IMPLE

FINAL REPORT

FROM IDEA TO DESIGN

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Date: 31-10-2019

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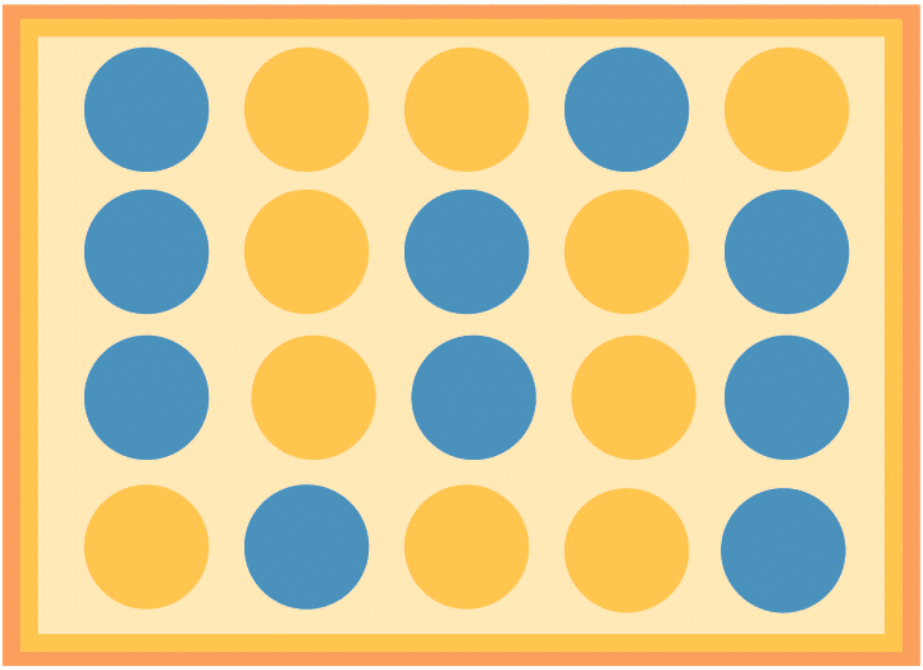


Index

Part 1

After the first Thursday lecture, after the midterm, we brainstormed individually (*see Appendix D*), on what could be improved and how our midterm concept (*see appendix C*) could be improved. We gathered these individual ideas during our first Tuesday meeting, with which we created a generic set of improvements. We decided to first start individually because we couldn't meet during the weekend as a team. But by doing it this way, we could effectively use the time of the weekend to already come up with improvements. The generic improvements helped us make clear what still needed to be done in the next few weeks, which is why we wanted to come up with them.

That same day, we got feedback on our midterm concept in our tutor meeting. Our feedback was that we should consider that our concept might be too difficult to carry out, we discussed this in a group meeting after. Our group was a bit divided on whether to stick with our original concept. We came to realize that our concept might be too difficult in too many aspects and some of us were worried that we wouldn't succeed in realizing our concept. Because of this we decided to do a 5-3-5 brainstorm session (see *Appendix A*), to quickly come up with a lot of ideas which could simplify our concept. We further elaborated these ideas over the weekend, because we wanted the ideas from the 5-3-5 to be more concrete. We also decided to make some lo-fi prototypes of the existing concept to see if it would be feasible (see *Appendix B*).

We learned on Monday, after the weekend, that the worked out 5-3-5 ideas were simpler but not creative and interesting. They were very good as backup concepts, if the concept we chose to improve might still be too difficult. Our lo-fi prototype showed us that our original concept would be feasible. Because of these reasons we decided to stick with our original concept, from the midterm.

The weeks after, we started to improve final details in our design.

We first agreed on what qualities of our concept needed improvement by using the brainstorm information from after the first Thursday lecture (*see appendix D*). We started with doing individual research again (*see Appendix D*), on these chosen qualities, so we could work efficiently and use all the time we had.

Our main improvement point was improving the pin-press-system. We based our system on a few aspects of a cabinet closing system that already exists (*see Appendix E.1*). Our pin needed to spring back when touched, but also able to lock when displaying a product. This cabinet system already had some of these qualities, so we could use some parts. For example, a rod that stabilized the spring so it could collapse properly. We chose to base our pin-press-system on this system, because it worked perfectly, and we didn't have the time to design a system on our own.

To lock the pins, we decided to use Velcro because we found that you can easily get it loose while still being sturdy enough to hold the pins in place (*see Appendix E.2*).

With the research on electronics we found an easy to make DIY pressure mat and decided to prototype only this mat, to see if this would work in our concept. The mat didn't work good enough, so we went back to researching (*see Appendix F*). Our conclusion was to use a movement sensor instead. This way, less sensors were needed to detect movement of the pins, which would also make the design cheaper to make in real life.

The interaction we had in the midterm concept (*see Appendix C*) had to be revisited. Our initial idea to have a LED on each pin would not be possible, due to fact that we would be using movement sensors among other things. We did not want to have individual sensors on each of the pins, the same goes for LED's on the pins. Furthermore, the pixel density would be too little to make a decent advertisement since each pin would be equal to one pixel. We discussed these issues with each other and decided that instead of the pins, the storage boxes containing the corresponding product would light up. This would also draw the attention of the customer to the right storage box in a playful way. We did keep the part of being able to push the pins.

To make sure this interaction could be executed we had to connect the whole display electronically. We had to keep in mind that our display blocks are modular, so they can be in a different position every time, which made it difficult. After body storming with the lo-fi prototype we decided to make use of the clips (*see Appendix G*) to attach the boxes, because these clips could move with the modularity of the display. The clips would get a conducting metal inside and a nonconducting outside, because we decided to use the clips as electronic connectors as well, so the storage-boxes wouldn't need their own battery. Only the pin-boxes would need a battery.

We then had a body storm session (*see Appendix H.1 and H.*2) to visualize the dimensions of our display on life-size, so we would know how big our prototype had to be. With the prototype we wanted to show the electronics and the modularity of our design, to make sure we could show every quality of our design equally good during the exhibition. Because of this we decided to make two prototypes (*see Appendix H.3*).

After agreeing on the dimensions of the display, we could decide on the size, the amount and the spacing of our pins. We decided to start from a common, small product from loyalty products: a wineglass. With these dimensions we calculated the minimal width between the pins to keep it stable. (*see Appendix I*) With the spacing dimensions and the display dimensions we finalized the diameter of the pins and the number of pins.

While bodystorming and exploring our design with our small pin art we realized that products could easily fall out of the pin box (*see Appendix C.2*), especially with our decision to significantly decrease the number of pins. We figured that we could solve this problem by putting half spheres at the end of each pin. This way, example products are more stable when being displayed in the pin boxes (*see Appendix J*).

An important goal for our display was that it takes up little space while being transported. That way more displays could be transported at the same time. Because the pin-box wouldn't be able to be any more compact, due to the integrated electronics, we shifted our attention to making the storage-boxes as compact as possible. We brainstormed a bunch of ideas to make the display as compact as possible (*see Appendix K*) and decided to choose three options. To confirm if these ideas were feasible, we made a simple prototype (*see Appendix L*), which included all these ideas. Our prototype helped us a lot, because we stumbled on a few issues with pivot points we hadn't seen before. Our boxes would be unstable and could collapse. We went back to brainstorming to solve this issue. During which we decided to make a diagonal vertex which would prevent the box from collapsing and could be folded with the box.

We had to decide on a color for our display. The color had to be attractive but shouldn't mash with the colors of the supermarket. That's why we chose white for the boxes to let the products and advertisement stand out.

With all this information on the changes we did to improve, deepen and widen our midterm concept we built the prototypes. After we built the prototypes, we decided it would be a good idea to think about from what materials a full-size model of our display could be made (*see Appendix M*). We did this to give our concept more depth and we figured that bamboo would be the best option for us since it is ecofriendly, firm and more resistant to expansion than regular wood. Hereafter, we did some calculations and estimated the cost of our display to be around €930, -

Part 2

As first step into deepening, widening and overall improving the midterm version of our concept, we set up general meetings as a team for each Tuesday. In which we agreed to have individual work for weekends done, before each meeting. This way, we agreed, would be the best way to keep on track with all the work that had to be done.

In the first half of this course, before the midterm, we did not have a clear work division. We did give each other tasks, however; those were more general, up until editing and writing the first report, we did everything together.

In the second half on the other hand, we did have a more structured work division since it was not only brainstorming and conceptualizing anymore. We decided to make use of each other's talents and learning goals. After we had settled on our final design, we made a general work division so we could maintain a good structure during improving the concept. We agreed that Sem and Britt would focus on the video, due to them having experience with filming and editing, and because we found that they did a great job on the midterm video. Mart and Jade would be working on the physical prototype and Lisanne would do the poster. This was our initial plan however, during the weeks to come we found that a lot of that changed.

Due to the short amount of time that we had to realise our design and everything around it, we had to be as productive as possible during our weekly meetings. Unfortunately, Mart became ill at the 8th of October, so we had to work without him. The task division then changed because we did not know when he would be better, together with the fact that we could not risk delay on our project. We decided to give Mart some smaller tasks that he would be able to do while lying in bed. Meanwhile Sem found a tutorial for a do it yourself pressure mat while he was researching different sensors. He and Jade tried to recreate it and tested it out. While Jade and Sem where working in E-lab on figuring out if the sensors would work, Lisanne and Britt started to work on gathering the materials for the technical prototype. This we call

‘preparation’, in the task division. Over the previous weekend, Britt had also done research on pin movement. At the end of the day we looked at our progress and made another task division for over the weekend. We wanted to make a 3D animation instead of a live action movie, Britt had some experience with 3D printing and wanted to learn more about modelling and Solid works and agreed to make the animation. She also 3D printed the clips for our bigger prototype. Sem offered to make the pin-box in the technical prototype, while Jade agreed to work on the smaller prototype and Lisanne would work on the poster.

One of the final decisions that had to be made was how we could fold the storage-boxes. Britt made a small cardboard box to help us visualize. After a long brainstorm session, we decided how we wanted to make this work in the technical prototype, and we could start working on the last part of our prototype. At this point a storyboard was made. Britt initially offered to make the folding box however due to the fact that, one of her task of making the animation would already take up a lot of time and, two, because Sem had already made the other part of the bigger prototype and therefore had access to the correct supplies (the right paint for example). We discussed the look of the poster and Lisanne continued with it. Jade then continued to with the smaller prototype and improved it a little after the feedback from the rest of the group and Mark, our tutor. Mart took care of the advertisement and made a few small boxes to fill the bigger prototype.

As the demo day approached, we started to put the finishing touches on our work. We were not quite happy with the poster so Sem, who already had a few of the images that would come in handy for the poster such as the logo, took it over from Lisanne. Jade had been doing some materials research, after she had finished the smaller prototype, and based on that she and Lisanne estimated the total cost of our display. One of the things that we still had to do was to write a pitch. We sat together and wrote it together. As finishing touch for our presentation, Jade made a big yellow arrow to draw people's attention.

On the presentation day itself we decided that if no one was asked to pitch, that Jade would be pitching with the help of Sem, who demonstrated the electronics and the way the boxes can fold. Lisanne, Britt and Mart where there to answer questions or to do a second pitch in case Jade and Sem where already occupied.

The next step was to write the report. To help each other write a better personal reflection, we did a feedback round. During this round each of us got feedback from the rest of the team. The feedback consisted of constructive criticism and compliments. Hereafter, we divided the final report and decided that Mart and Britt would do the first part, and Jade and Lisanne would do the second part. This is also described in the distribution table, as 'individual part'. The Tuesday before we had to hand in the report, we sat together to improve the report and to give it a nice design.

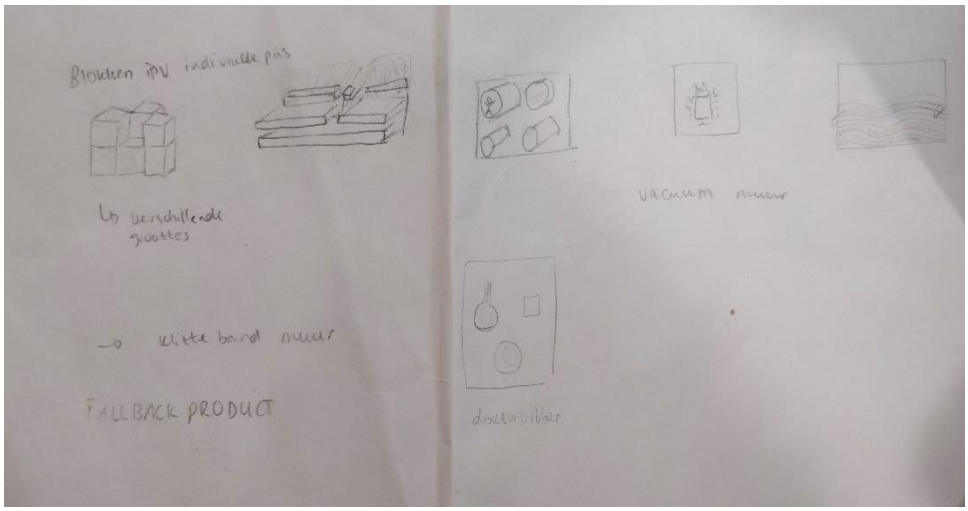
To help visualize the work division we have made a table, which you can see below.

Task division

Task	Sub-tasks	Britt	Jade	Sem	Mart	Lisanne
Research concept	Pin-attachment prototype	100%	-	-	-	-
	Foldable box prototype	100%	-	-	-	-
	Electronics	-	40%	60%	-	-
	Materials	-	50%	-	20%	30%
Video	Storyboard	100%	-	-	-	-
	Drawing and animating	100%	-	-	-	-
Prototype (deliverable)	Preparation	25%	25%	25%	-	25%
	Small prototype	-	100%	-	-	-
	Technical prototype			100%		
	Drawing/3D-printing clips	100%	-	-	-	-
	Advertisement	-	-	-	100%	-
Poster	Preparation (first version)	-	-	-	-	100%
	Final poster	50%	-	50%	-	-
Pitch	Writing pitch	20%	20%	20%	20%	20%
	Delivering pitch	-	100%	-	-	-
Final report	Individual part	100%	100%	100%	-	100%
	Final version	24%	24%	24%	4%	24%

Appendices

Appendix A



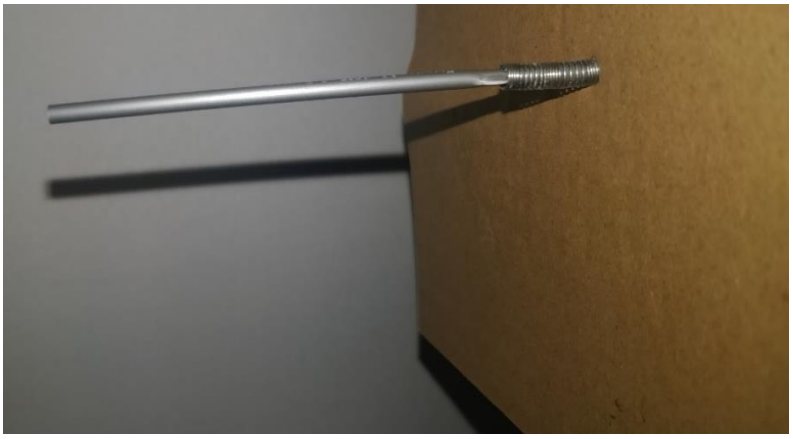
A.1; Image of the 5-3-5 for new concept ideas.

Appendix B

Images of lo-fi cardboard prototypes of the pin-attachment-system.

B.1

B.2



B.3 **B.4**

Appendix C

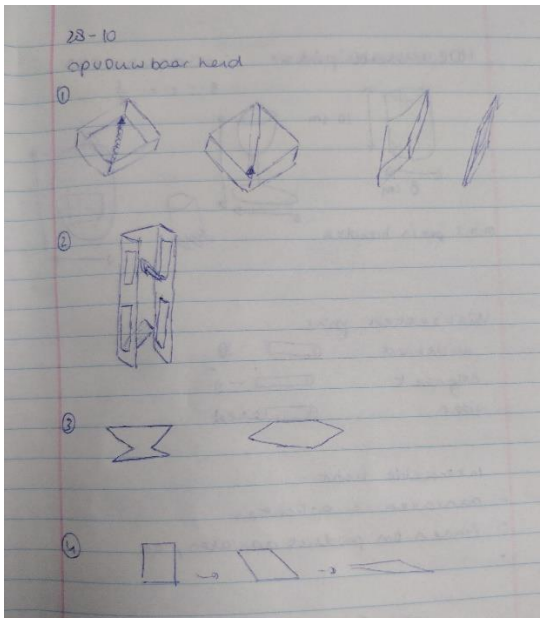
Midterm concept:

Our midterm concept was to create two compartments, a pin-box and a storage-box. Out of these compartments a full display can be build. The pin-box consist of pin art with LED lights in each individual pin. An example product can be held in the pins, like on the picture (*see Appendix C.1*). When the product is touched, the pins underneath the product will be pressed and the LED's in the pins around the product will light up. After this the LED's in the pins around the product will light up to show the brand name of the product.

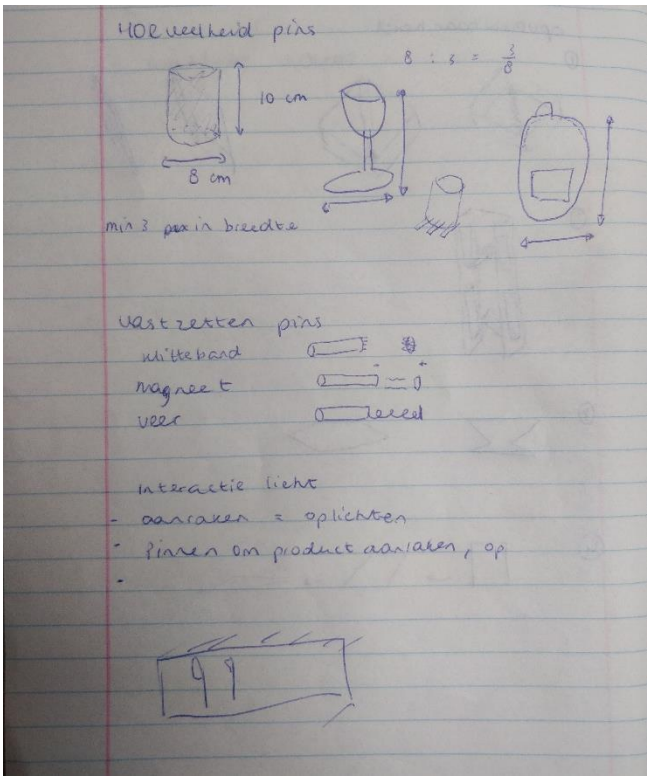
C.1; Image of the prototype from the midterm concept.

Appendix D

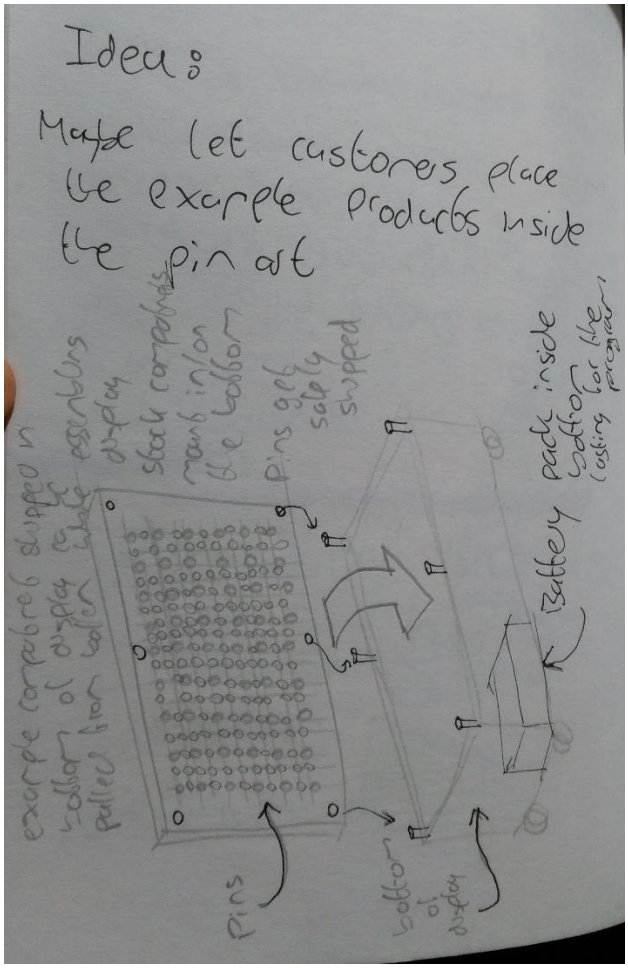
Images of brainstorming.



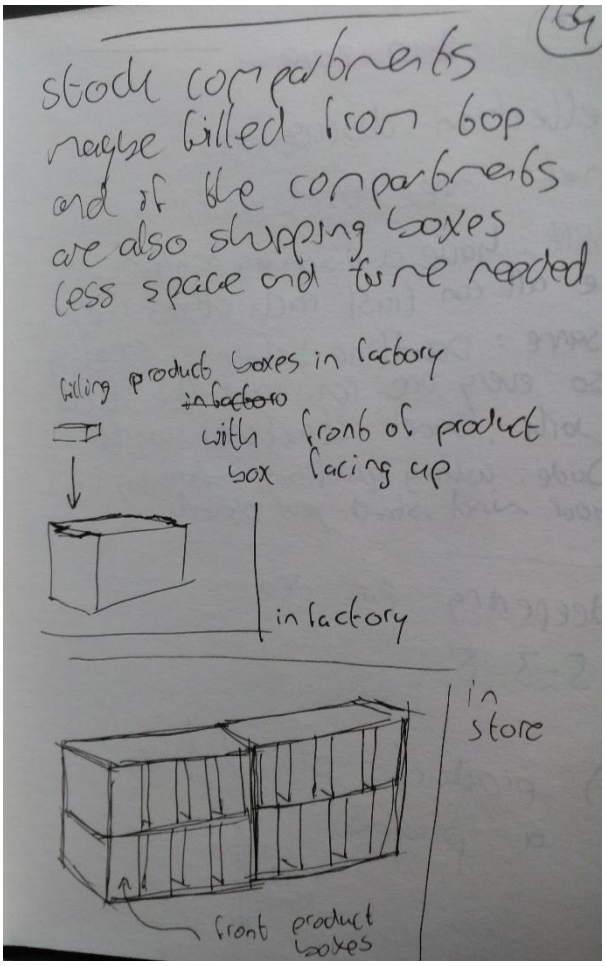
D.1



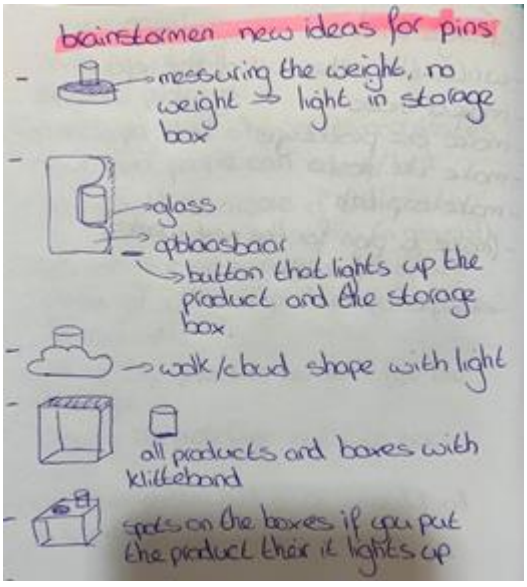
D.2


Idea:
Maybe let customers place the example products inside the pin art
Battery pack inside bottom for the charging
Pins
bottom of display

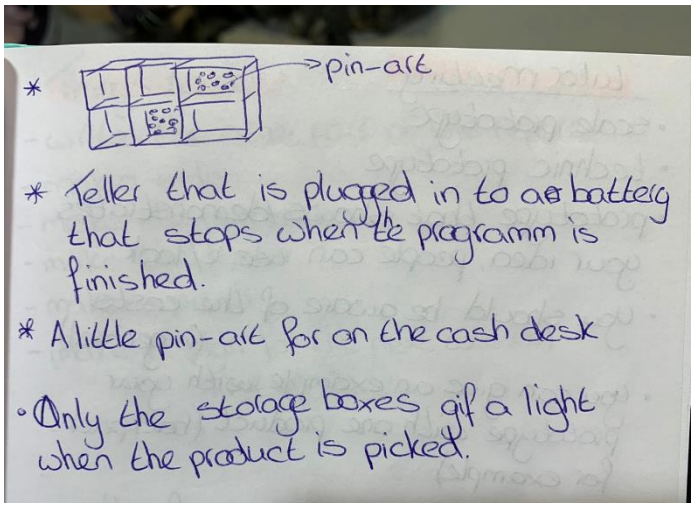
D.3


stock comparbments maybe filled from top and if the comparbments are also shipping boxes less space and time needed
filling product boxes in factory
with front of product box facing up
in factory
in store
front product boxes

D.4


brainstormen new ideas for pins
messuring the weight, no weight → light in storage box
glass
pressboard
button that lights up the product and the storage box
walk/cloud shape with light
all products and boxes with klittebord
spots on the boxes if you put the product their it lights up

D.5


pin-art
* Teller that is plugged in to an battery that stops when the programm is finished.
* A little pin-art for on the cash desk
• Only the storage boxes gif a light when the product is picked.

D.6

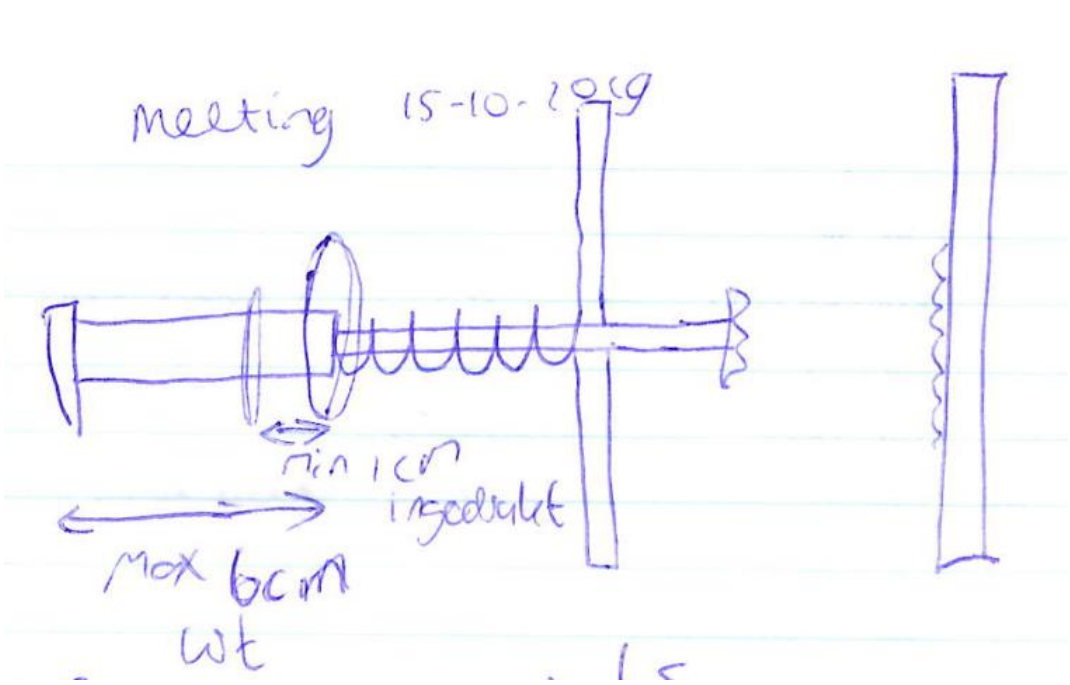
Appendix E

Images of existing spring system.

E.1.3

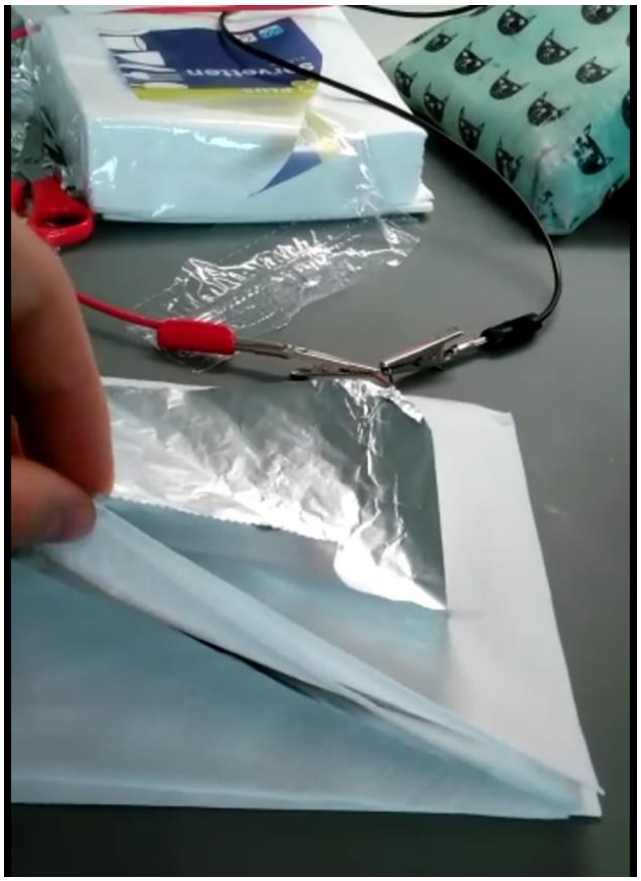
E.1.2

E.1.3



E.2; Image of sketch of the final pin-system, with springs and Velcro.

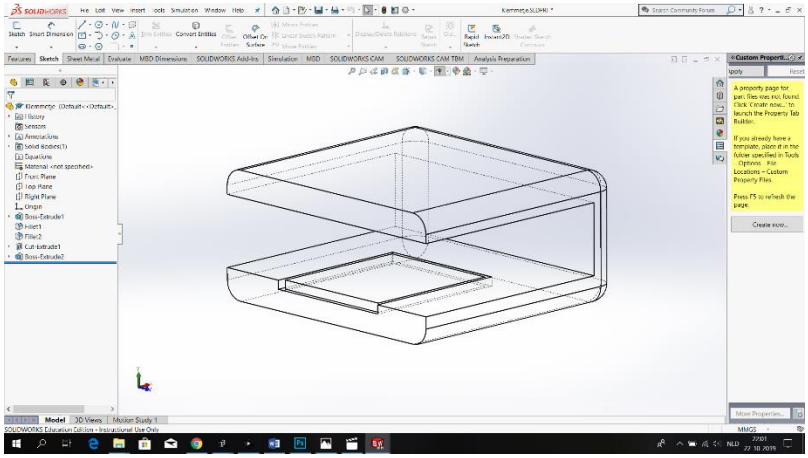
Appendix F



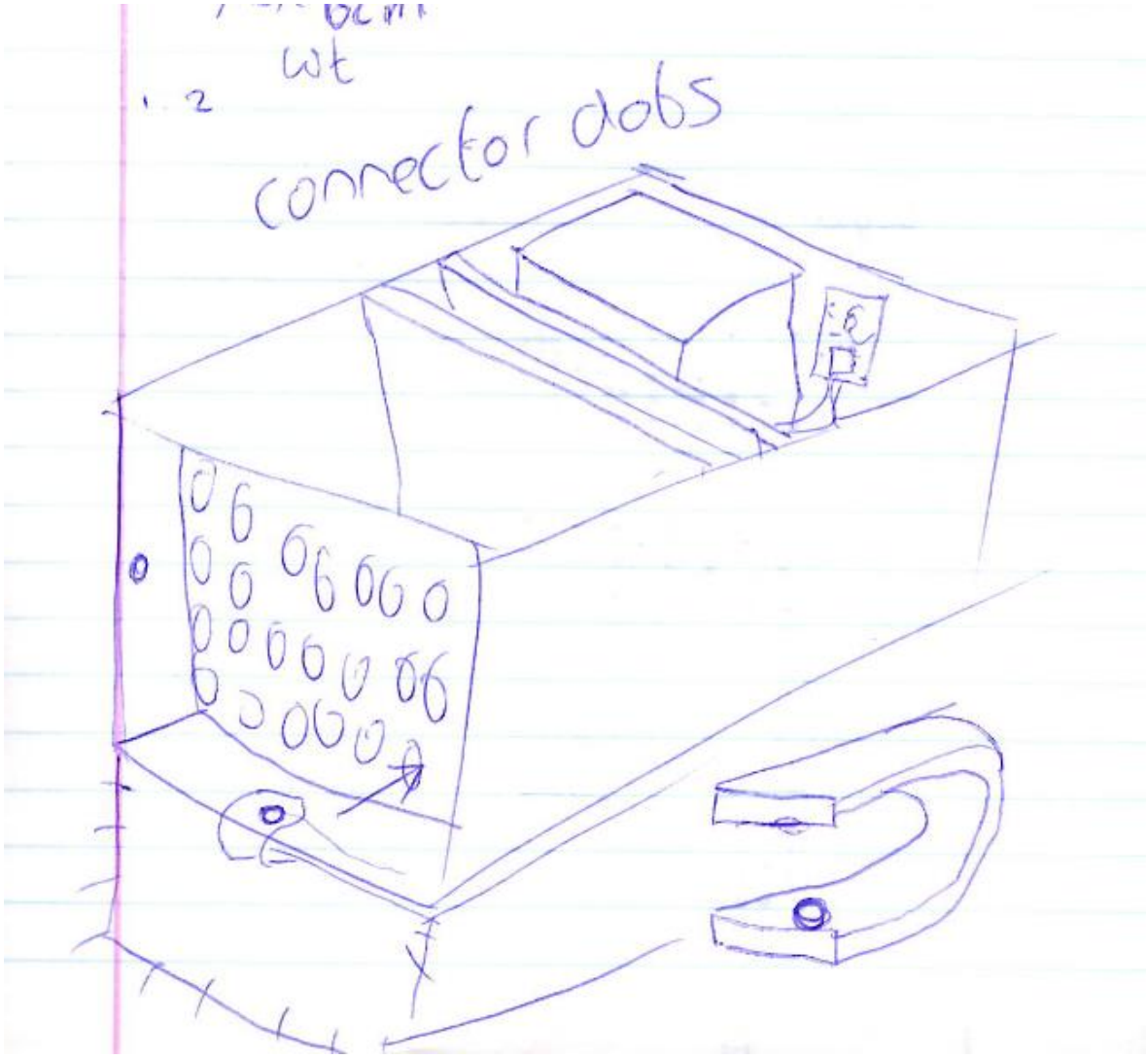
F.1; Image of research on DIY pressure mat.

Appendix G

Images of finalizing electrical flow in display.



G.1; Image of the connection clip.



G.2; Image of a pin-box on top of a storage-box, with the connection clip. The clip connects to the dots, on both boxes. With this connection the boxes are electronically linked.

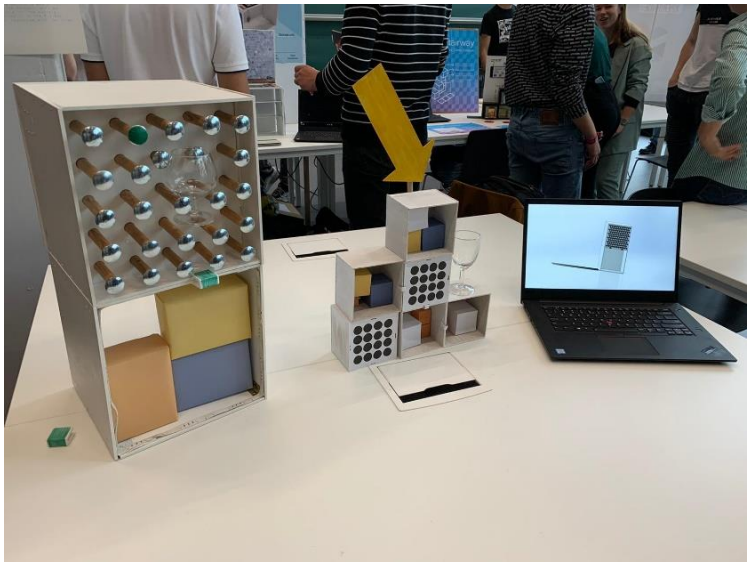
Appendix H

Images of body storm/visualization of display dimensions

H.1

H.2

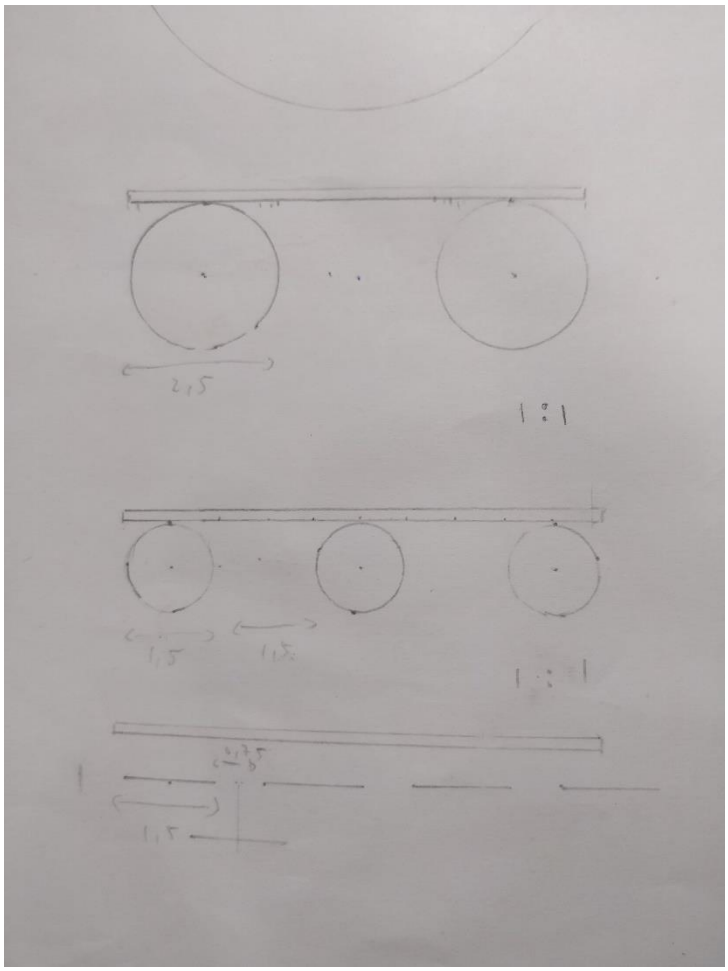
Image of the two prototypes we built. The right one is a scale version of how the whole display would look like, which we call the small prototype from now on and left the enlarged version of one pin-box and one storage-box, which showed the pin-interaction and the clips, we call this the technical prototype from now on.



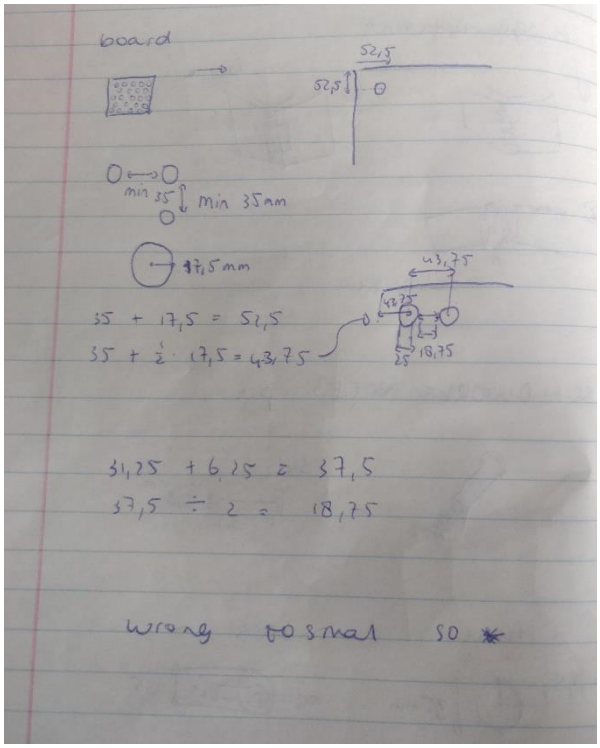
H.3

Appendix I

Image of deciding spacing and diameter pins.

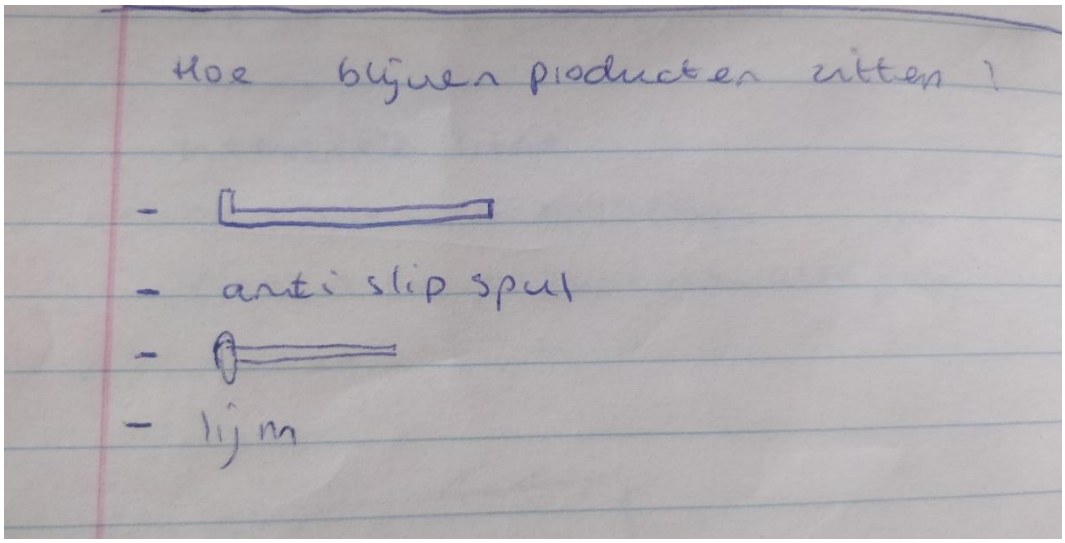


I.1



I.2

Appendix J

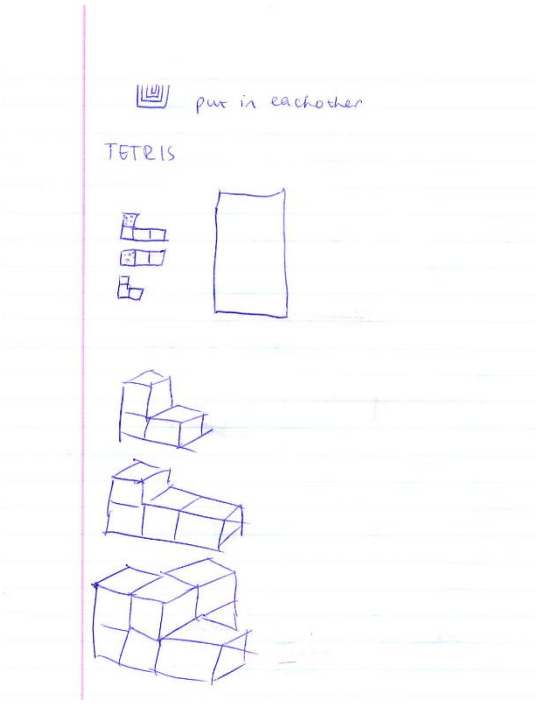


J.1; Image showing a brainstorm on better securing products in display.

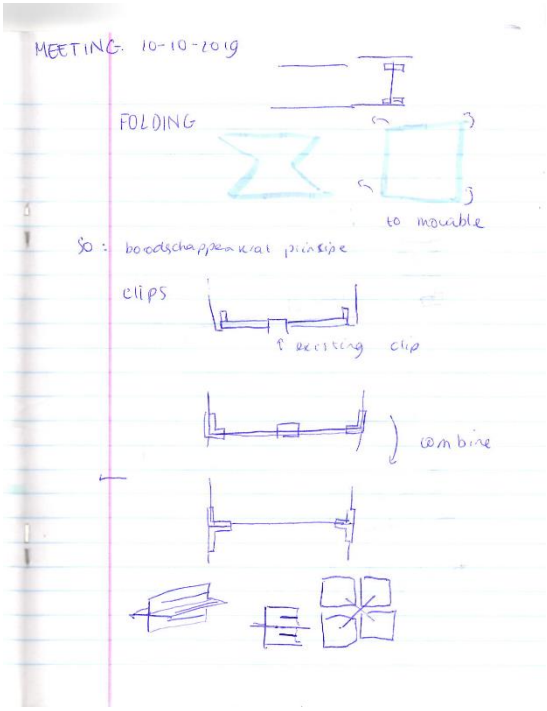
J.2; Image showing our final idea for the pins, with the half spheres at the end.

Appendix K

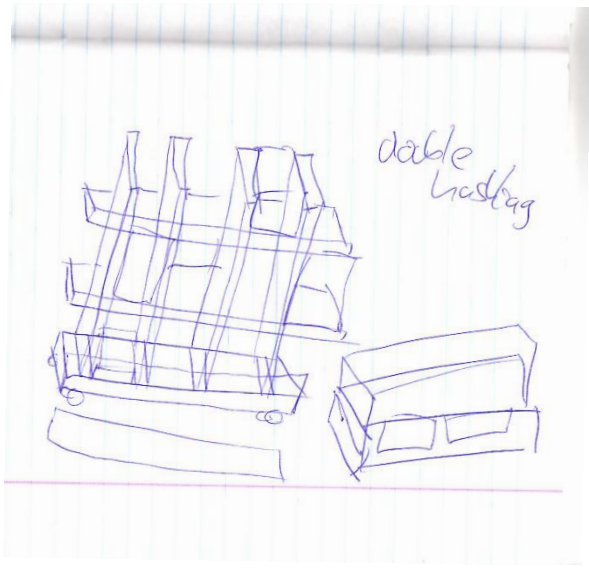
Images of brainstorm session on a compact way to store the display.



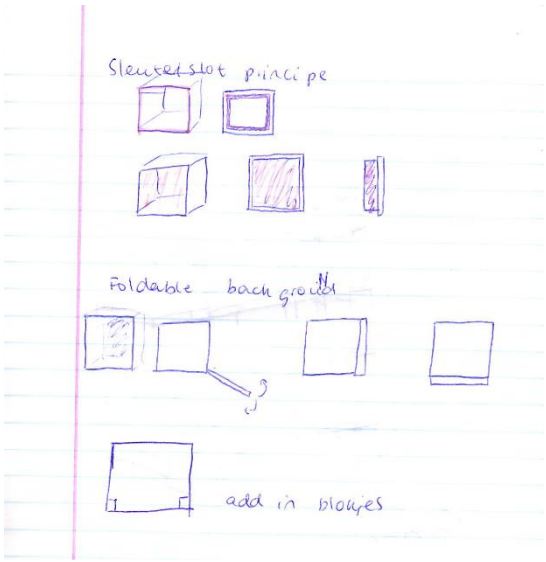
K.1



K.2



K.3



K.4

Appendix L

Images that show the cardboard model that we used to explore the different ways of folding boxes.

L.1

L.2

L.3

L.4

L.5

Appendix M

M.1; bamboo; €249,95 for a sheet of 2,98 m^2 → €749,85 for a stand of 9 boxes of 2 cm thick.

Bamboebouw Nederland, https://www.bamboebouwnederland.nl/bamboe-plaat-20-mm-side-pressed-5-laags-naturel, accessed at: 22/10/2019

M.2; magnets; €0,26 for 20 pieces

Magnetenkopen.nl, https://www.magnetenkopen.nl/zelfklevende-magneten/?gclid=Cj0KCQjw0brtBRDOARIsANMDykbf94ytvsVcEYsMAA_S5oALflHnlInsQJOAD9ip_yC8Dmcr06HZ9fUaAkBgEALw_wcB, accessed at: 22/10/2019

M.3; Hinges; €43,92 for 36 pieces

Mijnijzerwaren.nl, https://www.mijnijzerwaren.nl/hang-en-sluitwerk/1843-axa-scharnier-1105-rh-76x76-2mm-topc-8713249109121.html, accessed at 22/10/2019

M.4; Sensors; 22 x €1,50= €33,-

Kiwi Electronics, https://www.kiwi-electronics.nl/infrarood-straal-detector-5mm-leds?gclid=CjwKCAjwxt_tBRAXEiwAENY8hUJXIZJ5Z2MmLd9pzYG1PsxFTV1uYrRm-Qn-waHlJ1Ly9fra0a1JxRoCBu8QAvD_BwE, accessed at: 22/10/2019

M.5; meubelbeslagonline.nl. (z.d.). Greeploos kasten openen met Push to Open. Geraadpleegd op 9 oktober 2019, van https://www.meubelbeslagonline.nl/druksnappers/tip-on/pushtoopen

M.6

Price for 1 display (3x3): around €930, -. Based on the materials mentioned under 'Material' in the appendix and on a box size of 50 cm high, 50 cm wide and 40 cm deep.