually communicate playfulness and not annoyance, it was important to ground that character in something I could reference throughout the process. I drew inspiration from how writers conceive of their protagonists and decided to write a short character description that served as a reminder of ‘whom’ I wanted to create (see Appendix). With that description in mind, I then looked to other projects that could serve for inspiration for form, interaction, graphic and motion design.

INSPIRATION
A variety of existing work (beyond that mentioned in section ‘Introduction’) was referenced during the creation of the project – some deliberately and some less so. Pages 56 and 57 give an overview of the projects consulted for inspiration and further detail on why these projects were chosen can be found in the appendix. In retrospect and in the interest of transparency, the project ‘Connbox’ by Jones, Bishop and Ludlam (2013) of the design studio BERG was a major influence in terms of their work on reverse skewmorphism. However, during the development of the project that project was not consulted and only discovered during the very last finishing touches on the interface design. That said, their work not only predicates this thesis but also surpasses it in execution.

FORM & INTERACTION
Throughout the final concept development phase there was a constant back on forth on how the camera’s physical form influences the digital interface and vice versa. Given the goal of provoking new ideas on what characters for connected cameras could be – I felt there was potential to purposefully push the boundaries of what we consider a camera interface to be - and potentially introduce a new signature interaction that would separate this concept from other cameras in the market. At the same time, focussing on the moments before and after a photograph is taken allowed for new considerations that would not necessarily be considered by most camera makers.

To kickstart the ideation process I used actuation keywords (Moussette, 2012) to come up various tangible interaction modalities for how we might interact with a camera instead of the established touchscreen + button conventions. The idea behind this that using more tangible interactions would contribute to the perceived character of the camera and ultimately led to more playful interactions that would be perceived as enjoyable.

I drew inspiration from how Super 8 cameras needed to be rewound before every use, or a film camera that needed the film to be wound in before any photos could be taken. Another source of inspiration were the paper mockups resulting from the first research workshop and a sketching workshop conducted with students from the Advanced Product Design MFA programme. After quickly trying a couple of those options and mocking them up using foam, I found that adding a simple handle to the camera body introduced an element of curiosity of what it controls (‘is it a coffee grinder?’) and at the same time signalled that this camera was purposefully different and memorable.

I then took this experiment further to consider how the interface might map to the hardware control itself and the resulting movement the user needs to perform. As the form started to take shape, so did the list of intended features (see Result). That led to considering where controls had to be placed in relation to each other.

The top level interface would be the mode the camera is placed in (off, record photo, record video, review media, community and settings). The ‘handle’ control would then allow users to navigate within the selected mode, select items and toggle between states. Additional buttons on the right side of the screen would allow then allow for shortcuts to specific features applicable across modes and to navigate ‘back’ in the view hierarchy.

Another important aspect was to mitigate the issue people had with how the challenges were presented to them in the prior smartphone app prototype (see Exploring the Design Space). Here the goal was to introduce a non-interruptive way of displaying challenges. In one hardware prototype I included a simple fading LED button that indicated when new material was available – this behaviour is also similar to how BERG’s little printer indicates new content. This way the device had a way to subtly signal from afar that it had something to “say” - without interrupting an existing task. It also doubles as a playful reference to the camera having a light bulb moment. This detail meant that the camera would require a more prominent place in its owners home – and shouldn’t be stored away in a drawer like many researchers did with their other cameras. I solved this problem by introducing a charging dock that would allow the camera to reserve a spot on a desk and at the same time ensure that it’s always charged and ready to go.
TOP: ROUGH FOAM MOCKUPS FOR THE 'TWIST' ACTUATION KEYWORD
BOTTOM LEFT: FORM WORKSHOP WITH STUDENTS FROM THE ID-PROGRAMME
BOTTOM RIGHT: TRYING OUT DIFFERENT CONTROLS

LEFT PAGE: SELECTION OF SKETCHES FOR POTENTIAL INTERACTIONS AND INTERFACE FLOWS
TOP: EARLY RENDERINGS OF THE CAMERA CONCEPT

MIDDLE: EXPERIMENTING WITH DIFFERENT COLOURS AND FINISHINGS

BOTTOM: EXPERIMENTS FOR THE CHARGING DOCK (LEFT) AND MODEL FOR MILLING (LEFT)

TOP: ADAFRUIT BLUFRUIT PROOF OF CONCEPT WITH SWIFT APP

BOTTOM: INTERFACE EXPERIMENTS FOR THE GENERATIVE COLOUR PALETTE AND PARTICLE SYSTEMS
VISUAL DESIGN
In addition to how the digital interface flowed, it was important to consider what it communicated. Again, here I wanted to cycle back to the character description written earlier (e.g. loud and clear) and try and go against conventions. A theme I wanted to play with here was the idea that not only are the challenges novel, but also how the interface looks over time. For that effect I decided to create a generative colour palette that would make each challenge visually stand out from the last one. That meant that the other visual cues were well balanced and presented consistently. The visual variation also made for a striking effect when navigating between challenges (and media). Here the inspiration came from a ‘Rosolde’ that would flip each card over until the end of the stack was reached. To introduce the idea of a community I fell back on an idea by Christoffel Kuenen, who used a swarm of birds as a metaphor for a crowd in a presentation. I then took that idea a little further and integrated a shape based particle system into the interface background to indicate how popular a particular challenge was. That had the side effect of the making the interface feel alive.

PROOF OF CONCEPTS
Part of my personal learning goals for the project was to ensure I would be able to prototype some elements of the final concept. By aiming for a prototype I expected it to help communicate the concept to people not involved in the project during the final exhibition and presentations. At the same time, working with hardware helped me externalise my thoughts early in the process, learn about what was achievable and where potential pitfalls would await. It also had the side effect of making duller project phases a lot more exciting. In total I made two such proof of concepts to determine which technologies stacks I would be able to use for the final model.

The first proof of concept involved using a Raspberry Pi 2 computer, the Raspberry Pi camera module and a 3.5” touch screen. Like an Arduino board, the Raspberry Pi has GPIO pins that can be used to connect buttons, LEDs and other physical controls. The benefit of using these components were that it allowed for a relatively compact form factor. The downside of this approach was it turned out to be difficult to run the prototype on battery power - as the Raspberry Pi, the screen and camera all drew a lot of power. Additionally, programming the user interface turned out to be rather challenging, because of the lack of appropriate graphical user interface frameworks.

The second proof of concept used a combination of an iPhone and an Arduino. It turns out a smartphone combines a high resolution screen, wireless and internet connectivity, a powerful battery, various sensors and a camera in a rather compact form factor. Additionally, the iPhone comes with a rather expansive set of tools to prototype screen graphics and animations. The challenge here was to find a way to connect physical controls to the closed ecosystem of the iPhone. For this an Adafruit Feather Blufruit LE - a miniature Arduino-compatible prototyping board that includes a Bluetooth LE chip was the perfect solution. Unfortunately, Adafruit’s support on how to write custom iOS apps is lacking - which meant that most of the code had to be reverse engineered using Adafruit’s app and Apple’s Bluetooth programming guide (2013).

However it also opened up using Apple’s developer stack to program the interface using their UIKit-framework. Most importantly, this framework already handles touch inputs, animations, particle systems and custom transitions which allowed for a rather quick implementation of the app in less than a week. It also allowed access to the Taptic engine that was used to simulate a ‘knocking’ feedback used when the user selected an item.
How has your neighbourhood or city changed since you first moved in?

Think of ways of expressing what that change means to you.

472 contributions

by Ingrid K. 

Beacons of Gentrification
RESULT

CONCEPT
Globally less than half of us describe ourselves as being creative. One hurdle to creative expression is ‘just’ getting started. This project explored how a camera might invite more of us to explore our own creative expression by sharing our perspective of the world. KOPPLA is a concept of an Internet-connected camera that treats its owners as a creative collective. It’s designed to put a smile on your face.

KOPPLA offers its owners personalised inspirational challenges at the touch of a button. Examples of such starting points might be to look for signs of how their neighbourhood over the country is changing, to ask a friend to describe the stories behind their favourite objects, or even depict the aftermath of a zombie apocalypse in your home town. Challenges come from the creative collective of other KOPPLA owners or from organisations looking for personal perspectives. Material contributed to the collective is then free to be reused by any KOPPLA owner provided they have contributed material of their own. When new challenges are available, the ‘Challenge’ button begins to pulse. If pressed, the camera then displays an animated overlay of all currently available challenges.

KOPPLA owners can contribute photos, videos and stories to a challenge. Stories are a sequence of photos or videos that are narrated. To narrate a single photo, or a series of photos, KOPPLA owners press and hold the ‘Record’ button during the time they are speaking. Stories then show up appended with an autogenerated title card in the review screen.
KOPPLA also reduces barriers to spontaneous use, making sure the camera is in plain view, charged and ready to go. When KOPPLA is placed on its charging dock, it automatically offloads photographs to the cloud, only keeping favourite photos on the device itself. Favourite photos are marked as such by navigating to that particular photo (or video) and pressing the ‘Favourite’ shortcut button.

As there are increasing privacy concerns surrounding devices connected to the Internet, KOPPLA makes it whimsically obvious when its connecting to the World Wide Web. When doing so, its ‘handle’ will start rotating for the duration of the connection.

KOPPLA’s entire digital interface centers around rotating the ‘handle’ control on the device side. It’s used to navigate forward and backwards through photos, challenges and menus. Selecting an individual item or bringing up its contextual menu is done by depressing the ‘handle’ control. To return to a previous screen, the ‘Back’ shortcut button will take users to the last viewed item in the camera’s current mode.

KOPPLA aims to provoke new ideas for what the industry considers a connected camera to be. In that sense, as a connecting rather than connected camera, KOPPLA aims to go beyond offloading photographs to a smartphone or the Internet – instead connecting its owners to new places, people and ideas.

**EXHIBITION**
KOPPLA was exhibited at the UID16 Degree Show from June 1st - June 10th. The exhibition included a poster, the final prototype and a video (accessible at https://vimeo.com/184698691 password: umeasyndrome) and was open to the general public. During the Degree Show event, the project was also pitched to numerous representatives and UID alumni. That pitch can be viewed on Umeå Institute of Design’s website.
UID6 DEGREE SHOW EXHIBITION STAND
UMEÅ ARTS CAMPUS, 2016

PROJECT VIDEO
https://vimeo.com/184698691 (pw: umeasyndrome)
A degree project in the field of Interaction Design, “the practice of designing interactive digital products, environments, systems, and services.” (Interaction design, 2016) represented the opportunity to further discover where in particular my interests lie and to expand my skills in areas of the practice that I have not gotten the chance to involve myself with during the MFA’s regular curriculum. It is also an opportunity to consider where this fast changing field might be moving to next.

Since joining the programme in mid 2013, I have been fascinated by the idea of a post-screen world – by the promise of more tangible and ambient interfaces. However, throughout my studies and internships I have also had to come to understand that tangibility often also comes at a cost – designing every object to have the perceived simplicity as a hammer begets a large toolshed. Instead what we ought to strive for is an appropriate balance between what can live digitally and what can be expressed physically. If we can successfully strike that balance, and go beyond what is merely usable and functional, we can design experiences with objects or services that have a measurable impact on people’s lives – one that may even be behaviour changing. This is the great promise of designing truly great ‘connected products’. But in order to do that, one needs an understanding of both worlds - the physical and digital.

King and Chang (2016) argue that we have reached a point the point where any product or service could manifest itself digitally or physically – where the choice of medium is no longer dominated by the technology used. It strikes me that if we as interaction designers are serious about stepping out of two dimensional world of screens then our involvement should go beyond laser-cut boxes and consider some of the principles industrial designers traditionally have concerned themselves with for the last century. In a nutshell, this is precisely what I was aiming to explore over the past 18 weeks – even though I had little prior education in the discipline.

Looking back I feel this degree project has given me plenty of opportunity to expand my skill set. For the first time I’ve faced a truly open design space on my own and had to devise a strategy to whittle it down to something achievable within the constraints of the project. Not all of my methodologies produced the outcomes I had hoped for – nor did always give me the necessary confidence to move ahead. But by learning to embrace ambiguity of the design process and trust myself to find a way, I feel like I’ve been able to learn a lot about how I think and work as a designer.

Then, the project has given me the opportunity to consider how an object conveys a specific character. This meant figuring out how I might go about ensuring that these ideal characteristics would come across consistently on different levels (form, interaction and visuals). Of course, this also meant I got to familiarise myself with some of the tools and techniques industrial design concerns itself with. I got to delve into 3D modelling and could explore with rapid manufacturing techniques.

Of course there are larger questions at play as well for which I have not found answers for. What happens to these products when their services stop being supported? What are the unintended consequences of encouraging creativity in unsuitable contexts? And what are we to do if all our future consumer products start nudging us to change our lives?

Given the massive scope of the project there are of course many things I would reconsider. I lay no claim to the fact that the form of the camera is particularly well designed (e.g. from a perspective of ergonomics), nor can I claim that every detail in the digital interface is considered. I would have loved to delve deeper into designing all kind of fun sounds that would support the interface, or even work on the physical prototype more. But that was always going to be the nature of the project – an overview of what it takes to design a connected object. I step away from this work with a new respect towards the amount of work that it takes to decide to even put a concept forward – without even thinking about what it would take to bring this product to market.

At the same time I hope to approach new tasks with the same enthusiasm and curiosity to approach things head on and with a focus on making as I’ve shown throughout the last 18 weeks. So even though individual elements could be refined further, I feel like I’ve adequately demonstrated my skills as a professional designer.

Umeå, June 6th 2016
Kevin Gaunt
KOPPLA PROTOTYPE PLACED IN CHARGING DOCK ON A SHELF
UMEÅ ARTS CAMPUS, 2016
THANK YOU

This project would not have been possible without the help of the following people:

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- Madyana Torres de Souza
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- Joakim Bergbom
- Chris Zobl

and many more students and staff from Umeå Institute of Design, as well as numerous friends and strangers who never grew tired of lending a helping hand.

Thank you!

APPENDIX

CAMERA CHARACTER DESCRIPTION

This camera is not like the others. It’s a bit of an outsider, a bit of a dreamer. It decided early on that it will not compare itself with the megapixels and the other tech mumble jumble that, quite honestly, it doesn’t quite understand itself. Nor does it get along well with the analog cameras, it’s just too proud to be digital. But it has other things going for it: a long term memory and an optimistic hunger for new stories. It’s not overly chatty - but has a loud and clear voice when addressed. When other cameras are silently being pushed aside, it confidently stands the ground, constantly preparing itself for the moment when its going to be used. And how could it not be - it’s form almost addicatively inviting to the touch, its naiveté too charming to resist.

FRAMEWORK FOR FUTURE CAMERA CONCEPTS

A basic framework was derived to categorise the concepts resulting from the future camera workshop. Its 5 dimensions were purpose (whether the camera was meant to document something real or explore something new), visibility (whether the recorded material was considered private or public), control (whether the photographer was in control of the camera or whether it acted on its own behalf), perception (whether it was considered to be a playful toy or a robust tool), and finally, personification whether the camera emulated human characteristics or not.
CROWDS SOURCED VIDEO EXPERIMENT

Both the results of the initial survey and the interviews indicated that most people thought of their camera in a very personal way – as a device that they alone were in control of. In order to explore alternatives to that expectation, a small filmmaking experiment was conducted. I wanted to find out how people might be able to collaborate making films or other forms of collaborative art together – without having to be present in the same location.

The community chosen for the experiment were the workers of Amazon’s Mechanical Turk crowdsourcing platform - which Amazon calls its Artificial Artificial Intelligence. This choice was motivated by the ease of access to the community and that it hypothetically might broadly represent potential owners of a consumer camera. On Amazon’s platform so-called ‘workers’ – people – usually perform simple tasks that algorithms struggle to automate. Usually these tasks include transcription services, photo processing or data cleaning / verification activities.

For this experiment a single Human-Intelligence-Task (HIT) was set up, in which people were asked to record themselves for 30 seconds answering the question “what do you want to do before you die?” and describe their experience of doing so in a sentence. Participants were compensated with $4 for their submission - and made aware that they had to agree their material to be made available to the public online.

After approximately 48 hours, 50 Amazon workers mostly from the United States and India participated in the experiment. The quality of the material varied drastically from video to video - some shot on old computer webcams, others on old non-smartphone handsets, and again others on the newest iPhone 6s. Submitting the video proved challenging for many workers, as they often exceeded allowed email attachment quotas and had to divert to using file or video sharing services like Dropbox or YouTube. The submissions were then edited into a short video based on the quotes that had the most impact.

The learnings from this experiment were that it was very much possible to crowdsource the creation of video material on a global scale - but that further work is needed to ensure that it can be done more smoothly than through Amazon’s existing platform. I see the result of the experiment as opening up another interesting question: could the purchase of a camera bring the ticket into a community of camera enthusiasts that might work as a collective to create new material together?

Participants described their experience as mostly positive. Some mentioned that it felt awkward to talk to their camera when nobody else was around - while others even expressed gratitude for getting a chance to reflect on their lives.

- RIGHT TOP: PARTICIPANTS IN AMAZON CROWD SOURCING EXPERIMENT
- RIGHT BOTTOM: USER RESEARCH SYNTHESIS WALL
CONNECTING CAMERAS: PhotoGraphy

DESIGN PRINCIPLES

DEMILITARISE LANGUAGE

Soldiers shoot. Hunters capture. Photographers and videographers create. Refer to a more positive and inclusive language to talk about what we use cameras for.

INCLUDE MOMENTS OF SUSPENSE AND SURPRISE

Bring back some of the delight from before our cameras allowed us to immediately review our results – all good things need some time to develop.

MAKE THE BEST STAND OUT

Even professionals need to force themselves from recording too much material. Let’s make sure our favourites do not get drowned out by too much noise.

MAKE IT EASY FOR PEOPLE TO GET STARTED

The best way to taking better photos or making better films is just to do it more. Practice makes perfect. Sometimes we need a nudge or two to get going, it might lead us to new places.

LET PEOPLE BE CREATIVE ON THEIR OWN TERMS

Let people explore what feels right for them. What one person might consider as a failure, might be a huge success in somebody else’s eyes. Give them a compass not a map.

ENCOURAGE SHARING AND REMIXING

Like most things, great work is more rewarding when it is shared with somebody else. Surprising results happen when allowing other people to build on it.

VIEWING CHALLENGES

To view inspirational challenges, KOPPLA owners can turn their lens to the ‘community’ mode setting, or press the pulsing button to quickly gain access to which new challenges have just been submitted. To flick through the challenges use the handle. To see more details or to submit photos, press once and then select the appropriate submenu.

UNBOXING

Each KOPPLA comes in a personalised box. Owners are not sure what exact colours their KOPPLA will have – and which handle they’ll get (to invite sharing of accessories). Also after unboxing, KOPPLA needs to be assembled – allowing for an immediate first creative success.

VIEWING CHALLENGES

To view inspirational challenges, KOPPLA owners can turn their lens to the ‘community’ mode setting, or press the pulsing button to quickly gain access to which new challenges have just been submitted. To flick through the challenges use the handle. To see more details or to submit photos, press once and then select the appropriate submenu.

TAKING PHOTOS & VIDEOS

Recording photos and videos happens similarly to most point-and-shoot cameras out there. But KOPPLA purposefully offers fewer settings. Instead, KOPPLA owners are asked to judge their photos immediately. If they particularly like it, they are encouraged to press the favourite button. This means that the photo will always be accessible on the device.

FIRST PHOTO

After turning on the camera, KOPPLA immediately gives a selection of three ideas of what your first photo could be (e.g. take a photo of the camera that I am replacing). This action reinforces the KOPPLA’s main raison d’être. Photos can optionally be shared with the KOPPLA website.

THE LISTENING PROJECT

Record a conversation with a close friend about their favourite possession. Make sure to ask them why and try and record the entire conversation either as a video or as a series of photographs.

10 more Remind me later
KEY KOPPLA OWNERSHIP MOMENTS (2 OF 2)

REVIEWING / NARRATING
KOPPLA makes it fun to review photos on the device itself or on any connected television. Either sequentially browse through all photos or search for a specific moment using the voice interface. KOPPLA also makes it easy to create a short narrated video while reviewing photos and videos by holding the narrate button while viewing media.

SUBMITTING
Users submit media to a challenge of their choice they’ve taken directly from the camera. Submitting media gives access to the material other members have published (which then may be used by the collective).

CHARGING / UPLOADING
KOPPLA immediately starts charging when placed on its charging dock - if new photos or videos are available then it also starts uploading the photographs to its private cloud service or a service of the owners choice. While uploading KOPPLA’s handle spins to clearly indicate what it is doing. After some time, KOPPLA will then automatically disconnect itself from the network.
BERG’s Little Printer manages to convey optimism, warmth and cuteness using a really simple shape. The product feels very honest and almost minimalistic to its purpose - printing messages on receipt paper – yet it adds a couple of elements that make it that much more charming: the legs that are used as stands to angle the device slightly, or the glowing LED that signify that new messages are awaiting printing.

The work done by Teenage Engineering on their OP-1 synthesiser serves a nice example of how audio equipment does not have to look like all other audio equipment. It too uses simple shapes and finger friendly controls come across both neutral and playful. Their digital interface forgoes showing detailed numbers or data for a much more literal, and whimsical visualisation of its effects (e.g. a cow’s stomach). From a sound perspective, it has a fantastic tape rewind sound that is both skewmorphic and yet feels appropriate to the device. On the whole it shows that a high quality product does not have to be all that serious.

The digital crown on the Apple Watch is another great example for a control that feels at home on a watch, yet is incredibly fun to play with - whether that be to actually use the device or just to unconsciously.

Google’s Material Design Guidelines offers a good starting point for the visual design. I liked that most of the interface elements are kept relatively simple, and yet once ‘activated’ suddenly transition in delightful animations that seem to evoke having weight and inertia.
## Project Schedule

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**January:**
- Project Kickoff Prep.
- Research Prep.

**February:**
- Ideation
- Interaction 16 Helsinki

**March:**
- Presentation Prep.
- Halfway Presentations
- Validation

**April:**
- Model Making + Prototyping + Concept Refinement
- Test Week
- Softcopy Report Deadline

**May:**
- Exam Prep., Video and Photos
- Examination

**June:**
- Degree Show Preparation
- Degree Show