

«We're not sure what it is about drawing machines that fascinates us so, but judging from the relative frequency we come across these things, it seems we're not alone in our obsession»

Julia Kaganskiy, the creators project¹

1

I want to create a drawing machine

I was quite sure that I want to create a drawing machine for my diploma project. A robot that draws something on a surface. Some of my conviction got lost when I started to research and found the big amount of these art-bots that exist out there.

What is fascinating about these machines? What questions do they pose? What drives people to create them? How would my model look like? These questions I wanted to explore.

Drawing machine?

By drawing machines I mean all the robots, automates and applications that create drawings. I don't mean tools that help people to draw better, but machines that outsource the act of drawing. Machines that have a creative influence on the result.

Some of them function like printers, reproducing in their own way whatever input you give them, others create exclusively their own artwork.



Dürers perspective machine: No drawing machine in my sense. It is an aid to draw, but does not create itself.



Pen: No, for the same reason.



#3

Robert Howsares «Drawing apparatus»: Yes, it does create something on its own.

They come in many forms



#4 Opensource Kit



#5 Purely analog high-tech



#6 Blood as ink



#7 Spray can as printhead



#8 Purely digital



#9 As a display



#10 Paintball rifle as printer



#11 To write an infinite loop of signatures



#12 To draw random lines



#13 As the second career of a World War 2 bombsight computer

Β.

Reasons to draw

What is drawing anyway?

It's <u>«a form of visual art that makes use of any</u> <u>number of drawing instrument to mark a two-di-</u> <u>mensional medium».</u> ¹

It is one of the oldest forms of human expression that existed long before the written language. Already the ancient cavemen were drawing on their walls. It is not quite clear why they did it, but it shows what a basic need drawing is. It is also one of the most efficient ways to communicate an idea. In the arts, drawing is used to express one's creativity and was long seen as the foundation of an art practice. During my «propedeutique» at least it was still the number one skill to learn. What I like about drawing is

A. that it trains the eye and the consciousness. When you draw something you become truly able to understand the object and you discover much more details in it than if you just look at it.

B. To doodle is also a kind of meditation. Sometimes it brings you to a nice state of mind.



#14 Picasso

My personal motivations are quite in line with the answers I found on a website where people were asked why they draw². Some of the most occurring replies were

- To understand the object you draw
- To appropriate something
- It calms / it's kind of a meditation
- To communicate an idea
- To express something

What does this have to do with drawing machines? Those are all desires that make perfectly sense for humans, but not for robots. The paradox of outsourcing those tasks is one of the interesting aspects of drawing machines. It combines two worlds that don't seem to fit together: Technology and soul. The absurdity of a machine that meditates or tries to express itself is interesting.

Let's have a closer look at some nice examples to find more interesting aspects. The first one leads us 241 years in the past.

2 http://www.quora.com/What-are-some-of-the-reasons-people-draw

С.

Jaquet-Droz Automata

or

The fascination of reproducing the human



^{#15} Jacquet Droz Automata



#16 The draughtsman

Those impressing drawing machines were built in 1774 in Neuchâtel by the Jacquet-Droz family. They are extremely complex dolls that are able to write (the writer) and to draw (the draughtsman).

«The draughtsman works by using a system of cams which code the movements of the hand in two dimensions, plus one to lift the pencil. The automation also moves on his chair, and he periodically blows on the pencil to remove dust.»¹ He is able to draw four different drawings. Although it is the oldest machine I found, it's drawings have the most impressive line-quality. The result looks very natural and it would be very difficult to tell whether they are made by a human or a machine.

«The writer» is even more impressive. He consists of 6,000 pieces and is a programmable writing machine - kind of a mechanic computer. The wheel in his back tells the doll what letter-sequence to write. It can be exchanged to whatever sequence you like. They are still functional and can be seen at the Musée d'Art et d'Histoire of Neuchâtel.

1 http://en.wikipedia.org/wiki/Jaquet-Droz_automata

Unlike most of nowadays drawing machines, Jaquet-Droz automata are quite human looking dolls. Therefore we perceive them not only as drawing machine, but as a reproduction of ourselves. According to art-historian Andres Pardey, the act of drawing was chosen to make clear «I am able to reconstruct a human»². Why are they more fascinating for us than an

inkjet-printer, that does the same thing and is even more complex? It must be partly because we can look at their mechanisms and find out how they function. A complex system that becomes understandable fascinates us. Also the beautiful arrangement of the mechanical parts is already a work of art itself. To watch them turning must be even more attractive.

2 He told me that when I met him. We will come to him later.



#17 The draughtsman's drawings

D.

Tinguelys Métamatics

or

The role of the artist





#19 #20 Métamatic N. 10 at work

Tinguely introduced drawing machines to modern art in 1959. His Métamatics are a series of machines that produce artworks in collaboration with a human. The drawings they create resemble abstract paintings that were popular at this epoch.¹

I liked the simplicity of his creations, the playful looks of the machines and their wild gestures that they are doing when performing. Some of the Métamatics are exhibited at the Tinguely Museum in Basel, so I decided to go there and have a look. I could even get an appointment with Andres Pardey, the vice-president of the museum, to talk with him about the Métamatics and drawing machines in general. At 10h in the morning I was the only visitor in the large museum. One of the Métamatics is right by the entry and can be used by the visitors. I received a coin to put in the machine that gave me the right to let the motor turn for two minutes. You can choose what colors to use, how to mount the paper and the pen. Then you can start and stop the machine by pushing a button. I did my drawing and was surprised how fast the time was over. I wasn't very happy with the output. But when a guy from the security staff told me that people are often disappointed with the result, I started to find it all right. He told me that people expect something original. Because you can define parameters, you see the drawing also as your own creation. But finally it's a very random process.

1

http://en.wikipedia.org/wiki/M%C3%A9tamatic



#21 My Tinguely

Then i could talk with Andres Pardey. He is art historian and was involved in several publications and discussions around the Métamatics.

What is interesting about drawing machines?

Pardey: They pose the question of «What is the artwork?» so precisely. Is it the machine? Or the drawing and the machine is just the producer, the artist? Or is the performance when the drawing is made the actual art-moment? These questions reflect the change of paradigms in the art world; that the artwork isn't a clearly defined piece anymore. Three different artists are involved in a Métamatic-painting: Tinguely, the machine and the visitor. The notion of the author gets dissolved, as well as the idea of the lone artist genie. This concept is made clear by a stamp on the back of each drawing.

PEINTURE EXECUTÉE EN COLLABORATION AVEC «META-MATIC N° .10» DE TINGUELY PAR .MARTIN DATE .02.01.2014 LIEU .BASE

#22 The question of the author

This role of the author question is a very reoccurring theme in modern art. Why is this question so popular?

Because the pursuit for individuality is very characteristic for the 20th century. Before, it was only possible for the richest to be interested in it- everybody else went to fight wars. With the automation of everything individuality became a main subject for normal people. Parallel to this, art questioned this strive constantly. We are looking for individuality in a place with around 7 Mia people, that is completely absurd.

<u>Are Tinguelys machines a critique of industrial-</u> ization?

I wouldn't talk about critique, because art in general doesn't give precise critique. It rather comments than making precise statements. But of course it questions the reality of the technical world. Tinguely started working a long time after the industrialization. He lived in the beginning of the post-industrial time. There was already a consciousness that the mechanical age is over. He was interested in the machine as a producer, as a life-aid that doesn't aid much in the end. Technique and perfection wasn't important for him.

Was he nostalgic then to create such primitive, mechanic machines?

It is more a punk or outlaw attitude. It didn't fit his creative process to be precise, because it would have meant that he had to build slowly. The primitive machine was his medium of expression, that he chose in the fifties and with which he stuck. Like somebody else chooses painting. Just because something has become obsolete doesn't mean that you cannot use it anymore in fine arts. Oil painting is also something that nobody uses anymore excepts art painters. In the past we painted furniture with oil, because there was nothing else. Nowadays it is not a nostalgic turn but just a decision to use it. Or why does anybody still write a symphony for an orchestra? There is no bigger anachronism when you can easily replace the orchestra by synthesizers. That isn't for nostalgic reasons, but because it doesn't have the same effect. You could say writing music nowadays for instruments of the 19th century isn't contemporary. Art doesn't ask if what it uses is contemporary; it uses what it wants to use.

<u>What would Tinguely do today? Would he code?</u> Maybe, maybe he wold also code on a commodore64 if it is more simple.

What is the future of drawing and drawing machines?

Drawing won't disappear. It is such a basic need of us, that we will always continue to do it. And therefore also the confrontation with the mechanic or automated drawing will always happen. In fine arts we still have almost exclusively mechanic drawing machines. And I'm still waiting until an artist brings a really good purely digital drawing machine. I already saw some, but they were all so uninteresting. It's always so predictable what will happen. I'm looking for one where an intelligent interaction with the visitor is happening. (listen MIDs!)

Maybe it is also just per definition not interesting to do a digital drawing machine. Maybe we are already so far away from machines, that an interaction with it is more spectacular than with a screen. But I'm sure that even this process can be made interesting, so that an attractive digital drawing machine could be invented.

End of the interview, thank you Andres Pardey. There were some interesting answers. He didn't find the man-machine relationship very important, but I could find some interesting thoughts about that in the catalog of their exhibition «Kunstmaschinen Maschinenkunst»:

«However cold, unfeeling, monstrous and unpredictable machines sometimes seem to be, they always remain the product of humans»². That means also that no matter how hard we try, we will never succeed to disappear as their authors. There were even more interesting thoughts in that book:

Forced Hedonism

According to the art-historian Justin Hoffmann (not to confuse with Dustin Hoffman), delegating art to machines liberates artists from a forced hedonism or enjoyment, which can be a burden for him³. He is forced to produce individual designs that reflect his soul and to show them to public. The artist is responsible for his creation, but less for the creations of his creation. If you construct a drawing machine to do your work, then the product is not only about yourself anymore.

Should every fame-tortured painter build drawing machines to do their work? Maybe some of them would have lived longer. The downside would be that all their work would lose their initial meanings and automatically thematise the relationship between man and machine.

This might seem unfair, since nearly every artist uses machines in their process. The difference is that they use them as a tool and not as co-author.

Would a machine be able to create a classic painting that moves us? Not in the same way like if a human painted it I would say. Because we see the painting as a product of algorithms and motors and not as the product of a passionate human. Our imagination can't construct a dramatic story around it or feel empathy for a regular computer.

However, if the machine takes human qualities, like Jaquet-Droz automata's, or the computer-woman in the Film «Her» then you could connect to them.

3 «Kunstmaschinen, Maschinenkunst» P. 5



#23 The artist as romantic genius

What we think about the creator makes part of how we see his work. I heard of a painter who likes to tell visitors of his exhibitions that he stays in his morning coat and smokes all day when he paints. Because thats what they want to hear he said. His story makes then part of how they perceive his work.

Do machines have a soul?

Will we still believe in souls when science will have explained every functioning of our body as a series of chemical reactions? And will then robots be the better artists because they have more processing power? Maybe they will be able to produce dramatic pieces. But will they also get goosebumps when looking at the drawings?

Deep questions. When every riddle will be solved, we will at least still have why-questions that we can pose ourselves. Like why do we exist? For robots it's easy to answer. They exist because we created them.

Dörrfelt's Work

or

New Aesthetics

Parallel to the mechanical drawing, there is a whole series of artists/programmers who create generative artworks and use regular printers or plotters as the output device. One representative that I find especially interesting is Matthias Dörrfelt. He is searching for new aesthetics and is a great example of generative art with heart. He creates algorithms that produce cute drawings that imitate the handmade. I admire his work because he brings fresh inputs to generative art, which is dominated by cold colors and wire-frame. He creates interesting contrasts between complex code and simple visuals. Every time he shows a new project I find that he is talented and that I also want to do what he just did. So I'm sure I can learn something from him. Luckily he agreed to give me an interview.



Where does your interest to create drawing machines come from? What are your sources/ inspirations?

Dörrfelt: Using code, randomness & chance to create art is a very satisfying way of working to me. In an interview from 2000 between Hans Ulrich Obrist and Brian Eno, Eno described his process of designing dynamic systems for his work in the following way: "Instead of building a house - which is the way classical symphonic composition saw itself: building a cathedral - instead of doing that it is like designing a seed. You plant it and it grows into something". While Brian Eno's view certainly captures some of the fascination about thinking of a composition as a set of rules rather than a fixed entity, it seems too passive and top down. To me, it is not like designing something and then lean back and watch it develop. Working with randomness is bouncing ideas at eye level. I don't play god and watch my creation unfold as planned. I initiate the process. I watch, I listen. I learn and react. We play.

Looking back at the history of artists working with software, Harold Cohen is probably the most outstanding figure regarding my own work. While many early and contemporary computer artists used code & randomness to detach personality and bias from a work to find supposed objectivity, Cohen treated software as a tool for artistic expression. I am very much in line with that. I am not interested in digital clichés or objectivity. I use randomness as a collaborator to amplify personal bias and expressiveness.



^{#25} Dörrfelts "Weird Faces Study"

<u>What do you seek with algorithmic drawing and</u> why?

When working with software and chance there is a very interesting tension between meticulously engineering a piece of software on the one hand while giving up control on the other hand. It's almost a paradox. To me surprise is the driving force here. John Cage describes this in his lecture Experimental Music from 1957 as "I have become a listener and the music has become something to hear". I don't want to know from the start what the project is going to be in the end. Like John Cage who points out that his use of chance for musical compositions makes each performance as interesting to the composer as to the audience, I want to be surprised a long the way. I want to learn something. I want to be in a dialogue with the work. This is where randomness steps in.



#26

Dörrfelts sketchbook: Doodeling mixed with descriptions of his C++ framework.

Aberbreihenfolge: -Threads - File - System Super Log, Exceptions - App / Window Beriehing - Veyboard / Mouse / HID fortig machen - Hemory Manager - evel hoghing in. Shared Phr. Resources

Did your passion for hand drawing lead to your interest in drawing machines?

I am not sure if it is fair to say that one thing led to the other. I always had an interest in drawing, art and creating things as well as an interest in technical things. The artist in me was always stronger though, so I only seriously started picking up coding when I realized its potential as an artistic tool.

Do you see yourself/your projects as techno-critic or techno-lover?

That is hard to generalize. I like to think of myself as an optimist and despite all the ways in which technology can and has been abused, I believe in the good in man and therefore technology.

What were the most memorable reactions to your algorithmic drawing work?

Happy people cheering up imperfect robots.

Why are you looking for handmade aesthetics in CGI?

I am very critical about separating digital from analog aesthetics. I don't believe in any notion of digital aesthetics. Computers are the most generic tool at our disposal. The aesthetics commonly perceived as digital are symptoms and artifacts of contemporary technology, culture and tech-nostalgia. They are based on the now and yesterday of digital culture but not necessarily the tomorrow and not digital by nature. In times of the retina display where as the name suggests the eye is not even able to see the individual pixel anymore, the pixel merely becomes more than an atom to a canvas: invisible and therefore irrelevant for any aesthetic discourse. As the noticeable artifacts become fewer and fewer, digital media gets closer to becoming the perfect shape-shifter, as generic as its binary nature. As universal to its output as the amino acid is to its DNA or RNA. The digital refuses to be framed. This is what is truly new about the aesthetics of the digital: that there is none. <u>What does it mean for you to create machines</u> that behave like humans?

To me it's a chance to learn a lot about how humans work. We should accept our weirdnesses and flaws and allow technology to overcome the perfectionist expectations we have towards it. We share one space.

What importance has the analog side in your works?

Todays technologies are mostly considered to be tools that fulfill specific tasks. They are practical. In this context surprise is a blemish. Technology is supposed to work as expected. Surprise signals a malfunction, an error or an



#27 "Mechanical Parts" and the fascination of looking at a drawing robot at work

individual not capable of operating the technology. Thus, for most people the relationship between technology and humanity has somewhat of a binary nature. Perfection and speed are attributes usually reserved for technology while emotionality, propensity for error and imperfection are commonly perceived as genuinely human. My recent artworks such as the Weird Faces (2012), I Follow flip-books (2013), Robo Faber's Mechanical Parts (2013) and Weird Second-order Loops (2014) challenge this division by playing with our expectations towards technology. Shouldn't there be a clear distinction between the handmade and the machine-made? No. People tend to categorize too much because it's easy. There is no virtual reality. The vir-

tual is part of the one reality that we live in. I think it's fine if people categorize things if it helps them. Clear distinctions don't exist. There is no black and white, only many shades of

Dörrfelt's Work

gray.



Hands on experience

aka

Hans

I build a little drawing bot from spare parts, because I was tired of only thinking about the topic. A lot of things got clearer when I started to do drawings with it.

What do I like about it?

It's fun to play with. You give some simple orders and can watch what happens. The physical dimension is very important, it adds surprises. You tell him to go forth and back for instance. Instead of doing that in place he creates a pattern, because the wheels are not perfectly parallel or because the floor isn't straight.



#29 Hans

Was it outsourcing art to machines?

No, it felt like Dörrfelt said, like a collaboration; or more like master and servant. I gave the orders and he executed them. When he didn't behave like I wanted, I deleted his memory and gave him new inputs. In the end it is still me who does the composition by re-placing him on the paper and deciding when it is finished. It's a really satisfying way of working. Giving orders, and then leaning back and watching how the drawing slowly unfolds. To watch the pen automatically glide over the paper has also something meditative, just like drawing by hand. We didn't come that far that I'd praise our outputs as masterpieces, but with some more time you could definitely find some algorithms and configurations that lead to more interesting drawings. It could also be a good way to teach creative programming. It is motivating to try out algorithms and see what they look like as physical drawing.

<u>Did I perceive the robot as something living?</u> Not at first, but when I gave him the eyes and the name Hans, he gained personality. When I came back from the toilet and he had painted my floor, I yelled at him «No Hans! what did you do?!»

Samples of Hans' work can you find on the cover of this book.



#30 Out of control



#31 Old-fashioned human painting

G.

Conclusion

or

Do I want to create a drawing machine?

During the research I was always thinking a bit about what kind of drawing machine that I could invent. I came up with some project ideas. The whiteboard-display for instance: a whiteboard pen that draws messages or your calendar on a whiteboard. He would erase obsolete informations and update them by drawing the new ones. That could be a nice low-fi display that doesn't even need electricity when it is turned off. I was fascinated by this Idea, but of course when I checked it on the Internet some nerds already did whiteboard displays. They didn't do it like I imagined though. I could do it anyway. Then I came up with the drawn postcard service. That would be a web service, where a customer can send a physical postcard by drawing in his browser or convert an image to a line drawing. This drawing would then be reproduced by my drawing machine and sent to a recipient. It seemed like an interesting combination of digital and analog communication. Again I was excited about this idea and of course when I looked it up it existed already. There's the web-service called Handwrytten¹. Does everything already exist? Should I go home and do something else? The only thing that could cheer me up was this quote by André Gide:

"Everything that needs to be said has already been said. But since no one was listening, everything must be said again."²

That was the input I needed to continue my analysis and not feeling too useless about it. What ingredients were interesting in the good drawing machines that I came across? They are all very different. Nevertheless I made a list of categories or ingredients that must be interesting, along with some brainstorming for my own model:

1 http://www.handwrytten.com/

2 http://en.wikipedia.org/wiki/Andr%C3%A9_Gide#Quotations

<u>System/Technique</u>

I haven't found one that uses stamps. Or I could automatize a silk-screen printer or other printing techniques

<u>Ink</u>

I could use coffee, horse manure, acrylic paint

<u>Context / What it draws and why</u>

A machine that draws random lines won't get much attention. I could do one that draws portraits of people using a camera. Or one that writes down some copyright protected data that it downloaded from pirate bay, or private messages.

<u>On what it draws</u>

Drawing on walls, On the floor, on something that a visitor can take as a souvenir, or that would be photographed and shared digitally

<u>Quality of the image</u> Expressive? Precise? New aesthetics?

The performance

Wild gestures, or a kind of dance?

<u>Interaction</u>

The visitor could choose parameters and explore the potential of the machine, or create something digitally that would then be transformed to a physical drawing.

The Machine as object

Should look interesting also when idle (like Métamatics, or Thibaults Grand Central) The possibilities are endless. But just looking for a medium that nobody already used to create a drawing machine seems a rather dumb approach. Searching inspiration in all the drawing machines that already exist out there would only lead to another CNC-plotter. Like a snake that bites it's tail. Any other field might be better to draw inspiration from.

What is my approach?

What do my works that I like have in common? Often they seek to entertain, to cheer, but in a way that challenges the audience and gives them something to think about. Humor and simplicity are important elements. But it is a fine line between an artwork that is fun and one that is just a joke. I don't want to do just jokes. Or at least I want to create intelligent or subtle jokes. I like the styles of Fischli Weiss or Olaf Breuning, where humor and simplicity are also important, but paired with poetry and also a certain Swissness in the way that they take their work serious. Or Niklas Roy is a great example too, except that he has Germanness instead.

What topics do I want to address?

Ideally I want to create something popular that makes sense. What does make sense? To question consumerism? To be sustainable? How can I connect this with drawing machines and humor? Maybe these are too many criteria for one project. But does it make sense to make art without addressing serious problems? I guess so. Art can save the world too. It can prevent us from despair or going crazy. It can thrill and flash people, and give them food for thought.

What kind of drawing machines is still interesting for the audience?

They have seen so many. The performance is important. It is fascinating to observe a robot creating a drawing. The most exciting thing about Hans was to change parameters and to observe what he made out of it. Most drawing machines are not interactive with the audience though. But since i found that this was the most fun, mine should keep this aspect.

The output should make more sense than the random lines. Maybe the above mentioned portrait-painter, where the audience could decide what they feed to the camera. He would then interpret that input in his own way. To address current topics is also a good way to be interesting. The idea of the slow display could be fashionable. A slow internet-of-things object and an old/new format of messaging.

Do I really want to make one?

The drawing machine combines my interests in drawing and technology as expression techniques. If I will really build one in the end I don't know yet. I prefer the approach that Dörrfelt mentioned, to get surprised along the way and not already knowing in the beginning what the end-product will look like. I need the practical side in order to understand things and to make progress. I like to build right away and then discuss the trials and to see to what it can lead. This research still gave me a good base in terms of references and things to keep in mind. If I continue to incubate this subject, to discuss it and to do experiments, I'm sure it can lead to something good.

Credits

Images

#1	Dürers machine: http://www.npg.org.uk/learning/digital/portraiture/ perspective-seeing-where-you-stand/the-drawing-machine.php
#2	A pencil: http://galleryhip.com/no1-pencil.html
#3	Drawing apparatus: http://roberthowsare.com/rational-aesthetics/drawing-apparatus/
#4	Piccolo: http://piccolo.cc/
#5	Niklas Roy's Cardboard Plotter: http://niklasroy.com/project/149/cardboard_plotter
#6	Ted Lawson's Blood Portrait: http://www.dezeen.com/2014/09/01/ted- lawson-self-portrait-robot-paint-blood/
#7	Jürg Lehni's Hektor: http://juerglehni.com/works/hektor
#8	Georg Nees Computergrafik: http://dada.compart-bremen.de/item/exhibition/164
#9	Whiteboard Clock: http://www.thingiverse.com/thing:248009/#files
#10	Facade Printer: http://sonicedevelopment.com/facadeprinter/
#11	Tim Lewis Auto-Dali Prosthetic: http://www.thing-hamburg.de/?id=791
#12	Harvey Moon: http://www.huffingtonpost.com/2013/06/26/robot-art-har vey-moon-drawing-machines_n_3504886.html
#13	Desmond Paul Henry: http://en.wikipedia.org/wiki/Desmond_Paul_Henry
#14	Picasso: http://www.masterworksfineart.com/blog/pablo-picasso-in- vallauris-a-place-for-invention-linocuts-ceramics-and-love/
#15	Jaquet-Droz The Writer: http://animamechanica.com/2014/02/11/the-writer/
#16-17	Jaquet-Droz Automata: http://en.wikipedia.org/wiki/Jaquet-Droz_automata
#18-22	Own photos
#23	Ragnar Kjartansson, The End: http://wwwold.fsrr.org/eng/info-ed-eventi/eventi/incontri/408
#24-28	Images by Matthias Dörrfelt: http://www.mokafolio.de

#29-31 Own photos

All online sources consulted the last time on 10.02.2015

<u>Books</u>

- HOFFMANN Justin et al. Kunstmaschinen Maschinenkunst. Heidelberg: Kehler, 2007
- PARDEY Andres et al. Métamatic reloaded. Heidelberg: Kehler, 2007
- ANTONELLI Paola, FREYER Conny. Digital by Design. London: Thames & Hudson, 2010
- DE BOTTON, Alain, The Art of Travel, London: Penguin, 2014

More drawing machines

http://pinterest.com/martinhertig/drawing-machines

<u>Font</u> Nitty Light Cover artwork

Hans

<u>Thanks to</u>

Andres Pardey Matthias Dörrfelt Chistophe Guignard Jeannine Erb

Made at ECAL in 2015

