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Peer reviewed|Thesis/dissertation

UNIVERSITY OF CALIFORNIA

SANTA CRUZ

Wandering

An interactive installation about screen and body

A thesis paper submitted in partial satisfaction
of the requirements for the degree of

Masters of Fine Arts

in

Digital Arts and New Media

by

Yanzi Li

June 2019

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ABSTRACT

Wandering

Yanzi Li

Wandering is an interactive installation which reflects people's physical and emotional entanglement with the screen devices and the Internet. It uses motion tracking technology and visual art programming to create an addictive experience for rethinking the relationship between human and digital technology. This project consists of three themes: how people use digital tools as a substitute for their own ability, how people continuously respond to and are distracted by app notifications, and how people create and share information in everyday life through screen devices.

Keywords: Screen, Body tracking, Digital system, Interactive installation

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Introduction

Screens and humans

From ancient times, people tried to understand heaven through rivers and lakes. Because of the reflection of the sky, the water surface became the first screen through which people could communicate with the Gods.¹ From the age of about six months, infants begin to recognize themselves in a mirror.² Nowadays, digital signage can be seen everywhere.³ About 2.7 billions people use smartphones in 2019 all over the world.⁴ The screen is not only the window for people reaching out the world, but it is also a tool for conveying information and entertainment. It snags our attention no matter where we are -- at work in front of the computer, on our smartphones, in front of our high-definition televisions, in supermarkets, and in health clubs where screens display advice or advertisements.⁵ People understand themselves and the world through all kinds of screens: a water surface, a mirror, a TV screen or a phone screen. Today, with the development of technology, smart screen devices try to understand humans and influence people's lives.⁶

¹ Jordan Blevins. *Water, Symbol of Our Relationship with God*. Ecumenical water network. 2009.

² "Child Psychology Classics: The Mirror Test • The Thoughtful Parent," *The Thoughtful Parent*(blog), October 1, 2009, <https://thoughtfulparent.com/child-psychology-classics-mirror-test.html>.

³ Khan. *18 Surprising Statistics About Digital Signage*. 2016.

⁴ Number of smartphone users worldwide from 2014 to 2020 (in billions).

⁵ Michael St Clair, *So Much, So Fast, So Little Time: Coming to Terms with Rapid Change and Its Consequences*(ABC-CLIO, 2011).

⁶ "Trust: Humanity vs. Technology," *Bryan Kramer*(blog), November 29, 2016, <https://bryankramer.com/trust-humanity-vs-technology/>.

More and more people have concerns about device distractions, smartphone addiction, and internet security. 54% of U.S. teens worry that they spend too much time on their cellphones.⁷ A famous British science fiction television series, *Black Mirror*, highlights the regard for humanity's relationship to new technology. The author of *Black Mirror*, Charlie Brooker, stated that "*if the technology is a drug – and it does feel like a drug – then what, precisely, are the side effects? This area – between delight and discomfort – is where Black Mirror, my new drama series, is set. The 'black mirror' of the title is the one you'll find on every wall, on every desk, in the palm of every hand: the cold, shiny screen of a TV, a monitor, a smartphone.*"⁸ Nowadays, screen devices become an integral part of many people's lives. The thesis project, *Wandering*, creates an interactive experience about this entangled relationship between people and screen devices.

Concept of the thesis project

Wandering is a digital trilogy exploring three aspects of people's digital life, talking about how people transform, receive and create information with screen devices. *Wandering* is a digital trilogy exploring three aspects of people's digital life, talking about how people transform, receive, and create information with screen devices. Receiving and producing digital data are the primary function of digital systems. However, both users and digital systems are the objects as well as

⁷ Jingjing Jiang, "How Teens and Parents Navigate Screen Time and Device Distractions" (Pew Research Center, August 22, 2018).

⁸ Charlie Brooker, "Charlie Brooker: The Dark Side of Our Gadget Addiction," *The Guardian*, December 1, 2011, sec. Technology.

subjects of transforming in the receiving-producing process. Digital systems analyze input data and output results. Users understand what they receive and have different physical and emotional responses. With digital devices, people can also transform their identities and gain new skills. These three perspectives of people's digital lives support each other as a loop. This project has three separate scenes to show the relationship between these three perspectives: the “Machine Translation” scene talks about how people use digital tools as a substitute for their own ability which refer to transform information, the “App Distraction” scene recalls the behavior about continuously responding to app notifications and receiving messages, the "Magic Screen" scene shows how naively people create and share information with screen devices.

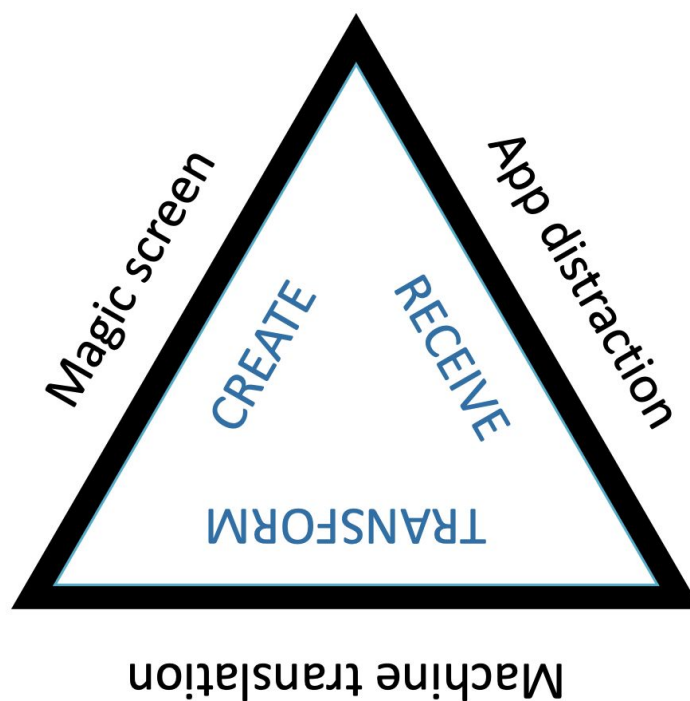


FIG. 1 The concept of Wandering

“Wander” means to walk or move in a leisurely, casual, or aimless way.⁹ It is a common experience to browse websites or play with smartphones leisurely, casually, and aimlessly. The unstructured Internet, eye-catching ads and distracting messages build a perfect environment for wandering. This project, Wandering, recalls this phenomenon and asks whether the smartphone overuse is meaningful and valuable.



FIG. 2 Interact with Wandering

For me, wandering means getting lost and forgetting the original goals. It is a condition of tired minds. Under the impact of rapid digital technology development, people lost their way in different digital devices, software, Apps, and digital media. A smartphone provides a leisure place for escaping the stress in life, relaxing, and browsing cool stuff. I believe not everyone is ready to deal with the issues caused by digital technology. By experiencing this project, I hope the

⁹ “The Definition of Wander,” [www.dictionary.com](http://www.dictionary.com/browse/wander). <https://www.dictionary.com/browse/wander>.

participants can rethink their daily behavior with their screen devices in a critical way and reduce device distraction and addiction.

Wandering is also an exploration of how to break the boundary between the real and the virtual, between the two sides of a screen. In this piece, people interact with screens through their bodies, immersing themselves in an innovative digital system, and exploring new ways to communicate with the screen.

Historical context

Text Rain

by Romy Achituv & Camille Utterback

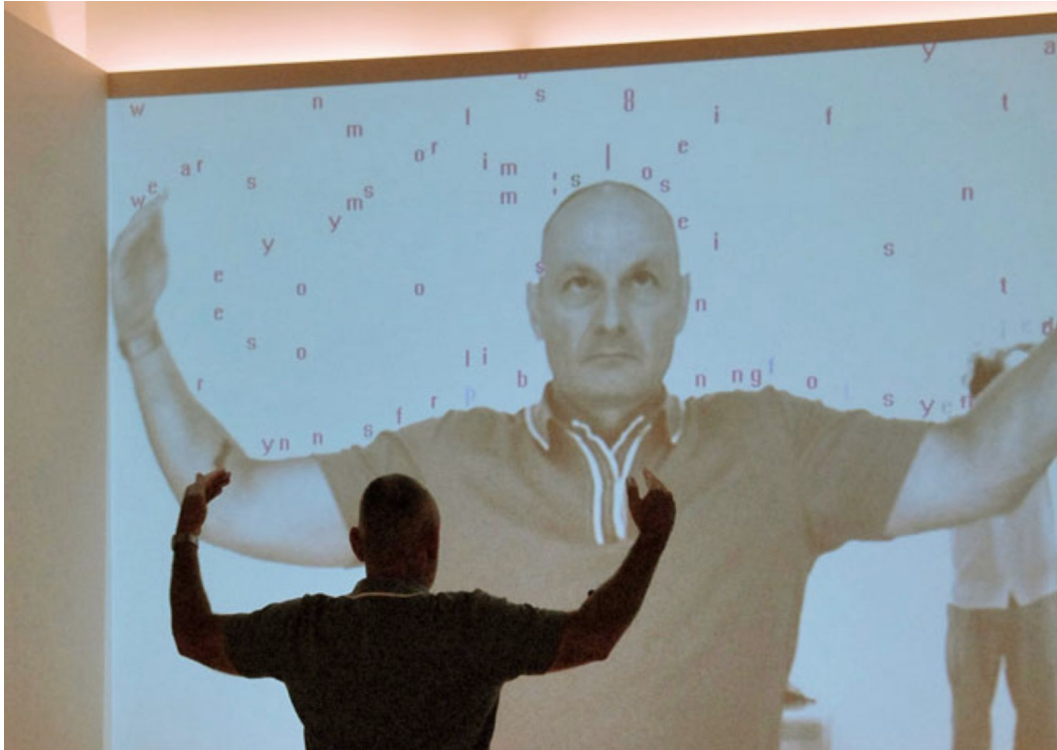


FIG. 3 Text Rain, 1999

Text Rain is an interactive installation in which participants move in front of a large projection screen, using their bodies and other objects to lift and catch falling virtual letters. On the screen participants see a mirrored video projection of themselves and animation of falling letters as text rain. The letters can land on participants' heads and arms.

“If a participant accumulates enough letters along their outstretched arms, or along the silhouette of any dark object, they can sometimes catch

an entire word, or even a phrase. The falling letters are not random, but form lines of a poem about bodies and language. 'Reading' the phrases in the Text Rain installation becomes a physical as well as a cerebral endeavor."¹⁰

In Wandering, participants have similar experience -- moving in front of a TV screen and communicating with their virtual bodies and virtual element. Text Rain builds a bridge between the animation of falling text to the physical movements of human bodies. Wandering creates three different interactive systems as well. In the "Machine Translation" scene, there is a peaceful process of translation of text on virtual bodies. In the "App Distraction" scene, there is an animation of falling app icons as app rain which responds to participants' "catching" behavior.

Screen Series

by Scott Snibbe ¹¹

Screen Series is a series of interactive art about projection and body. Each work in the Screen Series starts with a white rectangle projected onto a wall. The projections react to viewers when they step between screen and projector. The system records viewers' movements and project the recordings on the screen. It allows viewers to create cinema with their bodies, either through reactive projections that respond to viewers, or through porous projections that record viewers' movements.

¹⁰ "Text Rain | Camille Utterback," <http://camilleutterback.com/projects/text-rain/>.

¹¹ "Digital Art," Scott Snibbe - Interactive art, <https://www.snibbe.com/digital-art>.



FIG. 4 Deep Walls, 2002

In Screen Series, *Deep Walls* is a projected cabinet of cinematic memories. When a person walks into its projection beam, the interactive wall starts recording his shadow, and the shadows of those who follow. When the last person leaves the frame, the shadows replay within one of sixteen small rectangular cupboards, looping indefinitely.

Cause and Effect is another interactive work. It records viewers' movements in silhouette as they simultaneously displace the recordings of previous viewers. The prior recordings are shown in random places. "*When the movies re-play on sliding tiles, only the viewers' movements are shown, giving a sense of autonomy to actions that were actually determined through interaction with the prior recordings.*"

Wandering also uses body shadow in the "Machine Translation" scene to create a conceptual feeling of digitization. In the "Magic screen" scene, the system records and post participants' images every second. Deep Walls has rectangular cupboards to display the recordings because it is about cinematic memories. Cause and Effect display the recordings in random places and size to illustrate the complex system of "cause and effect". The "Magic Screen" shows images in an unstructured way like Cause and Effect, which indicates the complexity of dealing with digital content.

Body Movies

by Rafael Lozano-Hemmer

Body Movies is a large-scale public installation. "Thousands of portraits, taken on the streets of the cities where the project is shown, are projected on a giant screen using elevated robotically-controlled projectors. However, the portraits are completely washed out by powerful xenon light sources placed at ground level. When people's shadows appear on the screen, the portraits are revealed within them."¹²

In the "Machine Translation" scene, there is a similar design that the silhouette is a window to reveal the hidden translation result. However, there is no specific position or pose for participants. They can use the silhouette to read the translation

¹² "Rafael Lozano-Hemmer - Project 'Body Movies,'" http://www.lozano-hemmer.com/body_movies.php.

of a certain sentence. In the "Magic screen" scene, the silhouette is part of the camera filter. There is nothing on the background in this scene as the Body Movies.



FIG. 5 Body Movies, 2001

Mariposa

by Zachary Booth Simpson¹³

Mariposa is an interactive installation about human and nature, made by Zachary Booth Simpson. The system of this artwork has a camera, a screen, and a computer. When participants stand in front of the screen, they can see their body

¹³ Zachary Booth Simpson, *MARIPOSA*, 2001, <https://www.mine-control.com/work#/weite/>.

shadows and a swarm of butterflies on the screen. If the participants remain very still, the digital butterflies will begin to land on their hand or shoulder to rest. A sudden movement will send the butterflies into a panic.



FIG. 6 Mariposa, 2001

Zachary Booth Simpson has a lot of art practice about using unique technologies incorporating the entire body, turning viewers into participants, and teaching them something along the way. In Mariposa, participants experience being very still in a tranquil garden and letting the environment come to them. Mariposa is playful and thought-provoking. Wandering has a similar design goal about inspiring

participants during the interaction in a moving-thinking-feeling structure. In Wandering, participants have multiple behavior choices with the system. Standing still or moving with a particular purpose can receive different feedback on the screen, which provides diverse experience and understanding.

Overview of the thesis project

Inspiration

"Am I a cyborg ?" I kept asking myself this question when I wrote an essay "The concerns of the future relationship between human and artifacts in digital films : robots, cyborgs, and clones". My answer is "yes". I realize that I can't function without my smartphone, I can't study and work without my laptop; I can't be a digital artist or an engineer without digital tools. My life has already built on these technologies. In "A Cyborg Manifesto," Donna Haraway described "a cyborg is a cybernetic organism, a hybrid of machine and organism, a creature of social reality as well as a creature of fiction." Cyborgs are "creatures simultaneously animal and machine, who populate worlds ambiguously natural and crafted".¹⁴ Bruce Sterling in his science fiction Shaper/Mechanist universe suggested an alternative cyborg called Lobster, which is made not by using internal implants, but by using an external shell (e.g., a Powered Exoskeleton).¹⁵

In October 2017, I learned the word "cyberpunk"¹⁶ and was intrigued by the cyberpunk style in the "Blade Runner 2049" film.¹⁷ Science fiction writer Lawrence Person stated that "Classic cyberpunk characters were marginalized,

¹⁴ Donna Haraway, "A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century," in *Simians, Cyborgs and Women: The Reinvention of Nature*(Routledge, 1991).

¹⁵ Sterling, Bruce. *Schismatrix*. Arbor House. 1985.

¹⁶ "What Is Cyberpunk?," *Neon Dystopia*(blog), <https://www.neondystopia.com/what-is-cyberpunk/>.

¹⁷ Kosove, Andrew A., Broderick Johnson, Bud Yorkin, Cynthia Sikes, Hampton Fancher, Michael Green, Denis Villeneuve, et al. 2018. *Blade runner 2049*.

alienated loners who lived on the edge of society in generally dystopic futures where daily life was impacted by rapid technological change, a ubiquitous datasphere of computerized information, and invasive modification of the human body."¹⁸ I didn't believe cyberpunk would be the possible future, but I changed my mind when I visited Times Square in New York one year later. I found myself suddenly intruded into a cyberpunk world. I was surrounded by huge screens and recorded them on my small phone screen. I realized that the cyberpunk world is not pure imagination. Everyone can be a cyborg in this digital era. This unforgettable experience inspires me to create a digital artwork about the relationship between people and screen devices.

Tools and media

Since my project is about the screen era and new behaviour under the influence of screen devices, the experience should present something dynamic and engaging. I used Leap Motion, a hand movement tracking sensor, in some interactive projects. Participants can play with the digital system freely, but the interaction is limited to hand and arm moving. For my final project, my first idea was to create a more immersive experience. So I chose Kinect as the primary tool.

The Microsoft Kinect sensor is a peripheral device (designed for Xbox and Windows PCs) that functions much like a webcam. However, in addition to providing an RGB image, it also provides a depth map. Once that information is

¹⁸ Lawrence Person, "*Notes Toward a Postcyberpunk Manifesto*," Nova Express. 1998.

on the computer, lots more can be done like “skeleton” tracking (i.e. detecting a model of a person and tracking his/her movements) by using Thomas Lengling’s Kinect v2 processing library.¹⁹

I use Processing in this project, taking advantage of its creative community and resources. Processing is an open source programming language and environment for people who want to create images, animations, and interactions. It is initially developed to serve as a software sketchbook and to teach fundamentals of computer programming within a visual context. It has promoted software literacy within the visual arts and visual literacy within technology.²⁰ I think Processing is an artist-friendly programming language with many useful tutorials and libraries. Much of the sample code in Processing inspired me while working on my previous projects.

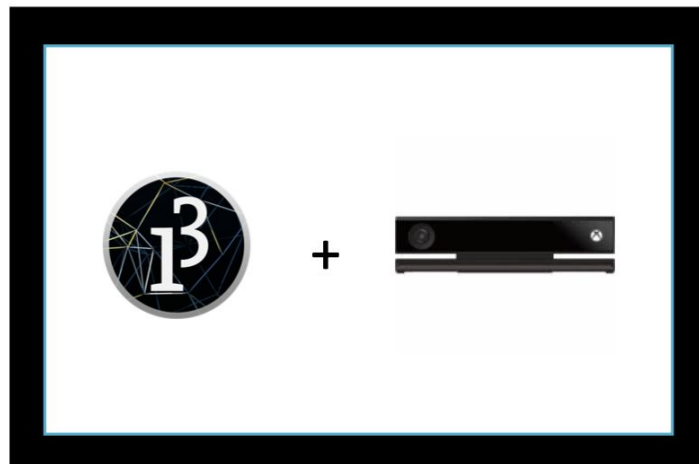


FIG. 7 Processing and Kinect

¹⁹ Daniel Shiffman. *Getting Started with Kinect and Processing*. <https://shiffman.net/p5/kinect/>.

²⁰ Daniel Shiffman, *Learning Processing: A Beginner’s Guide to Programming Images, Animation, and Interaction* (San Francisco, CA, USA: Morgan Kaufmann Publishers Inc., 2008).

The three scenes

Wandering reveals how people transfer, receive and create information with screen devices. Each scene has different design and experience.

The first piece is called "Machine Translation", which shows the conceptualized silhouette in a black and white scene. There are two layers in the scene about an English article and its translation results. The article is divided into four pages. In each page, the top layer shows the Google translation result of the article in three different languages -- Chinese, French, Italian. The fourth page is created by translation English to Chinese and back to English again. The top layer pages have a white background with black text and blue hyperlinks. By using an invert color filter, the bottom layer shows the original article in four pages with a black background with white text and orange hyperlinks. The TV plays the pages in a loop.

When the audience stands in front of the screen, the silhouette becomes the translation windows showing the machine translation result. When the viewer moves, the previous body shadow fades into the black background smoothly. The body-like translation window consists of many small squares rather than the real body shape. The abstract silhouette made by pixels builds a sense of digitized body, which expresses that it is hard to separate what skills people know from what the digital tools they have. In this scene, participants get access to read an English article in Chinese, French, and Italian very easily. Installing a translation

app means it is possible to understand a foreign language. The English article in this scene refers to how technology changes people's brains.²¹ The relationship between user and device become more complex and profound than people thought.

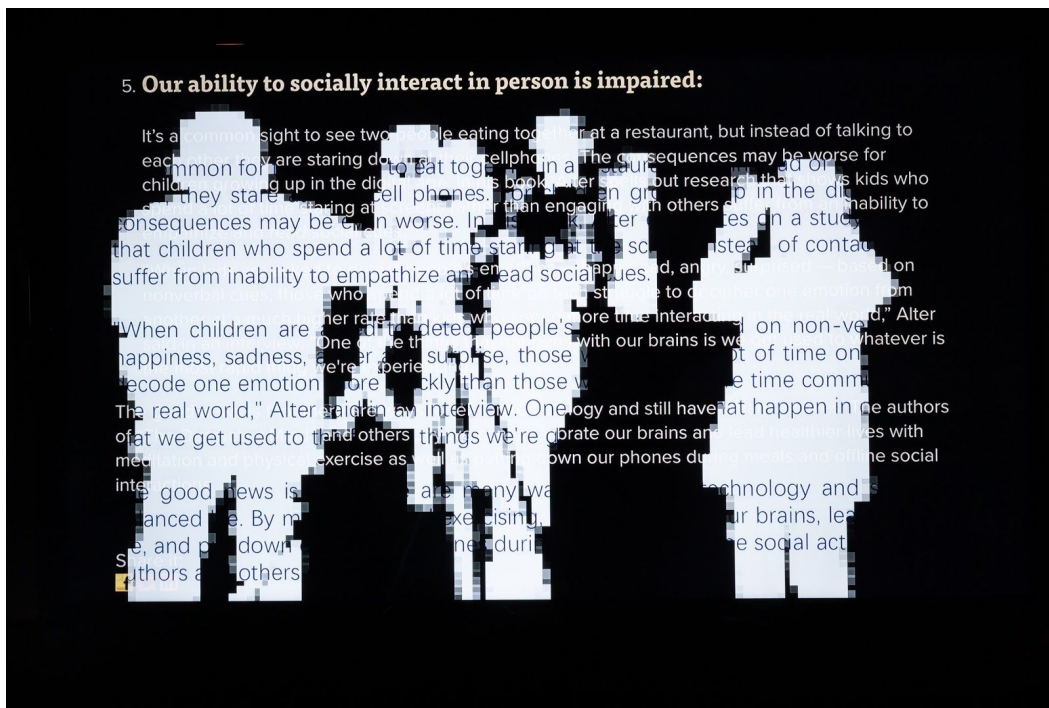


FIG. 8 Machine Translation

The second piece is called "App Distraction". It reproduces the moment when people continuously respond to the app notifications and click the app icon so that the red notification number will disappear. In this piece, the audience' body becomes a wireless controller to move the abstract avatar on the screen. The avatar's head is a white screen with a black frame. The avatar's body is an abstract pentagon showing the body from neck, shoulders to hips and eight straight lines representing arms and legs. There is always a cellphone on the avatar's hand. Each

²¹ 5 Ways Technology Is Altering Our Brains. The SMU Newsroom. 2017

participant has a specific color in the avatar's body. In the piece, App icons with red notification mark fall as rain in a pure light gray background.

The avatars echo participants movement, and the virtual phones can interact with the falling Apps by touching them. When the avatar responds to one App, the red notification mark disappear with a "Ding" sound, but the App icon will stick on the background. When the audience keeps responding for a few minutes, the screen is full of app icons which overlap the virtual bodies. The system is a simulation of the overwhelming and inevitable experience of frequent phone notifications. If the audience misses any App icons, nothing happens. This lack of consequence is a metaphor that most of the notifications are meaningless or inconsequential.

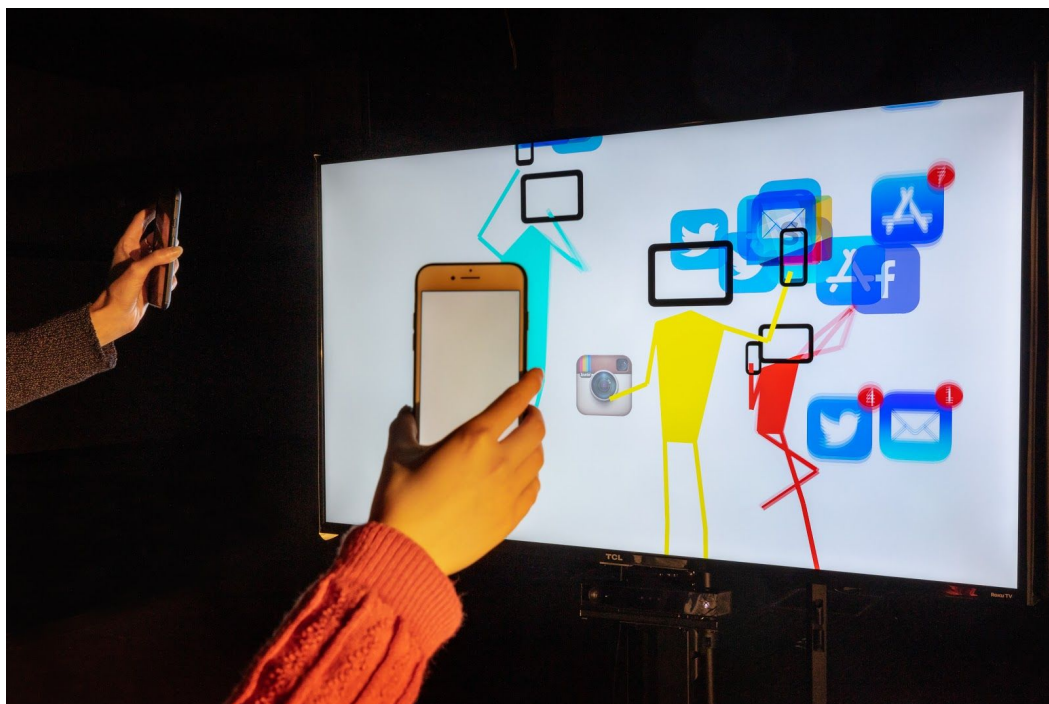


FIG. 9 App Distraction

The last piece is called "Magic Screen". In this piece, there is a camera screen between a participant's hands with black frame and live video on it. The hands control the diagonal of the screen. The system automatically takes photos in each screen frame and posts them on the TV screen in every second. The audience can change the size of the picture by increasing and decreasing the distance between their two hands. They can take selfies as well as take photos of others in front of the screen. However, the images are posted in random positions on the TV screen at a rapid pace. Each participant has a different color filter for their photos. It is not only a reflection of the trend of posting selfies but also a simulation of how quickly and thoughtlessly people create digital data.



FIG. 10 Magic Screen

Installation design

Wandering consists of three pieces. Each piece has its own system: one Kinect, one computer and a monitor. The three monitors form a triangle so that participants can join this project from any direction at any time. They can also see how other participants interact with the other two pieces while they play with the project.

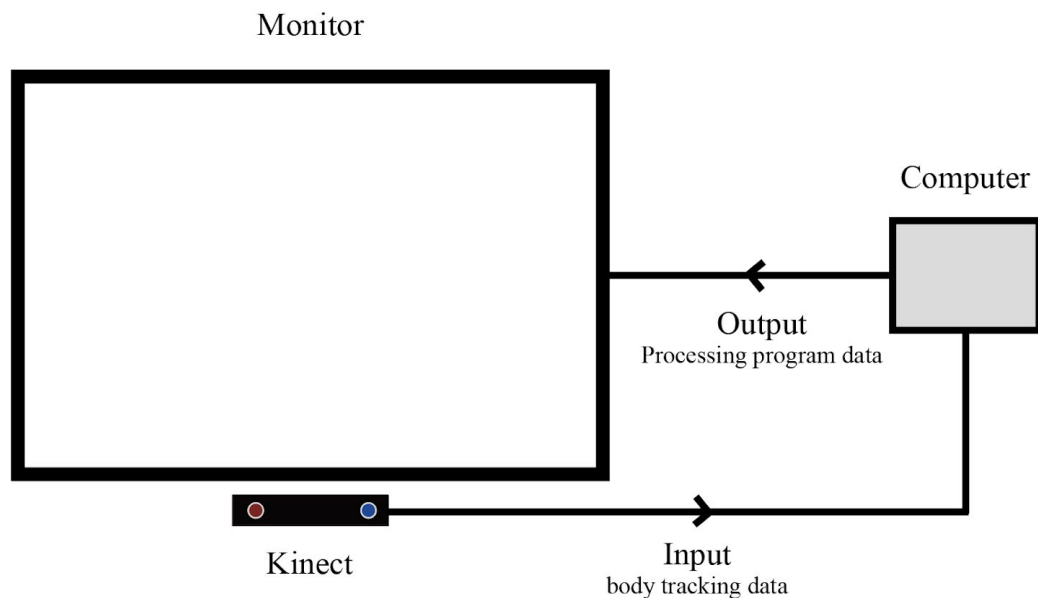


FIG. 11 System Diagram

I modified the project idea for many times. In the very beginning, the installation plan is an immersive environment with three projection walls. I was inspired by TeamLab's immersive installation²² and did some research on projection mapping. Different screen size can provide a different user experience. Big screen size may decrease the feeling of engagement.²³ In early playtests, I noticed that participants

²² "TeamLab Borderless Tokyo Official Site : MORI Building DIGITAL ART MUSEUM," <https://borderless.teamlab.art/>.

²³ Jinghui Hou and Yujung Nam, "Effects of Screen Size, Viewing Angle, and Players' Immersion Tendencies on Game Experience," *Computers in Human Behavior*, 2012.

tend to stand far from the big projection screen and see others' interaction. As a result, nobody interacted with the project in the proper distance, and no one experienced the piece as I expected. In an open studio, I showed the "Translation" piece in a 6x8 foot projection screen. It was unexpectedly successful. I realized that the bigger the better is not true. People feel uncomfortable standing close to a large screen. It is a similar reaction when I stood in New York Time Square. The interface is the direct point of contact between the participants and the system.²⁴ I should consider the input and output media as a whole to refine the experience. In the final version of Wandering, I use 55" monitors as the display. It is a friendly size for people playing with the Kinect from 0.5 to 4.5 meter distance.



FIG. 12 The installation of Wandering

I also explored two plans for how to display the three scenes. One was looping the three scenes on one screen. The other was to show them on separate screens. In

²⁴ Kwastek, Katia. *Aesthetics of Interaction in Digital Art*. The MIT Press, Cambridge, MA, 2013.

the final project, I use the second plan for three reasons. Firstly, Wandering has an unstructured form, without a predetermined order. Secondly, if the three scenes are shown on separate screens, there is no order for them. Without order and didactic goals, the experience itself asks the audience to "wander". Participants need to choose the order and may be distracted by other scenes. Thirdly, the second plan is easier to achieve technically. To build one complex system is harder than to build three similar simple systems. So using separate screens fits the project conceptually and technically.

The position of the screens was another question. There were many ways to place three monitors at a recent showing of Wandering within the Receivership thesis show at UCSC. In the end, I positioned the "Machine translation" piece at the door of exhibit space, because it is the most peaceful piece and there is no pressure to play with it. If participants see this piece first, they will get the basic idea of interaction about body movement with the kinect. The text in this piece can provide some context of the whole project. Even though I don't expect people to read the text, the "Machine translation" is the best "welcome" piece in the installation. The "App Distraction" faced a wall so that participants had more contained space to play. "App Distraction" is the most playable piece and requires more patience and engagement. The "Magic Screen" faced the other installations in the Receivership show. As a result, visitors for other installations would be included in the camera, which also stressed that a smart device is a magic screen recording and showing people's lives without their intention or permission.

Scene design

Wandering is an interactive installation. When I designed this project, I explored how to convey my concerns about screen devices through the interactive process in three different ways. It was a challenge for me to make an interactive system with variability.

As Nathaniel Stern mentioned, “the interactivity of software-based digital systems is preprogrammed.” The program can only respond to a series of inputs. It is impossible to cover every potential participants' behavior. If the participants figure out that something happens when they behave in a particular way, they will probably follow and repeat the behavior. In other words, without variability, the interaction becomes a game with a goal rather than art, and the participants become robots.²⁵

Machine Translation

The "Machine Translation" scene has three different interactions. The most straightforward behavior is to play with the light and shadow on the screen. The pixelated body with text creates an immersive feeling of merging into the digital world. In the early prototype, I noticed that when people moved in front of a screen, they wanted to read the content and kept thinking about the meaning of the

²⁵ Stern, Nathaniel. “*Interactive Art: Interventions in/to Process.*” *A Companion to Digital Art.* Ed. Christiane Paul. John Wiley & Sons, Ltd, West Sussex, United Kingdom.

piece. The beautiful animation of fading shadow encouraged participants to engage with the interactive system.

The second level of the interaction is to read the content on the screen. Even though many participants wanted to read the text on the screen in playtesting, the challenge of choosing material still existed. I used Tao-te-Ching in the first version with its original Chinese text and English translation. Tao-te-Ching is a Chinese philosophical masterpiece talking about real and virtual, which is relevant to this project. However, it is hard to convey its philosophical ideas about real and virtual in a rapid interactive experience. In the second version, I showed two articles about machine translation in two pages. One article was in English with its Chinese translation, and the other one was in Chinese with its English translation result. Participants didn't understand they were two different articles in two different languages. Also, the disadvantages of machine translation didn't fit the theme of this project.

In the final version, I chose an English article about how technology changes people's brains, which provided participants some conceptual background about this piece. This article is easier to understand than Tao-te-Ching, and the topic is more relevant to people's lives compared to the disadvantages of machine translation.

There is another way to experience this scene. I assumed that participants might try to compare the original text with the translation result. I used Chinese and English in the previous versions. Because I knew both of them, it was possible to tell the different meanings between the original text and translation result. However, I ignored the exhibition content and my audience. Since the project was shown in America, and most of the participants spoke English and didn't know Chinese, asking participants to understand the Chinese translation result was difficult. In the final version, I showed the translation result in three different languages -- Chinese, French, Italian so that more people could experience this level. I also included one page that was created by translation English to Chinese and back to English again for English speakers.

The "Machine Translation" scene doesn't ask too much engagement. Most participants enjoyed playing with the virtual body, try different poses with friends, and took photos. Some of them stood still to read the article. Participants who understood Chinese, French, or Italian spent a long time to read the translation results by moving their bodies as the translation windows.

App Distraction

The "App Distraction" scene is the most playable scene. I think it is an experimental piece but not a game because there are at least four ways to play with it. This piece reflects the common phenomenon of distraction by digital notifications and mental cellphone addiction.

In the early version of this piece, I built a playable system for multiplayer with less instruction. The avatar worked well in simplicity. The screen on the head and the screen on the hand could interact with other objects. The primary behaviors were touching and avoiding moving objects. Reaching a message box meant receiving the information while dodging meant ignoring the notice. The goal was to avoid touching the annoying floating data on the screen. Because of the lack of instruction, most of the playtesters tried their best to reach every message rather than to evade.

In a functioning prototype, the bothering information were advertisements. There was a red notification number near the bottom right corner on the screen showing how many ads were ignored. If participants missed one ad image, and it passed the bottom edge of the screen, the red notification number increased and the size of the number grown. Playtesters assumed that the red notification number was the score of touching ad images. This design confused the playtesters and indicated this piece was a game.

I asked myself what the theme of this art piece was. I didn't care about the number and the score. I only wanted to recall the distraction moment and to ask participants what their strategies to deal with the vast amounts of digital data were. Less is more. I deleted many functions to amplify the feeling of inundated by digital information. App icons with red notification number on the top right corner replaced ad images. Only the phone screen on the hand could receive the

information. Participants were more familiar with app icons and got used to responding to App notifications.

It is fascinating to see how participants interact with this piece. Even though the original idea is to avoid being distracted by app notifications, most of the participants can not stop reaching to app icons. Some of them do both -- avoid every app that they don't like such as Twitter and touch the apps that they are interested in, for example, Instagram and Slack. When a virtual phone reaches an app icon, the app icon stays on the screen for a while with a "Ding" sound. Some people feel satisfied with the "Ding" sound while other people want to sweep the app icons on the screen. The behaviors and intentions reflect the contradiction of app notifications. People don't want to be disturbed by phones but have concerns about missing important messages. Some participants hold their phones when playing with this piece. The real phones strengthen the connection between the real world and the digital system. The Kinect cannot analyze body data properly if a person stands near the edge of the detection range or in strange poses. Some participants successfully trick the Kinect and see the unstructured virtual body by moving in and out of the detection range, form shapes with others, and even try handstand.

This piece has many potential developments in the future. According to the feedback I receive, I'd like to make a series of this piece. To make sure it works well with the other two scenes, I simplify the system many times. For further

development, I am going to create a game version of it with more complex interaction, try different screen sizes and shapes, add several kinds of digital information, and personalize the data for each participant.

Magic Screen

The "Magic Screen" scene is the only piece in Wandering that uses live video. The system simulates the online platform for sharing images. The digital screen is a mirror that reflects a user's identity. People watch others' lives through a screen, record their information in digital devices, and post images on the internet. In this piece, the participants are the subject of providing digital data in everyday life.

The participant has a magic screen between hands. The size of the screen is adjustable. The early version of this piece only had black and white. The black silhouette of the audience moved in a white background. The magic screen between hands was very similar to the screen in the "App Distraction" scene with black frame and no content on it. This version worked fine but lacked of meanings.

For the final version, the black silhouette of the audience turned to a body mask of a real-time video. The audience only viewed themselves on the screen. The body mask filtrated the background and other stuff in the real world. I changed the white screen into translucent and applied a color filter on the screen. It pointed out

that people posted different identities online and probably performed an ideal but unreal aspect of their lives.

Each participant has a personal color in the filter. If two participant overlaps their magic screens, a new color comes up, which indicates the behavior of sharing and collaboration in the online platforms is meaningful. The system records the images on the magic screens and displays the latest record on the TV screen in random positions. It is a metaphor of how thoughtlessly people take pictures. To extend this point, people create all kinds of digital data quickly, for example, messages in social media, music and videos in the playlist, emails, and digital files. In this piece, the screen refreshes every second. However, compared to how often people create data, not everyone cleans their mailbox or delete chatting records frequently.

Many participants take photos of the TV screen while interacting with the piece, recording how this digital system posts their images. They are more engaged if they see this piece with their friends to overlap each other's screen.

Wandering

I used some common behaviors while designing Wandering, especially in the "App Distraction" scene. Digital system designers use digital psychology to bring users eyeballs to the apps. The trigger is a general strategy that sparks users to complete a particular action. For example, the tiny red dots that show up on some

of the apps indicate if there have been new activities or actions requiring users interest.²⁶ According to a recent mobile consumer survey, the average consumer in the world is likely to check his or her smartphone 52 times today. Some people believe the red notification dots are addictive design tricks which entice people to open the app to find out what is going on. Others assert that obsessive anxiety about missing out on something is what makes people return to their devices regularly all day (and night).²⁷

In the "App Distraction" scene, most participants wanted to reach to app icons without thinking because they got used to answering every notification red dot on the screen. I don't expect participants to understand the digital psychological strategy behind the behavior. In fact, the app icon itself is another kind of trigger. However, by repeating the movement of reaching apps or watching others doing it, the participants can realize the smartphone addiction and distraction problem causing by the red notification dots. As John Herrman mentioned, "I've met dots that existed only to inform me of the existence of other dots, new dots, dots with almost no meaning at all." ²⁸

Another strategy I used in this project is randomness. Unpredictable rewards and feedback can foster curiosity and encourage users to repeat the behavior. In the

²⁶ Daniel Shiffman, "Digital Psychology - Triggers," n.d., <http://digitalpsychology.io/triggers/>.

²⁷ Larry Rosen, "Obsessive/Addictive 'Tiny Red Dots,'" *Psychology Today*, March 11, 2018, <https://www.psychologytoday.com/blog/rewired-the-psychology-technology/201803/obsessiveaddictive-tiny-red-dots>.

²⁸ John Herrman, "How Tiny Red Dots Took Over Your Life," *The New York Times*, March 4, 2018, sec. Magazine.

"App Distraction" scene, the disappearance of the red notification dots and the "ding" sound are the reward for interacting with apps. The random positions and speeds of the falling app icons make the scene more playful. The variable types of app and notification numbers make the participants more engaged with the piece which simulates what people experience with their smartphones. In the "Magic Screen" scene, the screen shows photos in random positions. It could be a reward if the pictures display near the participants or overlap each other in some interesting ways. Some participants spent a long time playing with this piece, waiting for the unpredictable rewards, and taking pictures on their phones. I applied a phenomenon called the partial reinforcement effect here, which means if people are unsure when they will get a "treat," they continue to act because they don't know if it's just a longer pause than usual before the next reward.²⁹ In the "Machine Translation" scene, the translation result languages are not random. I choose English, Chinese, French, and Italian because I am more familiar with them than other languages. But they are uncertain on each page to the new viewers seeing them for the first time.

These three pieces in Wandering reflect people's relationship with screen devices and digital systems in various aspects. Some of them are more abstract; some of them are more realistic. They form a dynamic system as a whole and support each other at different levels. The objects of interaction are bodies, Kinects (motion track sensors), and screens while the machines are different. The "Machine

²⁹ Daniel Stefanovic, "Digital Psychology - rewards," n.d., <http://digitalpsychology.io/rewards/>.

"Translation" scene treats the whole body as an interface. In the "App Distraction" scene and the "Magic Screen" scene, hands play an essential role in the interaction. The head, arms, legs, and the rest of the body parts provide complementary meanings.

Also, the content of the pieces supports each other. The text in the "Machine Translation" scene refers to the phone addiction and distraction in the "App Distraction" scene. As a response, the "App Distraction" scene includes some social media Apps such as Facebook, Twitter, and Gmail. The Instagram icon showed in the "App Distraction" scene build a close connection with the "Magic Screen" scene in the posting images aspect. Consisting of multiple styles, Wandering reveals the variety of the digital world and people's diverse experience with screens.

Conclusion

Wandering is a dynamic system providing various interactions. The physical body and the digital space enter into complex interrelation. This interactive artwork builds a frame of moving-thinking-feeling. By moving arms and overlapping a sentence, participants have a strong sense of using the superpower of translation, which is a simulation of getting new skills quickly by using digital tools. Catching falling app icons can be satisfying, exciting, overwhelming, and bothering. The behavior reflects the practice of continuously responding to and being distracted by app notifications. By changing the selfie frame, participants create and post photos on the screen constantly.

Wandering juggles entertainment and contemplation in various ways. Even though some kids treated the installation as a game or a digital toy, Wandering is an art project provoking critical thinking about the relationship between people and screen devices. People could feel unsatisfied with the "Machine Translation" when they noticed the translation mistakes. Some participants wanted to get rid of the app rain in the "App Distraction" scene, but the only way to do it is leaving the screen. Also, some participants didn't like to see their photos posted on the screen. All these uncomfortable experience can force people to face the contradictions while using digital systems.

Compared to traditional strict and critical artwork, in my opinion, more

experimental and engaging digital art can attract more audience and attention. The various experience in Wandering helps participants rethink their relationship with digital tools, smartphones, and online information.

With the development of VR, AR, and projection technology, people will keep wandering around the digital world in a more immersive or convenient way. I believe people's physical and emotional entanglement with the digital system will become more complicated and various in the future.

Bibliography

- “5 Ways Technology Is Altering Our Brains,” March 15, 2017.
<https://www.samuelmerritt.edu/news/2017/5-ways-technology-altering-our-brains>.
- Blevins, Jordan. “Water as Symbol of God’s Holy Spirit (Forerunner Commentary),” March 10, 2009.
<https://www.bibletools.org/index.cfm/fuseaction/Topical.show/RTD/cgg/ID/4978/Water-as-Symbol-Gods-Holy-Spirit.htm>.
- Booth Simpson, Zachary. *MARIPOSA*. 2001.
<https://www.mine-control.com/work#/weite/>.
- Brooker, Charlie. “Charlie Brooker: The Dark Side of Our Gadget Addiction.” *The Guardian*, December 1, 2011, sec. Technology.
<https://www.theguardian.com/technology/2011/dec/01/charlie-brooker-dark-side-gadget-addiction-black-mirror>.
- Clair, Michael St. *So Much, So Fast, So Little Time: Coming to Terms with Rapid Change and Its Consequences*. ABC-CLIO, 2011.
- Dystopia, Neon. “What Is Cyberpunk?” *Neon Dystopia*(blog), n.d.
<https://www.neondystopia.com/what-is-cyberpunk/>.
- Haraway, Donna. “A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century,” in *Simians, Cyborgs and Women: The Reinvention of Nature*. Routledge, 1991.
- Herrman, John. “How Tiny Red Dots Took Over Your Life.” *The New York Times*, March 4, 2018, sec. Magazine.
<https://www.nytimes.com/2018/02/27/magazine/red-dots-badge-phones-notification.html>.
- Hou, Jinghui, and Yujung Nam. “Effects of Screen Size, Viewing Angle, and Players’ Immersion Tendencies on Game Experience.” *Computers in Human Behavior*, 2012.
- JIANG, JINGJING. “How Teens and Parents Navigate Screen Time and Device Distractions.” Pew Research Center, August 22, 2018.
<https://www.pewinternet.org/2018/08/22/how-teens-and-parents-navigate-screen-time-and-device-distractions/>.

- Khan, Irfan. "18 Surprising Statistics About Digital Signage," January 27, 2016.
- Kramer, Bryan. "Trust: Humanity vs. Technology." *Bryan Kramer*(blog), November 29, 2016.
<https://bryankramer.com/trust-humanity-vs-technology/>.
- Lozano-Hemmer, Rafael. *Body Movies*. 2001.
http://www.lozano-hemmer.com/body_movies.php.
- "Mobile Phones and Society — How Being Constantly Connected Impacts Our Lives." *South University*, n.d.
<https://www.southuniversity.edu/whoweare/newsroom/blog/mobile-phones-and-society-how-being-constantly-connected-impacts-our-lives-137313>.
- Paul, Christiane. *A Companion to Digital Art*, n.d.
<https://www.wiley.com/en-us/A+Companion+to+Digital+Art-p-9781118475201>.
- Person, Lawrence. "Notes Toward a Postcyberpunk Manifesto." *Nova Express*, no. 16 (1998).
- Rosen, Larry. "Obsessive/Addictive 'Tiny Red Dots.'" *Psychology Today*, March 11, 2018.
<https://www.psychologytoday.com/blog/rewired-the-psychology-technology/201803/obsessiveaddictive-tiny-red-dots>.
- Shiffman, Daniel. "Digital Psychology - Triggers," n.d.
<http://digitalpsychology.io/triggers/>.
- . "Getting Started with Kinect and Processing | Daniel Shiffman," n.d.
<https://shiffman.net/p5/kinect/>.
- . *Learning Processing: A Beginner's Guide to Programming Images, Animation, and Interaction*. San Francisco, CA, USA: Morgan Kaufmann Publishers Inc., 2008.
- Snibbe, Scott. *The Screen Series*. 2002. <https://www.snibbe.com/digital-art>.
- Stefanovic, Daniel. "Digital Psychology - Rewards," n.d.
<http://digitalpsychology.io/rewards/>.
- TeamLab Borderless Tokyo Official Site :MORI Building DIGITAL ART MUSEUM*. n.d. <https://borderless.teamlab.art/>.

Utterback, Camille. *Text Rain* | *Camille Utterback*. n.d.

<http://camilleutterback.com/projects/text-rain/>.

“Wander | Definition of Wander at Dictionary.Com,” n.d.

<https://www.dictionary.com/browse/wander>.

“Water, Symbol of Our Relationship with God — Resources.” Page, n.d.

<https://water.oikoumene.org/en/whatwedo/seven-weeks-for-water/past/2009-water-and-justice/water-symbol-of-our-relationship-with-god>.

Webb, Amy. “Child Psychology Classics: The Mirror Test • The Thoughtful Parent.” *The Thoughtful Parent*(blog), October 1, 2009.

<https://thoughtfulparent.com/child-psychology-classics-mirror-test.html>.

Appendix 1: 5 Ways Technology is Altering our Brains

Technology is changing our brains as well as our lives. If you're reading this, it's likely that you're staring into a screen. Our inability to look away from our tablets, smartphones and social networking platforms is changing the way we process information and perceive the world, according to Adam Alter, author of the new book "Irresistible: The Rise of Addictive Technology and the Business of Keeping Us Hooked."

In one Gallup Panel survey, 52 percent of smartphone owners reported checking their mobile devices a few times an hour or more. Data confirms that young people are even more wired: More than seven in 10 young smartphone users check their device a few times an hour or more often, and 22 percent admit to looking at it every few minutes.

The digital age is transforming our behavior when we limit our communication to 140 characters and use emojis to express our emotions. When we're bored, we simply reach for our gadgets.

To mark Brain Awareness Week, here are five ways that modern technology is impacting our brains and our lives.

1. We have decreased attention spans:

It takes a much shorter time for us to grow bored and move onto the next thing. "Ten years ago, before the iPad and iPhone were mainstream, the average person had an attention span of about 12 seconds," Alter said in an NPR interview this week. Now, he says, "research suggests that there's been a drop from 12 to eight seconds ... shorter than the attention of the average goldfish, which is nine seconds."

2. We are more easily distracted:

A Microsoft Corp. study surveyed 2,000 participants and studied the brain activity of 112 others using electroencephalograms (EEGs) while they performed several activities across devices. It found that "heavy multi-screeners find it difficult to filter out irrelevant stimuli — they're more easily distracted by multiple streams of media." In other words, it's hard to complete a necessary task when our phone signals in incoming message.

In "The Distracted Mind: Ancient Brains in a High-Tech World," the authors argue that distraction impacts our productivity, relationships, and ability to learn. They say our brains have not changed much since we were cavemen, yet our ancestors did not have to deal with the vast amounts of digital data inundating our lives.

3. We can more easily multitask:

The Microsoft report says our ability to multitask has drastically improved in the mobile age. While that may sound like good news, Psychology Today reminds us that, “multitasking, as most people understand it, is a myth that has been promulgated by the ‘technological-industrial complex’ to make overly scheduled and stressed-out people feel productive and efficient.” That’s because performing various activities involving the same type of brain processing isn’t possible; you can’t talk on the phone, read e-mail, send an instant message, and watch YouTube videos all at the same time and still retain information.

4. We have grown addicted to digital technology:

Admit it; you’ve been tempted to stop working and check your Facebook feed to see how many “likes” you’ve received on your latest post. Similar to chemical dependence, technology and its built-in gratification are hard to resist. We simply can’t stop ourselves from compulsively checking our texts and scrolling down our social media feeds.

“The technology is designed to hook us that way. Email is bottomless. Social media platforms are endless. Twitter? The feed never really ends. You could sit there 24 hours a day and you’ll never get to the end. And so you come back for more and more,” Alter told the New York Times. “We are engineered in such a way that as long as an experience hits the right

buttons, our brains will release the neurotransmitter dopamine. We'll get a flood of dopamine that makes us feel wonderful in the short term, though in the long term you build a tolerance and want more.”

5. Our ability to socially interact in person is impaired:

It's a common sight to see two people eating together at a restaurant, but instead of talking to each other they are staring down at their cellphones. The consequences may be worse for children growing up in the digital age. In his book, Alter spells out research that shows kids who spend a lot of time staring at screens rather than engaging with others suffer from an inability to empathize and read social cues.

“When kids are asked to detect people's emotions — happy, sad, angry, surprised — based on nonverbal cues, those who spend a lot of time on tech struggle to decipher one emotion from another at a much higher rate than kids who spend more time interacting in the real world,” Alter said in an interview. "One of the things that happens with our brains is we get used to whatever is the most rapid thing we're experiencing.”

The good news is that there are ways to rely on technology and still have balanced lives. The authors of “The Distracted Mind” and others say we can recalibrate our brains and lead healthier lives with meditation and physical exercise as well as putting down our phones during meals and offline social interactions.