Frame

“A picture is worth a thousand words”
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Introduction
Problem

Use the Intel Perceptual Computing SDK & Gesture camera kit to open up, investigate, challenge existing paradigms of interactions and explore new interactive modalities

How might the modalities of interaction available to a human alter the ways in which an object’s affordance are made readable?

How do we encourage humans to interact with objects in space in order to discover the interactive capacities of objects (virtual and physical)?
Design Process
Brainstorming Session Oct. 21

The start of this process began by having a brainstorming session on possible ways individuals can interact with the gesture kit. Following brainstorming session, we decided to focus on making an interactive balloon popping game. After discussing our idea with others and receiving feedback, we thought that our idea needed to be more computer imaginative and engaging, so we then decided to focus on the interaction of balloon making using gestures. Next, we discussed what our action items were for the next couple of hours and started to explore and hack the gesture kit. Some of us looked for existing solutions, some worked on the visual design, and others worked on the programming.
Create system, which would remind off taking medicine regularly.

Find an online fitness partner, and learn and share healthy way of living life.

Create a solution to manage various accounts and store to find passwords easily.

Use any object near me and set gestures to interact with my laptop or TV.

Use my pillow as a communication device and talk and listen to my loved one’s as I sleep.

Create backup digital files automatically, for the brainstorming sessions I do it on white board.

Listen to music while being in the actual video

Have fun while waiting for the bus

Manipulate objects through a virtual space
Robert Cooksey’s
Brainstorming Session Oct. 28th

Design Process

Design a pet interaction device, where I interact and monitor my pet while working or traveling.

Create a tool, through which I can customize my measurements for online shopping.

Set reminders for critical things through various objects around the environment I am present in.

Create an application for my door, where I would know who tried visited my house/apartment while I am away.

Control my desktop files using my eyes

Have my computer feel/hear my emotions

Sense/know when my family and friends are excited/sad

Try on clothes that I see on the Web

Have my computer improve my designs for me

Intel Perceptual Computing | Frame | Vamsi Pasupuleti, Tony Pattin, Yishi Yang, Yalu Ye
Wouldn’t it be cool if...

If the music is played in the living room based on the mood of the person.

If my thermostat at home is set at home based on the variance of my body temperature over the day.

If my mom sends recipes from home which are loaded on the cooking device and easier to prepare dish.

If my bed knows my stress levels and invites you to sleep sooner for the day.

Stairs I use at my apartment greets and wish me while going to work/college and coming back.

If my shoes transmit information to the computer and send me weekly digest of all physical activities.

If I know the current mood status of the person I want to approach.

Give life to the sketches/characters I create on paper.
If the music is played in the living room based on the mood of the person.

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Give life to the sketches/characters I create on paper.
Design Process

Affinity Diagramming
**Music**
- G

**New Interaction**
- G

**Food**
- G

- Eating with fork and recording how much calorie I had
- Chew foods to interact

- Control my desktop files using eye movements
- Control computer with my mind

- Music player as mood indicator
- The music can know your moods and play right music for you

- relax
- focus
- increase
- to control music.
Clothes
- G

Distance Computing
- GROUP

Music
- G

Have my family can be in my room even if they are on another side of the planet

Try on clothes that I see on the web

Say hello to everyone in my building with a message on their phones

Being intimate with your loved one using virtual hand gestures

Have my meeting schedule displayed on my door and sync to my devices

Karaoke with friends non-coloured or at home

Bring out my board game & play it with ppl who are far away

Sing to the computer and it finishes the lyric

Control computer in my mind

Control my desktop by using eye movement

Interact with objects around us more
Design Process
Affinity Diagramming
Brainstorming Session

Affinity diagramming allowed us to organize our thoughts in categories based on new ways individuals can interact with Intel’s Perceptual Gesture SKD & Gesture Kit. This brainstorming activity helped us narrow down our possible design ideas.

Categories we explored:
- Emotion
- Interactive Objects
- Physical to Digital
- Clothes (Wearable Computing)
- Distance Computing
- Music
- Food
- New Interactions
- Imagination Fantasies
The body mechanic brainstorming session and body-storming activity helped our team explore the possible modalities we could use to create novel interactions. This gave us the opportunity to challenge existing paradigms of interactions and defamiliarize ourselves with the technology.
Design Process

Body Mechanics
Brainstorming Session

Head nodding rock music
Plugging your charger
Indian Style sit
After you are drunk, you move left and right (walking patterns) : bottle of beer, phone
Shooting a basketball
Fighting with a knife
Having sex + sex toys
Running and looking at roads, your body goes up and down
Speak to someone with a look in their eyes
Cutting meat with two hands
Taking a shower listen to music
Sit down and lay back
When you look at someone’s eye or shake someone’s hand, you can know if you have met before based on a visualized overlap of past experience.
Kicking a ball
Dancing
Bump boobs
Lay down your head on someone’s shoulder
Jump and run cheerfully
Racing a car
When you achieve something, you jump, stretch and yay!
Putting in eye contacts
Putting on pants
Turn to a superman
Riding a horse
Giving a hug
A French kiss
Throwing a Frisbee
Drinking out of a water bottle
Swimming in a pool
Using a ladder and going up
Rock climbing
Pole jumping
Playing tennis
Yoga

Playing guitar
Stretching when doing morning exercises
Catching fish w/ a fishing pole
Shooting a basketball
Throwing a tantrum
Doing jumping jacks
Chopping wood
Coughing
Rowing a boat
Swirl in dance
Fling your arms/legs to wake them up
Scuba diving
Sleeping
Exemplars

Lego calendar

Description: This is a design that connects physical world to digital. It basically is a Lego calendar. Users can create and arrange events by placing different Lego blocks with different color on a big base Lego block. After taking a picture of it, the system will automatically sync the schedule with Google calendar. It is an example of manipulating digital artifacts by physical, tangible objects.

URL: http://www.creativeapplications.net/objects/lego-calendar-by-vitamins-design-syncs-with-google-calendar/

Looks like music

Description: Looks like music is an art installation. Everything starts with drawing black lines on the floor. Then there are small cars that will detect black line and run on it as if it’s a track. After users draw different color strokes on the line. When the car goes on these stroke, it will play notes according to the color and weight of the stroke. This is an example of playful, open-ended design.

URL: http://www.creativeapplications.net/events/looks-like-music-yuri-suzuki-at-mudam-2013/

3D Tangible Tabletop:

Description: The 3D tangible tabletop uses the combination of 3D projection and tangible objects, which can be augmented to display visual information. In detail, it is a projected tabletop made for examining various design potentials for combining tabletop interaction and front projected 3D projection onto tangible objects on the table’s surface.

https://vimeo.com/31955422
Exemplars

Murmur

Murmur is a device which was designed to collect murmurs of the public (sounds) and translate them into light waves in a virtual world. Murmur enables the communication between public and the projection by simulating the movement of sound waves, building a luminous bridge between the physical and the virtual. The concept of bridging physical and virtual world is a takeaway for us.


V motion project:

Description: The V-motion project is an interactive music performance that translates the performers gestures to music and graphics. The gestural movements are captured using motion controllers which are then projected onto a stage.

https://www.youtube.com/watch?v=PRxlsFhml6U

Heineken Ignite:

http://heinekenignite.tumblr.com/

Heineken Ignite is an interactive bottle project that “creates memorable Heineken experience unlocking the power and possibilities of innovation and technology”. It brings beer drinkers together and responds to audio cues by lighting itself up in different ways. It is in the prototype Version 2.0 now.
Design Concepts

3D modeling capture, real time video capture

This concept is inspired by the “Lego Calendar” exemplar that takes a calendar entirely made by Lego bricks and syncs with a cloud based calendar based on the user’s input. It provides an interactive and tactile experience.

How: Taking the use of Legos, clay and/or other similar tangible objects to create 3D models with real-time updates and video capture.

When: This design could be used during the design process when prototyping or for the use of exploring different concepts rapidly.

Where: This concept can be installed in the workplace, home, and other collaborative environments such as the classroom, labs, design studios, and more.

Whom: This concept can be used by various designers, engineers, artist, etc. or anyone who simply enjoy 3D modeling. We are exploring a new way for individuals to have both an interactive and tactile experience in the world of 3D modeling.
Lego’s compose music notes

The concept is inspired by “Lego calendar” and “looks like music”. Logo blocks can provide a tactual experience and also is a bridge between digital and physical world. “Looks like music” draws connection between color and sound.

How: Audiences can make music by placing different Lego blocks on to a base board. Different color or shape of Lego blocks represent different notes. They can collaborate to make a melody or they can make a melody and share with others. They can carry their melodies(lego block) anywhere and modify them whenever.

When: When people want to relax, have a moment to relieve their stress. Or just want to have some fun.

Where: Public space like waiting rooms, lobbies. Private space like home or office.

Whom: Almost anyone can interact with it. People who waiting in the waiting room or lobbies. People who stays at home or working in offices.
Interactive Balloon

This concept is inspired by “3D Tangible Tabletop” exemplar that turns 2D image into 3D perception. The balloon provides the tactual experience for the people non-collocated and embodies each other in the balloon.

HOW: We will use balloon as a medium to represent 3D projection of a person to make a non-collocated person present and tangible. They can activate the balloon and the 2D image of the other far away can be turned into a 3D head in the balloon. They can talk to each other through the balloon as if they were just besides each other or they can touch/squeeze a little bit of the balloon like they touch the other’s face.

WHEN: We consider this concept can be applied when people miss others who are in different places and want to meet them in person and more lively.

WHERE: This concept can be applied to home settings or some other not too crowded places.

WHOM: We consider this can be applied to facilitate couples who are in a long distance relationship or
Domino

Domino concept is inspired from “Murmur” exemplar, the idea is to bridge real world and virtual world. To expand more, the disturbances created in real world are carried out through a bridge, which transmits the disturbances and connects to a virtual world, and the results seen in the virtual world.

How: We are connecting physical and virtual domino pieces, when you push one physical domino piece in a real world, the series of domino collapse and when it is near to a screen, it connects to the virtual domino pieces and make them fall in a sequential order.

Where: This could be an installation in art museums to explain people how physical and virtual worlds are connected. These kinds of interactions are playful and meant to be stimulate an experience of connection.

Whom: There is no age constraint for this design. The potential implication one can take out is to show the power of communication.
Jump Shadows to Play Music

This concept is inspired by “V Motion Project” that utilized whole body movement to have the interactive experience.

HOW: When people jump there will be various shapes of the shadow on the wall. The wall has a grid of different music notes. The area shadow covers will trigger multiple notes at the same time therefore playing music.

WHEN: This concept can be applied when people want to relieve stress or have fun.

WHERE: It is more for in a public space like park or party or concert. It can also be applied in workout exercises.

WHO: We envision this concept can be applied to those who loves dance to music but also for those who just want to utilize their whole body to have fun.
Embed Emotions: Giving life to an object

Embed emotions is inspired from the concept “Ignite”, the idea is to embed emotions to physical objects around us. Making physical objects connected or related through semantic representations. To illustrate more, we are introducing a social relationship context with physical objects.

How: Use of bottles, mugs etc. When two similar objects are closer, either through use of led lights or sound medium, we will show the related emotions of the objects. To create this we will be using sensors, arduino and Intel perceptual camera.

Where: Any tabletop physical objects, for example, office table, study table, kitchen platform.

Whom: There is no age constraint for this design. Any user can interact with these objects and learn relationship in a social context. However, we can change the context and introduce learning scenarios. For example, objects lying around in a kitchen space can be related based on type of dish user is preparing.
Final Concept: Story boards
A picture worth 1000 words! - Can we get more meaningful information
Kim opens the face-book applications, and views the news feeds.
He views the two of his friends Joe and Tom tagged in a photograph.
He wants to learn more about the people in the photograph
He used the binocular gesture and tries focusing on a particular face.
He see an option to play a video timeline for that specific person.
He navigates/Zoom in to see more photographs of the past.
He navigates/ Zoom out to see more photographs of the present.
Design Concept

Our concept is derived from the natural gestures used for binocular device and the idea “A picture is worth a thousand words”. A picture depicts/ provides details of a context or a scenario at one moment of time and stimulates a various interpretations to the audience looking at them. Our thought was to extend this idea by adding more details to the image, we are doing this by adding more meta-data and digital information of the past and present of the people, objects and surrounding environment captured in the photograph.

Video: http://vimeo.com/81352773

Github: https://github.com/yishiyang/IntelProject/wiki/Intel-Project
Everyone today have access to numerous amount of information, and with each day new applications are built and launched, more and more people are sharing data in the form of images, videos and other mediums. With our concept, the information can be clustered, organized and presented in a contextual way. We foresee, the future interactive applications will present large data sets to users, building digital libraries and embedding them into contextual based applications could be a potential way leveraging information to users.
Target Users

To talk about the targeted users, we intend this application for the people who are curious to learn more about people, objects and environments they like. One other potential targeted users could be children in educational context.
Motivating the Users

As stated earlier, our targeted audience change based on the application we build the meta-data. That said, for our concept, the motivation for the target audience people, and especially kids, who always curious to who know more. The innate nature of humans “curiousness” to know more about the people and objects around the environment will drive them to use our application. We believe the outcomes of the application are very straight forward, we assume more and more people are exploded with lot of information by glancing and interacting with the a single photograph. Who knows through this application, some could find their lost childhood friend or a potential life partner.
Potential Issues

We understand and acknowledge the potential privacy and security concerns linked with our applications. To address these, we would like to build strategies such as images or media curation procedures, user authentications and approval processes. However, for the scope of our project, we want to focus our efforts on creating applications and conceptualize a model to embed digital libraries in a photograph.
Design & Prototyping Process

To create the desired prototype for the concept. We break down the process into two parts. First, to create the interface for the images and embed video time-lines to navigate and second, to create binocular gesture programme to navigate (zoom-in & Zoom-out) back and forth of the video.
Interface

We want the interface to be an image of several friends. Whenever one friend’s face is focused and the video of that friend will begin to play. The video is a series of pictures this friend takes for the last couple of months or years. The gesture will control whether the video is playing forward or backward so we need to have some indicators to indicate current playing status. To implement this interface, we first find out a picture of many our friends taken together last year. We modified it in Photoshop.
To implement this interface, we first find out a picture of many our friends taken together last year. We modified it in Photoshop.
Then we draw three circles on three friends’ faces to define the detection area (each circle with a diameter of 50).
When one of these areas are focused on, we used the processing movie library to play that friend’s video. Note: The video used are found from youtube.com and all videos are found online about people keep taking pictures of themselves for a timespan of several months or years.
The playing status is indicated as a forward arrow or a backward arrow above the video area.
We have to create an algorithm to identify gesture vocabulary for binocular gestures. For this, we have used gesture recognition libraries to identify the tips of the fingers. We traced a line segment joining three hand part (up, middle and bottom) for the both left and right hands.
Next, we created a circular shape object on the screen, which acts as a focus point for both the hand gestures. This circular object (a white color circle with diameter 30 px) is created exactly at the midpoint of the line joining the midpoints of the two line segments created by the left and right fingers. The circular focus will not appear if the distance between left and right hand is bigger than 120 px.
Next, we calculated the slopes of these line segments using the coordinates of the finger tips. When we rotate the hand, the slope of the line segment change accordingly, we calculated the difference and set thresholds for both left and right hands respectively. We defined three status of the gesture: focus, forward and backward.
Since the camera can’t distinguish left hand and right hand, we compare the x value of two detected hands. The hand with the bigger x value is right hand and the other one is left hand.
Our next step, was to create two different inputs. First one, by rotating left hand gesture clockwise and right hand gesture anti clockwise simultaneously. [Zoom-in, go to past, back play]. Second, by rotating left hand gesture anti clockwise and right hand gesture clockwise simultaneously. [Zoom-out, go to present, forward play].

Later, we made the focus (circular object) appear on the screen, only after detecting the above mentioned inputs. Next, we did set thresholds to appear circular object on the screen. If the distance between two midpoints of the line segments is more than 130. Then we are not displaying the gesture. The rationale behind this, we want out gesture to be more contextual i.e. binocular in this case.
We propose two evaluation approaches, since the application prototypes still at its starting stages, we would like to test usability of the application, how the gesture pointer application can be more engaging and easier with the users interacting with the application. Other aspect, we would also like to benchmark the generated gestures based on memorability, error rates and ergonomic considerations. Issues such as physical stress and their related issues on humans while continuous usage of these gestures are captured in ergonomic considerations.

The second part of evaluation is how emotionally users are connected with the concept while interacting with the prototype during or after the use. For this, we want observe and collect data through modalities in real time through facial recognition, visceral reaction, physiological, and neurological. Later, after the end of the session, subjects are asked to indicate the emotion using Geneva Emotional Wheel (GEW). Through GEW model, one can collect both qualitative and quantitative data.
Reflections
Reflections - Vamsi

How does this project change the way you think about designs and prototyping for tangible and embodied interactions?

My knowledge earlier was limited to web interactions and to some extend product interactions but with the kind of exposure I received in this project, I perceive and think of a designs from various dimensions. There so much we can conceptualize and build as a designer, the projects likes these don’t limit our imagination. I am fascinated and inspired from lot of these projects and one such example, bridging a connection between real and virtual world interactions. The idea of prototyping made me move from creative design mindset to analytic design mindset, and in the process we were making decisions analytic decisions based on design judgments, at the end one also gets the sense of completion of the product.

What was your own process of moving away from the problem solving and targeting program and setting for perceptual computing in this particular assignment? What were the Challenges and accomplishments?

The process of moving from problem solving approach to problem framing is challenging for me, for most of the time in the program we learned skills require to understand problem better, and techniques were driven towards producing an optimized solution. I think research techniques like body storming, exemplar research findings make you move to problem setting frame of mind. However, these methods helps you to certain extend, but what changed my mind set was the role of being an observer and consume the surrounding information, come back brainstorm while sketching things out. The other challenges include creating the emotional connect between the product and the subjects, and generating evaluations procedures for these kind of tangible and embodied interactions. I could really see the potential of the application we built in the near future, now I view every object around me as digital interactive installation and I could easily more and more futuristic scenarios out of them.
How does this project change the way you think about designs and prototyping for tangible and embodied interactions?

It is very hard to step outside of the mindset I am used to. The body storm which we tried in this project is really eye-opening. I didn’t realize how complicated our body movements are. Besides that, it seems like each movement has its own subconscious intention. You climb steps to go up, run to avoid or chase and throw to get rid of. What interesting is those intentions will change according to contexts. You throw a ball to get a score but you throw a trash to get rid of it. When considering this in interaction design, it becomes more crucial. What are the possible intentions will the movement suggests under this context? This kind of consideration will be very helpful in designing intuitive tangible and embodied interactions.

What was your own process of moving away from the problem solving and targeting program and setting for perceptual computing in this particular assignment? What were the Challenges and accomplishments?

At the beginning we really had a hard time moving away from the problem solving mind set. Because we spent a lot of time and energy checking, debating about whether if one idea is problem solving or not. This method really broke our normal design pace and disrupted our process. People ended up exhausted and disappointed. Later we switched the method, we begin to put down those constraints. That helps us think more creatively and we actually check those ideas after we are done with the brainstorm. I think instead of remind myself stay away from sth. again and again, it would be better just to check that afterwards.
How does this project change the way you think about designs and prototyping for tangible and embodied interactions?

Tangible and embodied interactions will shape how the next generation will use technology. With this wave of technology, I believe you can impact a lot of users with immersive and empathetic designs. I would love to continue working on projects where designers can help bridge the gap between the physical and digital worlds. We are creating a new wave of interaction. Recently, I have been observing tangible designs, I can’t help but think about the different affordances a product may have and how we can simply change the experience by exploring the different modalities and interactions.

What was your own process of moving away from the problem solving and targeting program and setting for perceptual computing in this particular assignment? What were the Challenges and accomplishments?

This project was challenging in multiple ways. It requires a different ways of design thinking that forces you to stretch your level of creativity. To actually design for tangible and embodied interaction is quite different from process I am used to. The process itself is a lot different from projects we have received in Rapid Design Slow Change. To think, I was an end user to some of today’s perceptual computing such as the Microsoft Kinect and to actually be behind the scenes is truly an experience. I am so use to having a ‘problem solving’ mentality that it was difficult to transition to problem framing. Even after this project, I am still not sure if I can correctly problem frame.
How does this project change the way you think about designs and prototyping for tangible and embodied interactions?

I have been interested in tangible and embodied interactions for a while. This project involved several interesting activities in class for us to explore more about it. One example is body storm which really triggers me to think about different kinds of body movements and how interactions can be embodied in people. Although in our project we didn’t use too much body movement, that impression and experience is remarkable. Also we had the opportunity to see some awesome projects other people/team did which really inspired me. I feel tangible artifacts really enrich the interactions in everyday context. Since they are tangible, they add one more dimension to traditional interaction design and also bring more challenges.

What was your process of moving away from the problem solving and targeting program and setting for perceptual computing in this particular assignment? What were the Challenges and accomplishments?

I tried to imagine about the future instead of thinking some current potential problems. I watched some videos of innovative ideas or on-going projects to inspire myself. The challenge is that sometimes your idea unnoticelly solves some problem and it’s not easy to move away from it. I think the opportunity finding approach is somewhat overlapped with problem solving approach and it’s ok your idea is not completely away from problem solving. The more important point to me is to have the design really serve some purpose to bring about any good change to the world. The accomplishment, I would say, is to have a step forward to think more about the future and know there is a tangible way in front of me.
References

Videos

https://www.youtube.com/watch?v=iPPzXIMdi7o
https://www.youtube.com/watch?v=ACU7xpM4s6Q
https://www.youtube.com/watch?v=5ky6vgQfU24

Music

http://sc.chinaz.com/yinxiao/120128218443.htm
Serenade Me | Freeplaymusic | In-Classroom Use

Image

http://goo.gl/wXNDES
Party Photo by Tiffany Jen