WithU: Connected at a Distance

vivian-b.github.io/withU/index.html

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Abstract

This pictorial presents the prototype of a set of interactive devices to be used as a tool for long-distance communication. The project aimed to explore the possible interactions between two users using an artifact that communicate through the cloud. Reflecting on the current state of the world where people must keep their distance, the direction I was going for was a long-distance device to reconnect two individuals intimately. I explored the types of sensors that could help send a type of visual, audio or coded message to the other party. I uncovered distinct affordances of the sensors that will be used and figured out the types of interactions that could help with the initial motive of connecting two users.

Introduction

In the past few years, our relationship with others in a casual, day-to-day life has dramatically changed. Our connection with our surroundings is a recurring and fundamental part of our existence. Social distancing has impacted our relation to others and made many individuals experience what it is like to be apart from someone else. With the backdrop of modern society, highly efficient communication methods simultaneously made even the sensational events numb and repetitive while isolating us further physically. Especially during the pandemic, the proportion of isolated, unfeeling times of life have drastically increased. The aim of this project is not to help us circumvent the problem as a whole, but to reintroduce these precious feelings, fleeting experiences of excitement and emotions that have been lost. The intention is to make the users be more mindful of the other side and notice the distance between them. The artifact becomes a subtle and informative type of tracker for the users to keep in check with each other. Even on an intimate level, like many current tracking devices, the users become aware that they must exchange their location to know about someone else's. Bridging the gap and making long-distance communication work may require a third party to help transfer the data. As the shared data is sent to a bigger network, users' privacy is put into question. The project will help, challenge and act as a psychological prosthesis under the circumstances of the user and/or the environment situated. A constraining factor, simple as it may seem, is having to consider the material dependency that is necessary to utilize this device.

Design Narrative

The project started with a simple goal of having two users be able to interact at a distance. It turns out, that such a goal seemed more ambitious than planned. We did not know the difficulties of long-distance interaction until we researched radio signals and such, but we were still set building interactions between two users based on the distance between them. We were introduced to the use of powerful micro-controllers that are able to connect to the cloud. We were taken aback about the affordances of such powerful devices and tried to research the lowest cost for the intended interaction we were looking for. The project became more challenging as we were unsure if we wanted to continue or go back to the drawing board. We never really found an answer, and the team broke off.

At this point in the project, I was the one making the decisions and also the only one working. I decided to go through with the long-distance interaction. I wished to explore more about technology that had the ability to connect devices at a distance through the cloud. The prices for the microcontrollers were quite high, and, considering I needed two devices, the affordance became higher.

Components

- Lithium Battery
- NeoPixel Jewel
- Particle Argon
- Piezzo Buzzer
- Photoresistor
- Tilt Ball Switch

At the cost of the main brain of the devices, I tried to limit the use of sensors to avoid having to spend more. I went for the ones I had in hand and chose the sensors that seemed appropriate in size to be used on a small portable device. I was introduced to an interesting lighting component, the NeoPixel Jewel. Seeing the price, I pondered to see if I could go for alternatives. After some thinking, I evaluated the size and the amount of control over the LEDs and decided it was essential to the build. In my mind, I saw each "pixel" an indicator of an interaction. Excluding the middle one, I separated the lights into two categories, the first three will respond to the user holding the device, and the other three will mirror the other user's inputs. The middle part will lights up a certain way, depending on the combinations.
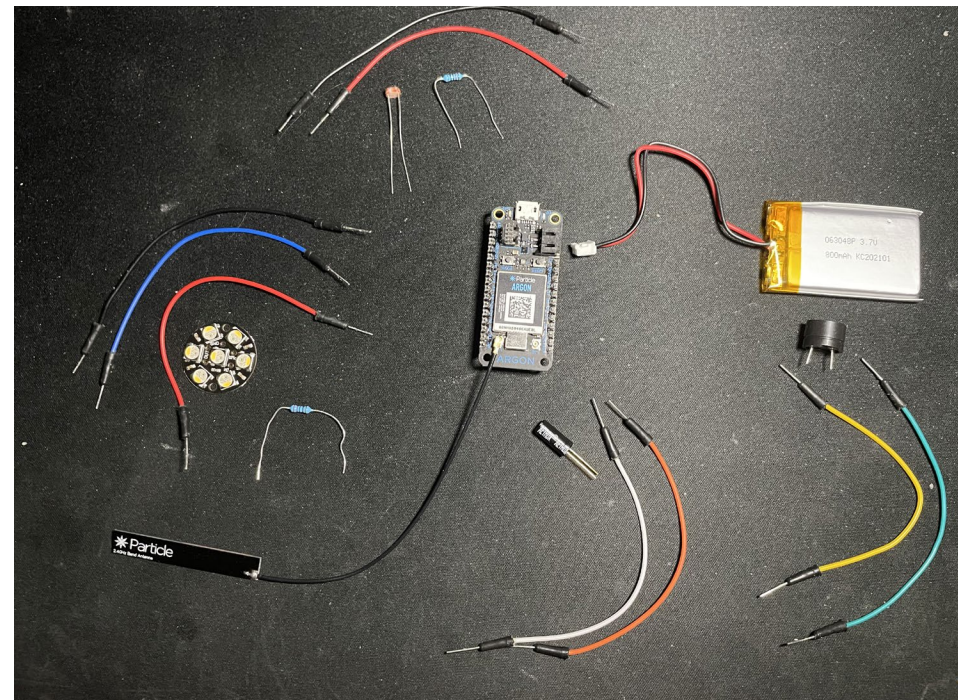

components

With time, I realized how irrealistic our first iterations of the design were. I did not expect the sizes of the components needed to build the final product. I revised the design so it was accurate to the sizes of the components used, but the ideas were never executed.

With my limited knowledge of coding and wiring, the building process was one of the biggest challenges. Setting the Particle Argon, the microcontrollers that can connect to the cloud, is supposedly an easy task, but I did run into some issues before I could get it working without a problem. I was able to make the two Argon devices send messages to the Particle Events and receive data from there.

I encountered many wiring issues or codding mistakes, but I was able to take small steps into building the desired interactions and prototyping a little with the help of TinkerCad. I relied on many examples of codes found online to help me write the correct interaction. I also searched through many Particle projects, hoping to find a hint to help with my coding.

Ironically, the remaining people in the team had no communication or connection. The progress remained slow, and while the meetings with the professor at school helped immensely, the project still barely moves forward. It became difficult for me to handle the project alone. There was a lot of time wasted on my part as I stubbornly try to solve problems that I couldn't comprehend for an extended amount of time. Many of the steps were rushed without careful consideration and the deadlines and milestones we're never met on time.

The direction of the project did not waver much from the original objective, but there were many missed opportunities and lack of exploration in the designing of the artifact.
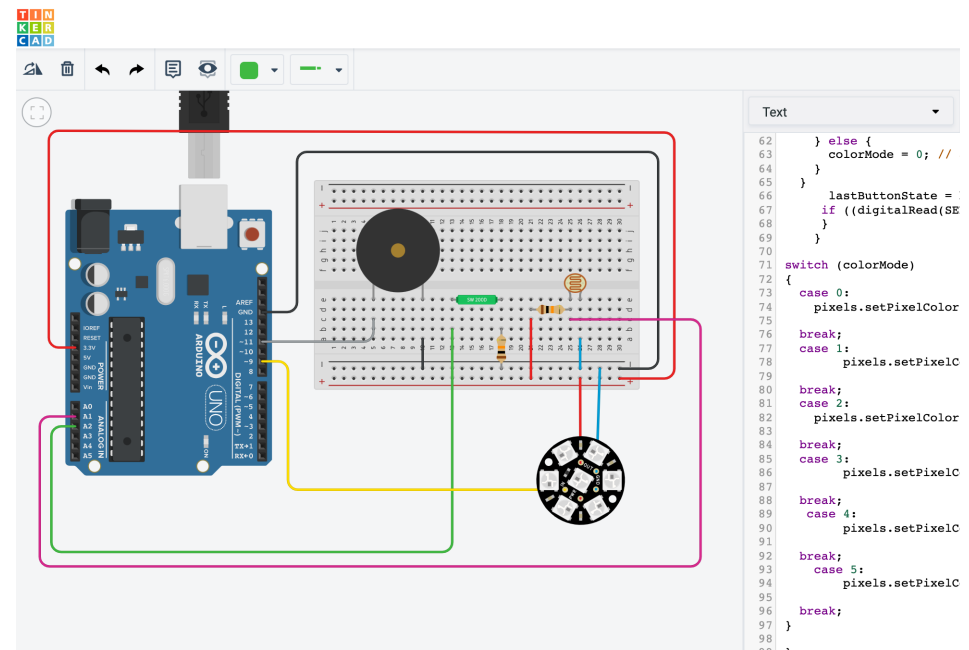
tested build using Tinkercad

breadboard build

Prototype

The basis of the device was to have the users able to communicate with their devices through the cloud. The communication is sent in the form of signals as the data from the sensors of one device send a message to the cloud for the other device to receive and act upon. The intention was to understand how their artifact reacts in correlation to the other device.

The messages that are shared between the devices are simply based on the readings of their sensors. For example, when the device is tilted, it notifies the cloud about the event and the other device takes the information in to react from.

Like a type of game, the user's interaction with their devices is meant to be in response to the other party. The "players" can make their own rules based on the information they get about the other user's device.
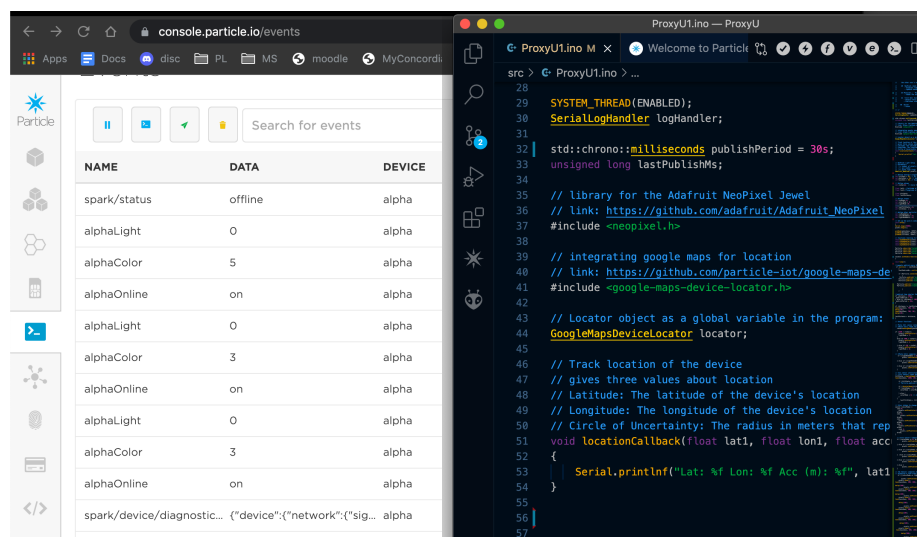
The NeoPixel acts as general indicator to show the main user's state and the partner's inputs. Special sound or visual effects are played depending on the combinations.
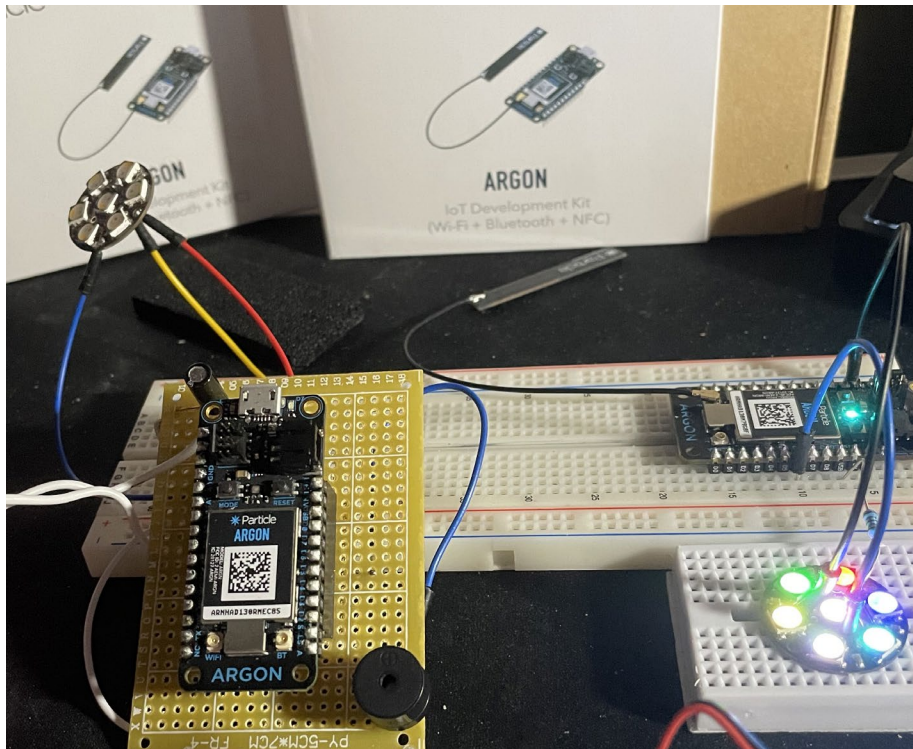
final artifact set up

Particle Cloud usage

Final Artifact

The artifacts effectively send and receive data about the other device. The regular updates the devices send to the cloud enable them to keep the other in check.

The devices' display of colours relies on the user's sensors as well as the other member's actions. The lighting of the device cannot be fully controlled by a single individual. Both sides must essentially figure out a way to interact based on what their device captures from the other side. The users and their devices become each other's halves as the inputs from their respective artifact complete the other person's device.

The end goal of their interactions is dependent on their decisions. The users can actively interact with the piece in hopes for the other side to notice their inputs and somewhat match their intentions. Other scenarios could be the pair leaving it to chances until they coincidentally match or for the devices do not have a single matching sensor. The intention is to make the pairs aware of each other as well as their input. The device sets hidden achievements for the users to figure out and experience a special reaction from the artifact.

Observations

The current state of the artifact is far from reaching its intended stage. Beyond the simple communication of the device's sensors, the intention was to send more meaningful and coded messages for the users to have a more intimate and developed interaction. The artifact is far less developed and behind in its building process. The software and hardware of the device are but the skeletons of the full build and still need a lot of steps to turn it into a stable prototype.

The main structure of the coding is set in place. The devices can communicate and can control the other side through the cloud. The devices react to the information that is given to them, but the interaction is not immediate, it is asynchronous.

I was unable to figure out a way for the devices to publish the information upon change, rather, the data is sent at a timed interval. Every ten seconds, the devices upload the current state of their sensors. Depending on the data, the colour of the device changes accordingly. The initial theme of the device was to gauge the distance between two individuals by using geolocation. Unfortunately, with my limited expertise and time, I was unable to execute this task. The devices are able to locate themself on the map, but I couldn't figure out a way for them to compare each others' locations and calculate the distance in between. Instead, I focused on the interactions relying on the sensors of the machine.

There were difficulties building the hardware of the devices. I did not manage to build a tangible, portable or wearable artifact. The devices did not reach a presentable stage to be tested with more tangible materials. I decided to showcase the artifact with two separate controllers. I used the cloud as a third controller to manually send information for the two devices to react to.

As the artifact is still lacking a lot in its build, the intended experience is not fulfilled. I failed to make a deeper interaction between the two devices. The two units are unable to communicate beyond a change of colour on their devices. The implementation of coded messages or more detailed inputs and outputs as suggested during the prototype stage was not explored.

There were many ideas of how the physicality of the build might look, but none of them were explored or tested. The build did not go that far past the breadboard to be transferred into a more final medium.

I wished to at least get the base concept of the artifact done before implementing more meaningful interactions to the device. The base of the project is not stable, but I am confident that the build can be pushed further to include more interactions between the two devices. For example, extending the interface by adding more quirky sensors or adding another level of interaction linked to how the user specifically treats the sensors.
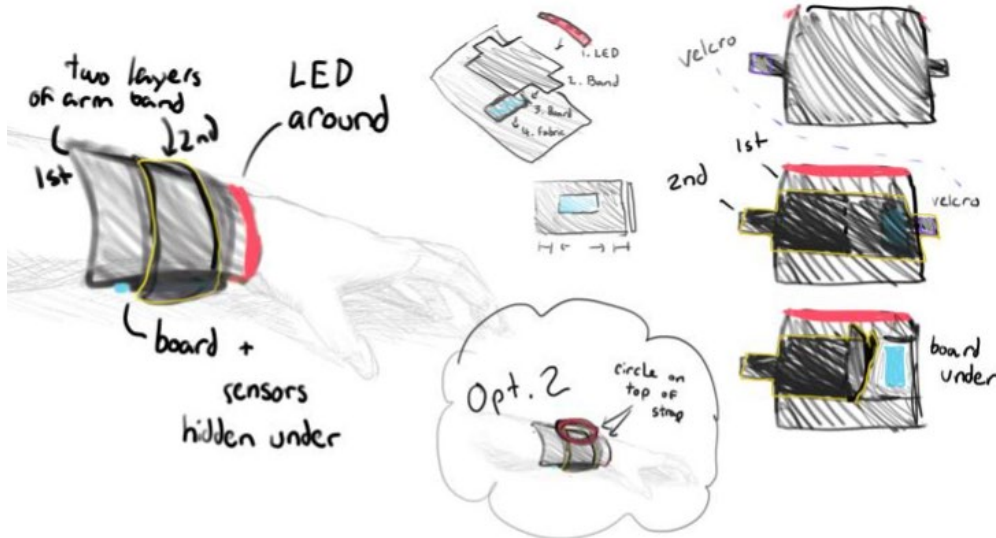
initial interaction concept

Future

I believe this project, is left on a open end. There are many features and possibilities of interactions that can be implemented to the idea of long-distance communication between two devices.

While the focus leaned more towards the interaction between two users, I still wish for the artifact to be an object that links a pair of individual and give them an intimate space even at a distance. I was saddened to not be able to implement the distance feature as planned. I believe knowing the approximate location of the other person can push them to try to close the gap between them. I wish the artifact heightens the special bond between two individuals as they transmit hidden messages on a device only they would understand.

second redesign
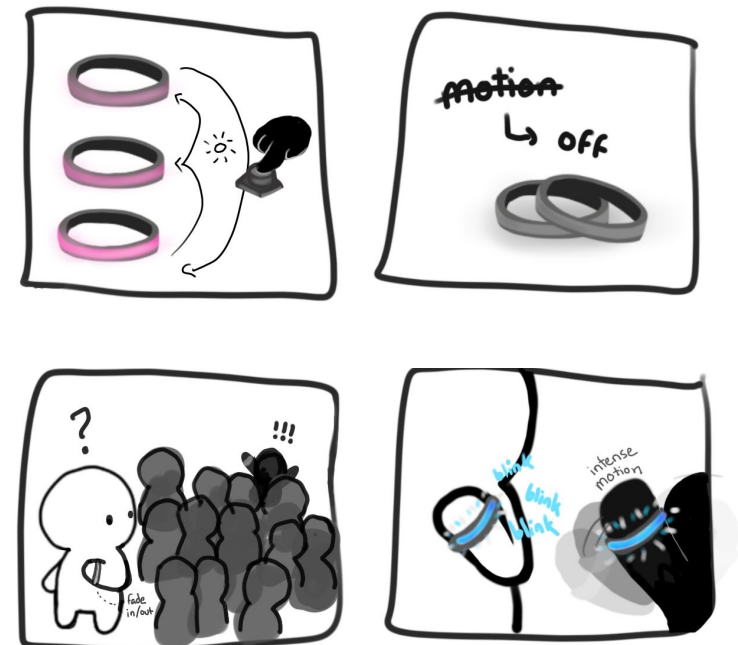
initial interaction concept

Endnote

It seems I have aimed too high for my expertise and did not spend enough time or have enough motivation or ambition to reach the goal. This project became an extremely difficult task that was too much for me to handle alone. However, it was still a valuable experience. My interest in Tangible Media wavers, but I am still glad for what I have learned in this project.

Special thanks to Elio Bidinost as I am extremely thankful to have such a helpful instructor to assist and look over the project with me.