



Skweezee

SOFT OBJECTS THAT SENSE THEIR SHAPE SHIFTING





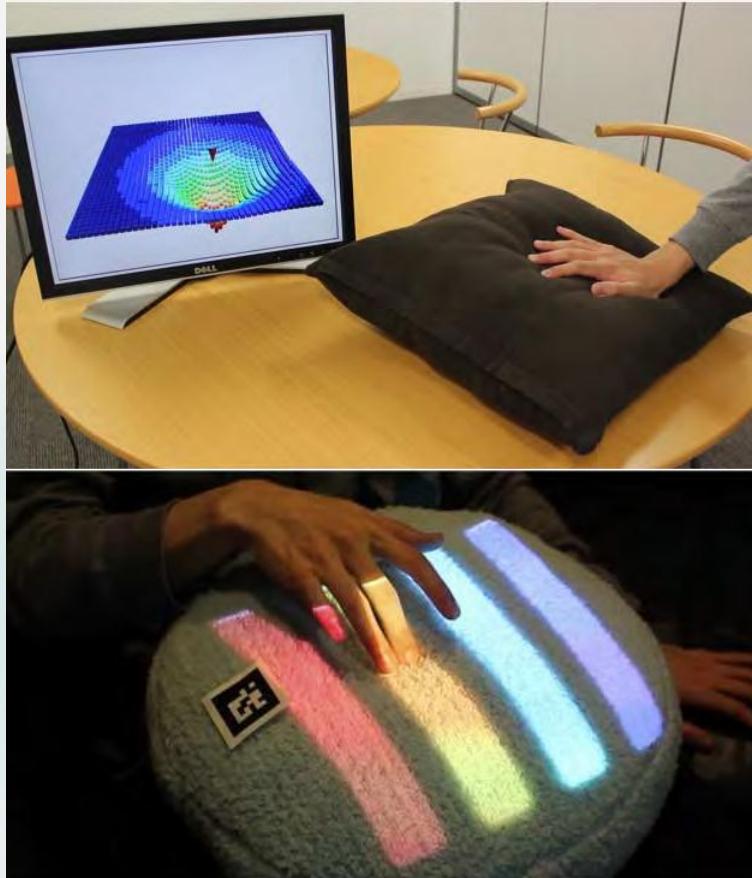
Related Work

Sage: Soft toy with computer heart



SAGE is an authoring tool that allows children to design their own wise storytellers to interact with. It explicitly aims to enable them to explore their inner world, as well as to learn about storytelling and technology. In order to foster emotional engagement and explore the integration of physical and computer interfaces, the sage storyteller was embodied in a interactive stuffed animal.

FuwaFuwa



FuwaFuwa sensor module, a round, hand-size, wireless device for measuring the shape deformations of soft objects such as cushions and plush toys. One can easily convert almost any soft object into a touch-input device that can detect both touch position and surface displacement by embedding multiple FuwaFuwa sensor modules in the object.

Digital Foam



Digital Foam is designed to support natural sculpting operations similar to those used when sculpting clay.

Soap: a Pointing Device that Works in Mid-Air



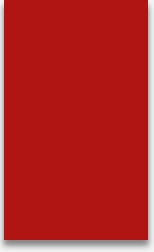
Computer mice do not work in mid air. The reason is that a mouse is really only half an input device—the other half being the surface the mouse is operated on, such as a mouse pad. Soap demonstrates how to combine a mouse and a mouse pad into a device that can be operated in mid air with a single hand.

Others

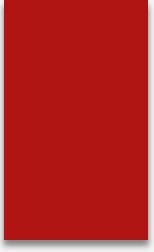
A Thin Stretchable Interface for Tangential Force Measurement

PINOKY: A Ring That Animates Your Plush Toys

DO-IT: deformable object as input tool for 3-D geometric operation



Users and product they interact with

- 
- Children -Toys(bear, dolls, stuffed animal etc), Ball, Cushion, Bottle
 - For Blind -Stick, teaching braille, braille keyboard
 - For Old-age -Stick
 - General -Bean bag, pillow or cushion, handbags



Possible Uses



Finding Uses

Interactive learning toy for kids



The soft toy could learn the various interaction with the kid.
Like hug, hand shake, bye gesture etc.
and interact with student based on that.

Music box for blind (Just a minimalist music box)



A music box based on Sqweezee. That will work based on gestures based on Sqweezee. Like press center to play or pause, twist right to forward and twist left to move back.

Re-designing your remote



People can redesign their cushion into a remote.

Wrist band



Wrist band that you can just wear your controller around your arm.

Other

Microsoft Arc Mouse(that switched on when user changed its shape from flat to curved).

Combining its use with flexible displays (mobile)

Security handbag for women.

For Exercise

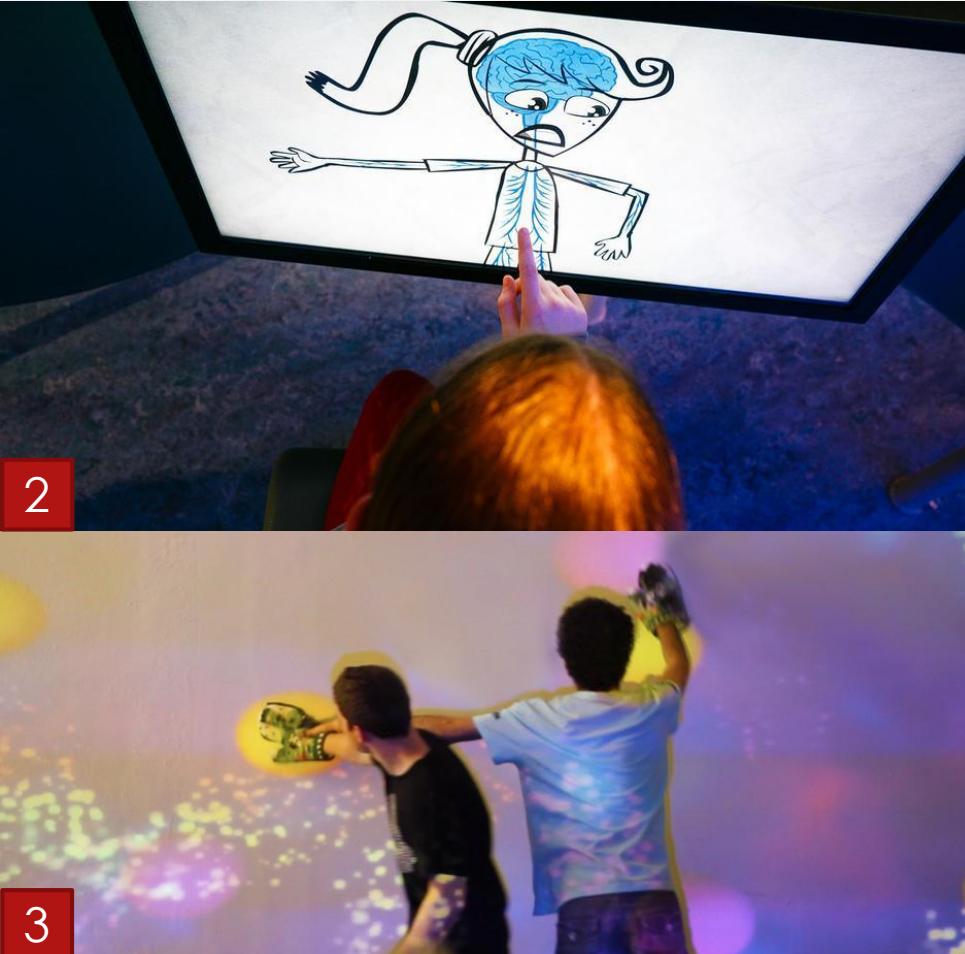
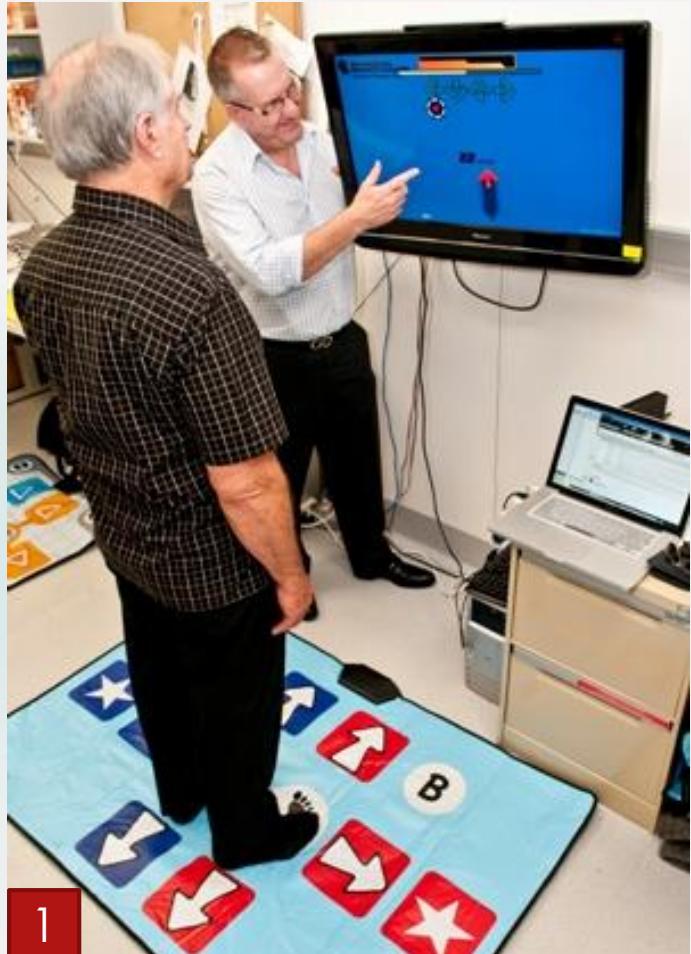




Building up on ideas

Gaming for Chronic Pain

Similar Products



1. Therapy by Australia's Dr Stuart Smith
2. Pain Medicine Care Complex
3. Bubble Popper
4. Chronic Pain Rehabilitation with a Serious Game using Multimodal Input Gaming



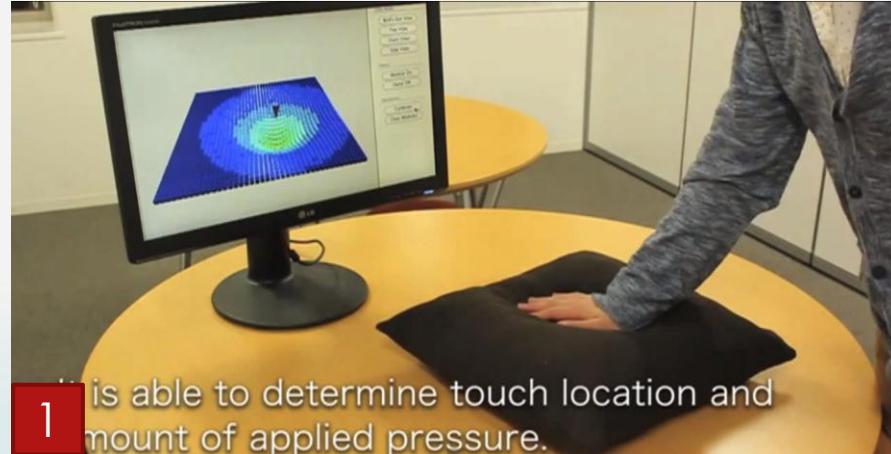
Gaming for Chronic Pain

Design Ideas

A game could be designed which makes the experience of exercise (such as pressing pillow under knee) similar to a game or sports (such as Street Luge).



Re-designing Remote Similar Products



1. FuwaFuwa
2. Makey Makey
3. Pillow Remote Control
4. Soap: a pointing device
5. Twiddler



Re-designing Remote

Design Ideas

Squeeze tightly to start the remote. Hit top-right to move to next channel and top-left to increase volume.



Smart Sofa

Similar Products

1. Interactive Sofa
2. Interactive Couch
Similar Product: <http://www.youtube.com/watch?v=g47Y1VLXBRU>
3. "Take A Seat" a Chair



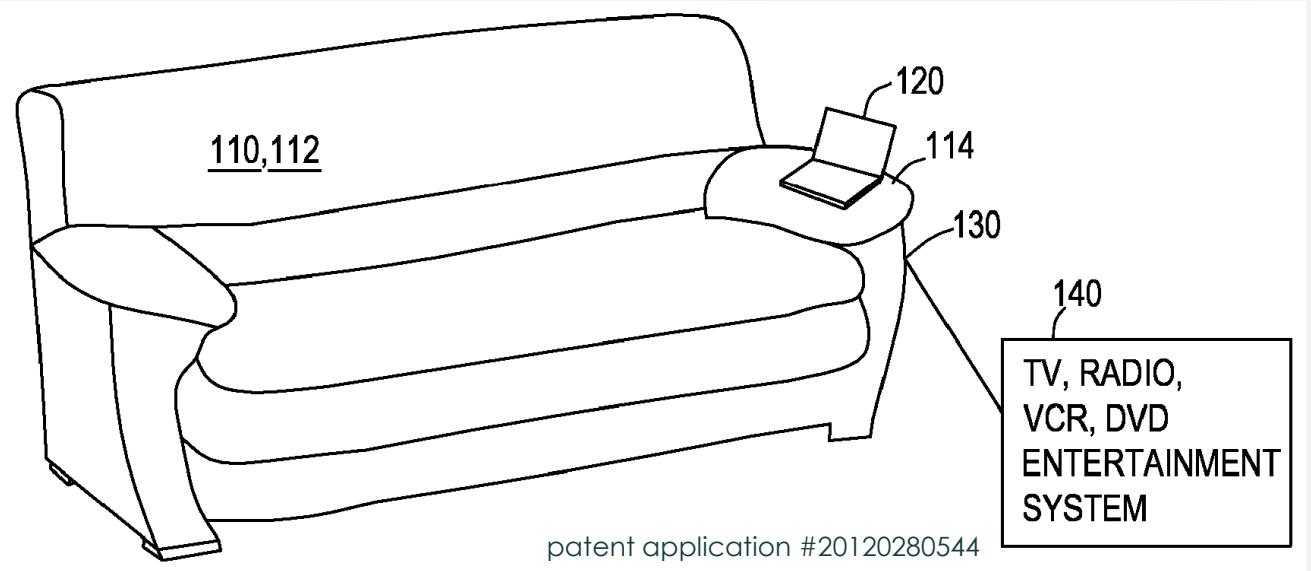
Smart Sofa

Design Ideas

When we sit on the sofa it gets activated. And it can act as **remote**. Interactions of which has to be figured out by user survey.

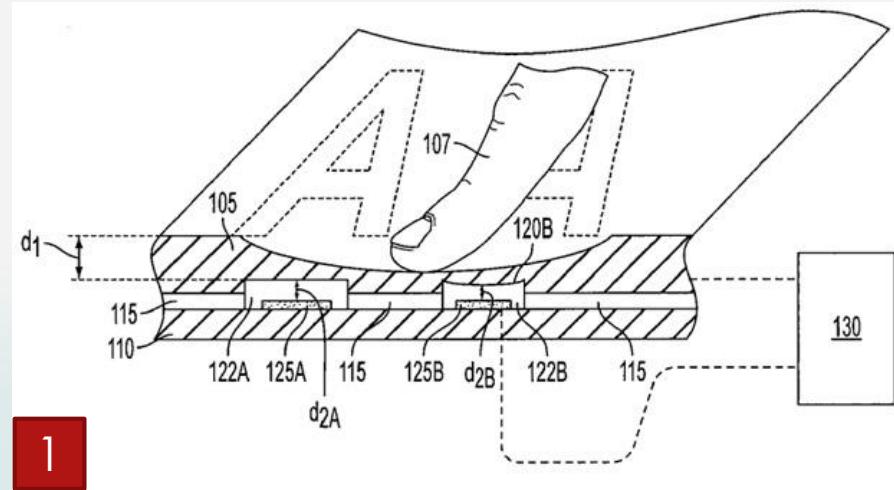
It can also have ability to communicate to internet of things. It can know where the user is sitting and automatically arrange its controls based on that.

Or may be just a simple sofa that produces **sound**. Also a sit and stand based **game** can be developed based on that.



Wrist Band

Similar Products



1. Apple iWatch Patent
2. Aqua W/Me
3. Nike Fuel-Band
4. Larklife Smart Wristband



Wrist Band Design Ideas

Since wrist band can be with a person all time. A wrist band can be designed based on Skweezee technology to control various devices like music while jogging or attending or rejecting phone call while driving etc.

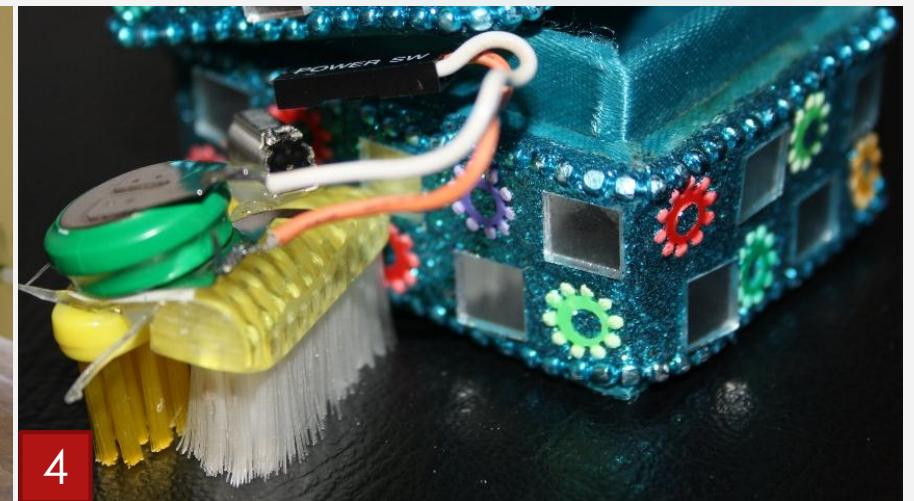


Interactive and programmable teddy bear

Similar Products



1. Pinoky
2. Sage: Soft toy with computer heart
3. MessagePetz
4. Ingegno



Interactive and programmable teddy bear

Design Ideas

A teddy bear that can be programmed by children.

Example- they can tell the teddy bear to produce a particular sound when they move the hand in particular way.

Or produce certain sound when they hug them or press their hands or ears.

Another alternative version could be in a form of puppets. So a certain gesture can be associated in a form of certain sound or activity.



Interactive Jacket

Similar Products



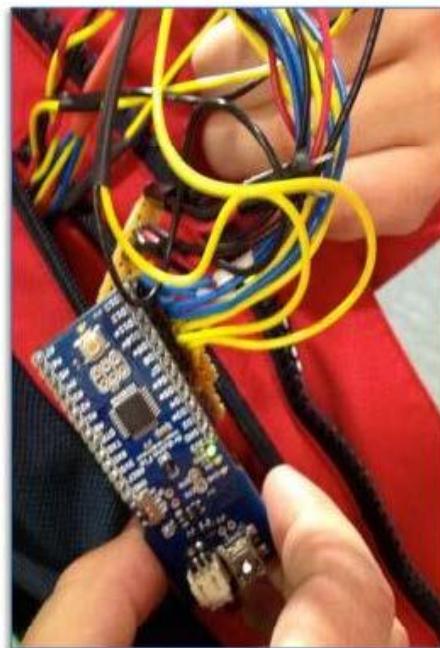
A) The smart jacket is embedded in a normal jacket and can be worn as a normal jacket.



B) QR code for automatic detection of the jacket



C) LCD screen showing messages sent by coordinator



D) The Arduino board and the wiring inside the lining of the jacket

1. Smart Jacket as a Collaborative Tangible User Interface in Crisis Management
2. Huggy Pajama A Mobile Parent and Child Hugging Communication System

Front of Input Doll



Back of Input Doll



Front of Huggy Pajama



Back of Huggy Pajama



Interactive Jacket

Design Ideas

A wearable jacket can be designed for children that can send messages to parent (I am safe, I am happy etc.)

Discussion

5 June 2013

- ▶ Explore cushion - Design and working of Workshop based on it. And how can it be programmed to control TV.
- ▶ Wrist band - Read the thesis and various interaction.
- ▶ Puppet- Explore story telling experience.



Stage 2: Narrowing in on Ideas

Cushion Remote

Workshop: Wizard of Oz

- ▶ In that one person will have the remote for TV in his or her hand and other person will act as moderator. So for example- Moderator asks the person to perform a gesture with cushion to start the TV. The user will perform some gesture. And the person with remote will start the TV. And similar can be done for other gestures and actions.

If possible-

- ▶ Followed by introducing them to Skweezee technology and explaining it.
- ▶ Followed by conducting a focus group on which is the best suited interaction with emphasis on why?

After this(later)-

- ▶ This can be followed by “Cushion Remote Workshop” and card sorting for the gestures.

Cushion Remote

Workshop: Other way

- ▶ Introducing them to Skweezee technology.
- ▶ Ask them to think about and list down the gestures related to common task of remote.
- ▶ Then ask them to prototype the cushion according to their choice (with a option to change the gestures they had decided earlier).

If possible-

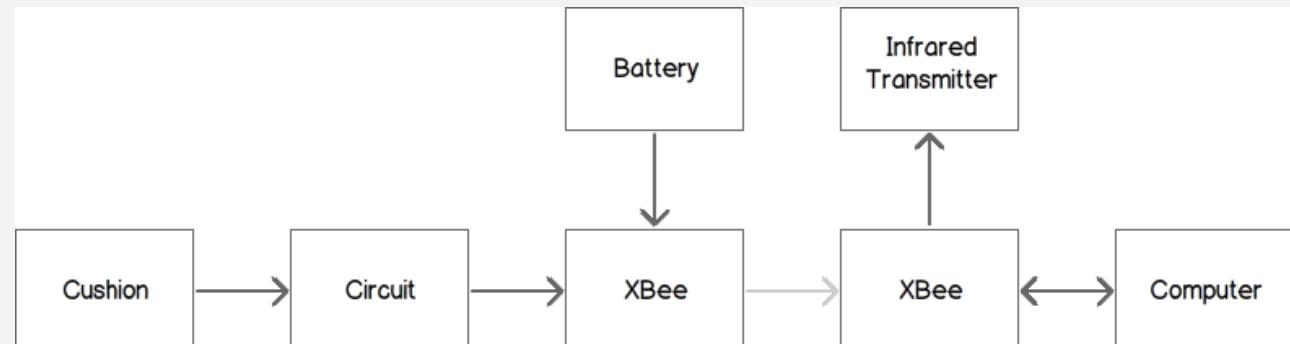
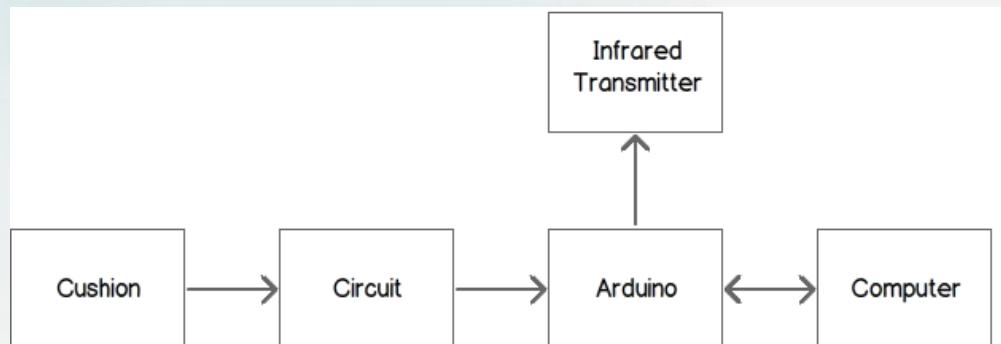
- ▶ Followed by conducting a focus group on which is the best suited interaction with emphasis on why?

Cushion Remote

Requirements

- ▶ If mini version of circuit **isn't** available-
 - Electrodes and wire
 - Arduino
 - Infrared transmitter to control TV
 - Wool, cloth and etc.

- ▶ If mini version of circuit **is** available-
 - Battery to connect to XBee
 - Infrared transmitter to control TV
 - Electrodes and wires
 - XBee
 - Wool, cloth and etc.



Wristband

Possible Games/ Uses

- ▶ Tag
One(or more) person are police officers and they have to catch the thief by wrist, if he does then the person is out.
- ▶ Message Pass
One person if watcher and other people are sitting in circle holding wrist of each other. People have to pass a secret message from one sender to receiver. Whereas watcher will have to catch the passing message.
- ▶ Power Rangers
Do different gestures to activate different powers and attack the enemy.

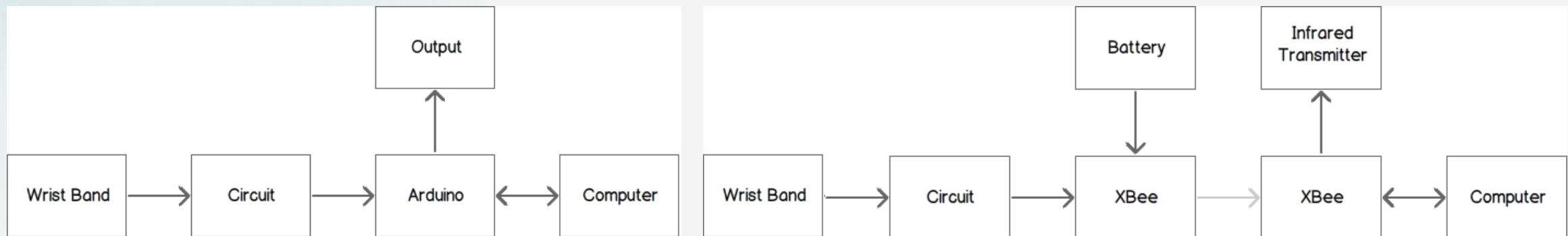
Important thing to consider is how children can manipulate its rule with least effort so that they can make many versions of it.

- ▶ Simple mp3 controller.
- ▶ Or a remote

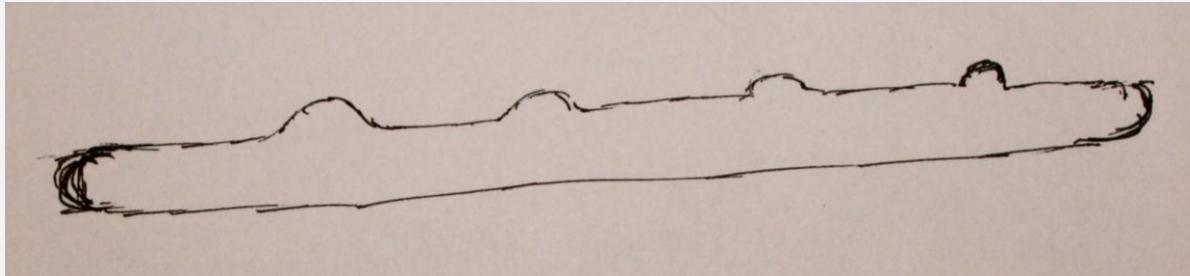
Wristband Requirements

- ▶ If mini version of circuit **isn't** available-
 - Electrodes and wire
 - Arduino
 - Infrared transmitter to control TV
 - Wool, cloth and etc.
- ▶ If mini version of circuit **is** available(**Preferred**)-
 - Battery to connect to XBee
 - Infrared transmitter to control TV
 - Electrodes and wires
 - XBee
 - LED(flexible if possible) for feedback
 - Wool, cloth and etc.

“Without interactive prototypes it is impossible to correctly evaluate impact of technology on game experience” - Iris Soute, Head Up Games



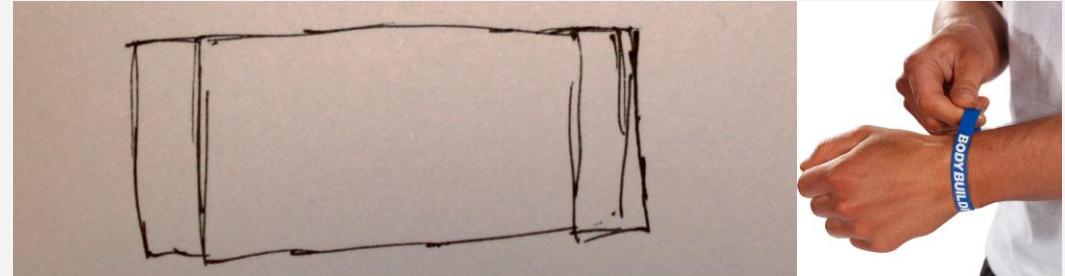
Wristband (Bad) Drawings



This is cross-section of how the wrist band could look like.

This gap in-between are for people to squeeze gesture(i.e. they try to reflect that this is the lace for your fingers to press/squeeze.

And the rising parts are for pulling.



This is alternative design that is based on the gesture shown in the picture.

In this the ends can be pulled like this and whole of middle part can be used for squeezing.

Wristband

Start Prototyping!!

Puppet

Possible Games

- ▶ Hand-Shadow Games
So if a person successfully makes a shape of a dog. Sound of dog can start playing.
- ▶ Puppet show(if possible with a puppet theatre)
That is architected by children and which is felicitated by use of sound and lighting based on gesture.

Puppet

Important points from Literature Study

- ▶ Participating in the progress of the story generally had the effect of encouraging the audience to think about the story. [1]
- ▶ That branching points, where audiences determine story progress, could cause a break in the audience's involvement in the story. [1]
- ▶ As predicted by a theory of externalization (Scaife & Rogers, 1996) being able to record their dialogue allowed children to stand back from the process of production while editing, promoting reflective thought and discussion about recordings. [2]

Puppet Roles

- ▶ Four styles of interaction with the PUPPET system are possible. These are: [2]
 1. The child as audience. Children watch the interaction between the two agents, reflecting upon their emotional states and goals.
 2. The child as actor. Children use the sheep avatar to explore the PUPPET world and to interact with the autonomous agents.
 3. The child as scriptwriter. Children record dialogue for the two agents and the avatar. Each piece of dialogue corresponds to a combination of status and attitude, and the character to whom it is directed.
 4. The child as editor. Children review the dialogue they recorded while viewing screenshots depicting the scenario at the time the recording was made. The children can then re-record any sounds they want to

Puppet

Important points from Literature Study

1. Ryohei, Egusa, et al. "Evaluation of the puppet theater based on inclusive design method: a case study of fourth-year elementary school students with normal hearing." Proceedings of the 11th International Conference on Interaction Design and Children. ACM, 2012.
2. Marshall, Paul, Yvonne Rogers, and Mike Scaife. "PUPPET: a virtual environment for children to act and direct interactive narratives." 2nd international workshop on narrative and interactive learning environments. 2002.

Discussion

11 June 2013

- ▶ Explore cushion - Workshop would be conducted on 12 June with approx. 20 users
 1. They would have a simple white cushion
 2. They would be blind-folded and would have to perform gestures with the cushion.
 3. This would be followed up by giving them all the resources such as markers, coloured paper etc so that they can modify the design of the cushion.
- ▶ Wrist band - Since designing the game would involve all the research and techniques of game designing. Its better to make a simple design which will control mp3 or act as a remote.
- ▶ Puppet – Its designing will be considered later after completing others due to lack of time.



Stage 3: User Study

Wizard of OZ

Why?

This study was done to learn about what are the natural gestures that users can use to interact with cushion which is being used as a remote.

Wizard of OZ

User Study Process

In this “Wizard of OZ” user study. The users will be given cushion and asked to perform various gestures with it like squeeze, pull, etc. The gestures are related to functions of remote. All participants, will after either performing the gestures blindfolded or basic, participate in the creation and then show how they would perform the gestures.

Basic: There is a cushion kept of the sofa. The user has to use it to perform gesture corresponding to the tasks that the moderator is calling out using the cushion.

Blindfolded: The person has to perform the gesture on the cushion corresponding to the task being called out by moderator without looking the cushion.

Creation: In this users will modify the cushion using markers, colored papers etc.

The tasks that users were asked to perform are **Start TV, Stop TV, Volume Up, Volume Down, Next Channel, Previous Channel, Menu Open, Menu Exit and Mute.**

Basic

Blindfolded

Creation

Wizard of OZ

Basic

This was done to see what gestures would user perceive as natural while interacting with a cushion. A plain white square (50X50cm) was given to them for this purpose.



Wizard of OZ

Blindfolded

Blindfolded was to understand what gestures users perceived as natural without looking at the cushion. How would someone perform a gesture without looking at it?
We didn't want user to look at the cushion while performing the gesture.



Wizard of OZ

Creation

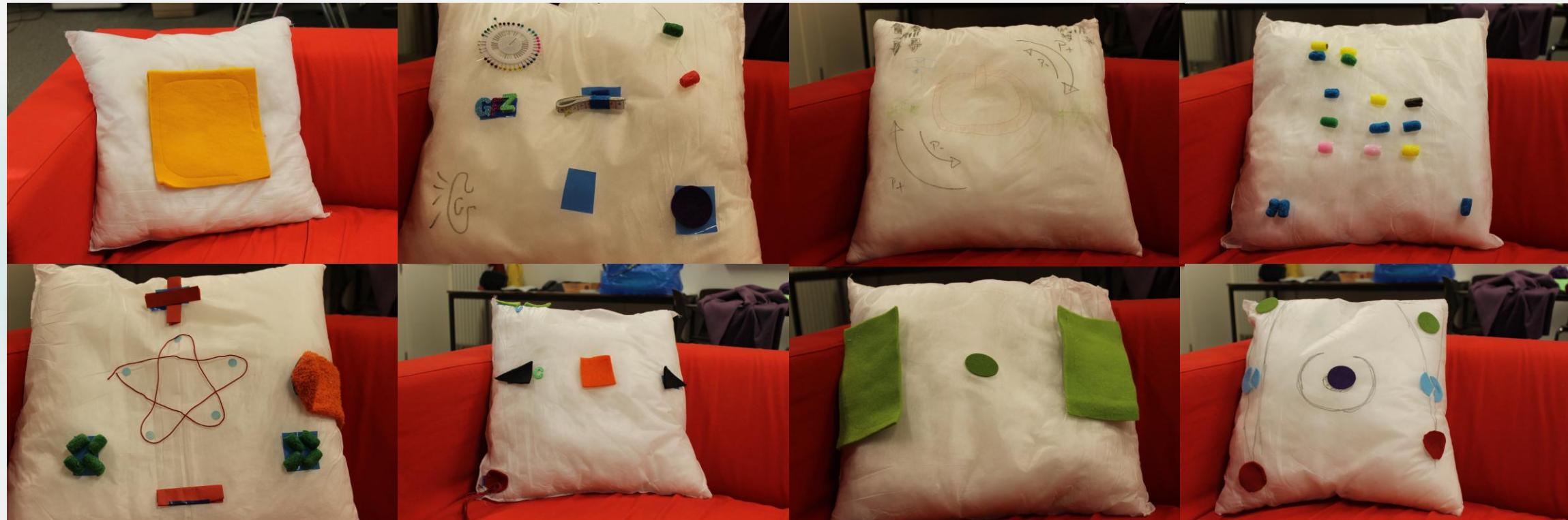
Creative task was given to the users to learn about most common visual metaphors for the users.



Wizard of OZ

Cushions

The varied cushion designs that came up after the user study.



Wizard of OZ

Observation

Some of them were plain replication of what they had been on conventional remote for so many years. While some users tried to use gestures that can be considered more appropriate for cushion (like twisting, pulling, pressing, squeezing etc.)

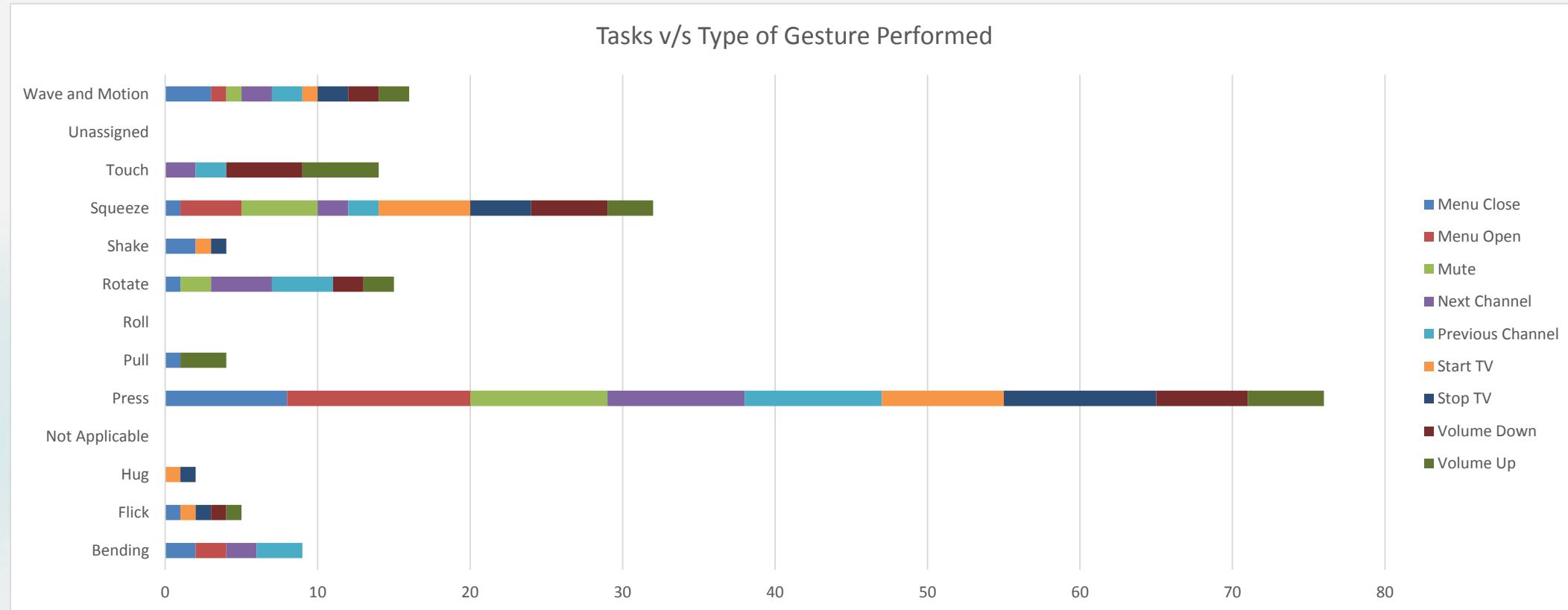
Discussion

18 June 2013

Analysis of gestures is to be done using NVIVO software and then coding (open, axial or selective) is to be done using axial coding.

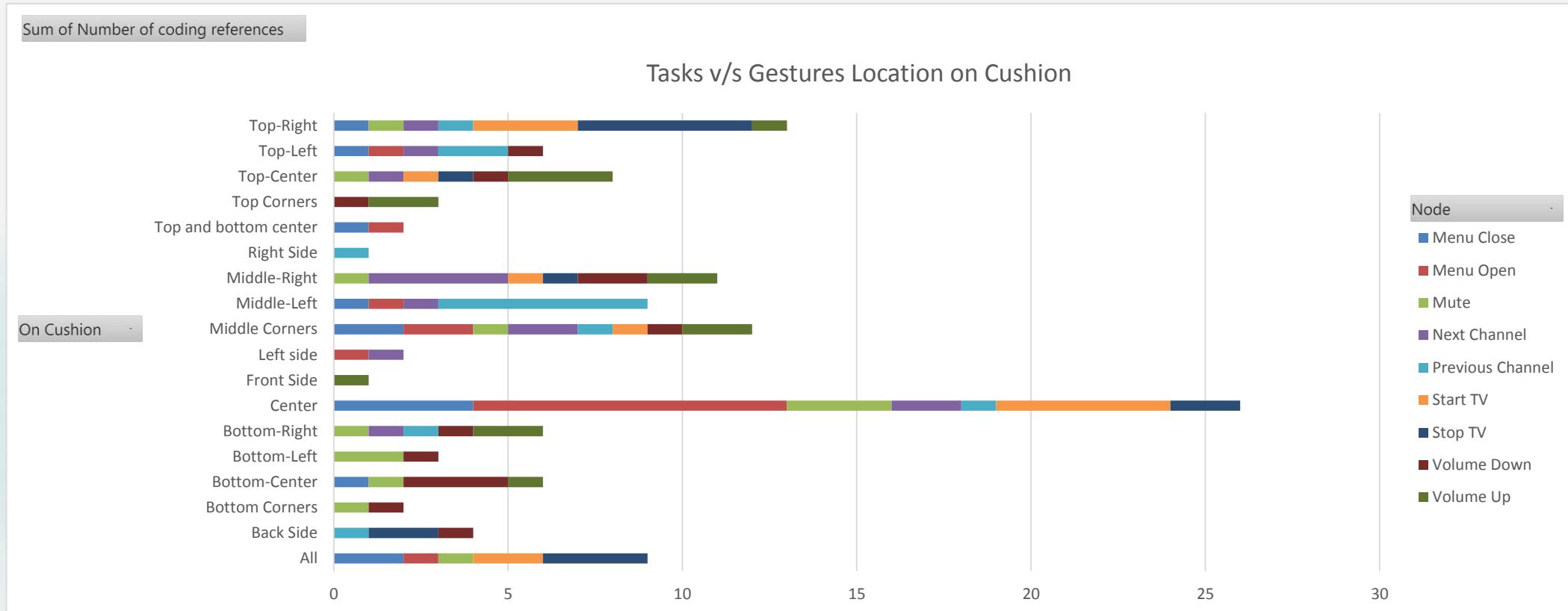
Analysis

Type of Gesture Performed



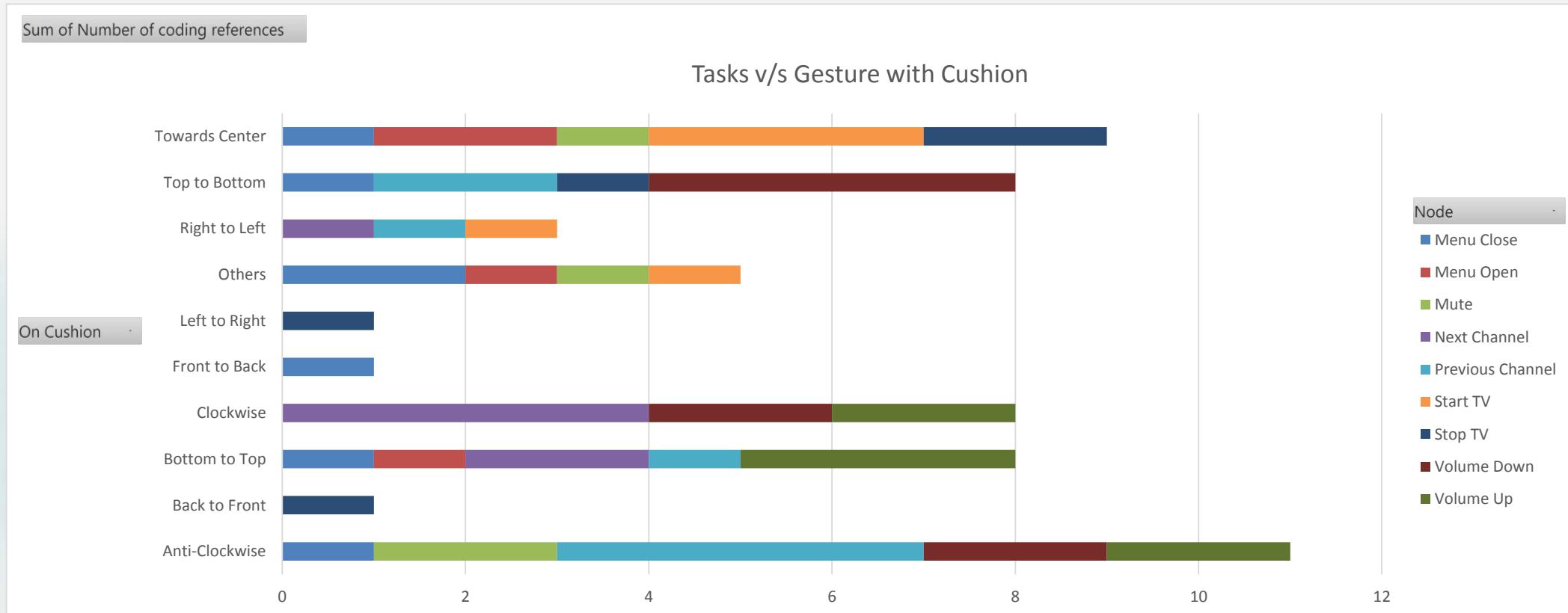
Analysis

Gesture Location on Cushion



Analysis

Gesture with Cushion



Discussion

26 June 2013

Videos were broken down to keep only the 9 gestures of each users for 20 users (10 basic and 10 blind folded).

Some primitive classification was done and was discussed upon.

The classification had to be improved.

Analysis

Gesture Location on Cushion

Tasks v/s Gestures Location on Cushion										
Sum of Number of coding references On Cushion	Node									
	Menu Close	Menu Open	Mute	Next Channel	Previous Channel	Start TV	Stop TV	Volume Down	Volume Up	
All	2	1	1	0	0	2	3	0	0	
Back Side	0	0	0	0	1	0	2	1	0	
Bottom Corners	0	0	1	0	0	0	0	1	0	
Bottom-Center	1	0	1	0	0	0	0	0	1	
Bottom-Left	0	0	2	0	0	0	0	1	0	
Bottom-Right	0	0	1	1	1	0	0	1	2	
Center	4	9	3	2	1	5	2	0	0	
Front Side	0	0	0	0	0	0	0	0	1	
Left side	0	1	0	1	0	0	0	0	0	
Middle Corners	2	2	1	2	1	1	0	1	2	
Middle-Left	1	1	0	1	6	0	0	0	0	
Middle-Right	0	0	1	4	0	1	1	2	2	
Right Side	0	0	0	0	1	0	0	0	0	
Top and bottom center	1	1	0	0	0	0	0	0	0	
Top Corners	0	0	0	0	0	0	0	1	2	
Top-Center	0	0	1	1	0	1	1	1	3	
Top-Left	1	1	0	1	2	0	0	1	0	
Top-Right	1	0	1	1	1	3	5	0	1	
Grand Total	13	16	13	14	14	13	14	13	14	

- Menu Close -
- Menu Open - Center
- Mute -
- Next Channel - Middle right
- Previous Channel - Middle Left
- Start TV -
- Stop TV - Top-Right
- Volume Down - Bottom-Center
- Volume Up - Top-Center

Analysis

Gesture with Cushion

Tasks v/s Gesture with Cushion										
Sum of Number of coding references	Column Labels									
Row Labels	Menu Close	Menu Open	Mute	Next Channel	Previous Channel	Start TV	Stop TV	Volume Down	Volume Up	
Anti-Clockwise	1	0	2	0	4	0	0	0	2	2
Back to Front	0	0	0	0	0	0	0	1	0	0
Bottom to Top	1	1	0	2	1	0	0	0	0	3
Clockwise	0	0	0	4	0	0	0	0	2	2
Front to Back	1	0	0	0	0	0	0	0	0	0
Left to Right	0	0	0	0	0	0	0	1	0	0
Others	2	1	1	0	0	1	0	0	0	0
Right to Left	0	0	0	1	1	1	0	0	0	0
Top to Bottom	1	0	0	0	2	0	1	4	0	0
Towards Center	1	2	1	0	0	3	2	0	0	0
Grand Total	7	4	4	7	8	5	5	8	7	

- Menu Close -
- Menu Open -
- Mute -
- Next Channel - Clockwise
- Previous Channel - Anti-Clockwise
- Start TV - Towards Center
- Stop TV -
- Volume Down - Top to Bottom
- Volume Up - Bottom to top

Conclusion

The result showed the location that was preferred while performing the gesture. Like starting the TV was preferred at center of the cushion or top-right.

For analysis all the videos were broken down into individual gestures. And then were named according to what seemed to be most appropriate. In normal scenario this is to be repeated by 4-5 researchers and then the name which is most common is decided upon.

It not just the name it also tells what the gesture is.

Discussion

1 July 2013

Design of cushion was finalized based on the classification.

Only Start TV, Stop TV, Volume Up, Volume Down, Next Channel and Previous Channel was considered for the final prototype.



Stage 4: Prototyping

Prototyping

Process

First, some sketching was done to illustrate the idea along with reasons. Like why is the start gesture located at the top right etc.

Some considerations during prototyping-

- ▶ The gestures should be designed such that unintended gesture detection is minimal. Ex- Channel should not change if I put the cushion behind my back.
- ▶ Gestures should be such that it can be performed easily without looking at it.

Prototyping

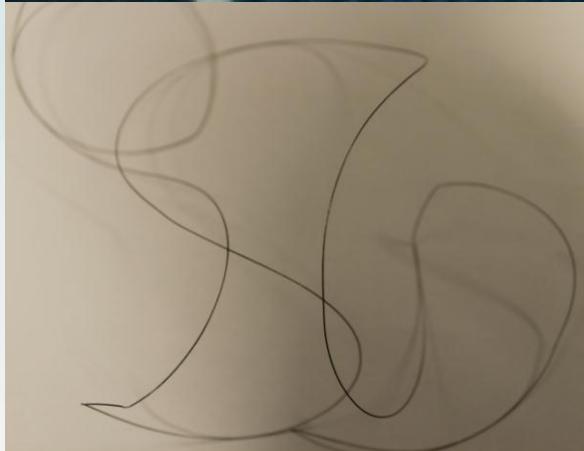
Final Gestures

- Start TV - Squeeze all of it
- Stop TV - Squeeze all of it (Since starting or stopping a TV is just a just a toggle scenario.)
- Next Channel - Squeeze forward side (Middle right or Top Right)
- Previous Channel - Squeeze backward side (Middle Left or Top left)
- Volume Down - Pull Middle-top away from the center
- Volume Up - Push Middle-top towards the center

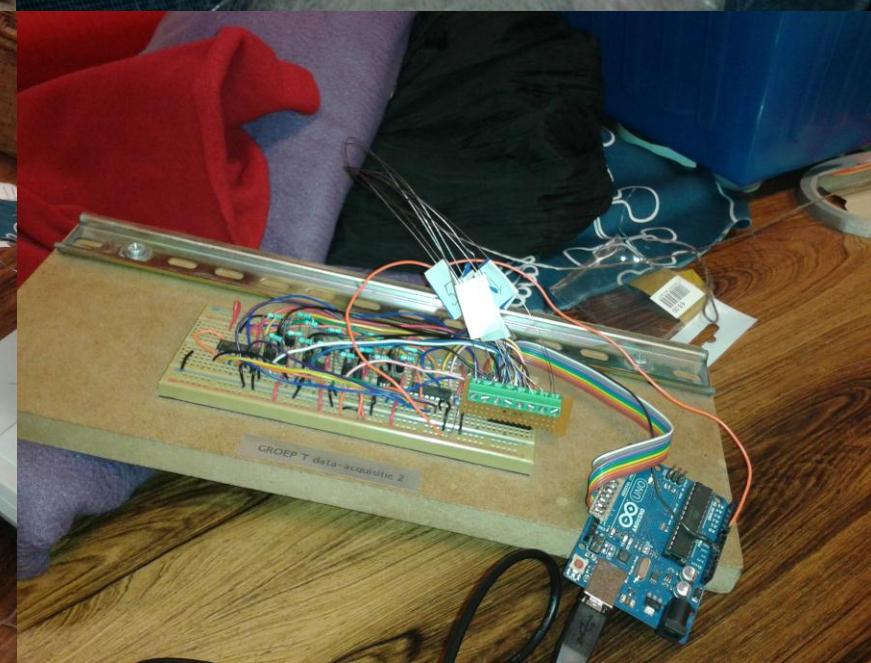
Prototyping

Material Used

Conductive Cotton, Conductive Thread and Conductive Tape.



Sewing and Coding



Prototyping

And Finally after lots of debugging...



Learnings

My Takeaways

Sewing.

Use Google Calendar.

Importance of process rather than outcome.

Document every stage of your process. And answer why for everything you do.
Like why this step or why I read this research paper etc.

It is important that your research work reflects in your output (final product). And for that proper analysis is important. Take time to do analysis and convert it into solution.

Have fun. Do work because you love it and not because you have to.

Do not waste a weekend in Europe. Go out and visit places.