SNIFF Tangible Toy *for visually impaired children*

The aim of the project is to bring something extra into situations of social interaction or physical activation amongst kids with a visual handicap.
Sniff is a toy dog that gives feedback through sounds and vibrations on tagged objects that comes close to his nose. The use can be in daily situations as well as in play, either alone, together with other kids or together with other Sniffs.

Brief
Playful Rfid: '..Rfid offers the opportunity to have action at a distance, batteryless and 'active' objects with memory, and the use of natural materials without obvious 'technology' on the surface...'

Background
Tambartun Kompetansesenter produce stimulation material for kids with visual impairment, for training up the senses. I have combined this task with the *Playful Rfid* brief.
Social interaction and physical activation are the main guidelines for my project. It has been important to encourage playfulness, and not to help accomplish a specific task or become an exchange for other senses. In the design I have explored sound and tactility as feedback.

Use
The two main situations of use is at gatherings at Tambartun centre together with other blind or poorly sighted kids, and in the kids natural environment at home or at kindergarten together with seeing kids. The last is the most common, and also where it's most important to try to make the worlds collide.
For interaction on same premises as other kids, visual clues has been removed.

Sniff

This is Sniff, a toy dog designed for children with visual impairment. He can detect objects that are tagged with Rfid through his nose and give different feedback in vibrations and sounds.

Feedback

The sounds makes it possible for a larger number of people to participate in play. The vibration deepens the tactile dimension and gives a personal experience when holding it.

Concepts

Sniff comes with two main concepts;
Emotion Stickers and a Memory Game.
Both concepts are scalable and can be used sitting at a table or over a larger area like a room or an apartment. Different levels of physical activation are going to be tested at the blind centre.
When playing with seeing kids in kindergarten a table-sized scene might be preferable for creating equal opportunities.

Memory Game
A game where the sound that's hidden in the nodes matches in pairs. The stones don't have any visual clues to which that belongs together.

The stones
The stone-like nodes are made with the desirability of marbles in mind, but instead of visibly beautiful, intended to have a tactile interesting quality.

The stone shapes are totally irregular, and the tactile desirability is created through a slightly concave surface on the stone. They should encourage the wish to touch.

Possibilities
Spread them out on a table, in a shelf, on the floor in a room and start playing. If the model is equipped with a sound chip the Memory Game can consist of sampled sounds like nature, animals or cars..

Emotion Stickers
In the emotions sounds and vibrations are combined in the
feedback with their different qualities;

Sound feedback is immediate, obvious and encourages social play. Vibrations are
more sublime, adds realism, 'life' and a personal bond.

The emotions are
HAPPY, EXALTED, SAD, SCARED and SNEEZE

The sounds, and some of the vibrations, are created through PWM coding.

Possibilities
Tag your room, your belongings or a book with the reactions you want. The
stickers are sold in many variations for your own optional use or to match a
certain story.

USER TEST NO 1

The first user test is carried out at a kindergarten in Oslo with a five year old boy who is not totally blind but has a grave visual impairment. The session is videotaped, but the parents doesn't want me to publish the material in any way so it's used only for my own studying purposes.
The meeting with the boy is really an eye opener for me, and makes me think I should have tried to make it possible to do it earlier with a rougher type of prototype. In a way I learn that it's limited how much one can learn from just a short test when the informant is a totally new person, and I assume this especially this applies when the tester is a kid. A lot of the time is used just for socialisation between me and the boy. But the testing still raises some important issues.

For this particular five-year-old, the sniffing action is not as intuitive as I hoped it to be, so I have to explain that part. The sounds on the stones seem too hard to distinguish from each other, and I think that the game would be improved a lot if it had the possibility to consist of sampled sounds. The difficulty level would be reduced and the playability would be much better if the sounds could be associative instead of only melodic. After all this is the point in visual memory as well; you get pictures of totally different objects, and their different nature can help you place them in a spatial grid in your memory. The Memory Game is a bit too difficult for this user to be a big hit, I think he likes the idea but he can't really tell the sounds apart and thinks he finds pairs even when the sounds don't match.

The Emotion Stickers concept placed in one of his favourite Albert Åberg books that I've prepared in advance is a bigger hit. He understands the sticker-concept very fast, and soon check every page for stickers before I get to read the story. After a few stickers he expect to find one on every page (and I don't have enough of them with me for this). The dog sits in his knee, under one of his arms like I intended and he pats it now and then. He asks why about exactly everything, and so as well about the dog's reactions, but then and there I interpret that as age dependent.
Unfortunately I discover that there are practical problems when placing the tags in a book. The fact that the tags are read through the pages makes the placing of them crucial. When placing them one really has to think about from which direction the toy dog's probably approaching to not get the reaction that was intended for another side in the book.
I also learn that the Emotion Stickers as a concept might take some of the attention away from the story you're reading. The stickers themselves are quite exciting and this can dislocate the child's as well as your own focus. On the other side it gives a reinforced focus on the emotional responses that the people in the story is experiencing, and this might create an opportunity to discuss what the child thinks about these feelings, if he ever experienced the same, if he is scared of monsters under the bed like Albert and so on. It is clear that a dramatic story with a lot of shifting emotion states gives the best result.

USER TEST NO 2

The second user test is carried out in my own apartment together with a five year old girl, a two year old boy and their father. Neither of the kids has visual or other types of handicaps. This is a photo session without video.

The Memory Game is tested briefly, but as the youngest kid likes to bang the stones on the table creating a lot of noise, the gaming seems to hard to catch for both of the kids. We try it again later just for fun, without the game ingredient just for testing the feedback and that's catchy enough for a two year old. I think the stones that triggers sounds in Sniff can be a useful element in a lot of plays without clear definition as well as being a game.

The Emotion Stickers is first tested in a book, and with planning of the placement that I mentioned earlier, the feedbacks work just fine. These kids don't seem as eager as the child in the first user test to check for stickers and to read them. In fact they seem more focused on the story, but every sticker that's read still has to be confirmed by their dad who's reading the story; "now he got sad because..".

The stickers is also tested around the apartment in a quick version of what might be a natural scenario; the five year old girl and her dad gets to decide where to put the stickers and what feedback to choose. A happy sound on the fridge, a scared sound on the stove, an exalted sound on the toilet, a scared sound on a dark cupboard, a sneeze in a corner.

USER TEST NO 3

The third user test is carried out at Tambartun kompetansesenter under the family gathering weeks for kids in the ages 0-6 years. There are three participant children, and out of them only two are video taped. We agree to bring in the kids one at a time when testing, otherwise it would be hard for them to experience enough of this new element in such a short time. I get permission to record the sessions on video as long as I consult the parents for their approval of the material before carrying out any publishing.

Frida, 3 year old girl, 100% blind
We test the Memory Game.

Casper, 5 year old boy, visually impaired
We test the Memory Game and the Emotion Stickers in a book.

The material from the tests is still work in process. I also think it's important to remember how deep knowledge you can get after just one initial test. The best way to go now would be to test with the users over a longer period of time. Apart from the kids themselves I get a lot out of the presentation of the concept for the parents, who knows their child good enough to evaluate the concepts by imagining the use of them, and the pedagogues at the centre who are specialists on problems specific to children with sight impairment in general.

Presentation for the parents
I present the project in short and get some immediate feedback from the parents. They like the concepts and seem curious about where I'm going with it next, if the toy will be produced and so on.

- There should be a user manual to the different games that you could play with the toy. This is something they miss when it comes to aid and stimulation material in general. Of course the concept could be open enough to play anything with, but if there are special details to pay attention to for the best pedagogical benefits, they should be described to give full payback.

- If you build a trail in your home with the Emotion Stickers, this could be a playful way to learn the kids how to find their way manoeuvring around, and encourage exploration of the surroundings.

- It would be nice with a simple interface on the computer for the parents to put in sounds themselves in addition, or if they want to upgrade the product. There is also one suggestion of the option to record their own sounds, for example their own voice to use in the stickers. They all agree that the use of sampled sounds is a good idea.

- They like the visco-elastic Tempur material in the body, and I learn that many kids with visual impairment don't like very soft and fluffy toys. The pedagogues agree on this and tell me that this has something to do with uncertainty and undefined objects, they like shapes that are recognizable and definable.

- I learn that "blind kids" is wrong way to put it – it's better to say kids with sight impairment. Of course this way of describing the users includes visual impairment as well as blindness, but most important is that this definition puts *the kid before the handicap*.

- One important thing that Sniff could be used for is to learn empathy. To place an Emotion Sticker on the kid or on other persons and get him to react to that. They think that when the toy reacts like he likes you this could create a bigger understanding of emotions and create bonding.

- The most important thing is that Sniff is a good cuddly animal. He doesn't have to have a lot of behaviours, e.g. sounds when you squeeze him.

Presentation for the pedagogues working with stimulation material for the 0-6 age group, plus whoever on the house that might be interested (most of them were not allowed to attend the short presentation I held for the parents earlier). I get a lot of good and spontaneous feedback.

- The organization of the game raises an important issue. In the aid material department at Tambartun they've got something called "sorting trays", consisting of a big rectangular space for keeping objects collected, with a line of small departments on top to put different selected objects in. (The objects to sort could be pearls of different sizes, pieces of lego, buttons, different geometrical shapes..) What they've experienced with the children is that they have a hard time learning to organize stuff in this manner. They don't want to keep track of things by organizing them in a linear grid, instinctively they much rather keep the objects in their lap, keeping them close to their stomach. The lack of visual stimuli for blind or visually impaired individuals results in an "egocentric reference centre", i.e. the only thing they can measure something up against is themselves, and the vertical axis of their own body. Experience shows that movement and orientation reaching away from the body is hard for them, in contrast to horizontal movement. Thinking of the centre of the axis, I suggest that organizing in a half circle might be even easier than horizontal lines. They don't know if this ever has been tested. That's strange, they admit, but it might be a good idea to try it.
  Of course one have to consider that even if a linear grid is initially hard for blind kids to learn, that doesn't mean that it's a bad thing to learn; a lot of actions in the world of seeing as well as of blind people, are arranged in lines and in layers, e.g. reading a text (ordinary letters as well as braille).

- Another spontaneous feedback is on the Emotion Stickers, that they find to be spot on for a reason that never crossed my mind when thinking of the concept. Specialist pedagogue Oliv Klingenberg explains that children with sight impairment often struggle with understanding and defining their own emotions. It is very common that they have a "blank" expression in their face, and they often have difficulty with referring to emotions. One thing that has to be learnt and discussed over and over again is; "How do I feel when I'm sad?" and "I am happy now, how does that feel like? What does it mean to be happy?"

When I ask for an explanation for this she replies that there's no proof in this field, only theories. One theory is that emotions is infectious through eye contact, that the silent interaction in our gaze results in a positive loop that nourishes the emotion that's shared. Seeing kids learn emotions through confirmation over and over again. When the visual dimension is missing emotions are complicated. When blind and seeing babies are born they show no difference in behaviour – they often smile spontaneously. But with age this seem to decrease among children with sight impairment, and it's believed to be a result of the lack of visual feedback on their emotions.

This means that there's indeed a need for a tool to practice and discuss emotions with the child, and the Emotion Stickers can be a playful way into this discussion. The Emotion Stickers concept was intended to just be an interesting ingredient in play amongst all children – and for blind children the pedagogues believe it could pay a very positive contribute to an important issue.

- Generally they pedagogues can clearly see the potential in Sniff for children with sight impairment, but also for children without this handicap. Tambartun has experienced this many times before, it happens all the time that their stimulation material designed for children with visual handicaps turn out to be suitable for their siblings as well. Tactile and auditive feedback is fascinating and inspiring for all kids, not just the blind.

Remaining feedback for improvements

- It might be a good idea to give the Emotion Stickers a more catchy look, to stimulate seeing children and kids who's sight are heavily reduced. Yellow and black create the most significant and easiest contrast to detect. Design wise the stickers, if they'd be yellow, could have a black ring along the rim; this makes them distinguishable when they're placed on a light as well as a dark surface. Otherwise they like the conceptual idea of the stickers containing a secret message that has to be read with Sniff to be understood.

- The concept that the Memory Game could consist of a song is a good idea. One of the pedagogues suggest "Lille katt.." from Emil, the same song that I myself first thought of. They use to teach the children this song at the family weeks. This particular pedagogue prefer "Lille katt" over "Bä bä lilla lam", my own second choice cause this also has a simple melody that's easily cut up into six elements. She refers to "Bä bä.." as boring.

- They also mention that even though the blind environment in Norway isn't very big, I mustn't forget that this concept might have an international potential. Them mentioning this makes me think there's a global power to act within the field of stimulation material.

At the end of the day I get some feedback from Edvin Bye, pedagogue with physical activation as his special field. He thinks both the Memory Game and the Emotion Stickers could be used as a tool in the activation games he use to set up. He also has some ideas for improvement;

- When playing the Memory Game the stones should lie on a tray with separated departments, so that they can't move around when playing.

- The Memory Game can be used as a motivation to movement and activation. It can build up under the child's interest to explore his surroundings. Many kids with sight impairment are very passive or they are just interested in their immediate surroundings (limited by the reach of their own bodies).

- A feedback for if you found the right or the wrong stone could be a good idea, especially for the youngest kids.

- If used in physical activation over a larger area the stones could be connected with a string so you have something physical to follow when looking for the next node. This could be sort of a labyrinth.

- The pairs you find could be connectable like two pieces of a puzzle (or a small part to put into a bigger shell? designers remarks..).

- The idea that Sniff is part of a bigger family of different animals is an appealing thought.

Edvin think there is *a lot* of potential in the concepts, and he seems really delighted to see the results (Orntlig artigt). He was out on a mission earlier when I presented for the other pedagogues, there for he has heard some of the reactions from the others before getting to see Sniff himself. Finally, and this is something I consider as really good feedback, he says that it seems like my design has managed to start up a lot of new ideas and new thoughts on Tambartun kompetansesenter.
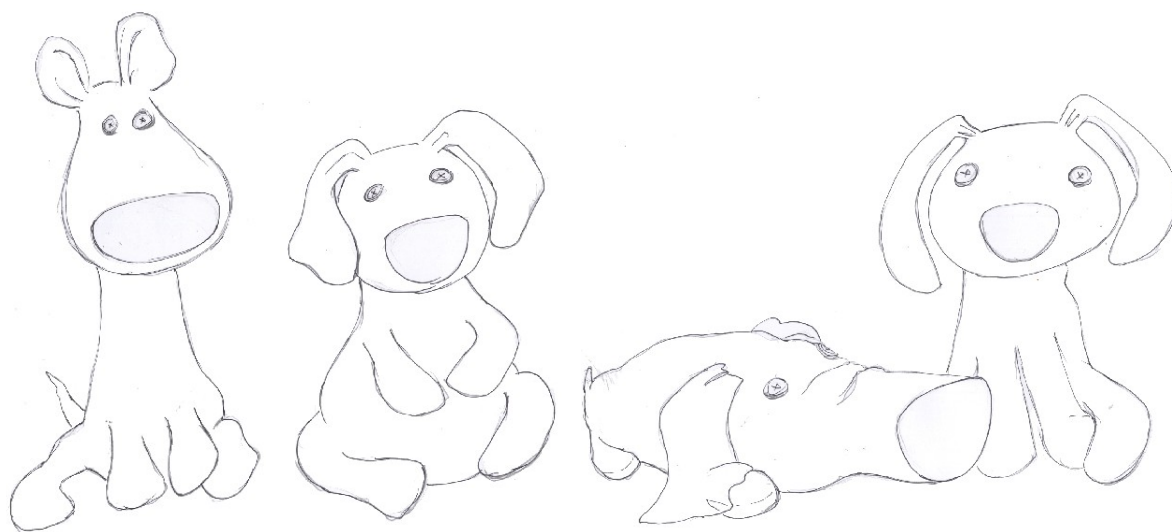
THE CONSEPTUAL PHASE

In the start of the project I got both inspiration and input to further research from Tambartun Kompetansesenter. I decided to design something under the category of stimulation material, not to specifically help accomplish a task or solve a problem.
The main guidelines for the design was that it should be socially engaging and/or physically activating, otherwise the kids would loose their interest after a while.
Another quality was to not make it too 'smart', then it quickly becomes an exchange for the use of other senses and in the end not helpful at all.
Sound, tactility or even light was found interesting to explore, as well as interaction on same premises as other kids.
From a workshop with famous anthropologist Anne Galloway I got the advice to try to make the worlds collide.

Concept generation
The project started off with a couple of creative workshops together with three other students in product design class. Methods from StigoStein were tried out in practice on each of out projects.
My main focus when I presented my scope was;
Blind kids 4-8 years, and the keywords Magic, Instant, Identity, Connection and Closeness. It was a concious choice from my side to not focus too much on Rfid and the technology, even though I told them briefly what it could be used for.
After the initial free idea generation we grouped the associations into Activity, Characteristics and Physicality.
Combining one word from each group with forced relations grew new concepts.
At the end the entire group of participants voted for their favourites.
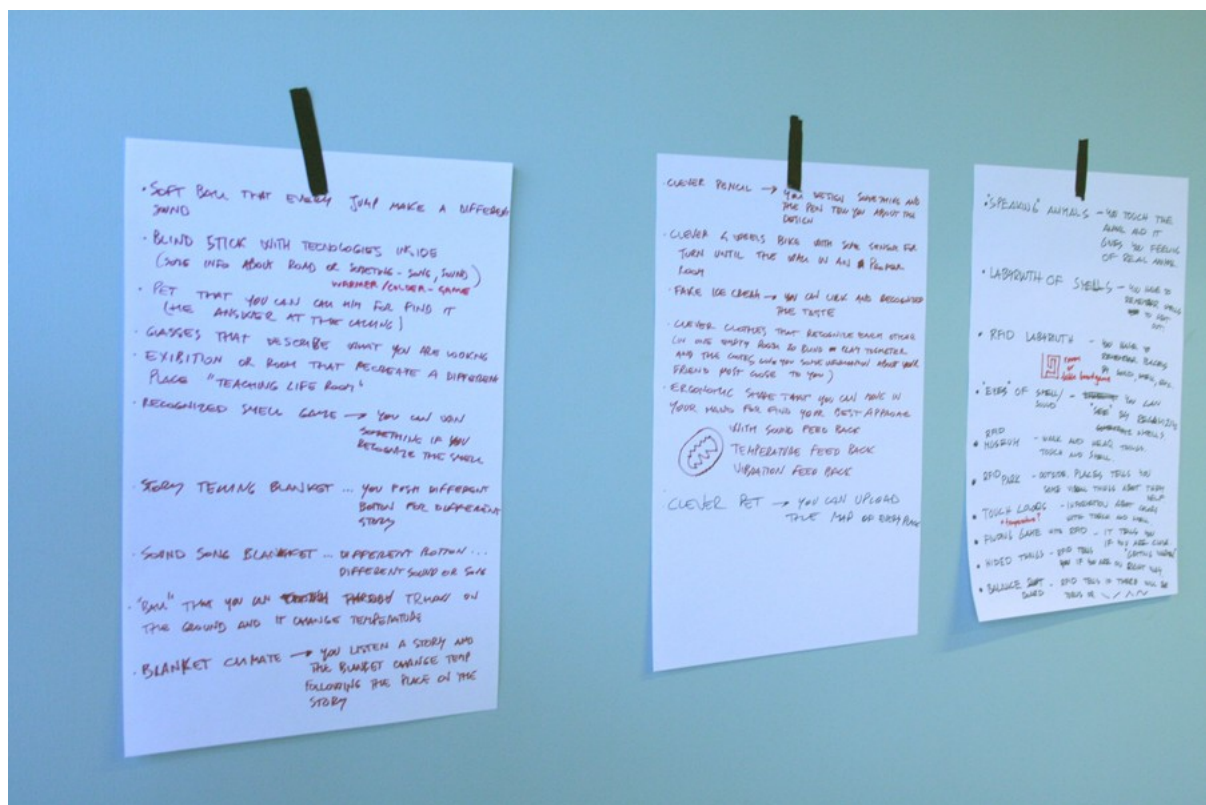
Concept development
The concepts are building upon the results from the workshop, but now I'm concentrating more on what might be possible with Rfid. A one week workshop with Tom Igoe, a physical computing guru, also helps sorting out which concepts might be more suitable for this specific technology. If the design is better off or equally solvable with for example different sensors or electric solutions, I consider that it's not suitable any more. I have to kill some darlings, but I think it's important to focus on the extra dimension that Rfid can contribute with.
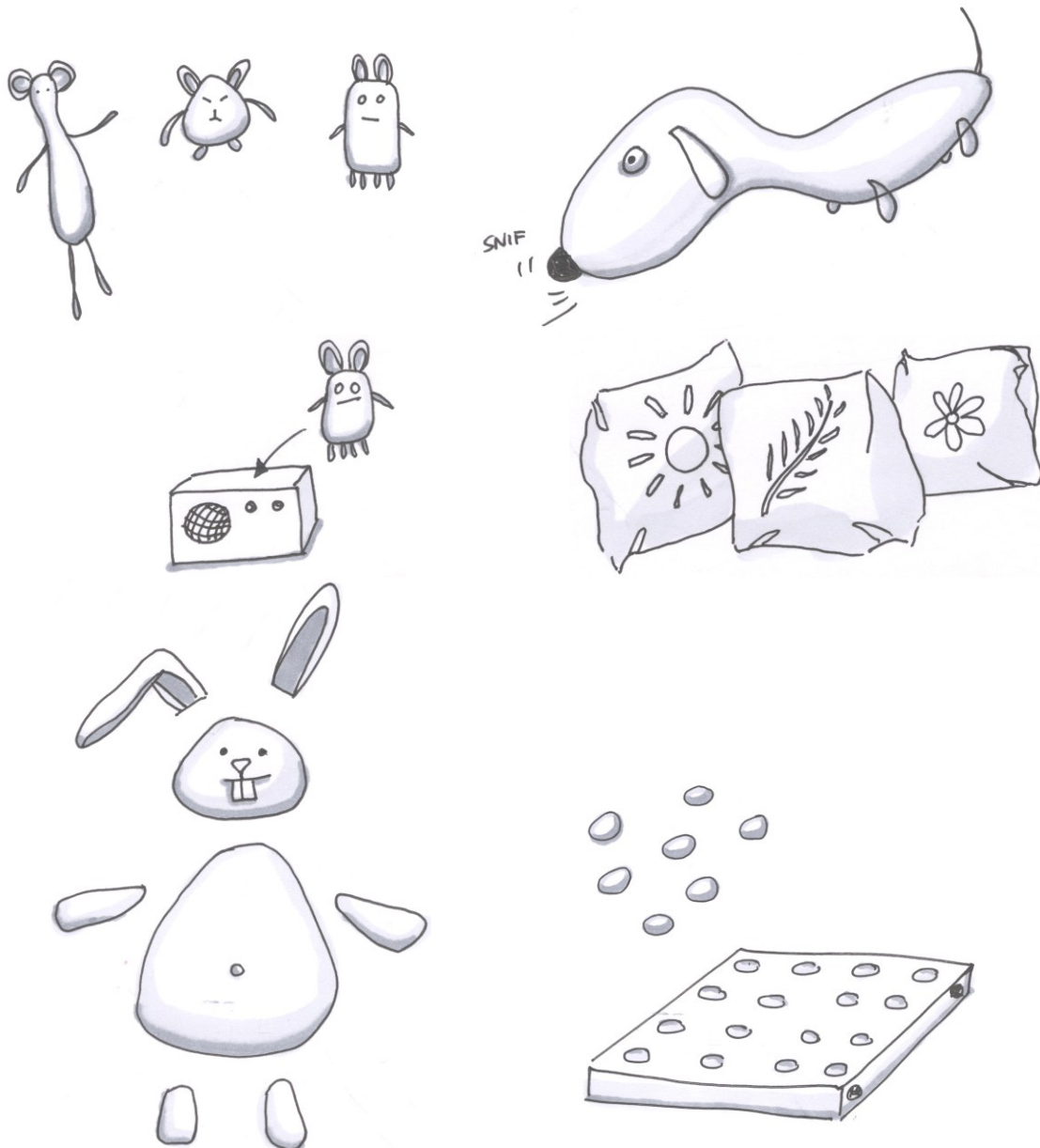
In the second round the dog who's later evolving into 'Sniff' is chosen as a starting point, and I'm trying to optimize it for Rfid and deepen the concepts. Physical activation is still central, and I'm thinking of a scalable concept that could be applied in different settings. Social cooperation with other kids makes interaction on the same level crucial.

I find out that the visual dimension is even more important in play than I imagined at the start of the project. I found hold for my suspicions in a Swedish report from 1991, interpreted to danish in 2006, "Legeudvikling hos blinde Småbarn"[1] by Stine Gustafsson og Gunilla Preisler, where the authors among other things has looked into blind children's possibilities to participate in play with seeing children.

From Tambartun I get the advice to design a toy that's soft, good to hold. This is of course my plan, I think they just get stressed from me telling them too much about how to solve the problems technically.
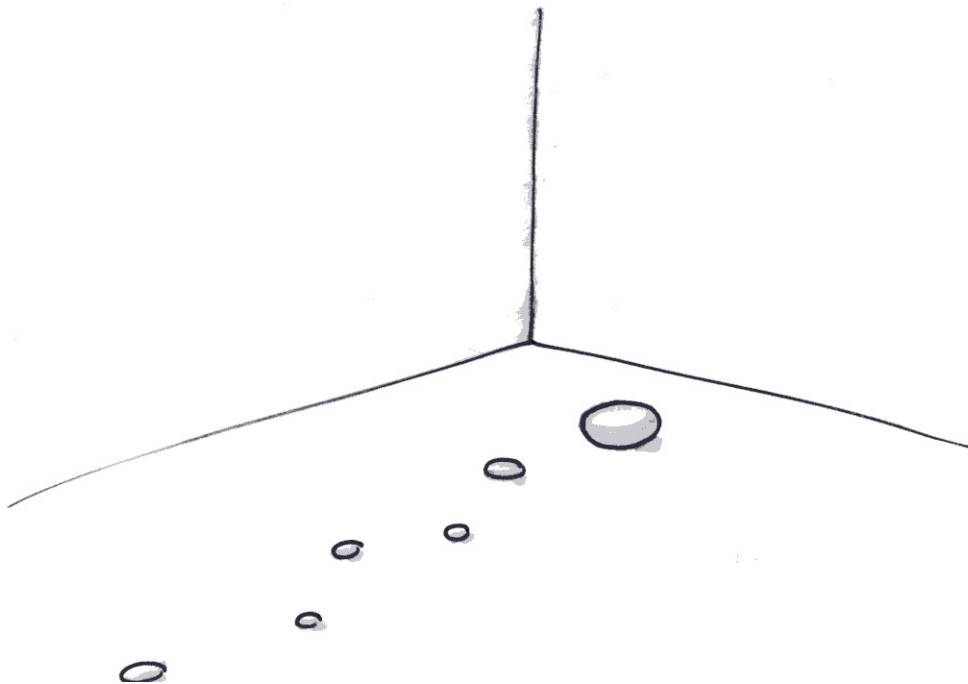
Treasure hunt consists of nodes to place out in the room, then use the dog to find them. Sniffing on one of them could give clues to where the next one is through vibrations and sounds. There could be three types of treasures; bird / middle / fish (placement clues). The nodes could have pre-programmed behaviour, so that they have to be placed in a specific way.
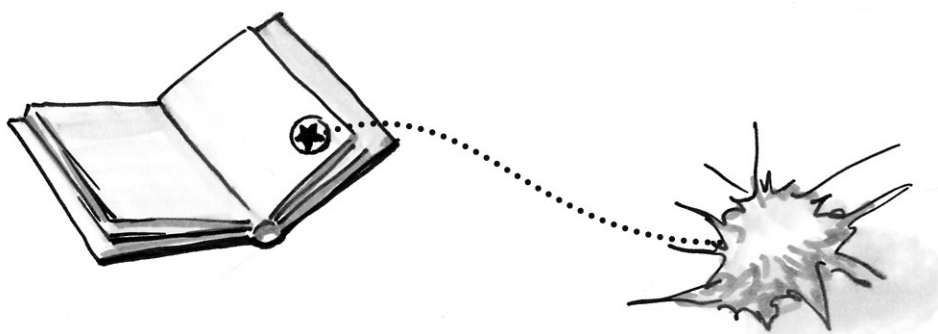
Story hunt consists of tactile tasks that matches a certain book, or a set of stickers to use on any book. On some pages there's a marking that tells you that you have to find an object connected to the ID specific sound / vibration. This can be a clue that you have to find to continue.

This could also be a set of mood stickers that controls the dogs reactions to the story.
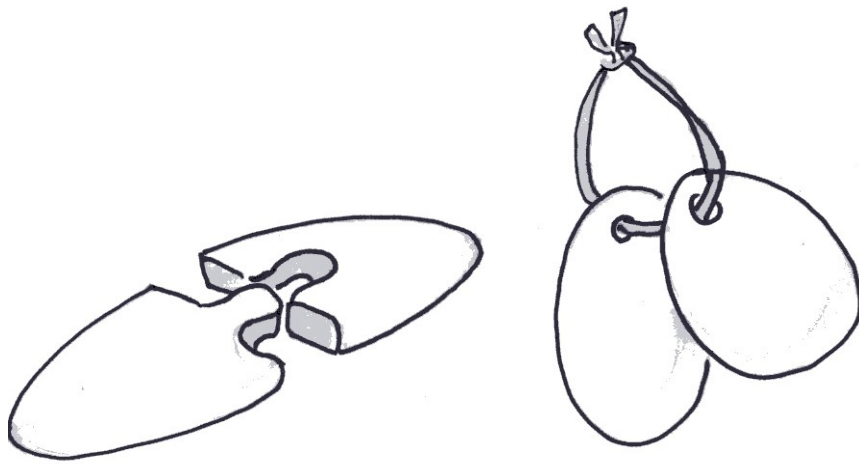
Memory is a game where you should find a pair that belongs together. There could be physical signs that tells you which two parts are matching, like a puzzle or two buttons that fit together. The clue could be the same sound or vibration, parts that match in weight or parts with the same proportion of two tactilly recognizable materials. Maybe you should find an object that smells like the task you're given?

If there are no visual or tactile symbolic traces you have to memorize in other ways, which can be interesting in the perspective of learning. This also adds to the magic of the experience.

Collector means that you can feed the dog with the objects you find and collect them in his stomach. The collector can be combined with Memory or Treasure Hunt. The fattest dog wins..

The shapes can be felt through the fabric, which can be tactilly interesting and create exciting razzling sounds.

"dragspelsmage"
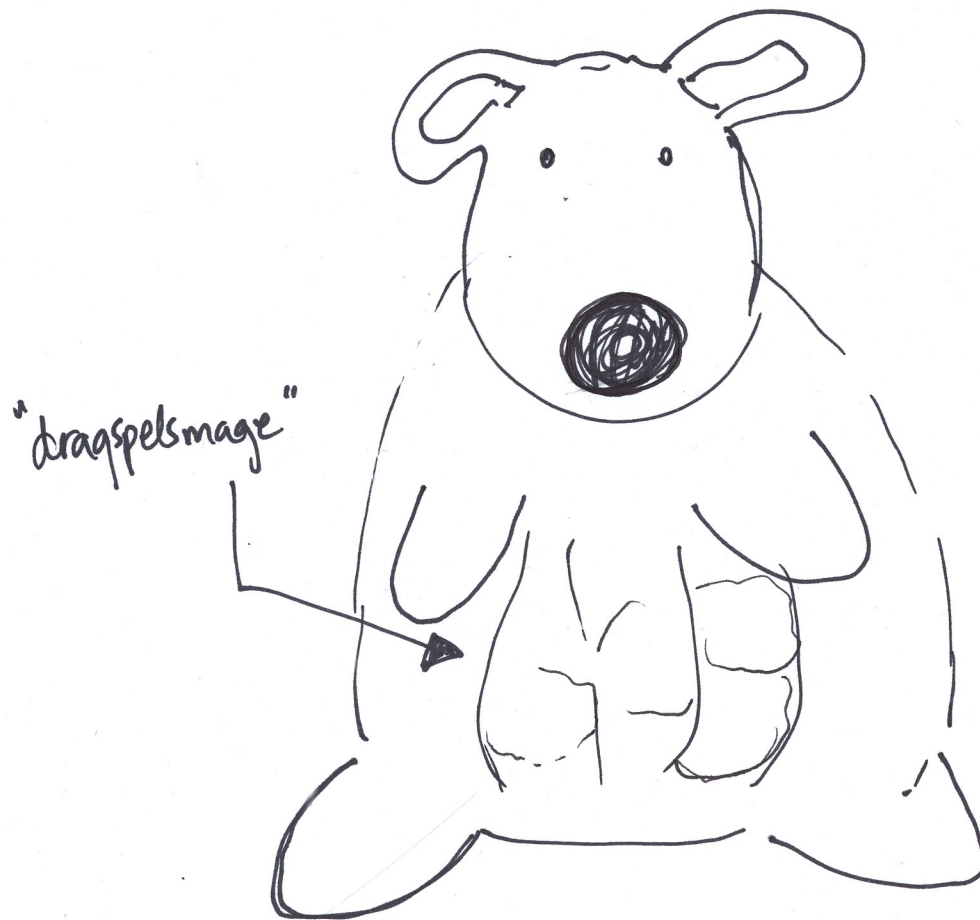
'Sharing' concept the dog has a memory of what he's been fed, and only reacts the first time you feed him with a particular piece. You have to share what you find with another dog to get a new reaction.

Another issue to consider was what structures could be made in the room. The set-up of the nodes can be controlled of a grown-up facilitator in advance to create different difficulty levels.

The behaviour also needed my consideration. The feeding-mechanism, and a lot of other behaviours was decided to be separated from the game. The design of behaviour is such a big part in it's own that I've chosen not to adapt on the concept this time. Also a built in behaviour would result in a totally different type of toy, that I don't even think would benefit the concepts.

Apart from in a social situation when many kids play together with their own Sniff, then the animals can recognize each other and interact. Sniffs can have different behaviour for different friends..

'Looks'

The main focus in this project has been on the conceptual side and on building a prototype to try it out in real life. The design has focused upon tactile qualities instead of visual. Then there are a lot of qualities that affect tactility that also affect looks. Still the design phase has had another development than I'm used to from more 'ordinary' processes.

One of the components in magic is the unexpected and there for I've chosen a low tech / no tech appearance of the toy. I found a suitable disguise for the dog in a retro romantic inspiration from an old fabric toy from a mid 70's Swedish toy concept, named Kalikå. The home made finish is the opposite of the technological soft animals inhabiting the toy stores. I did not want Sniff to be an ordinary technical toy, that talks or makes intendently realistic sounds that just not really reaches up anyway.

I've also used visibly strong contrasts to point out the function in the grip. The ways of use is a guideline for the concepts of the grip. It also depends on the size of the toy itself, to suit the hands of small children. I found it important to design out from the main use, well knowing that after my testing the shape might be reconsidered.
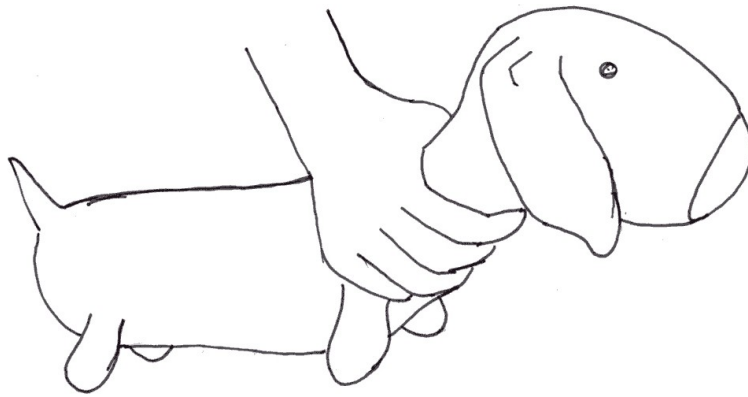
Grip around neck with one hand
- thin neck
- long, slender body
Pointing qualities
Size matters

Grip under arm
- soft & bendable middle parts
- longer neck
Cozy qualities
Size not important

Grip on upper chest
- thicker in the bottom
- legs out on sides for better grip
Sitting and collecting qualities
Size less important

THE PROCESS OF PROTOTYPING
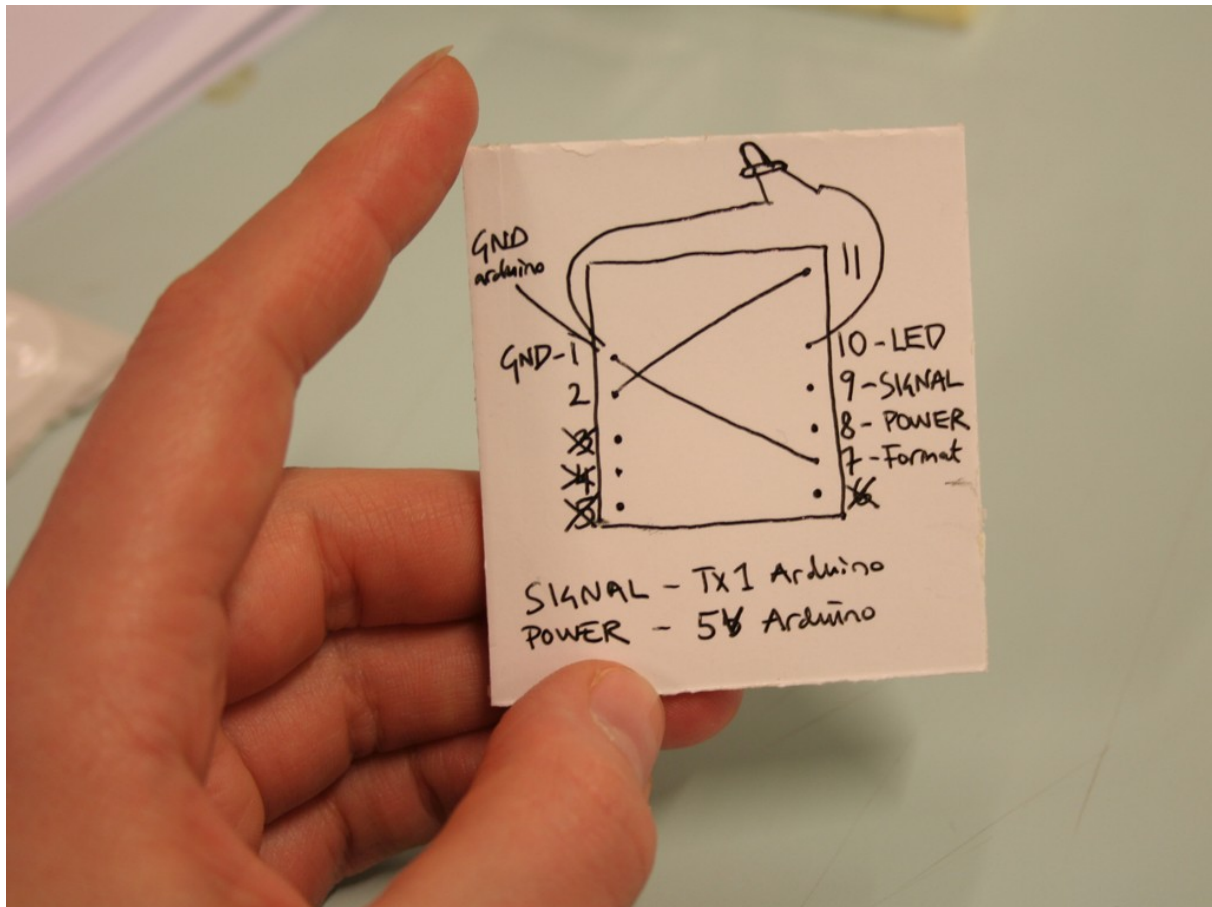
Most data sheets look like Greek to an inexperienced. Before entering the world of soldering sensitive equipment with high precision, me and Katarina make a cardboard dummy of the Rfid-reader. And when turning the board we get a view of the reader from the top. This may seem like an unnecessary idiot-precausion but it may prove helpful. Can't remember how many times I've had inside-out construction problems when for example sewing the sleeves of a sweater. OBS! The pins of SIGNAL and POWER accidently has changed position in this photographed version of the card.
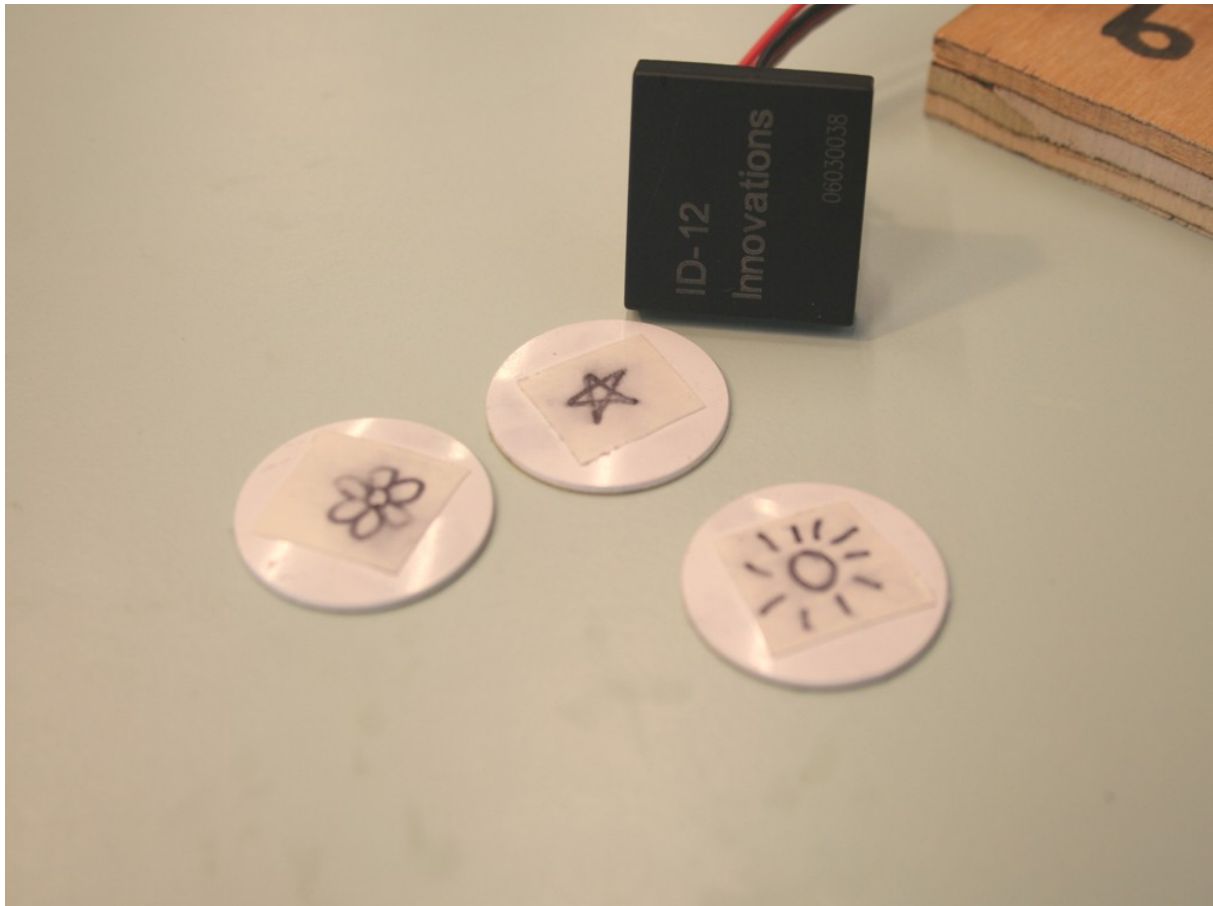
Strcmp.

This small bunch of letters solves something I thought might be a big issue with the code. This is a command in C to express String Compare, that fits perfectly with the mission of detecting the ID's, something I learned after emergency help from programmer boyfriend. Before this there was a problem with the strings getting compared number by number, and that's not an ideal way of doing it when ID's of the same type all start with the same figures. Since Arduino builds on C, and Processing on Java, I suspected there would be a lot more hassle for me to get it up and work. An in-house programmer certainly helps..

I prototyped this with three Rfid's and marked them sun, flower and star to identify them. Now the code gives a nice string back through the serial port, telling exact ID plus the words "sun", "flower" or "star".
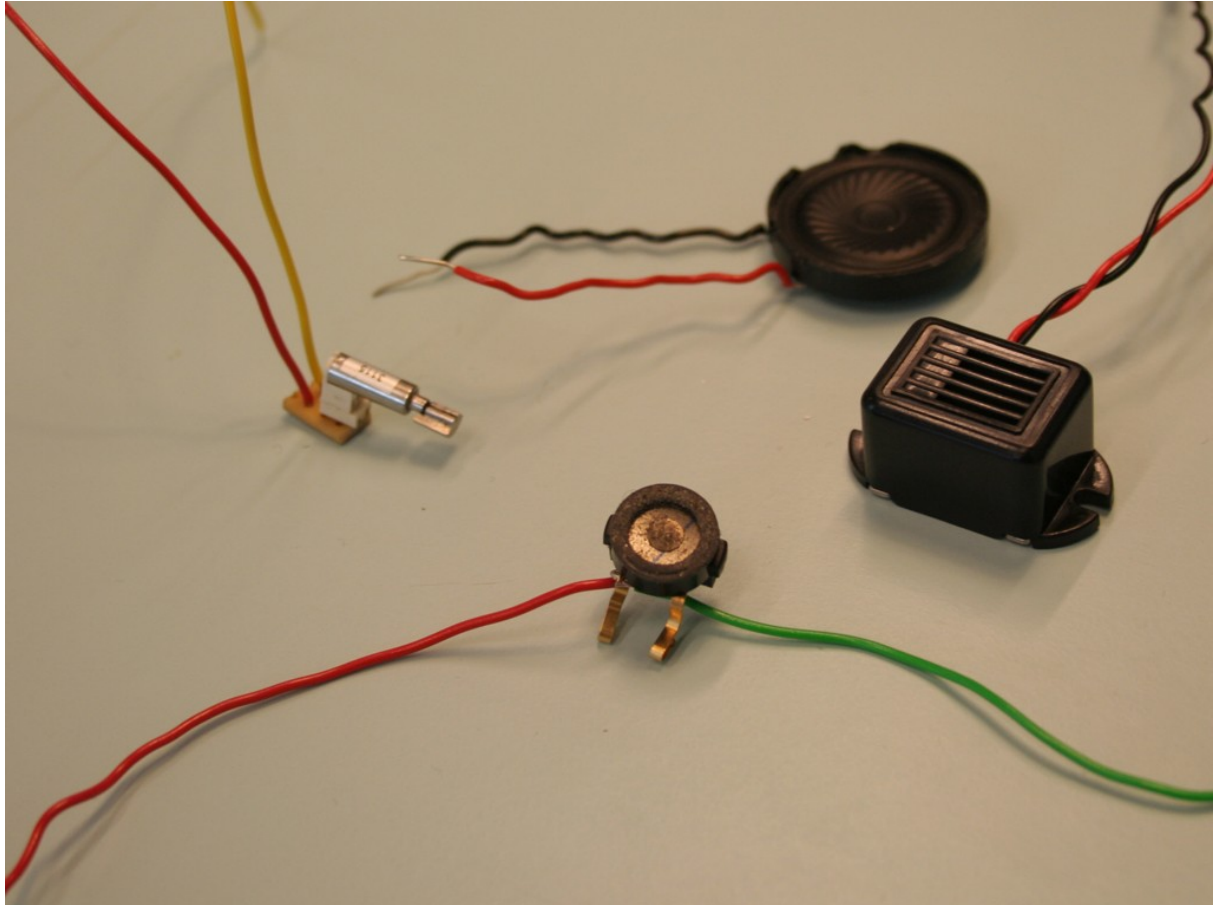
Some ingredients for making sounds is tested out; a small vibrating motor from a cell phone, a speaker from a cell phone, a piezo speaker and a buzzer..
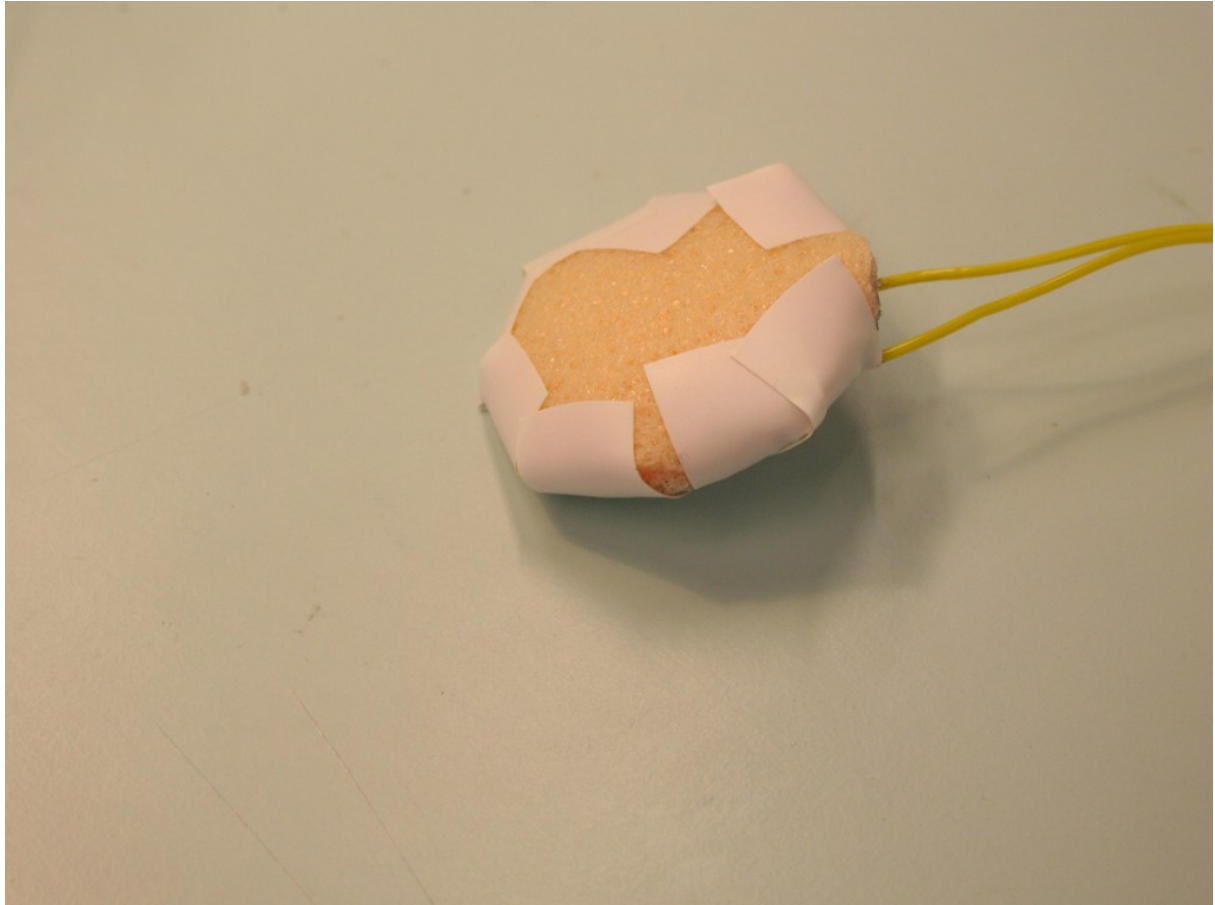
Sadly I'm not gonna afford to buy a sound device, like an mp3 player for my prototype. The ones that I've found that have serial communication are expensive, and to integrate a more raw version of a sound chip is a bit over my head as an electro newbie. The PWM sounds are harsh and sort of unpleasant to listen to, so I build some extra padding on the speaker to soften the sound a bit. Turns out the big speaker that came in a sound card is the most powerful, with the deepest sound.
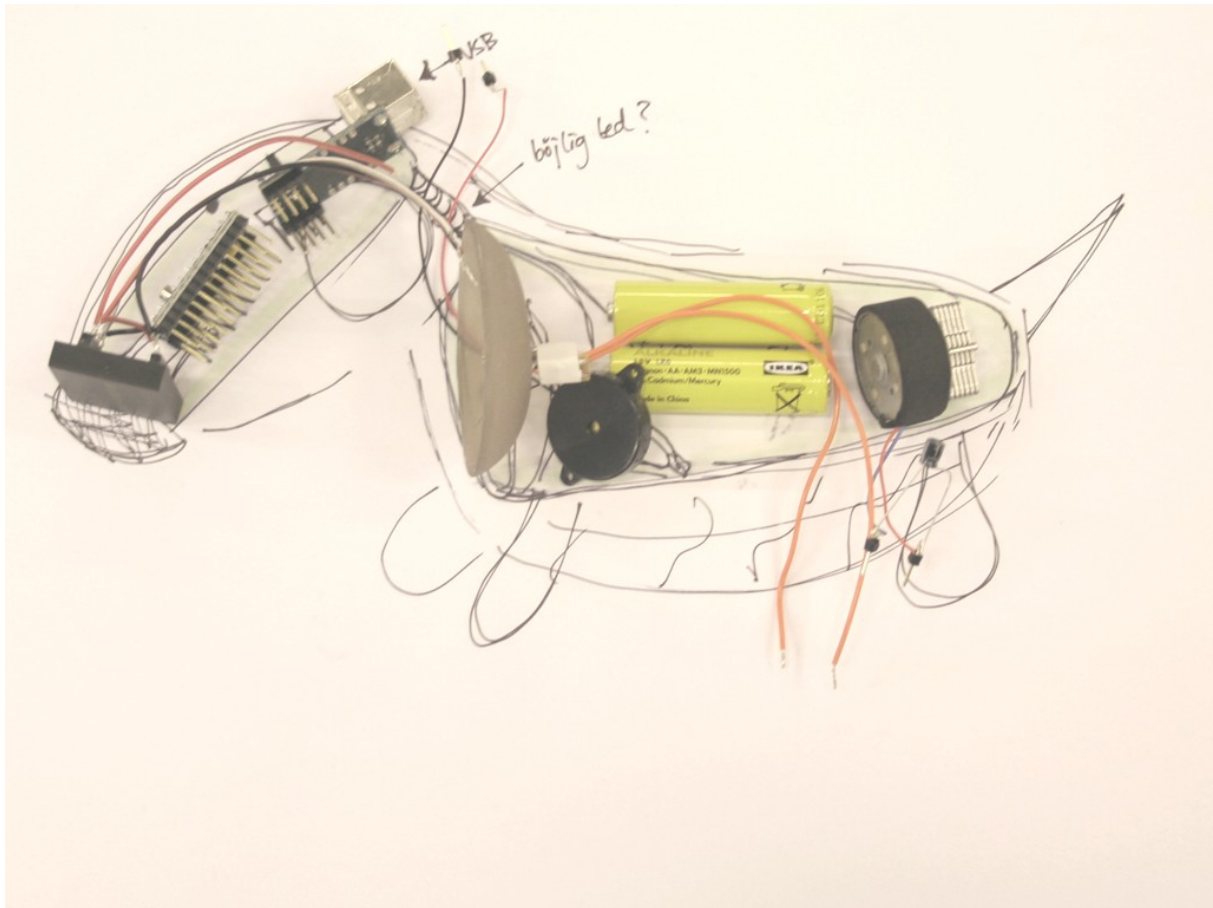
Planning for the construction and where to place the components inside the prototype. At this stage I still plan to make a more horizontal model of the dogs body. Later I change my mind about this thinking it would be nice if he's sitting when listening to a story, plus if the dog should be able to collect the nodes in the Memory Game in his stomach, he's better off in an upright position.
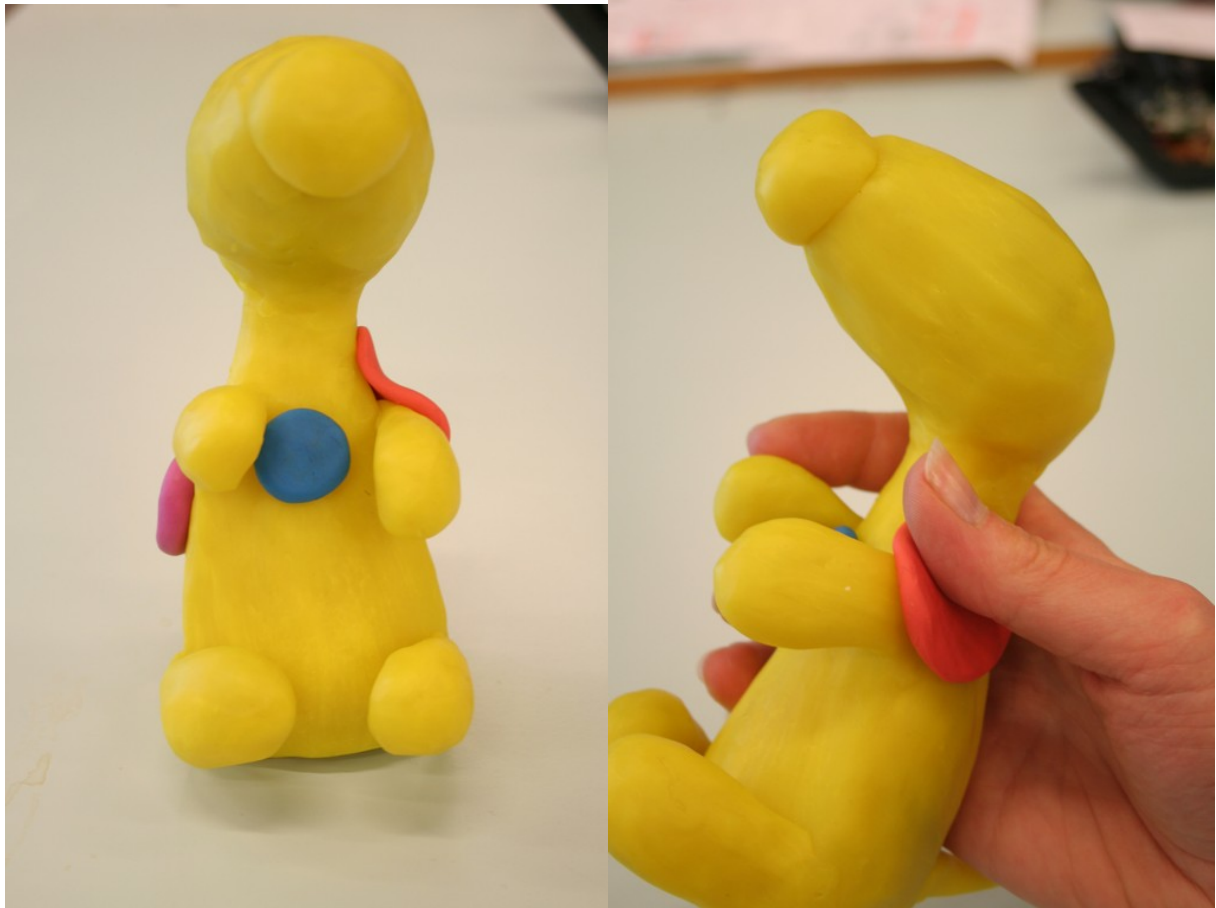
Building a more accurate shape and size of the shell for the electronics. The yellow wax dog is scaled 1:1, but there's going to be an extra layer of soft foam on top of this so it'll be a bit bigger. I'm deciding how to hold it, and mark out where the feedback areas should be. The red circle is the small buzzing motor in it's resonance box, the blue is the speaker and the purple is the big vibrating motor. I place them so the vibrations can be felt at different spots on each side of the animal's body.

I'm planning to build two shells, one for the body and one for the head. First I make a model of the body in clay and cover it with wax to test the inner space. Later I'm gonna vacuum mould the shells in pvc onto shapes in cibatol.
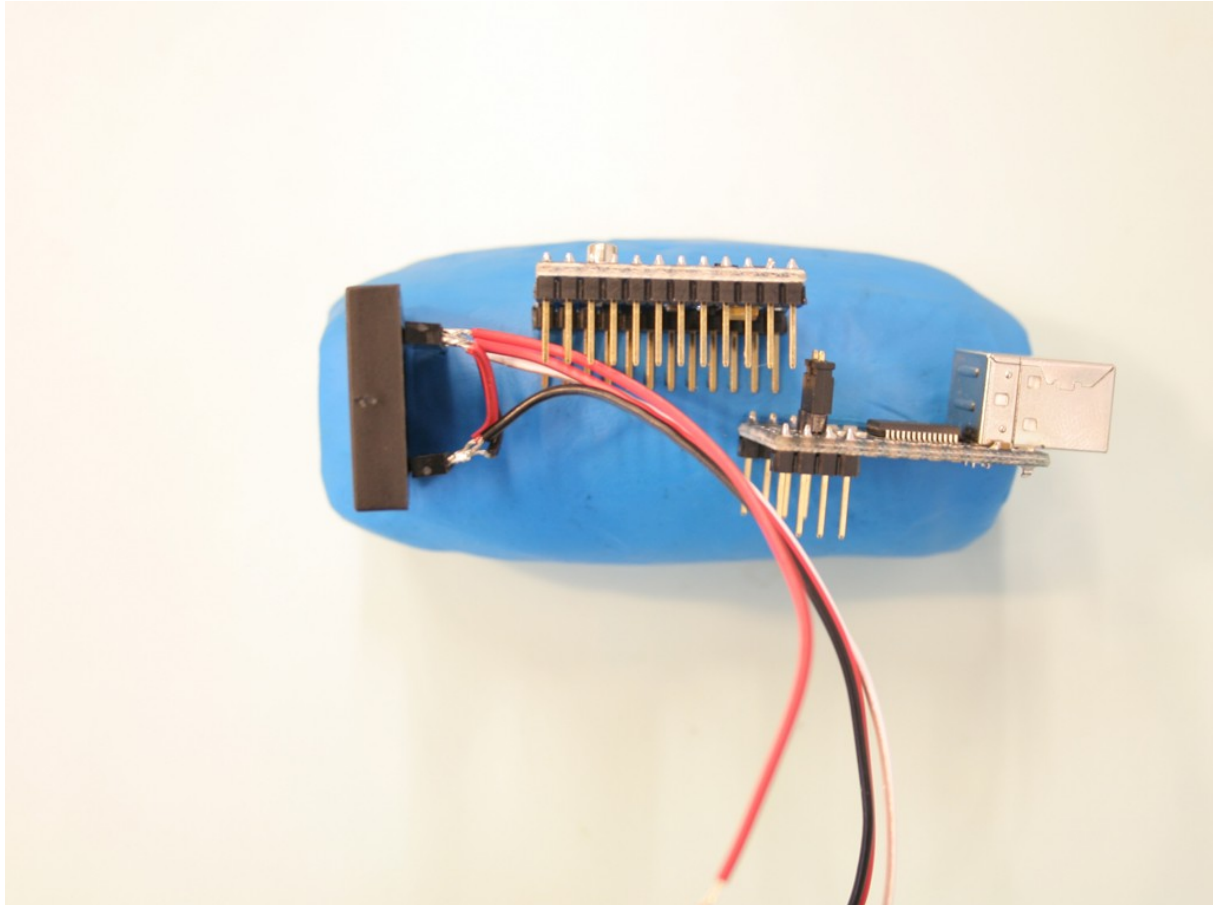
The head shell is going to protect the reader, the mini arduino and the usb-connection, and have two easily accessed buttons for de-connecting the white data-out cable and resetting. The body shell will contain the big motor, a piezo speaker and the small motor in the resonance box with the membrane. Plus a 5V battery in the bum. The tail will be bendable and able to support the dog when sitting, with a steel wire inside. In the concept it's going to be waggable, but for now I have simplified the prototype a bit. The head and the body will be connected with a type of joint so that the dog's head can be flexed up and down a bit.

(next page)
The shell of the body and the head are moulded separately from shapes in cibatol. I make them roomy enough to be minimized in the seam between the two halves when I know exactly how much space I need for the electronics. I then go for a fit of my newly built brain-unit, i.e. all that's supposed to be in the head; arduino mini, usb connection, Rfid reader, a flip button for disconnect RX and a push-button for resetting the board before uploading. Plus some nice led's for debugging purposes.
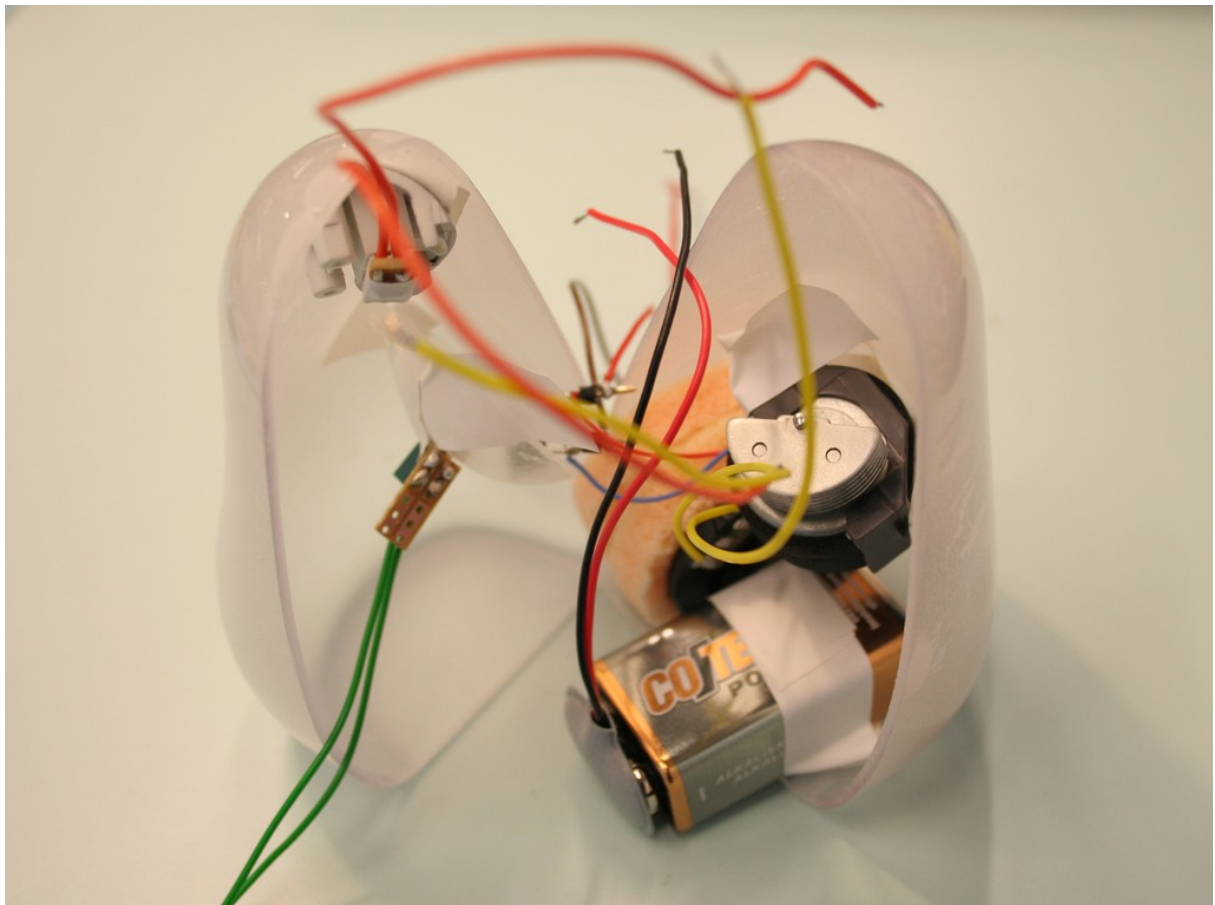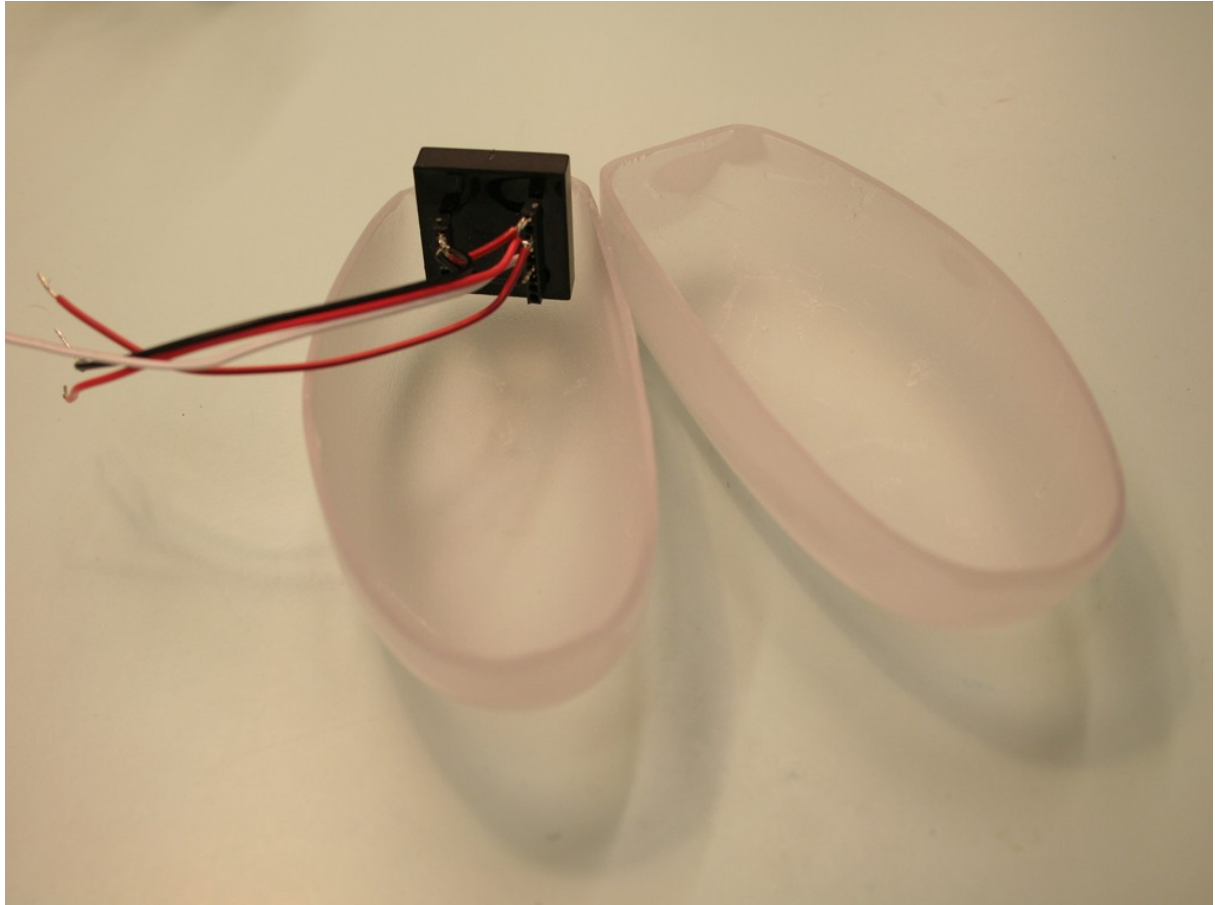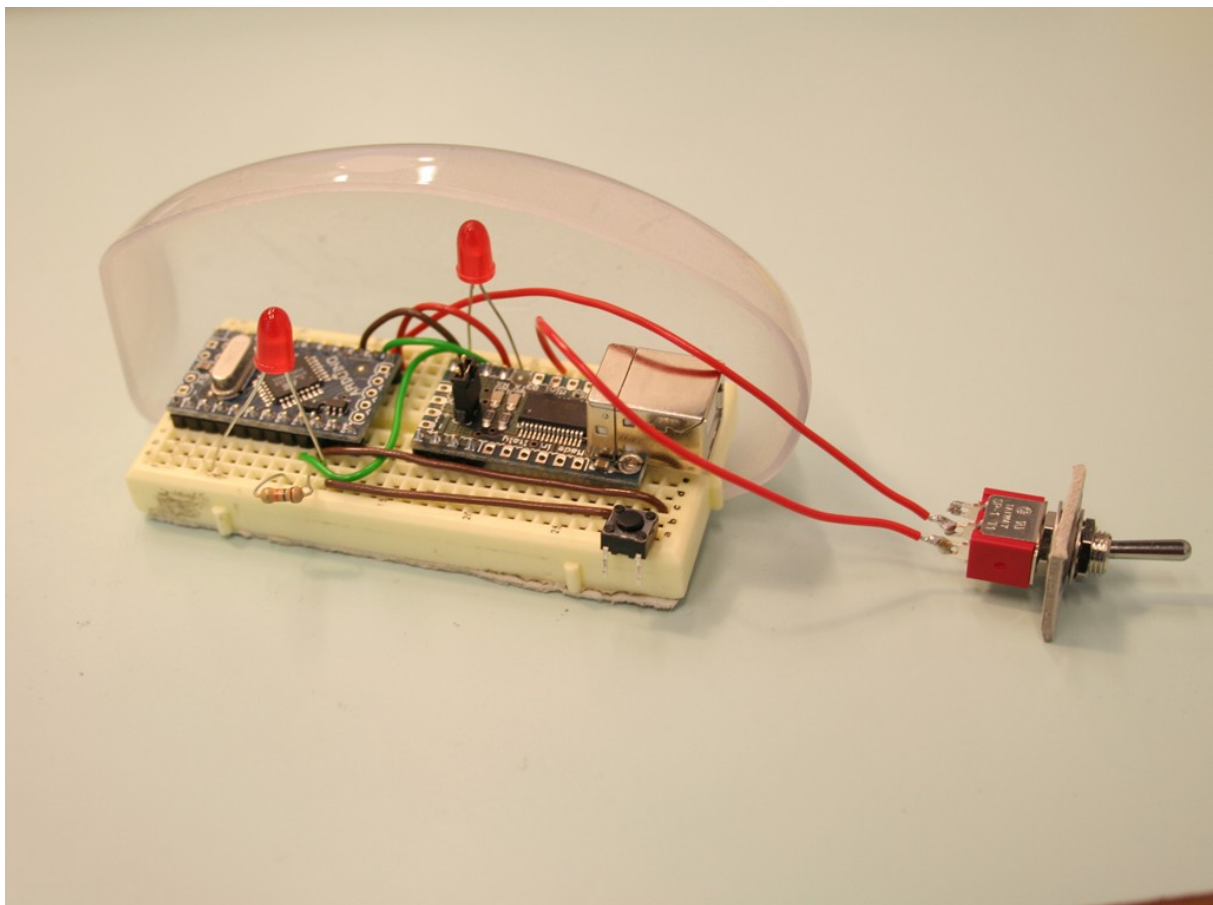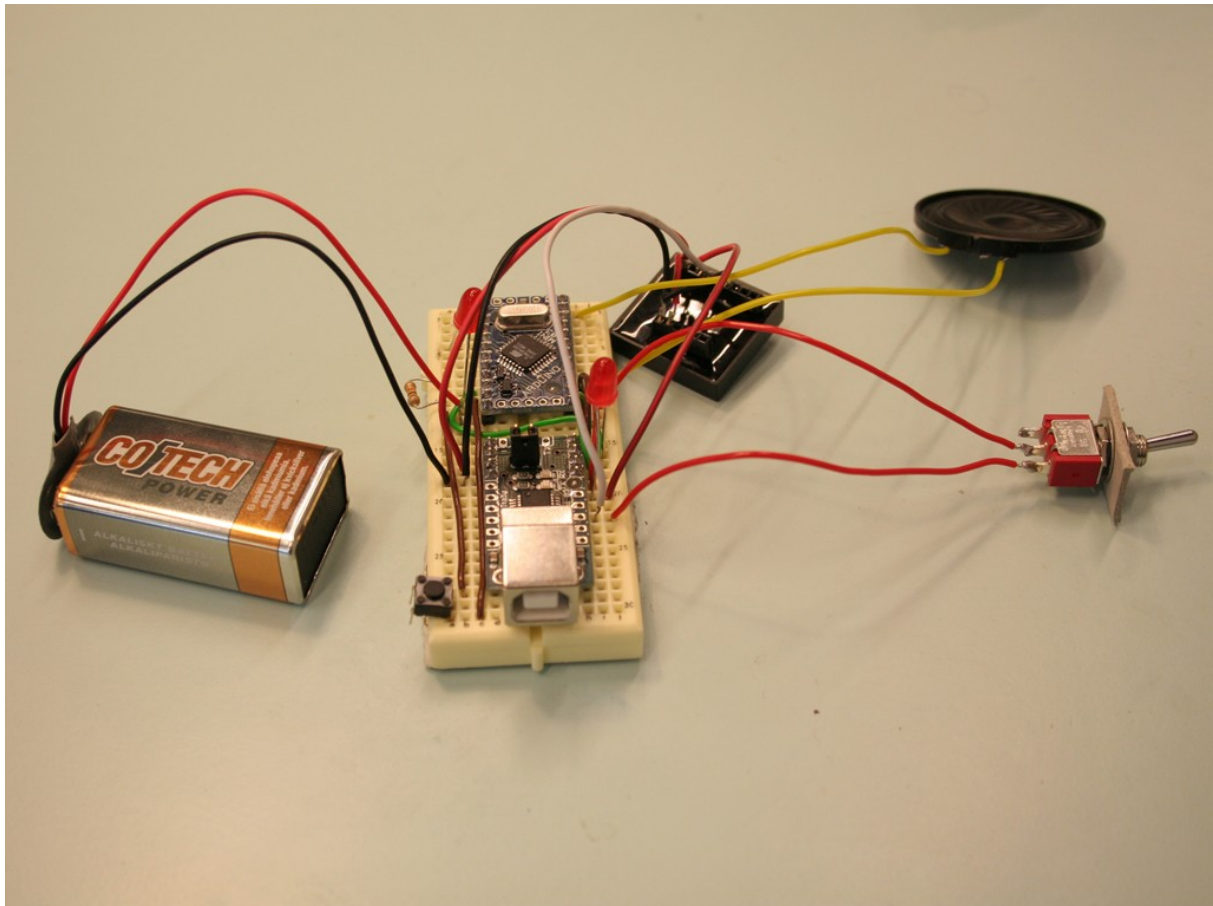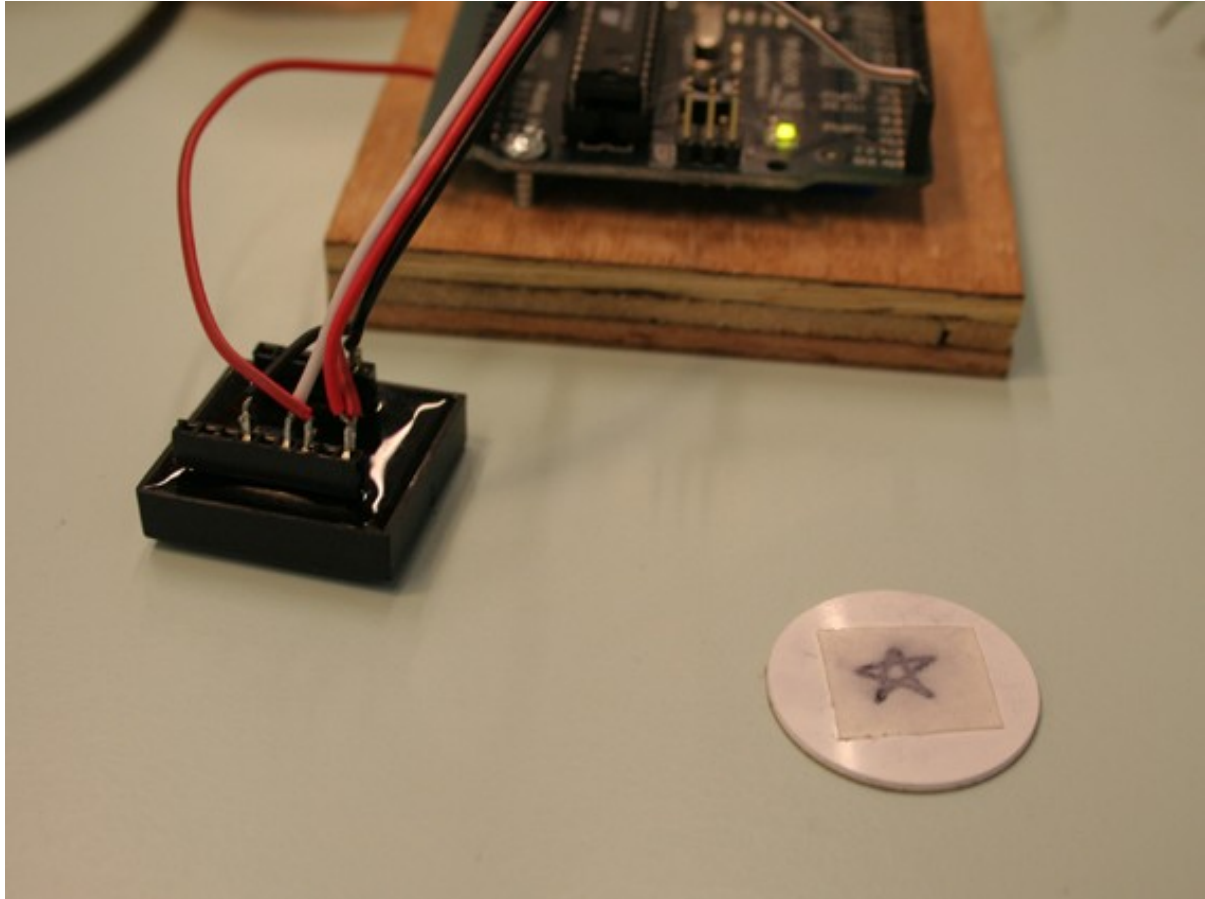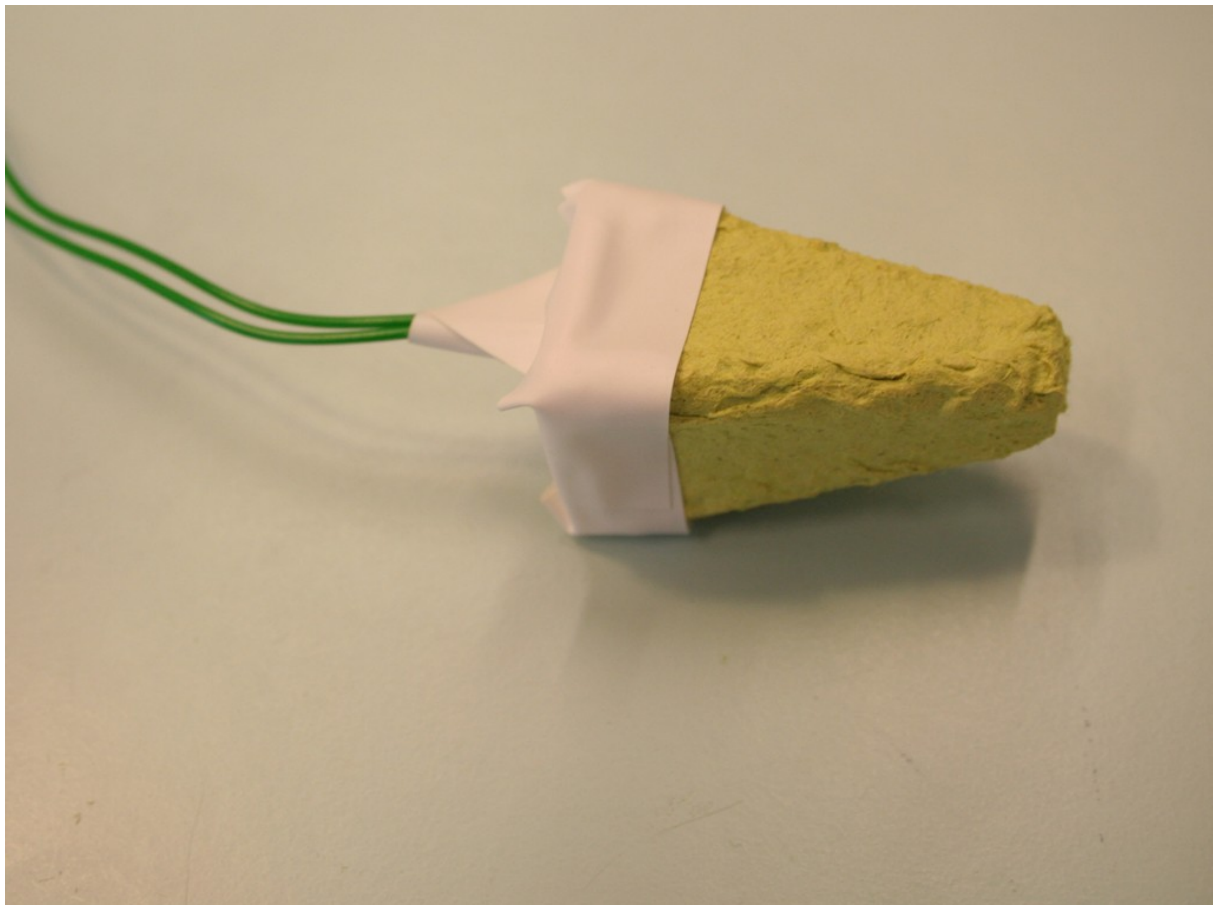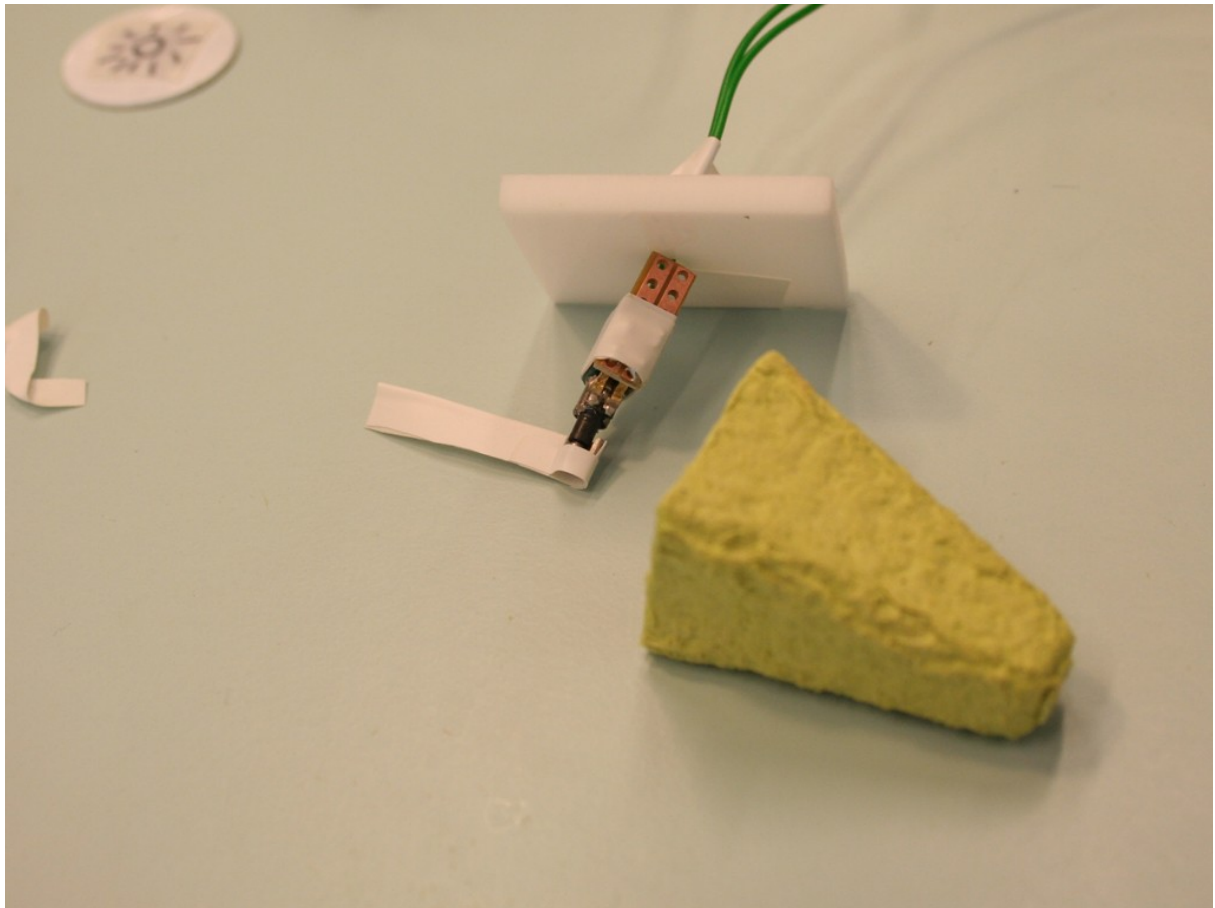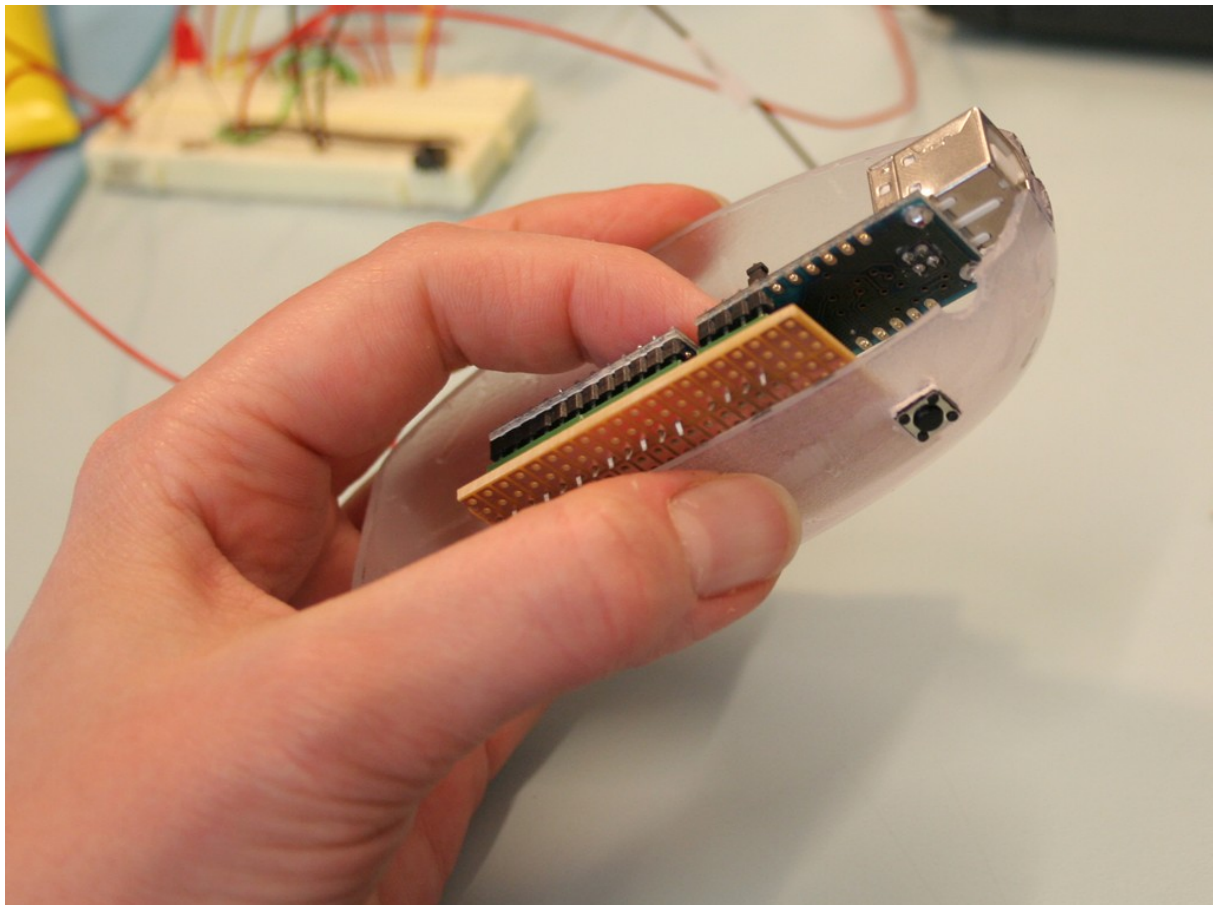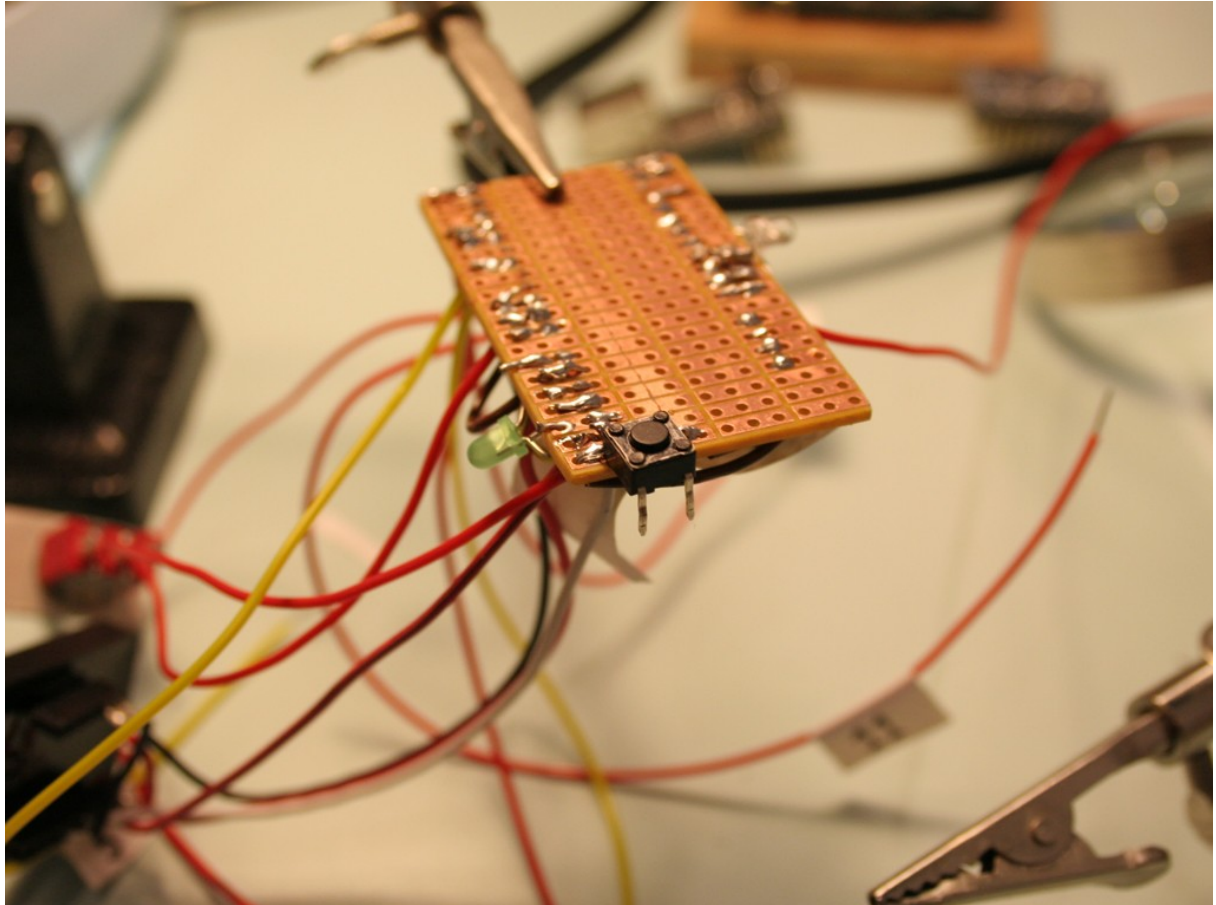
Strange things happens while I'm testing the motor. The code I'm using just reacts once on the Rfid chip, so to get a new reaction I have to move it out of the readers range and then in again. This is a bit inconvenient since I need both hands to hold the motor and the small sound-box parts like the shell, the membrane and finally the paper cone. But what I discover is that when the chip is positioned at a certain distance from the reader (as shown in picture) it goes in and out of the detection sphere without me moving it physically.
I don't know if the reason for this is that the readers radio sphere is unstable by nature, constantly growing and shrinking a bit, or if the small sphere from the chip when it's activated interfere with the readers sphere and there for create an instability.


(next page)
I discover that the vibrating motors actually make some soft sounds themselves, when they are fed with a PWM code that plays a melody. The sound is extra clear when something like a membrane is reinforcing the sound. When I'm finally trying to implement the membrane in the model, it turns out it's too sensitive for small changes in position to ever be stable in use in the kind of prototype I'm building. I then try to build a sound box that is less sensitive and doesn't malfunction just over a millimeter and create a razzling sound. After experimenting with encapsulating the sounds in a lot of different boxes, my choice falls on the egg box and the weakest of the small mobile phone motors. This works fine and has quite a nice sound to it as well. A bit like a soft growl, or perhaps even a sniff if you use your imagination.

SNIFF Tangible Toy
Tangible Interactions, spring 2007, AHO

Sara Johansson   www.sarades.no   30
Tutors; Timo Arnall and Mosse Sjaastad

(previous page)
The soldering phase demands a lot of concentration and planning. There are so many wires, so little space due to the hand-held size that should work for a young kid to use. There for it's really a beautiful sight when all the spreaking wires are neatly stuffed into the milky white plastic head. I've built a wall inside the head that gives the reader a separate room without any pressure on the sensitive solderings on it's back. At the same time it supports the breadboard so that this is kept in place even when I'm connecting the USB-cable or pushing the buttons. I've made one opening for the USB-connection at the back of the head and two more for the push-button and the switch-button on each side of the neck. When it's all mounted the board is snapped in place between the push-button and the internal wall. The wires are directed out from a fourth hole. I plan to reinforce the neck with a braid made out of the stiffer wires, that is thick enough to manage to hold the head upright and also being bendable. This later proves to be too weak, and is replaced with a bendable "swan neck" from an usb-lamp from Clas Ohlson.
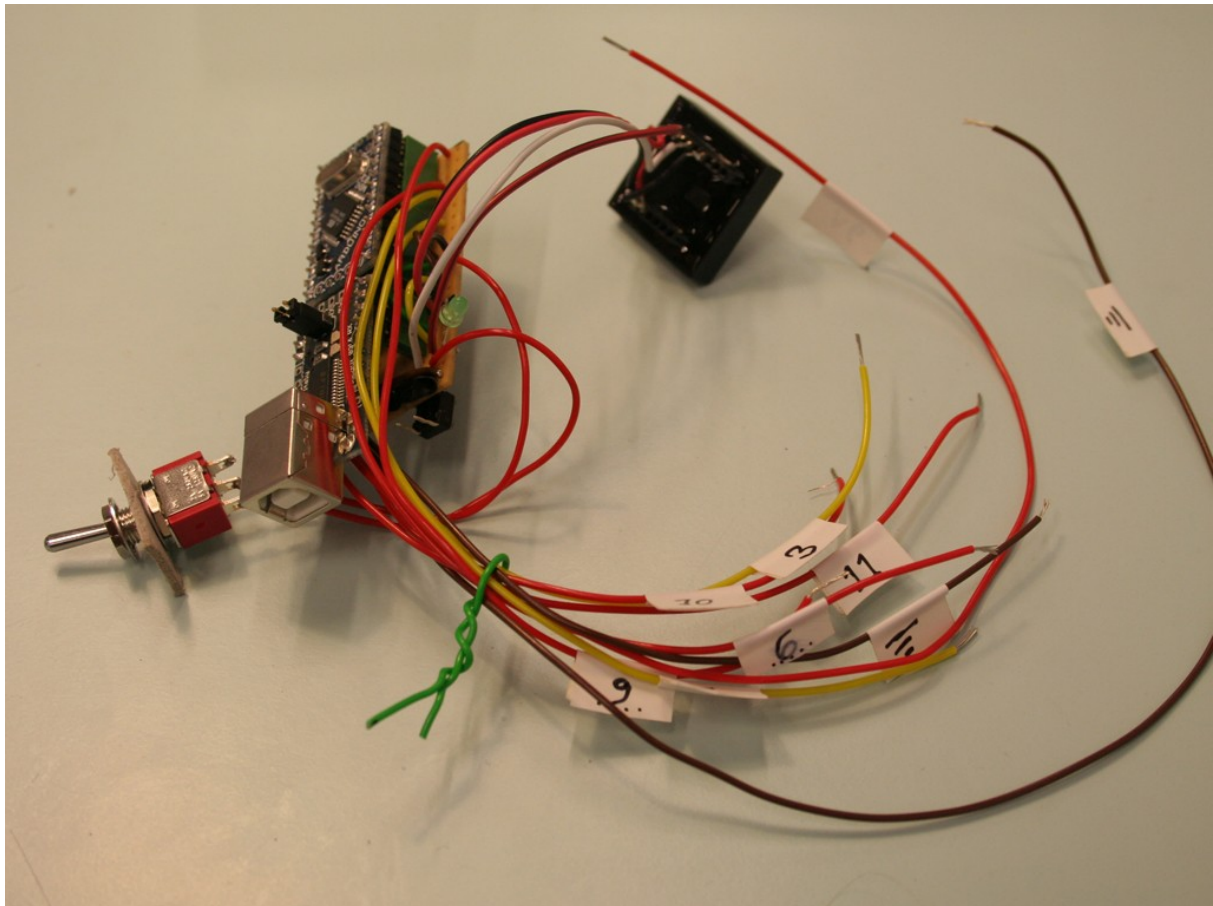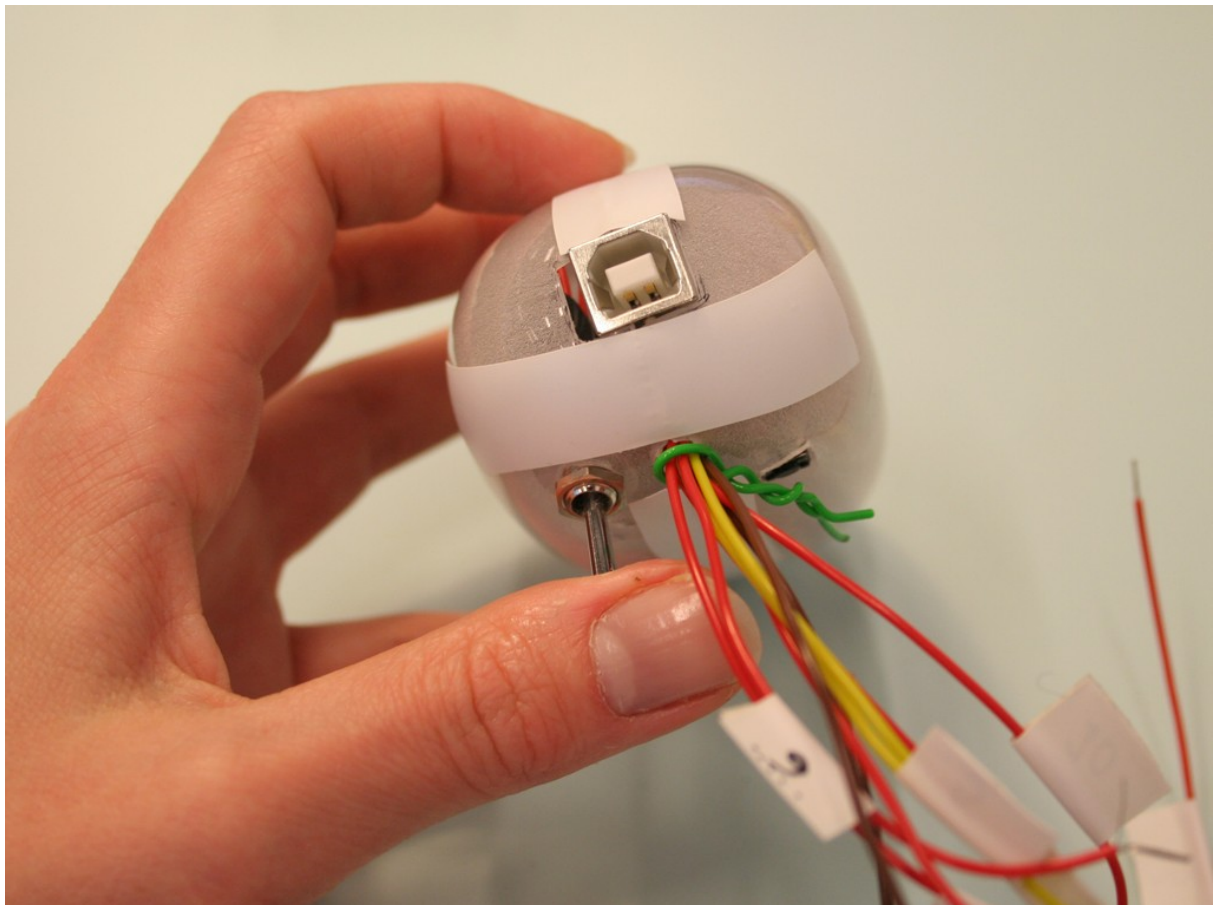
One of the arguments for keeping the detecting electronics in the head separate from the feedback functions in the body was to minimize the effect of the vibrators on the other electronic parts. After my experiences with user testing I maybe would consider making the connection between the two parts more solid; they could still be separate, but I would give up the possibility of bending the head in different positions for a even more stable neck.

Photo's from the construction inside the body. One small vibrating motor with spiky exact feedback, here encapsulated in a part of the original mobile phone shell for protection and mounting. The sound-box (construction mentioned earlier in this chapter) that makes a razzling sound and a weak vibration. (I learned that when the motor's used for making sounds it goes on cost of the vibration.) The padded speaker, finally I end up taking away a lot of the padding because the sound becomes too weak when the dog is wrapped up in soft foam on the outside. One big vibrating motor for a rumbling, shaking movement. This component also make a lot of noise, so it's not suitable for he more happy feedback emotions.
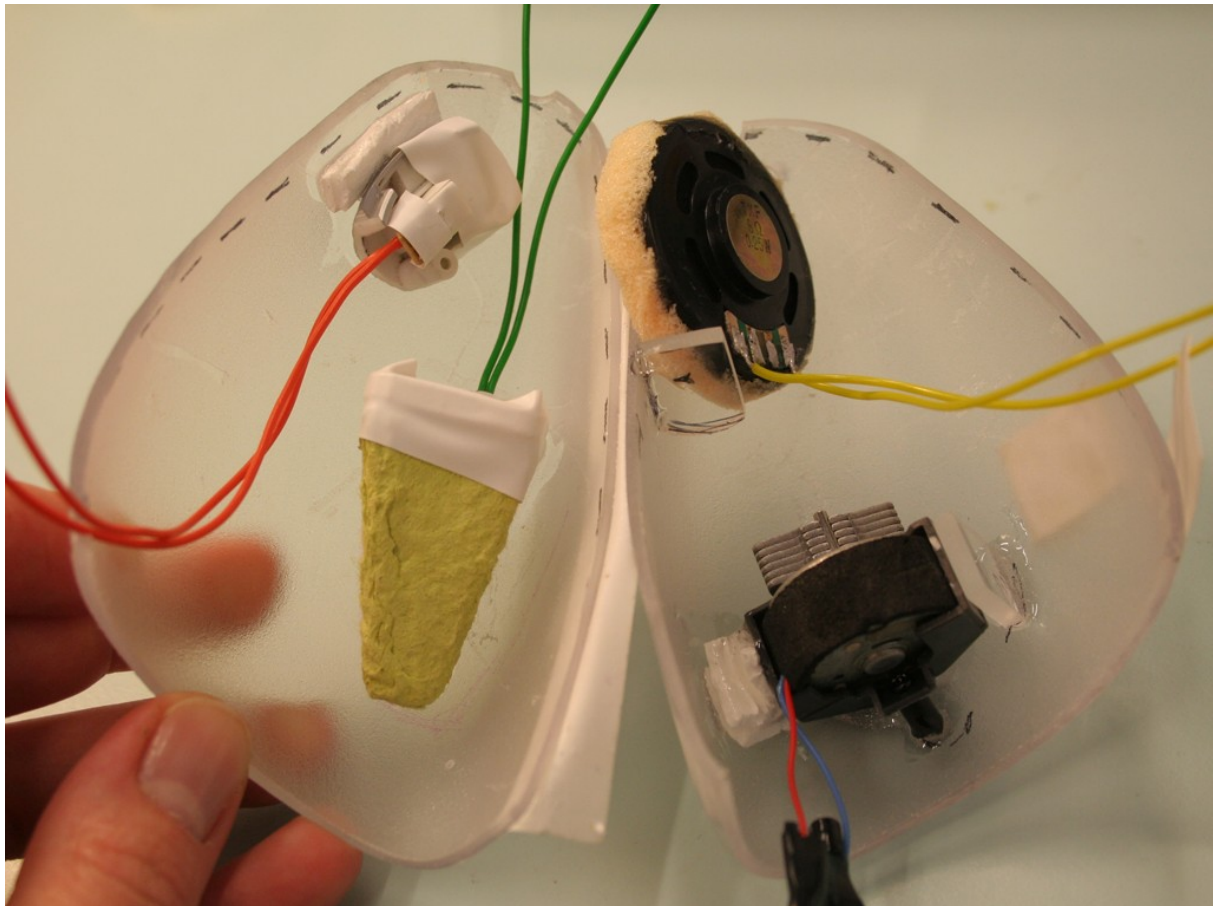
The model is wrapped in soft visco-elastic foam that's first form-cut to fit the shape. I make the foam thinnest where the grip is placed, to try to get the most out of the feedback from the vibrating motors.


(next page)
The usb connection in the back of Sniff's head makes it possible to upload new code and try it out. Even though I first design the sounds in Sound Forge based on a saw-curved sound wave, this process is quite time consuming. I have a hard time to find frequency tables that can be used with accuracy in Arduino, so in the end I end up using just the spectre in only one octave (defined on the Arduino playground page) in the melodies. The emotional sounds are created solely with sounds that falls or rises in pitch, as I discover that this gives them a softer approach. A bigger pitch spectre can be used here since neither the start or the stop of the tone has to be spot on and clear, but I try to count my way out of it mathematically of course.

Kids are cruel. After the first two user tests Sniff's head falls off. The electronics are safely secured, and has not yet today failed to work, but the neck enforcement experience a lot of pressure when the toy is played with.
It's not really as nasty as the picture indicate, but the result is that I have to tear off the padding to go in, open up the head cover and solder a screw nut on the end of the swan-neck to make it more durable. The glue used earlier simply isn't strong enough (even though the package tells me you can lift a car with it). This is a risky operation with all the electronics inside, especially when the swan neck itself gets hot in the process.

In the exhibition week the head falls off once again, so it's clear that the the construction should be solved differently next time. One might consider making a stiff neck enforcement in the same vacuum moulded plastic as the shell just to make it as stable as possible. Then the neck would loose its flexibility. Another option is to give room to really massive mountings of the swan neck on each side of the connection of the two separate shells.
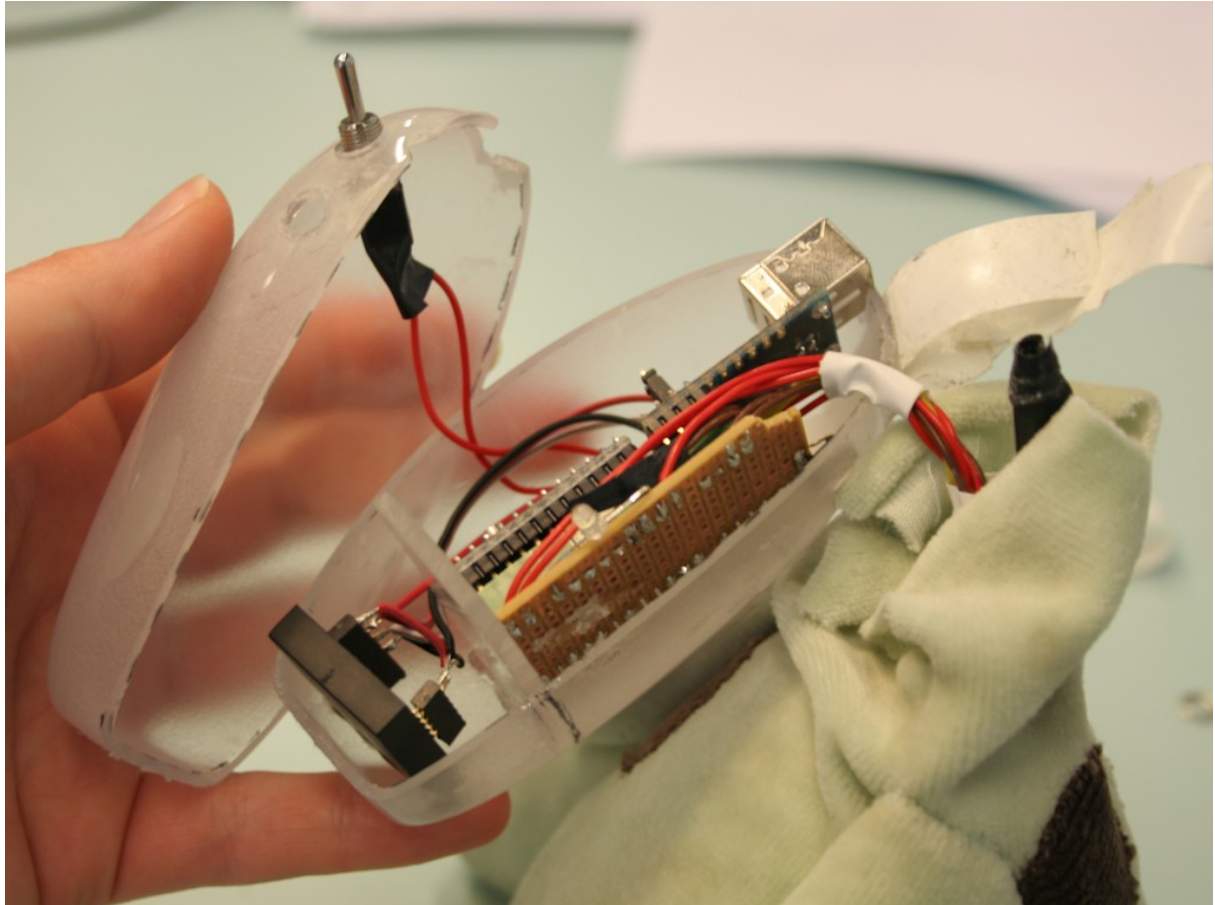
[1] "Observationer af et antal blinde børn i børnehave med seende børn viste, at der sjældent forekom leg mellem de seende børn og det blinde børn (Palmer, 1987; Preisler & Palmer, under utarbejdelse).

I strukturerede aktiviteter, hvor barnet sad på en bestemt plads og udførte veldefinerede opgaver, som var forståelige for det blinde barn, kunne det blinde barn fra 4-5-årsalderen deltage i de seende børns legeaktiviteter. Derimot ikke i såkalt fri leg. Fri leg indebærer ofte, at mange børn hastigt beveger sig i både tanke og i handling, samtidig med at de verbalt planlægger og ændrer på legen. Der behøves ikke megen fantasi og indlevelse til at forstå, at det blinde barn kan have svært ved at deltage i denne legeform."

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