Gabriel Kulp

Week 10: Finishing Up

August 1, 2018 kulp

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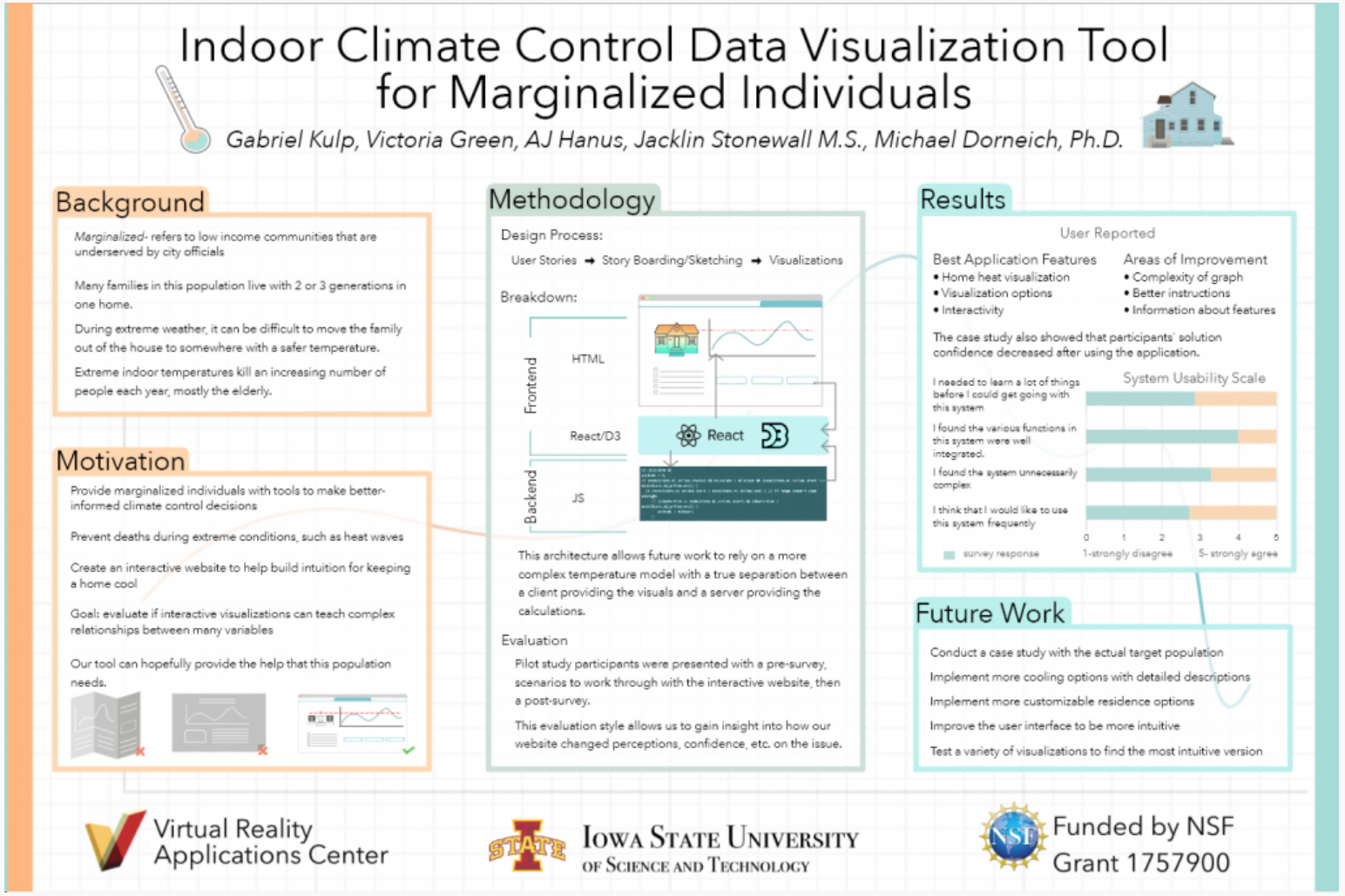
We got our poster printed! It feels so nice to have that out of the way. We're now just working on the oral presentation and the paper. Here's what they look like right now:



If you find any typos, please don't tell me.

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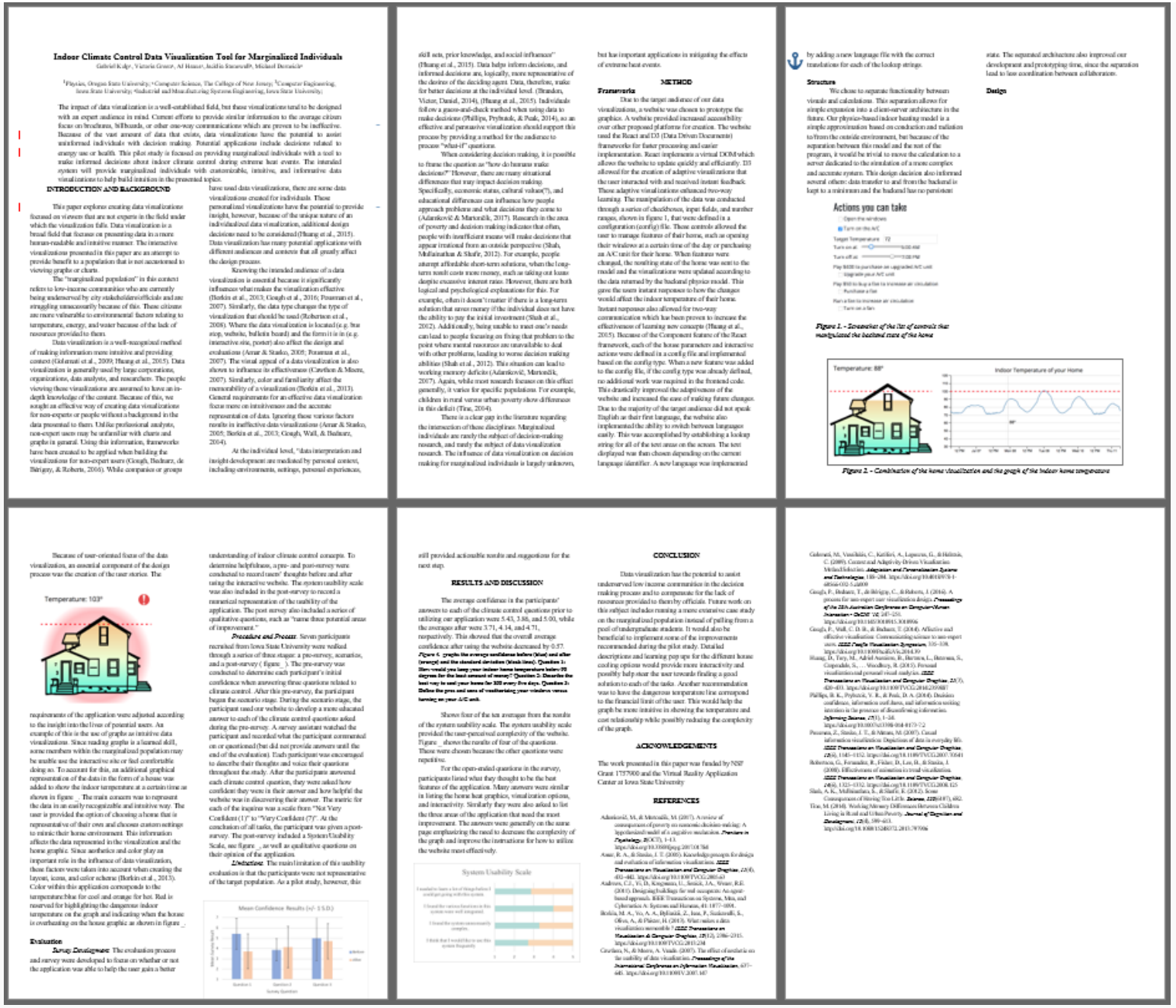

Indoor Climate Control Data Visualization Tool for Marginalized Individuals

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The impact of data visualization is a well-established field, but these visualizations tend to be designed with an expert audience in mind. Current efforts to provide similar information to the average citizen focus on brochures, billboards, or other one-way communications which are proven to be ineffective. Because of the vast amount of data that exists, data visualizations have the potential to assist uninformed individuals with decision making. Potential applications include decisions related to energy use or health. This pilot study is focused on providing marginalized individuals with a tool to make informed decisions about indoor climate control during extreme heat events. The intended system will provide marginalized individuals with customizable, intuitive, and informative data visualizations to help build intuition in the presented topics.

INTRODUCTION AND BACKGROUND

This paper explores creating data visualizations focused on viewers that are not experts in the field under which the visualization falls. Data visualization is a broad field that focuses on presenting data in a more human-readable and intuitive manner. The interactive visualizations presented in this paper are an attempt to provide benefit to a population that is not accustomed to viewing graphs or charts.

The "marginalized population" in this context refers to low-income communities who are currently being underserved by city stakeholders/officials and are struggling unsuccessfully because of this. These citizens are more vulnerable to environmental factors relating to temperature, energy, and water because of the lack of resources provided to them.

Data visualization is a well-recognized method of making information more intuitive and providing context (Gal-mezat et al., 2009; Huang et al., 2015). Data visualization is generally used by large corporations, organizations, data analysts, and researchers. The people viewing these visualizations are assumed to have an in-depth knowledge of the content. Because of this, we sought an effective way of creating data visualizations for non-experts or people without a background in the data presented to them. Unlike professional analysts, non-expert users may be unfamiliar with charts and graphs in general. Using this information, frameworks have been created to be applied when building the visualizations for non-expert users (Gough, Badurz, de Bürigny, & Roberts, 2016). While companies or groups have used data visualizations, there are some data visualizations created for individuals. These personalized visualizations have the potential to provide insight, however, because of the unique nature of an individualized data visualization, additional design decisions need to be considered (Huang et al., 2015). Data visualization has many potential applications with different audiences and contexts that all greatly affect the design process.

Knowing the intended audience of a data visualization is essential because it significantly influences what makes the visualization effective (Borkin et al., 2013; Gough et al., 2016; Pousman et al., 2007). Similarly, the data type changes the type of visualization that should be used (Robertson et al., 2008). Where the data visualization is located (e.g. bus stop, website, bulletin board) and the form it is in (e.g. interactive site, poster) also affect the design and evaluations (Amar & Stasko, 2005; Pousman et al., 2007). The visual appeal of a data visualization is also shown to influence its usefulness (Lavie & Meyer, 2007). Similarly, color and familiarity affect the memorability of a visualization (Borkin et al., 2013). General requirements for an effective data visualization focus more on intuitiveness and the accurate representation of data. Ignoring these various factors results in ineffective data visualizations (Amar & Stasko, 2005; Borkin et al., 2013; Gough, Wall, & Badurz, 2004).

At the individual level, "data interpretation and insight development are mediated by personal context, including environments, settings, personal experiences, still sets, prior knowledge, and social influences" (Huang et al., 2015). Data helps inform decisions, and informed decisions are, logically, more representative of the desires of the deciding agent. Data, therefore, makes for better decisions at the individual level. (Brandes, Victor, Daniel, 2014), (Huang et al., 2015). Individuals follow a guess-and-check method when using data to make decisions (Phillips, Prybutok, & Peak, 2014), so an effective and persuasive visualization should support this process by providing a method for the audience to process "what-if" questions.

When considering decision making, it is possible to frame the question as "how do humans make decisions?" However, there are many situational differences that may impact decision making. Specifically, economic status, cultural values(?), and educational differences can influence how people approach problems and what decisions they come to (Adamković & Martorilik, 2017). Research in the area of poverty and decision making indicates that often, people with insufficient means will make decisions that appear irrational from an outside perspective (Shah, Mullainathan & Shafir, 2012). For example, people attempt affordable short-term solutions, when the long-term result costs more money, such as taking out loans despite excessive interest rates. However, there are both logical and psychological explanations for this. For example, often it doesn't matter if there is a long-term solution that saves money if the individual does not have the ability to pay the initial investment (Shah et al., 2012). Additionally, being unable to meet one's needs can lead to people focusing on fixing that problem to the point where mental resources are unavailable to deal with other problems, leading to worse decision making abilities (Shah et al., 2012). This situation can lead to working memory deficits (Adamković, Martorilik, 2017). Again, while most research focuses on this effect generally, it varies for specific populations. For example, children in rural versus urban poverty show differences in this deficit (Tine, 2004).

There is a clear gap in the literature regarding the intersection of these disciplines. Marginalized individuals are rarely the subject of decision-making research, and rarely the subject of data visualization research. The influence of data visualization on decision making for marginalized individuals is largely unknown, but has important applications in mitigating the effects of extreme heat events.

METHOD

Framework

Due to the target audience of our data visualizations, a website was chosen to prototype the graphics. A website provided increased accessibility over other proposed platforms for creation. The website used the React and D3 (Data Driven Documents) frameworks for faster processing and easier implementation. React implements a virtual DOM which allows the website to update quickly and efficiently. D3 allowed for the creation of adaptive visualizations that the user interacted with and received instant feedback. These adaptive visualizations enhanced two-way learning. The manipulation of the data was conducted through a series of checkboxes, input fields, and number ranges, shown in figure 1, that were defined in a configuration (config) file. These controls allowed the user to manage features of their home, such as opening their windows at a certain time of the day or purchasing an A/C unit for their home. When features were changed, the resulting state of the home was sent to the model and the visualizations were updated according to the data returned by the backend physics model. This gave the users instant responses to how the changes would affect the indoor temperature of their home. Instant responses also allowed for two-way communication which has been proven to increase the effectiveness of learning new concepts (Huang et al., 2015). Because of the Component feature of the React framework, each of the home parameters and interactive actions were defined in a config file and implemented based on the config type. When a new feature was added to the config file, if the config type was already defined, no additional work was required in the frontend code. This drastically improved the adaptiveness of the website and increased the ease of making future changes. Due to the majority of the target audience did not speak English as their first language, the website also implemented the ability to switch between languages easily. This was accomplished by establishing a lookup string for all of the text areas on the screen. The text displayed was then chosen depending on the current language identifier. A new language was implemented by adding a new language file with the correct translations for each of the lookup strings.

Structure

We chose to separate functionality between visuals and calculations. This separation allows for simple expansion into a client-server architecture in the future. Our physics-based indoor heating model is a simple approximation based on conduction and radiation to/from the outside environment, but because of the separation between this model and the rest of the program, it would be trivial to move the calculation to a server dedicated to the simulation of a more complex and accurate system. This design decision also informed several others: data transfer to and from the backend is kept to a minimum and the backend has no persistent state. The separated architecture also improved our development and prototyping time, since the separation lead to less coordination between collaborators.

Design

Figure 1. - Screenshot of the list of controls that manipulated the backend state of the home

Figure 2. - Combination of the home visualization and the graph of the indoor home temperature

Because of user-oriented focus of the data visualization, an essential component of the design process was the creation of the user stories. The

requirements of the application were adjusted according to the insight into the lives of potential users. An example of this is the use of graphs as intuitive data visualizations. Since reading graphs is a learned skill, some members within the marginalized population may be unable use the interactive site or feel comfortable doing so. To account for this, an additional graphical representation of the data in the form of a house was added to show the indoor temperature at a certain time as shown in figure _. The main concern was to represent the data in an easily recognizable and intuitive way. The user is provided the option of choosing a home that is representative of their own and chooses custom settings to mimic their home environment. This information affects the data represented in the visualization and the home graphic. Since aesthetics and color play an important role in the influence of data visualization, these factors were taken into account when creating the layout, icons, and color scheme (Borkin et al., 2013). Color within this application corresponds to the temperature: blue for cool and orange for hot. Red is reserved for highlighting the dangerous indoor temperature on the graph and indicating when the house is overheating on the house graphic as shown in figure _.

Evaluation

Survey Development. The evaluation process and survey were developed to focus on whether or not the application was able to help the user gain a better understanding of indoor climate control concepts. To determine helpfulness, a pre- and post-survey were conducted to record users' thoughts before and after using the interactive website. The system usability scale was also included in the post-survey to record a numerical representation of the usability of the application. The post survey also included a series of qualitative questions, such as "name three potential areas of improvement."

Procedure and Process. Seven participants recruited from Iowa State University were walked through a series of three stages: a pre-survey, scenarios, and a post-survey (figure _). The pre-survey was conducted to determine each participant's initial confidence when answering three questions related to climate control. After this pre-survey, the participant began the scenario stage. During the scenario stage, the participant used our website to develop a more educated answer to each of the climate control questions asked during the pre-survey. A survey assistant watched the participant and recorded what the participant commented on or questioned (but did not provide answers until the end of the evaluation). Each participant was encouraged to describe their thoughts and voice their questions throughout the study. After the participants answered each climate control question, they were asked how confident they were in their answer and how helpful the website was in discovering their answer. The metric for each of the inquiries was a scale from "Not Very Confident (1)" to "Very Confident (7)". At the conclusion of all tasks, the participant was given a post-survey. The post-survey included a System Usability Scale, see figure _, as well as qualitative questions on their opinion of the application.

Limitations. The main limitation of this usability evaluation is that the participants were not representative of the target population. As a pilot study, however, this still provided actionable results and suggestions for the next step.

RESULTS AND DISCUSSION

The average confidence in the participants' answers to each of the climate control questions prior to utilizing our application were 5.43, 3.86, and 5.00, while the averages after were 3.71, 4.14, and 4.71, respectively. This showed that the overall average confidence after using the website decreased by 0.57.

Figure 4. - graphs the average confidence before (blue) and after (orange) and the standard deviation (black lines). Question 1: How would you keep your indoor home temperature below 90 degrees for the least amount of money? Question 2: Describe the best way to cool your home for 100 every five days. Question 3: Define the pros and cons of conditioning your windows versus having an your A/C unit.

Shown four of the ten averages from the results of the system usability scale. The system usability scale provided the user-perceived complexity of the website. Figure _ shows the results of four of the questions. These were chosen because the other questions were repetitive.

For the open-ended questions in the survey, participants listed what they thought to be the best features of the application. Many answers were similar in listing the home heat graphics, visualization options, and interactivity. Similarly they were also asked to list the three areas of the application that need the most improvement. The answers were generally on the same page emphasizing the need to decrease the complexity of the graph and improve the instructions for how to utilize the website most effectively.

CONCLUSION

Data visualization has the potential to assist underserved low income communities in the decision making process and to compensate for the lack of resources provided to them by officials. Future work on this subject includes running a more extensive case study on the marginalized population instead of pulling from a pool of undergraduate students. It would also be beneficial to implement some of the improvements recommended during the pilot study. Detailed descriptions and learning pop ups for the different home cooling options would provide more interactivity and possibly help steer the user towards finding a good solution to each of the tasks. Another recommendation was to have the dangerous temperature line correspond to the financial limit of the user. This would help the graph be more intuitive in showing the temperature and cost relationship while possibly reducing the complexity of the graph.

ACKNOWLEDGEMENTS

The work presented in this paper was funded by NSF Grant 1757000 and the Virtual Reality Application Center at Iowa State University

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Yes, this is illegible on purpose.

Despite having so few days left, nothing really feels different. Maybe I'm just bad at sensing it, but I don't notice any sort of dread regarding the end of the program. This could mean that it'll be smooth sailing until I'm home, or that the end is just sneaking up on everyone. Or everyone else is drowning in emotions and I'm high, dry, and clueless. I guess we'll see pretty soon.

REU|2018 Leave a reply

Weekend 9: A Quick Family Visit

August 1, 2018 kulp

I went to Cedar Rapids last weekend to visit an aunt, uncle, and 3 cousins that I used to see regularly. Unfortunately, I don't feel like I have much in common with my cousins anymore.

We went to an 80s-themed pizza place that had probably 30 arcade machines and another 10 pinball machines. The next day we went on a hike by the Cedar River. Here are some pictures:

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The Cedar River. No rapids in sight…

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There are a bunch more behind me. I actually got on the leaderboards for Missile Command and Asteroids! I suspect they wipe the highscores regularly, though, since I'm not exactly impressive at either game.

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This is just a cool art piece I saw on a wall. I'll never understand why some people think that windmills are an eyesore…

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Week 9: Crunch Success

July 27, 2018 kulp

We did our user trials yesterday. It feels so good to be done with the website and finally have the material for the poster and paper. We need to turn in the poster by Monday 8am, so I need to focus on my portion of the poster creation and editing process.

Here are some pictures describing this week:

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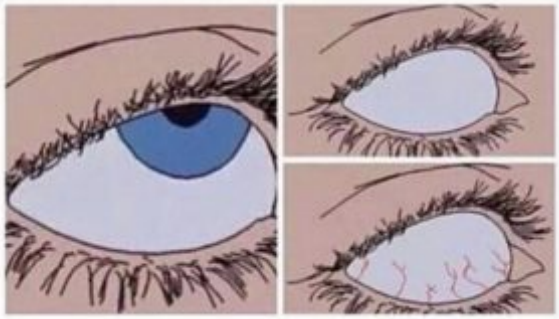
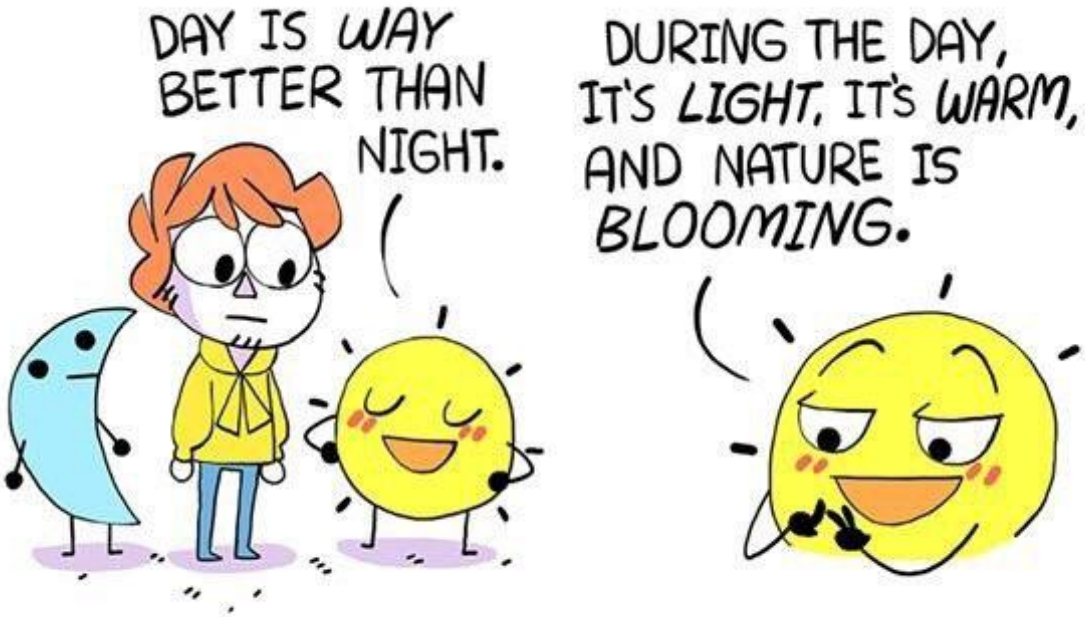
Let's go around the room say your name your major and a fun fact about yourself





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Week 9: Crunch time

July 25, 2018 kulp

We need our website functional (enough) for human testers tomorrow. It's definitely possible and we've made lots of progress today already, but I'm tempted to say that I don't really have blogging time. Here's a screenshot of the WIP interface right now:

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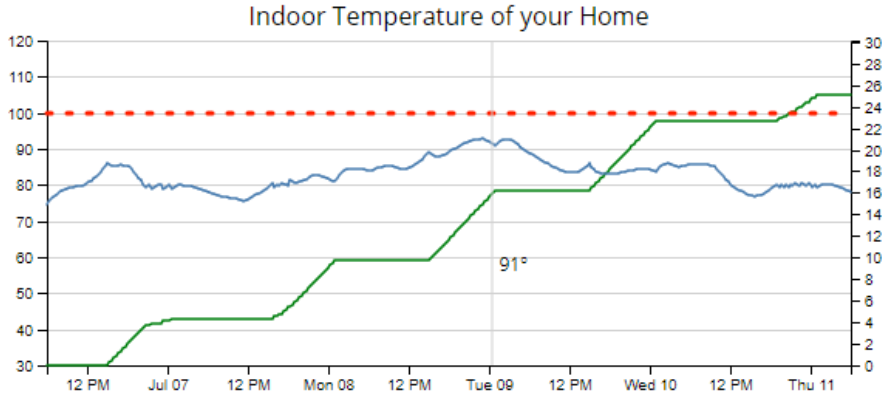
Home | Edit Info | Short term

Edit your home

Use the options below to explore the possible choices to keep your home cool on a hot day. The graphs and images are influenced by your decisions made in the actions you can take section.

Temperature: 91°



Normal | Heat wave | Show Cost

Actions you can take

- [ ] Open the windows
- [x] Turn on the A/C

Target Temperatue 80

Turn on at 3:00 PM

Turn off at 1:00 AM

- [ ] Upgrade your A/C unit

Pay $400 to purchase an upgraded A/C unit

- [ ] Purchase a fan

Pretty much all subject to change. The green line is total cost and the blue line is internal temperature.

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Weekend 8: Hackathon

July 23, 2018 kulp

Hackathons were originally events for working on personal hardware and software projects in an environment with food, few distractions, and people happy to help. More recently, they've become timed programming competitions. Until this weekend, I'd only tried the latter.

Previously, I've won several 24-hour competitions with Unity games. This time, with a non-competitive event (organized by Ilan, food provided by VRAC), I decided to try a project more focused on learning for those 6 hours on Sunday afternoon.

I wrote a C++ program for Ubuntu (run on a Raspberry Pi, but that doesn't actually matter) that lets the user "paint" on the screen with the mouse without using a graphical environment. That's probably more impressive than it sounds, so lemme try to explain some background.

The Linux kernel (a low-abstraction piece of the operating system that interfaces with hardware) keeps track of input devices and makes them available to programs that the user wants to run. There's a "file" for each input device that describes what it's doing. It's a stream of information, really, that describes anything coming from the device. For example, pressing a key on the keyboard makes the keyboard tell the kernel that it was pressed, when it was pressed, and what key was pressed. All that info is dumped in the keyboard event stream for anything else to read. Similarly, the mouse reports a little blob of information whenever anything happens to it. That structured piece of data (called a data structure, or just struct) describes what just happened (horizontal movement, vertical movement, button press, button release), when it happened, and in the case of movement, how much. So really what this boils down to is that I need to read that stream of data and do something whenever some info comes in. How does that usually work? Does every program that uses a mouse need to do that?

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In a typical graphical environment, there's a program that runs in the background that watches the mouse. Since the mouse only directly reports relative motion, this program keeps track of an absolute position by adding the relative movements as they come in. This also means keeping track of the borders of the screen so the pointer is always visible. If a different program wants to know something about the mouse, it asks this background program where pointer is, which buttons are pressed, etc. What I wanted to do in this project is ignore all that and write my own input handler that isn't bundled with a desktop environment. That's an unusual thing to do, since nearly every use for a mouse requires a desktop and thus already has the mouse handler available.

The first problem that I needed to solve came up because if the program is waiting for mouse data to come in, that means it isn't doing anything else. The whole program is frozen except when you move your mouse. What if you could tell part of the computer to watch that stream and another to use the data that the first part finds? That's called threading. (Yes, there are other ways I could've done this, but I wanted to learn C++ threading, anyway.)

I've made threads in C# (and Python, too, I think) for watching information come in through the internet. It's a similar situation where you have an asynchronous task that shouldn't hold up everything else. The way that C# and C++ do threads are somewhat similar, but I didn't have a new enough version of the C++ tools installed for the modern method to work properly (or at least that was my theory when I gave up after a few minutes). I instead learned C-style threading and made my program keep track of the mouse events that way. The thread waits for an even to come in, changes the position and state of a variable that represents the mouse, then goes back to waiting. Elsewhere in that program, I can read that variable and see the most up-to-date info about the mouse.

After getting the reading down, I had to actually do something with that data. In this case, I used it to move a cursor around the screen. I could've also used it to do something more complicated like rotate a 3D model or something like that, but I decided to keep it simple for now and focus on one challenge at a time. The end product lets you move a cursor with the mouse, left click to type "#" under the cursor, and right click to

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type a bunch of spaces in a square (which “erases” that part of the screen). That means you draw with a left click and erase with a right click, making for a simple paint program in a text-only environment!

REU|2018 **2** Replies

Week 8: Something worth showing?

July 19, 2018 kulp

So I think we’re at a point in our project where it makes sense to share some visuals. I threw together a sketch of what I was picturing a while ago and everybody agreed that it should work. We’ve been making steady progress toward this goal and realizing what kinds of changes make sense as we go.

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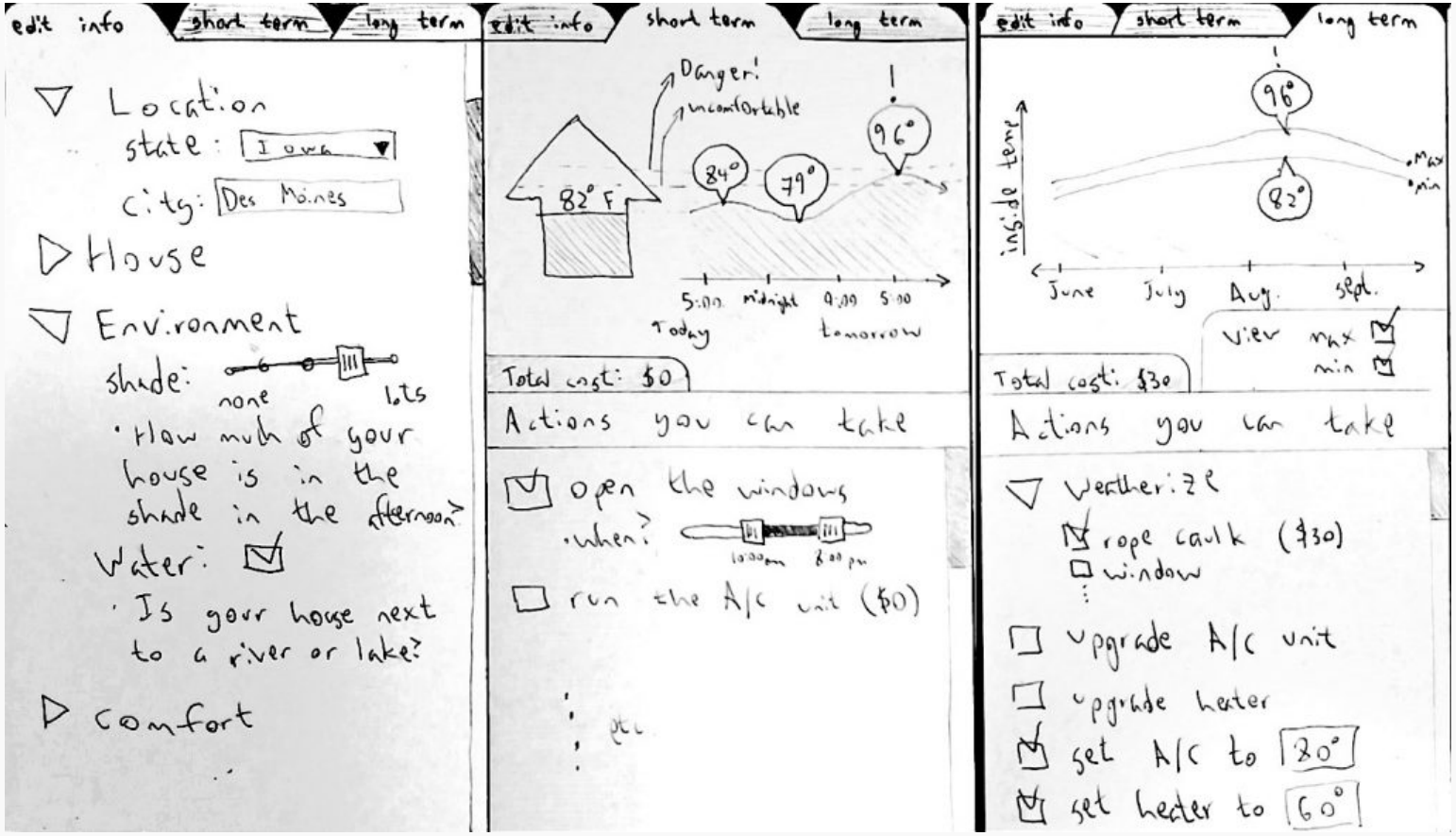

Here's a sketch I made a few weeks ago of what the website could look like

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Home | Edit Info | Short term | Long term

Create Your Environment

Location

State Iowa

City Des Moines

Home

Square footage 800

How many square feet is your home?

Garage

Do you have a garage?

Siding type Vinyl

What type of siding does your home have?

Environment

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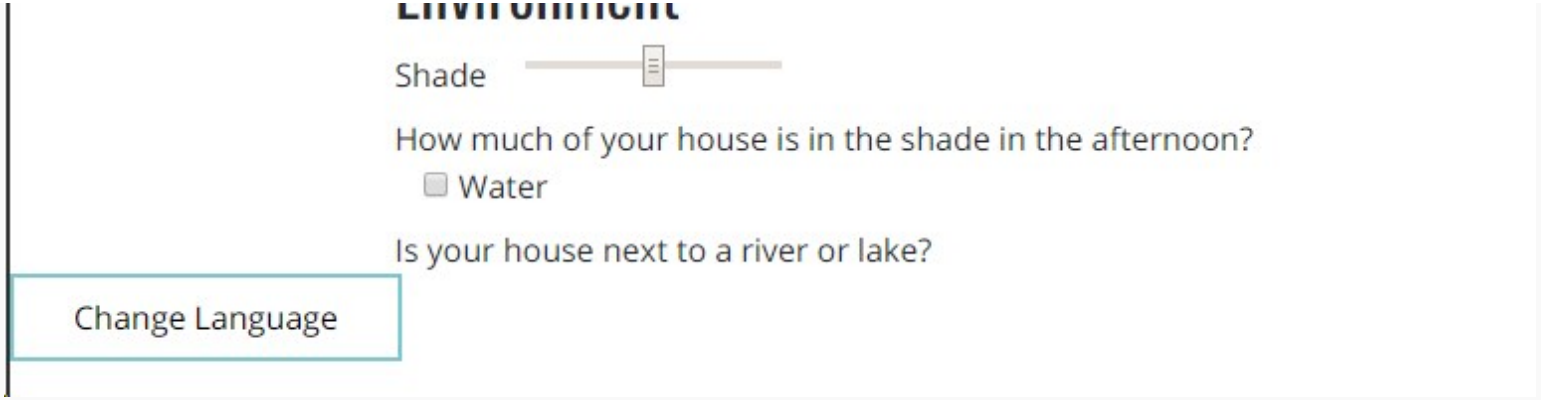

Here's a very work-in-progress screenshot of the interface. Note that all of these controls are rather arbitrary and just there for testing. We have some survey data, for example, that suggests that we don't need to ask about the siding type, since most people in our target population use wood. A future model could incorporate more options, but we're making a stripped-down test version just to see if this interactive presentation method is good for teaching.

At some point I might have a working prototype online (I'll post a link at that point), but for now everything is running locally. We don't actually need it to work on the internet, though, because we're going to be controlling how our pilot study subjects access it, so we could just as easily have some strange custom setup on the device we hand them.

So my next step (after going to our weekly Thursday meeting) is to program a semi-physical model of how outdoor temperature affects indoor temperature. The controls exposed to the user will change factors such as thermal conductivity, wall thickness, surface area, incoming solar radiation, etc. and hopefully produce some semi-realistic graphs of temperature.

I just waded through the ridiculous amount of NOAA data to get some hourly temperatures throughout the summer in Des Moines a few years ago, so that should be a good starting point for the outside temperature. Next up: get an inside temperature from it.

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Week 8: More Tasks

July 18, 2018 kulp

The DataViz team has been working on the website for a while now (it's really coming together!), but there are some other parts that we need to do, too. We need to have a paper ready for submission, a poster for the ISU-wide REU poster fair, and we need some real data from a pilot study (which is used in the paper and poster). Each of these things will take quite a bit of work, and we don't really have that much time left. I don't mean to say that we can't do it or even that we're discouraged, though.

By Thursday this week, we have to design a method of analyzing our testers. This is going to be a combination of screen recording, note-taking, surveying, and interviewing (before, during, and after the trial). I've never done something like this formally (though I've gotten informal play-tester feedback on some of my games), so it's new yet familiar to me.

Anyway, in light of the timeline and our list of deliverables, we decided to make it a literal list. We're now using Trello to emulate a sticky-notes-like organization scheme for keeping track of what's being worked on and what's left.

Here's an interesting table (that we'll likely need to use soon) of cost and energy consumption for various appliances: https://www.cityofames.org/government/departments-divisions-a-h/electric/the-energy-guy/household-appliance-energy-use

REU|2018 Leave a reply

Weekend 7: Wedding 2!

July 17, 2018 kulp

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I'll say up front that I didn't take as many pictures this time around, so I didn't have many to choose from when picking what to post.

I'm happy that I got to stay with my aunt, uncle, and cousins for the weekend, because I don't see them very often. Most of the people I met knew somebody from my extended family, so it was fun to explain my connections to everyone involved. This was more a rare chance for a family get-together than a wedding for me, since I know the guests much better than the bride and groom, who are both friends of my family.

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Left to right: my brother (making some strange face), cousin, uncle (he usually looks happier), me (my face is kinda odd, too), girlfriend, aunt, and cousin. I have around 30 cousins total, by the way. No, they weren't all there.

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The couple getting married are Jorge and Stephanita Luque. Jorge is only here for 3 months on a visa from Spain.

Logistics were pretty exciting. Angelica drove me down to Des Moines on Friday, where I got on a bus for 6 hours to Chicago. It only stopped twice. It had outlets and WiFi, but the internet connection was insufferably slow most of the time. Once in Chicago, I walked 15 minutes north to a train station, where I rode for around an hour further north to get to my great aunt's house, where my brother, uncle, and his family were staying the night (they came down from my uncle's house in Wisconsin). In the morning, we drove to Gary, Indiana

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to pick up my girlfriend from a train stop (she rode an hour and a half from Notre Dame). We then drove around 2.5 hours south to Indianapolis for the choir rehearsals, led by my uncle.

We stayed two nights in a friend's house and left early Monday morning for a long drive to Chicago. From there, I got on a bus, my girlfriend got on a train (from Chicago this time instead of Gary, so 2.5 hours for her), and my brother got on a plane. My aunt, uncle, and their two kids drove a few more hours the rest of the way up to their house in Wisconsin. I wasn't so lucky with the bus on the way back, though. Something was wrong with the circuitry (blown fuse? I'll never know.) and that caused both the WiFi and the outlets to not work. Nobody was available to take me from Des Moines to Ames at the end, and there weren't any reasonable priced and schedules buses, so I took an Uber for the last 40 minutes, which cost as much as a 6-hour bus ride.

Anyway, I'm back now! What a crazy pair of trips!

REU|2018 Leave a reply

Week 7: Between the Weddings

July 17, 2018 kulp

We actually got a lot done this week. Our application is taking shape (though not enough of a shape to be worth sharing). I'm happy with the organizational structure of this data visualization and I'm glad that it has continued to pan out as an extensible and easily-separable workflow. On Wednesday we went outside and took lots of pictures. Here is my favorite:

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Kind of a wave

On Thursday, we heard an interesting lecture about some VR research. I've probably mentioned this before, but we were all expecting a much higher portion of VR research at the VR Applications Center. Jon Kelly is looking into how our bodies perceive motion when they don't move. He's doing this by investigating where people think they are after moving and rotating in a virtual environment, and by changing the way that they

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move. When you physically walk and turn, you keep a very good mental map of where you are. When you teleport (or other types of VR locomotion), you tend to be worse at keeping track of where you are.

I've also personally noticed difficulty in maintaining that mental map when you introduce enough axes of motion into the environment. I enjoy a video game in which you have complete freedom of movement inside a cave-like environment without a defined up direction. This means that you can translate and rotate along/around any axis. In addition to the control difficulty (which my quadcoper flying days certainly helped with), it's really easy to get disoriented when there aren't lots of landmarks involved, and that's without even teleporting. I asked some questions about that research topic (which has applications in space stations) and learned that it's a rather unexplored field.

I left early on Friday to get down to Des Moines in time for a bus to Chicago for the next wedding I was invited to sing at. Thank you, Angelica, for providing transportation!

REU|2018 Leave a reply

Weekend 6: Wedding!

July 10, 2018 kulp

I went home to Oregon for the weekend to sing at the wedding of one of my childhood friends. I also got to see my brother before he gets a job and moves out (he just graduated) and my dad before he joins my mom in Geneva next week (she's at an internship at WHO). Anyway, here are some pictures:

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I'm guessing most of you haven't seen an Orthodox Christian wedding. This part is called the Dance of Isaiah and it's between 4 and 6 thousand years old (adopted from Jewish tradition). You can also see the bride and groom wearing crowns that are joined by a ribbon (though the ribbon isn't very visible in this shot). Some couples keep their crowns to be buried in (since there's no "'til death do us part" clause). If that sounds interesting, you can read some more on the Wikipedia page.

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I’ve known Emilia for around 9 years. The lucky man’s name is Arthur.

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I was one of the people carrying the groom. Sadly you can't have audio in a gif, so the Arabic dance music is up to your imagination.

REU|2018 Leave a reply

Week 6 (barely)

July 6, 2018 kulp

This week is only 2 days for me. Wednesday is a holiday, we have Thursday off, and I'm gone for Friday through Monday for a wedding in Oregon. AJ, our newest team member, will also be gone on Friday. Hopefully we make it far enough in these two days to do some work independently until we're in the same place again.

Monday, July 2

Today we welcomed our new team member: AJ. He should have a blog listing soon, but I'm not sure if he's required to post. He's an undergrad who's done some research for one of the overseeing professors here at VRAC, so he's familiar with a lot of the people (albeit not the REU students). He happens to fill some gaps in our team's knowledge about web design.

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I made some UI sketches that Jacklin loved, which closes out the majority of the pre-programming work. We should be able to get a solid start tomorrow!

Tuesday, July 3

Today was the first real work with AJ (and consequently the first work with a full team in over a week). We picked out some technologies to build our program with. We're currently planning to make a React.js website with a clean separation between the user interface, backend, and data (this separation promotes better organization, extensibility, and task separation). Our first block of work will be divided into 3 parts; Victoria will make the visual layout of the first iteration of the interface, I will make the backend that handles how the user selection modifies the data, and AJ will do the tasks in the middle, like specifying which buttons call which functions and how the graph is generated from the backend-served data. For this pilot study, the data file isn't very important. We only need to provide plausible information to measure how well the interface can teach people.

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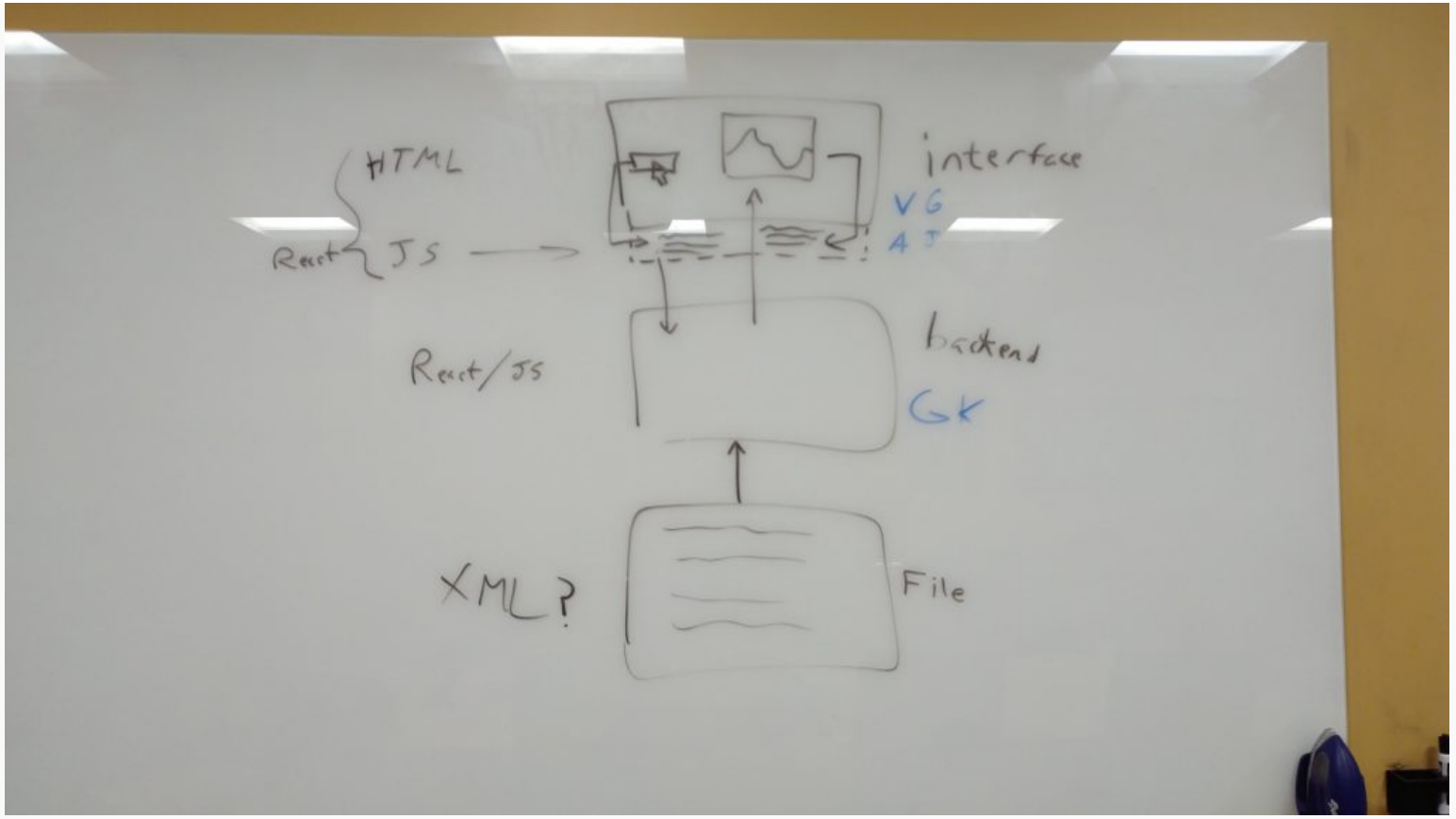

Here's a quick sketch of the architecture that makes a lot more sense if you were in the room with us.

I'll back up a bit, since not all of my readers at home know much about this project. We're creating an interactive website that will let you see how various changes (decreasing the A/C target temperature, opening windows at night, upgrading your insulation, etc.) impact your indoor temperature during extreme climate events. The goal is to help marginalized populations get a better sense of how to handle these situations, but in a more individual way. Current efforts to do similar things instead focus on brochures, billboards, or other one-way communications which have proven to not be very effective. Our research question is basically, "does this interactive thing do a good job of teaching these climate concepts?" This

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requires two components: the interactive thing, and the means of measuring understanding. We're focusing on the first piece right now, but we'll get to the second one before the end of the summer.

REU|2018 Leave a reply

Week 5: A slow finish

July 3, 2018 kulp

Hey, look! It's almost the end of June. I couldn't decide between "A slow finish" and "A fast finish". I can't really tell which it was.

Thursday, June 28

The DataViz team is running out of things to do besides making an actual application. Thankfully, that means we'll get to write some code soon. Unfortunately, that also means the selection of available tasks is currently rapidly decreasing. I enjoy the way that programming gives you so many ways to accomplish a goal. Writing a little formulaic snippet is quite different.

We had an interesting luncheon lecture about portable nanosensors for food safety, but I fear it has cemented my current distaste for bio-related topics. Computers are just so clean and logical that the world of bio just seems frustrating and arbitrary. I'm sure I'd have a different opinion if I started doing work in the field, though.

After work I went shopping with a few people and I got some produce (among many other things). It's been too long since I had produce….

Friday, June 29

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This labels one of the doors to the lab. Feels appropriate.

The day really flew by. I think Fridays usually go the other way, so that was surprising. We really just read through some of our grad student's previous publications to look for edits that we should make to our own lit review. We also did some more interface planning for the eventual application.

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Week 5: Reintroduction to the C6

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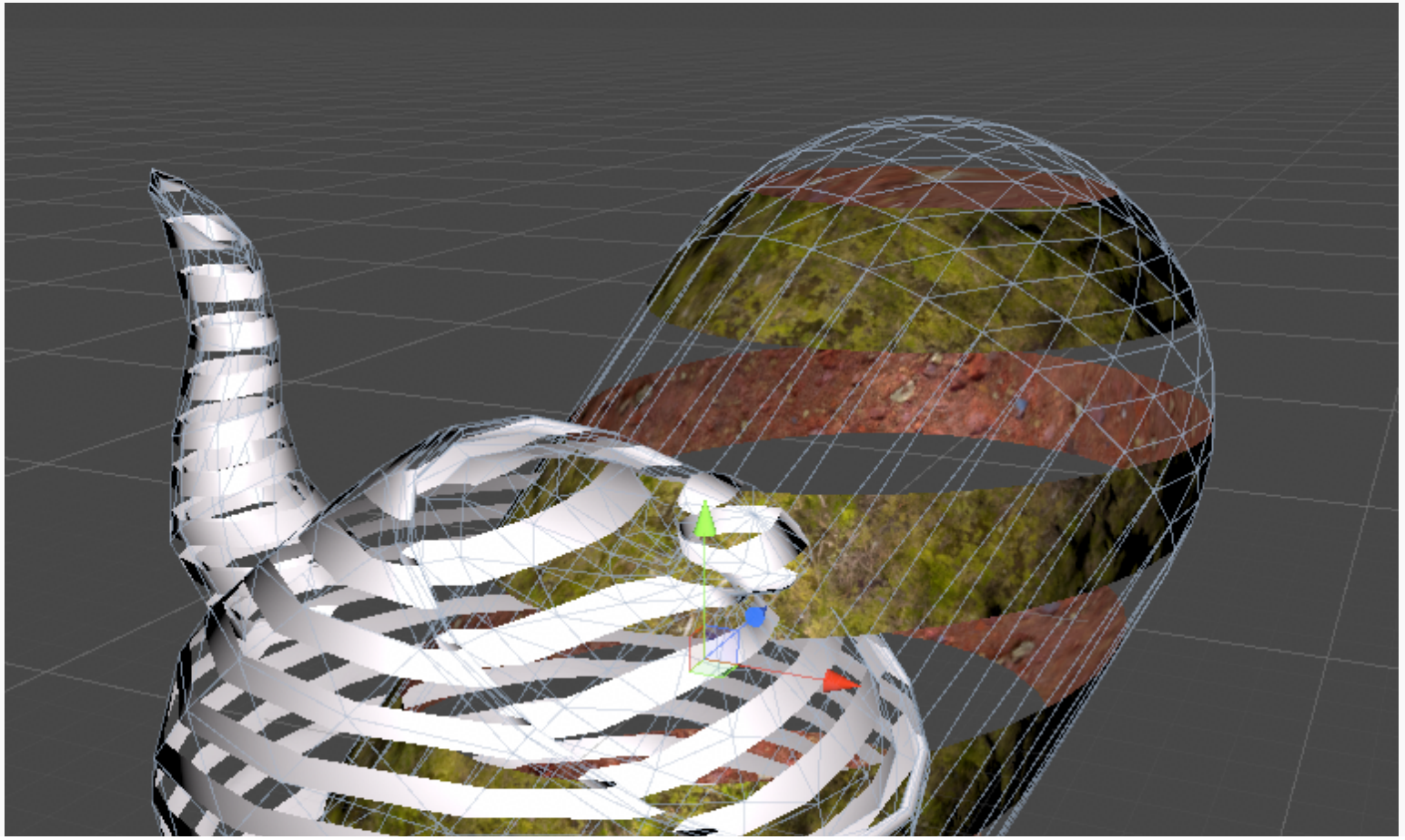
June 27, 2018 kulp

Monday, June 25

We finished up with the shaders section of the deeper dive. (Reminder: shaders are programs for the graphical processing unit.) This mostly consisted of following a slideshow and copying code, but I happened to have enough baseline knowledge to figure out how everything works. When we reached the end of the class, I took it upon myself to write a shader that renders only horizontal slices of an object without modifying its geometry.



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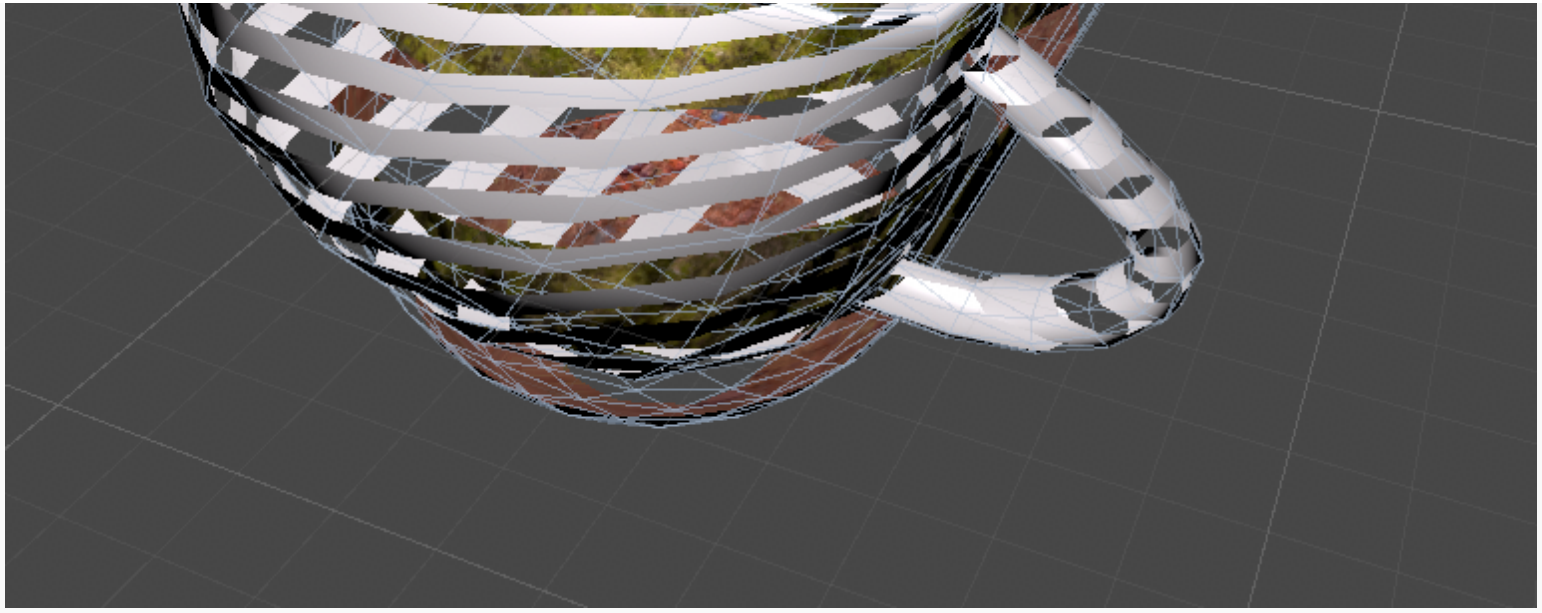

This view is a bit confusing, so I'll break it down. There are two objects here. The grayscale teapot is in the front with thin slices. Behind it (and partially inside) is a pill-shaped thing. The thin light blue/gray lines show the shape of the object being passed to the shader (called a "mesh"). It's up to the shader to figure out which pixels need to be what color to make the 3D object appear on the 2D screen. Sadly, if you haven't written a shader, you have no reference for how much vector math is involved in this process.

In the afternoon class, we got a second, more in-depth tour of the C6: the 96-node, $6 million graphics cluster and VR room. If you can't picture how 24 projectors can project onto 6 walls, this picture might help:

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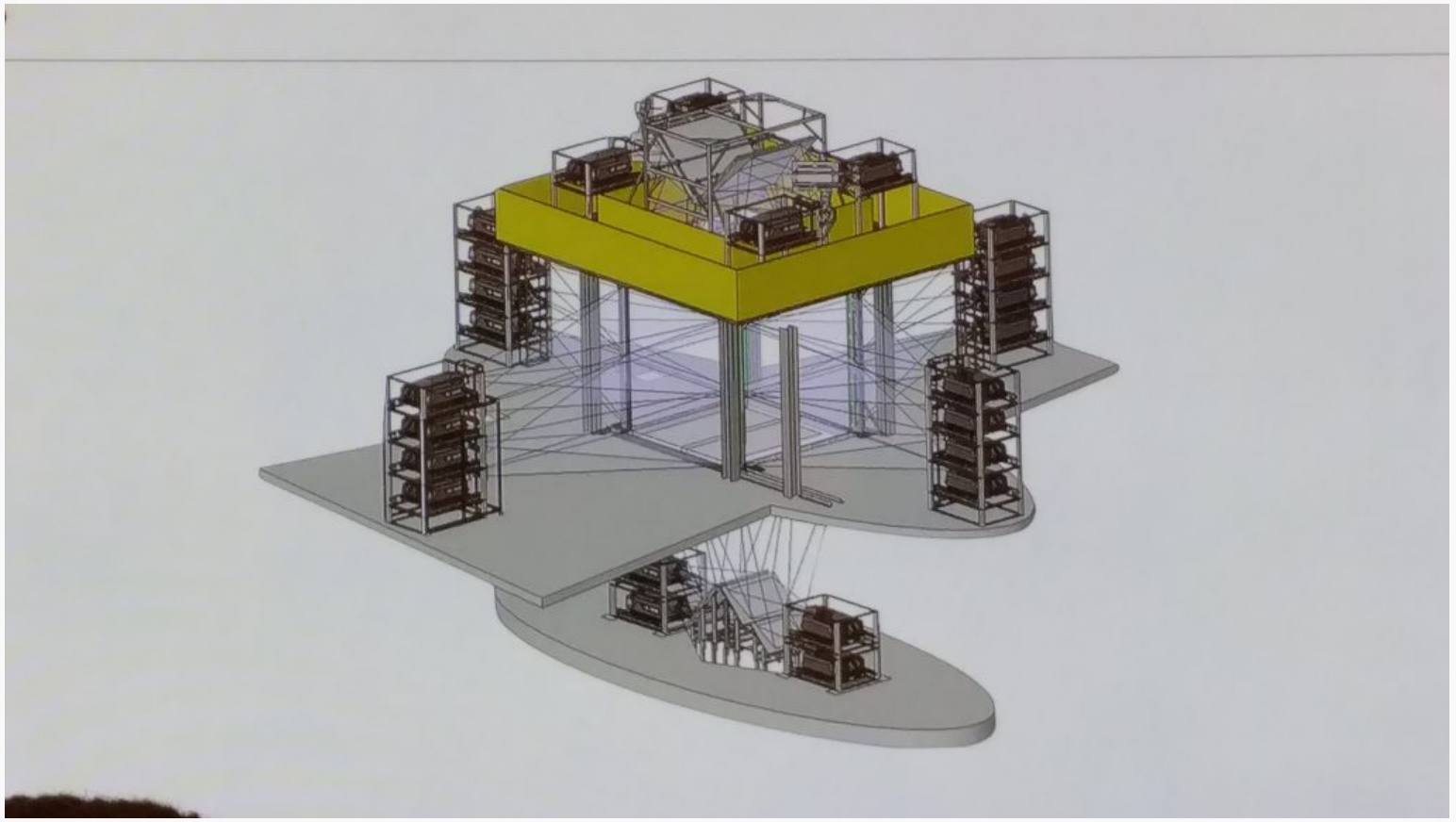

We made a small test scene in Unity using the plugin that allows the C6 master node to distribute the rendering and simulation to all 96 nodes. It was really neat to make a virtual world and then stand in it, all within in a few minutes (but I'm used to the concept from standard commodity VR systems)!

Tuesday, June 26

Today we talked about how to review a paper and practiced as a group. The DataViz group (well, we're a pair now) wrote the "research area paragraph" which describes what our goal is and also how to measure success. It's funny to me that we didn't even know what we were researching until week 5. I understand that

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research is about solving open-ended problems, but this is more like getting to the airport before you know where you're buying tickets to. It's fundamentally different than that standard research uncertainty that Dr. Winer is so proud that we don't have much experience with yet.

Speaking of Dr. Winer, (the associate director at VRAC and one of the two professors in charge of us,) we heard his career story over lunch. I'm still not used to hearing these full-career stories. It's interesting how thoroughly different lives can be. I know that isn't very profound, but that's alright.

Wednesday, June 27

Today my deeper dive group worked on a mathematically-complex shader that doesn't lend itself well to a succinct explanation. The end effect is that you can make an object appear to be cut along any arbitrary plane without actually affecting the geometry of the object. I also messed around a bit with some shaders that render 2D and 3D fractals and I rendered these:

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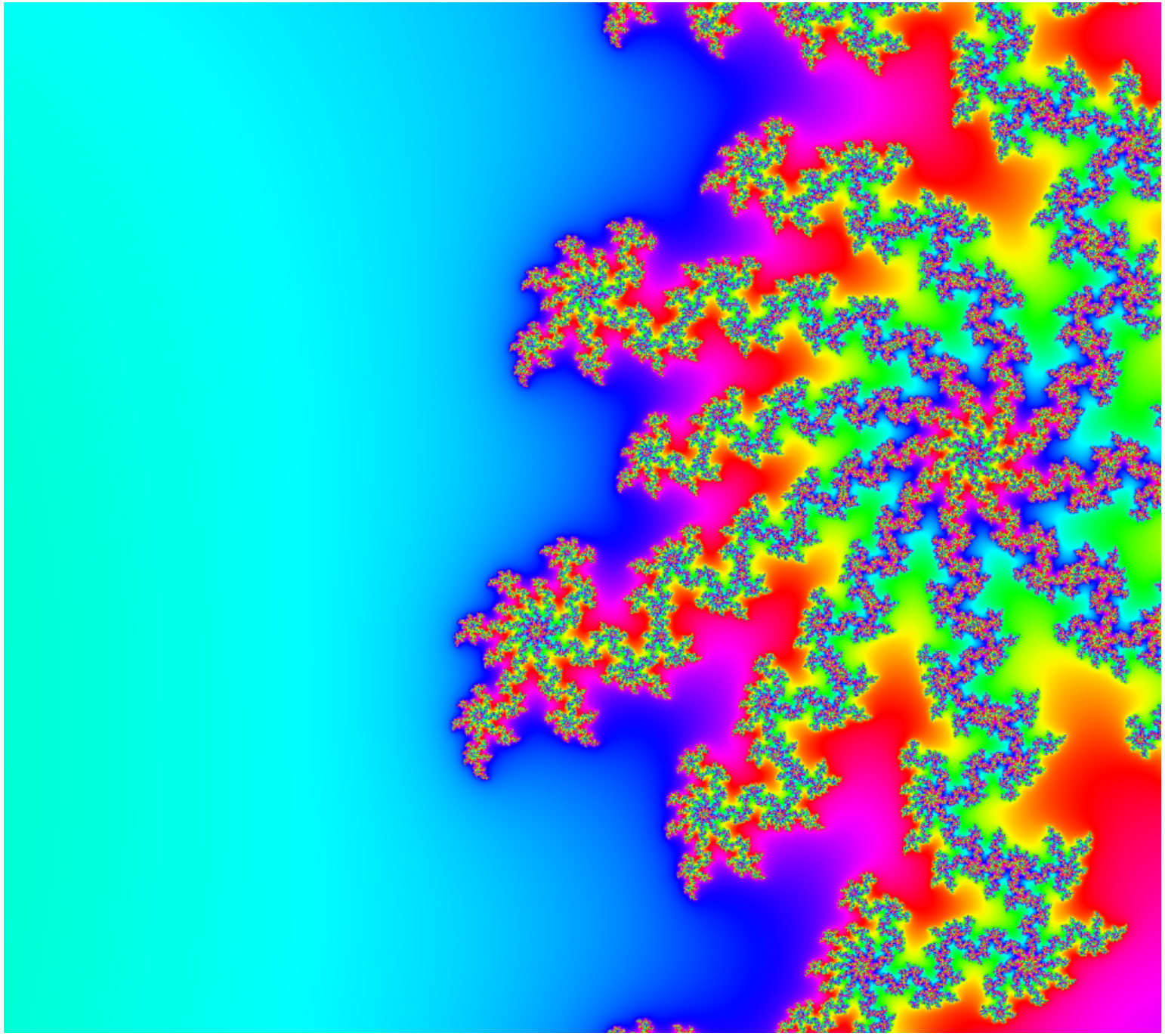

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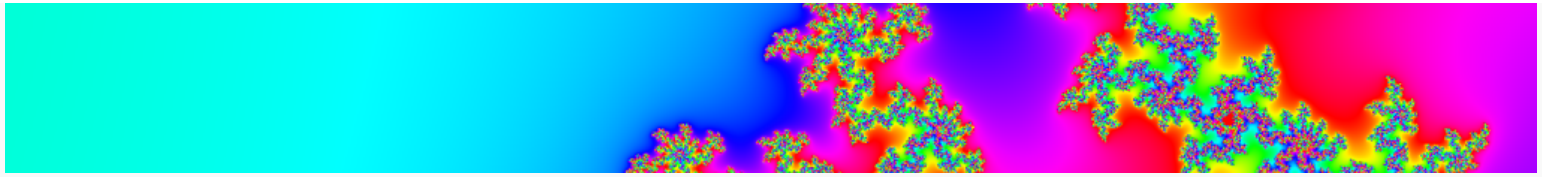
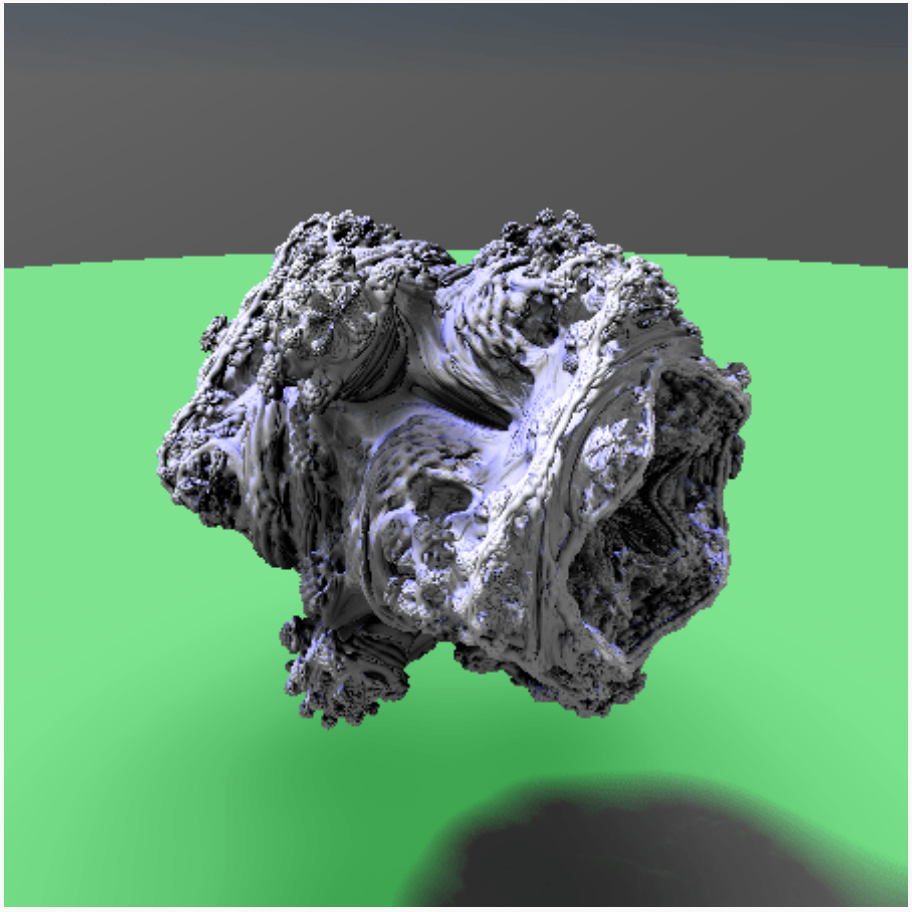


I wrote this one myself from the reference material on the Wikipedia page for the Mandelbrot set.



Most of the code came from someone else online, but I edited it to run in another language in another environment. This is the Mandelbulb fractal.

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I had a bad headache for most of the day. Made a few calls, including talking to my parents for the last time before my mom heads to Geneva for an internship at the World Health Organization. My dad will leave once his Visa gets approved; he's staying behind to attend the wedding that I'm flying back for a weekend to sing at. I took a nap after the calls, but I just woke up nauseous instead of feeling better. I read a bit while I waited for that to clear (and it mostly did) before going to bed again for the night.

REU|2018 Leave a reply

Week 4: all things must end

June 27, 2018 kulp

Thursday, June 21

We had a very nice presentation about interviews. I think the most important thing I learned is that 50% of the interviewer's opinion is already formed in the first 30-60 seconds since meeting, and after 2 minutes it's very unlikely they'll changed their mind. I find that pretty disappointing. In that amount of time, you're being judged on purely social things like small talk, eye contact, hand shakes, etc. instead of the skills you'll actually bring to the table (including social skills). It's a shame that human psychology puts more emphasis on those first-time skills that are seldom useful in the types of jobs I'm interested in.

Friday, June 22

Someone was let go today. They were the only person in both my research group and my deeper dive group. I can see why it happened, but I'm not sure that I agree that it did. The premise is that being consistently late is disruptive, but having them gone completely seems like it would be worse. I'm not worried about getting work done without them, so maybe not. I guess we'll see.

Anyway, we threw a quick goodbye party in the evening before they left in the morning.

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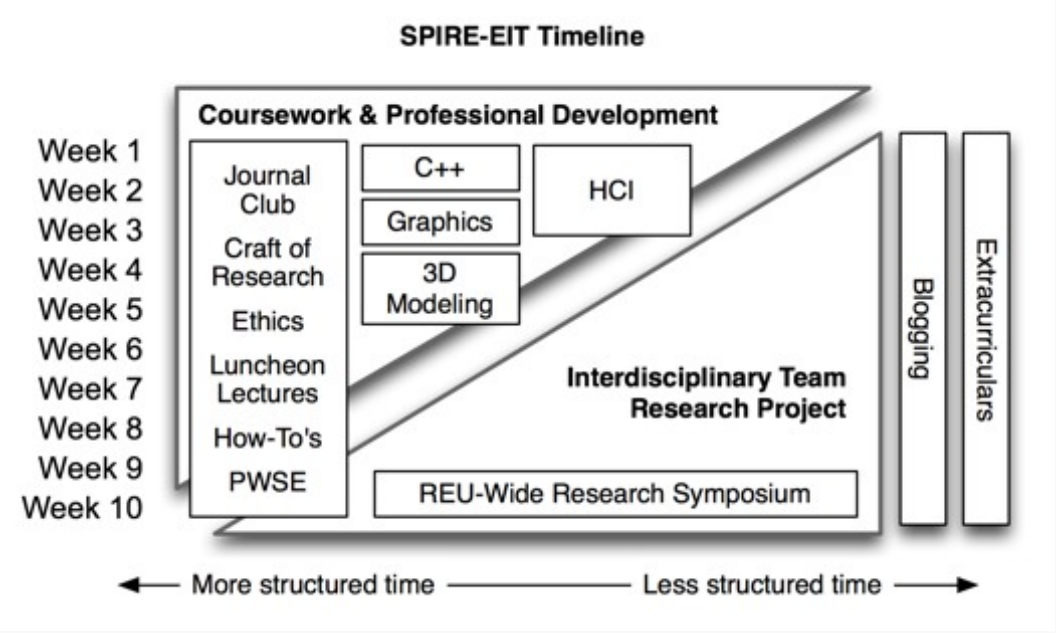
Week 4: Getting into a work rhythm

June 21, 2018 kulp

I think it's been long enough that naming posts by day isn't important anymore. This post is for the first half of week 4. Our extra scheduled events are on the decline, as planned:



This shift in scheduling means that there's a lot less to talk about besides our actual (currently unpublished) work, and our "deeper dives": small-group trainings on more specific topics. This year, the topics are 3D Printing, Unity Immersive, and Unity Shaders/C6. We'll learn more about these and rank our top choices later.

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On *Monday, June 18* we had our first day of Unity courses. I've tried to teach Unity before, so I understand how difficult it is. I was impressed by the curriculum and I would've loved to have that when I was bumbling through the platform years ago. On the other hand, the "mess around until it makes sense" method that I used has provided me with a very in-depth understanding of how the pieces all fit together, so maybe it's a draw.

Anyway, my experience in 24-hour coding competitions set me up to make a quick game during the instructional time. It's a simple flight simulator where you get points for flying through randomly-placed rings and lose points for touching the ground.

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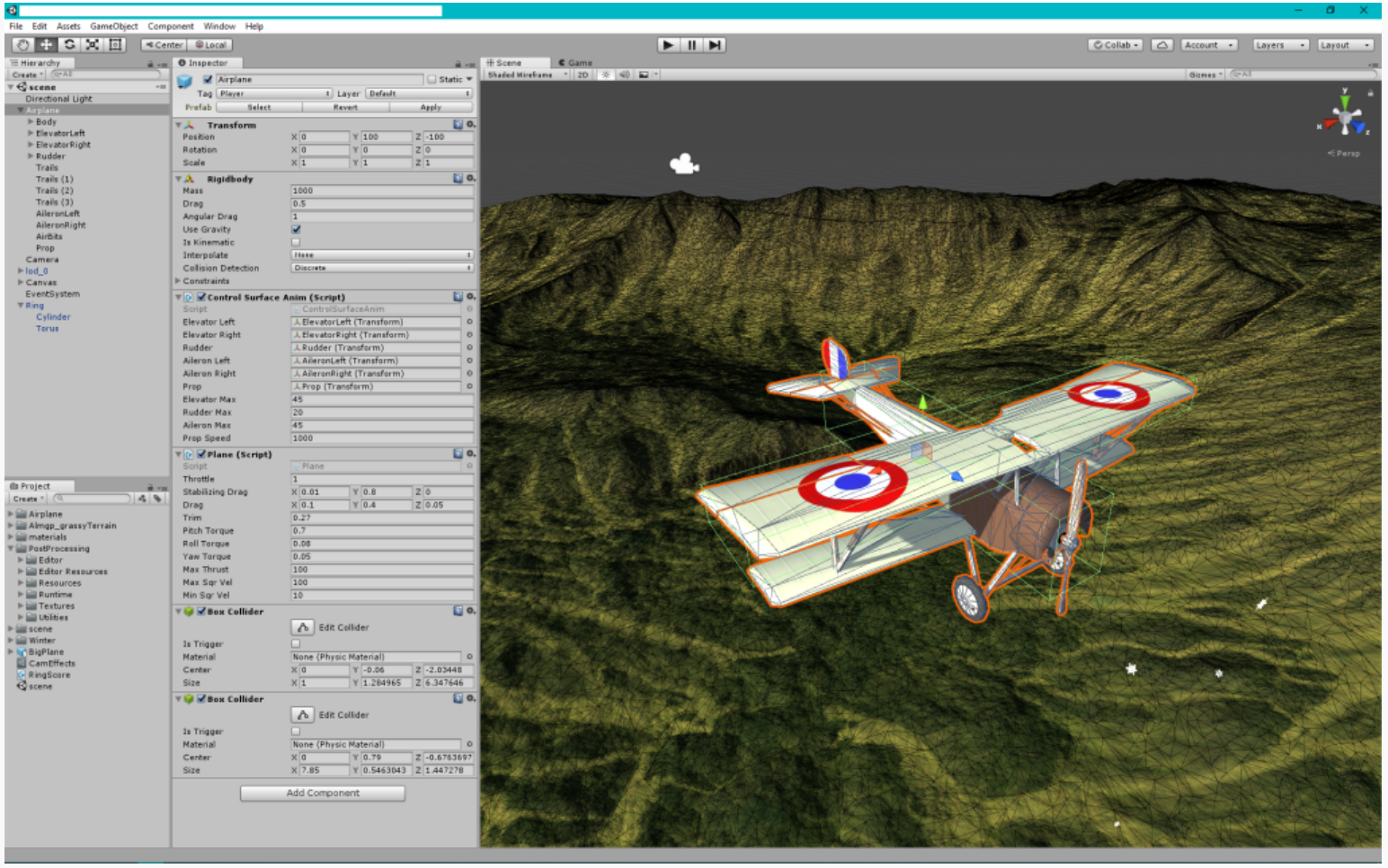

Scene editor

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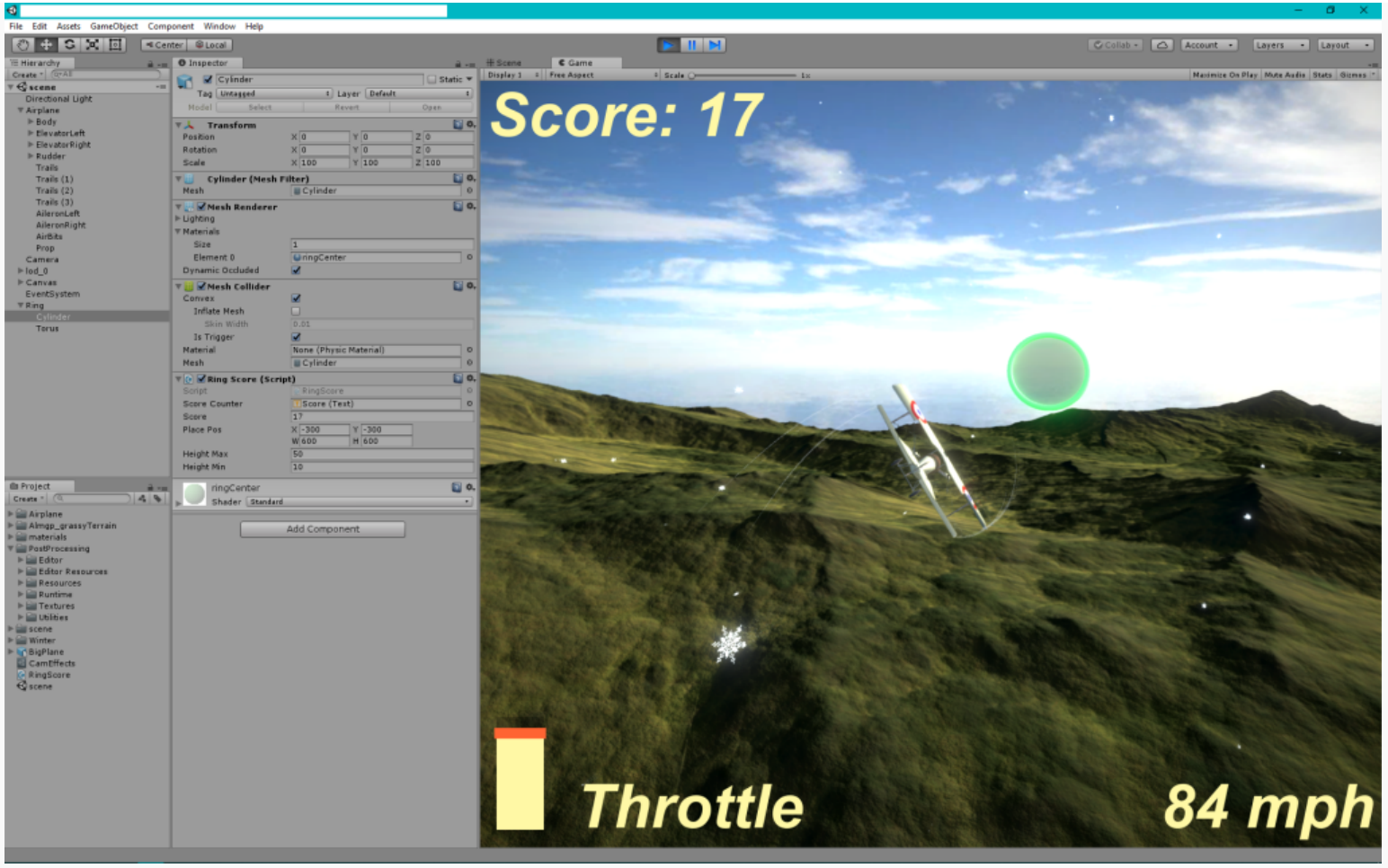

Actual gameplay

Tuesday, June 19

I got invited to another wedding. It'll be a stretch, but I might be able to attend both. One is for a childhood friend and the other is a family friend. One in Oregon and the other in Indiana. They're also a week apart.

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In the evening, my room put on some swing music and we danced a bit in the living room. Aidan can be a lead or a follow, so that worked out nicely. We'll put on a lesson for the whole group at some point, so I guess this was just practice.

Wednesday, June 20

Not the best start to the day. It finally came off.

Neither the bike nor I were damaged (it didn't break; it just wiggled off), but it did make me a few minutes late to work since I had to walk it home and grab Stephan's bike (he usually takes the bus).

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Today we did some more Unity training. I finished up my plane game and walked around helping others.

I'm pretty happy with the pause screen I threw together.

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We heard some more in-depth descriptions of each of the Deeper Dive topics. Unity Immersive focuses on creating a virtual reality experience for Vive, Oculus, or mobile VR with a focus on interaction paradigms. 3D Printing involves learning how printers work and making some common things like math models or small replacement parts. Unity Shaders/C6 is about programming GPUs (graphical processing units) and a $6 million virtual reality room.

I'm in the last one, since I have some experience in the other topics. I'm happy to have the opportunity to learn GPU programming, since it's something that I've been meaning to teach myself for quite a while now. I'm very comfortable with the low-level design and operation of CPUs, but I only know the high-level operation of a GPU. Hopefully it'll be the right environment to get some of my long-standing questions answered!

REU|2018 Leave a reply

Weekend 3

June 20, 2018 kulp

Saturday, June 18

I returned to the bike co-op to try to fix the bike issues that have been creeping up. The biggest issue is that the left crank squeaks with every revolution and even wobbles a little. I ended up taking the whole bottom bracket apart and cleaning it out, replacing a shot bearing, and lubricating everything.

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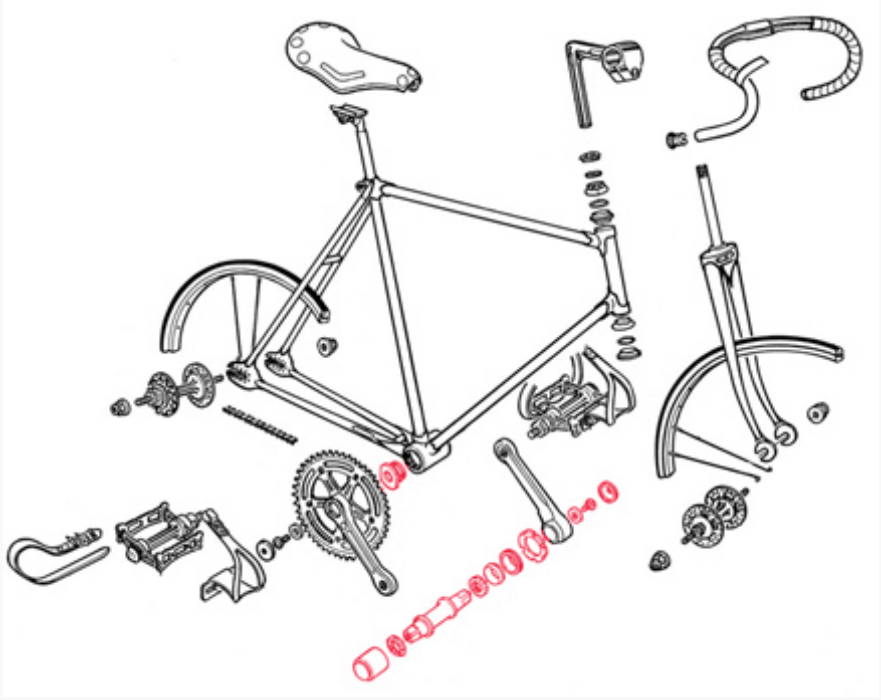

Bottom bracket highlighted in red

It worked for a bit, but the squeak slowly returned and then the wobble with it. I just hope the crank doesn't fall off at a bad time. (Is there a good time?)

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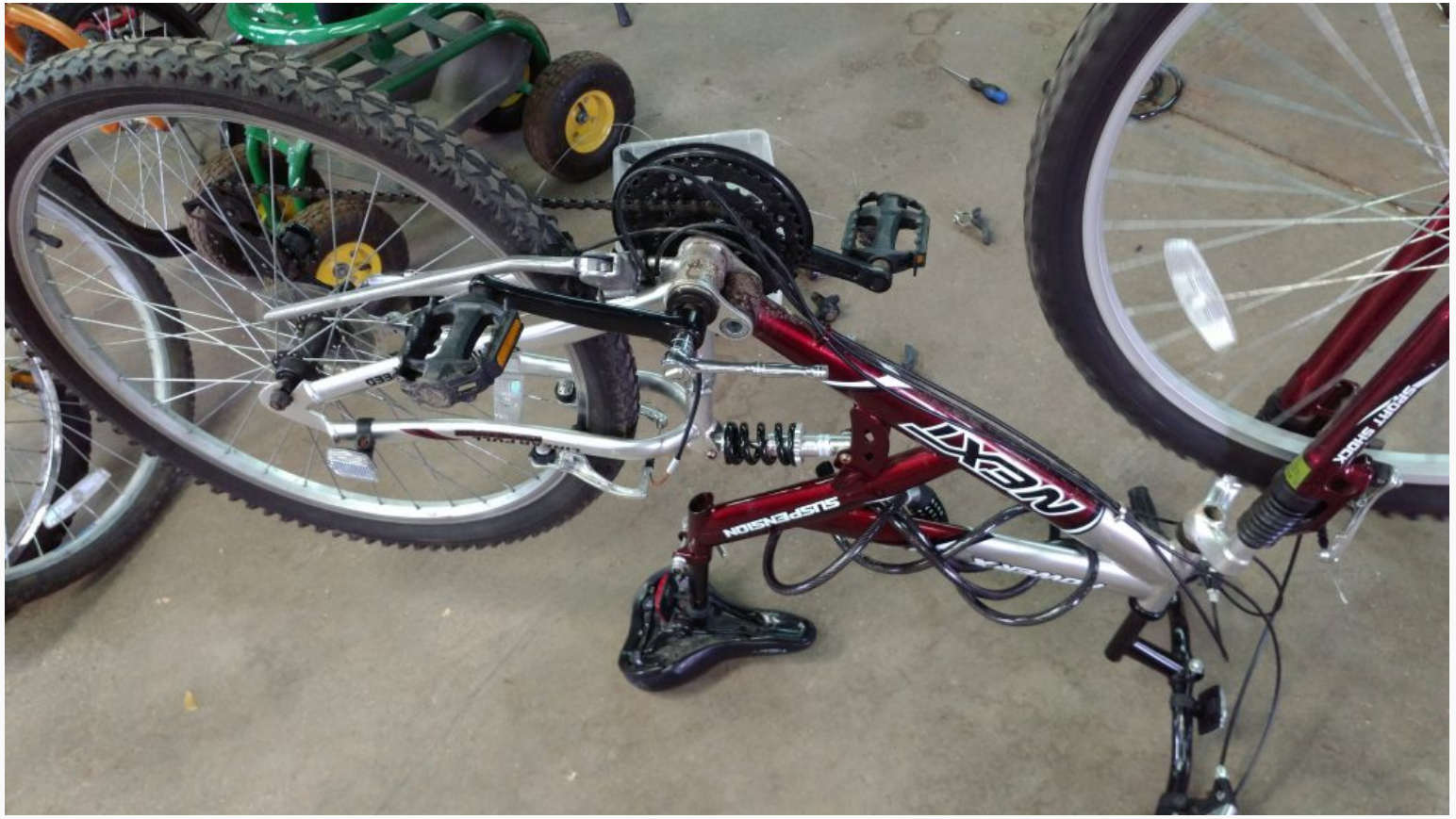

Before pulling it apart

Sunday was pretty normal. My roommates didn't leave their rooms until at least noon, so I had a nice morning without them.

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Day 17, 18

June 20, 2018 kulp

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Thursday, June 14

Rain again! It was quite the thunderstorm. Woke me up several times, hours before my alarm. It was also alarmingly dark. I checked the time on two devices just to make sure. I learned my lesson last time it rained, so I preemptively wore flip-flops and took the bus.

At VRAC we attended a very interesting lecture on decision trees, Bayesian Networks, and AI explainability.

Friday, June 15

Today was mostly Maya. I learned how to do some basic manipulations and how to import standard assets. I made this beautiful scene to demonstrate some of those things that I learned:

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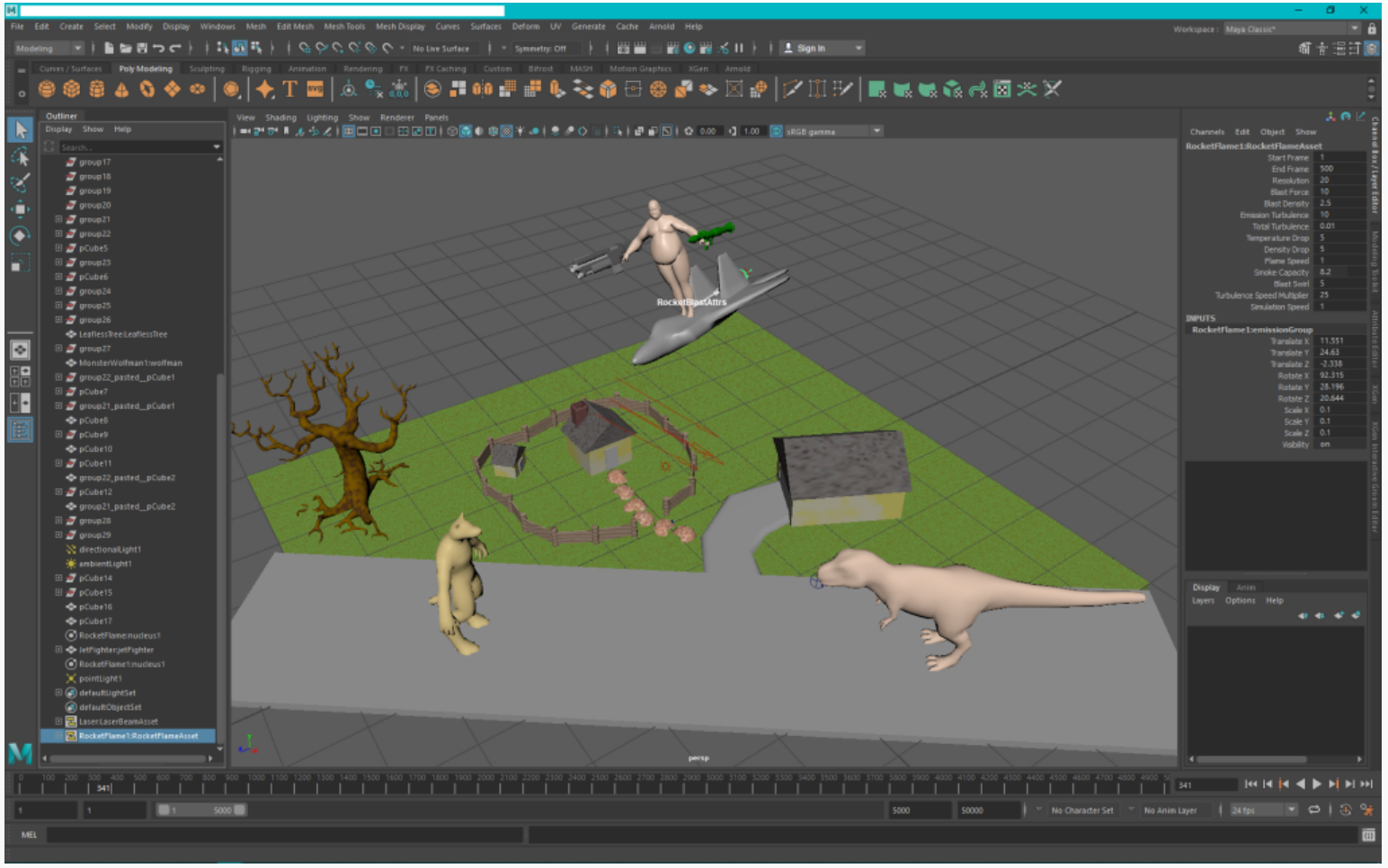

I made the buildings, fence, ground, and paths. The rest was just placing objects that others made and changing their materials.

Overall, I still prefer Blender to Maya.

REU|2018 Leave a reply

Day 14-16

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June 17, 2018 kulp

Monday, June 11 through Wednesday, June 13

Alright, I'm combining a few days since I'm behind and the number of scheduled events is decreasing (and therefore the number of things to write about, also).

On Monday, I had a good time going for a bike ride by myself. I asked a few other people, but nobody else had time or wanted to. It turned into an opportunity to explore and think, but also to notice that my bike still has some issues to work out on Saturday when a small group will return to the bike co-op. Specifically, the left crank arm doesn't sit right in the bottom bracket and causes some squeaking and wiggling.

On Tuesday, I (and the rest of the DataViz team) doubled down on finding papers for the literature review. It's a very slow process and very much a crap shoot. We had a brief meeting with our grad student toward the end of the day in which we learned that our ill-defined project may get a goal soon! We were also reminded that our professor will be leaving for a few weeks to take a train across Siberia to see the World Cup (but another professor will stand in during that time to provide guidance). After the work day was over, I rock climbed for a bit. Biking sounded fun, but I might have overdone it yesterday. Also if the crank falls off, I would want to be on or near campus.

We had another small group meeting on Wednesday. Next up: finish up the lit review with an exhaustive search to see if anyone else is doing research into the impact of data visualizations on marginalized individuals' decision making (and no, we're alone). We were also assigned the next set of tasks: write a few paragraphs about the problem area and literature review. We still don't know exactly what our project is (or its use-case), but that's coming by Friday.

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Weekend 2

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June 15, 2018 kulp

Days 12 and 13

Saturday, June 9

Ropes course. It was several hours of physical activity and group dynamics. I don't think we'd had any opportunities for full-group teamwork, since we mostly work in our groups of 3. Finally having all 12 working on the same thing was exciting. Lots of fun, but I was also happy when I could be alone again.

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Climbing those nets on the left was exciting!

Sunday, June 10

We left for the bike co-op in the afternoon and built ourselves some bikes. Mine didn't take too much work: the brakes weren't tensioned properly, the kickstand needed to be replaced, and the chain was rusty. I discovered later that the crank is a bit loose, but I don't think it'll be an issue. I'll take it back to the co-op next weekend anyway, though.

Interesting space to work in

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REU|2018 Leave a reply

Day 11

June 13, 2018 kulp

Friday, June 8

Next up: visualize more than one question. A “select all that apply” question is basically just a set of yes/no questions. I have a way to visualize that now, but what about a set of multiple choice questions? After some brainstorming, this ended up as the rough goal:

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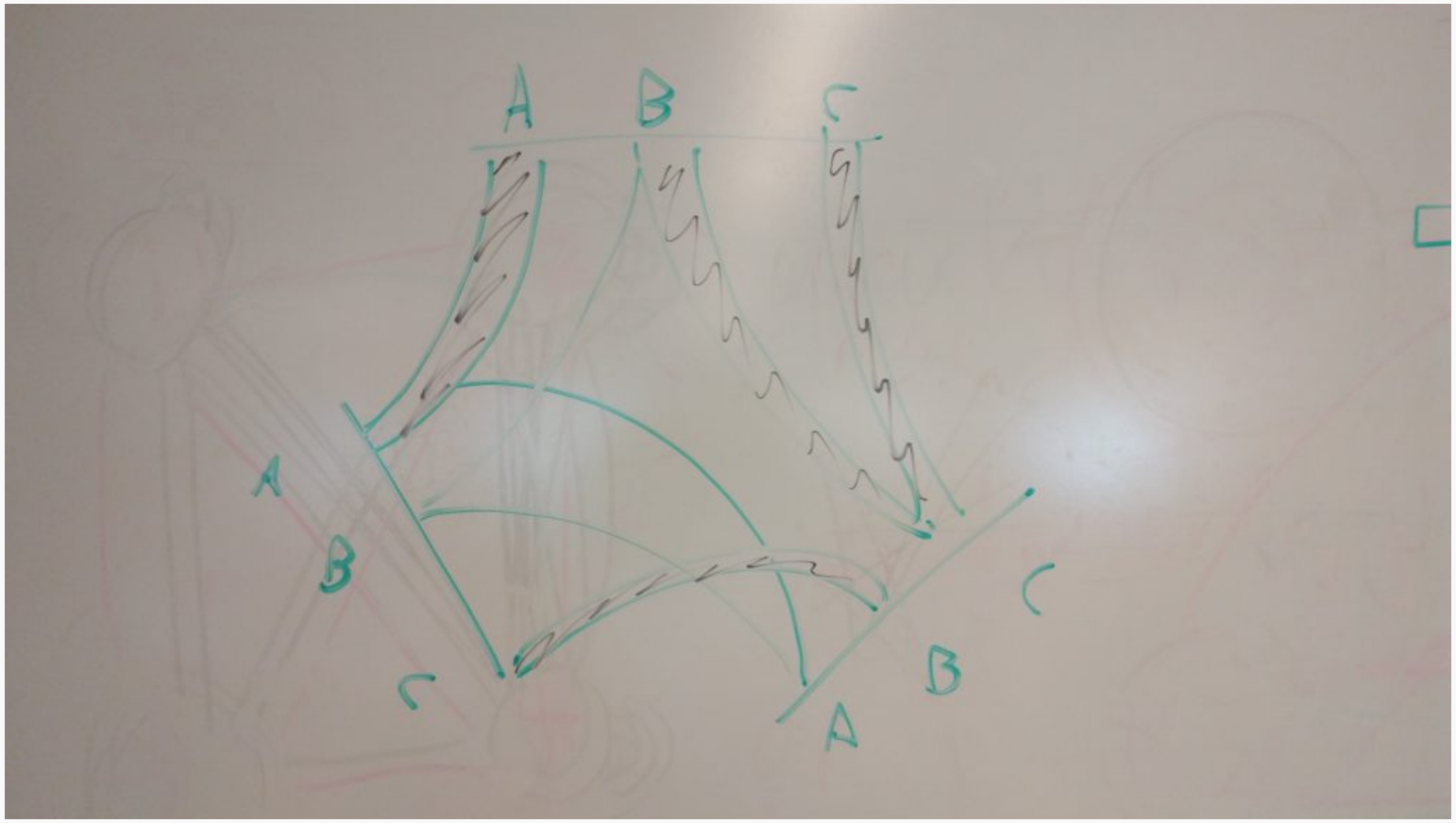

I spent the next few hours working on this new challenge. It requires a new Shadron program for graphics and a new C++ program for reading and counting data. It turns out that counting second degree relationships is kind of a pain! I ended up needing 5 nested for-loops to count through each pair of nodes: question A, option A, question B, option B, and survey responder. “Options” are the choices that the participant has (T/F, abc, abcdef, etc.) for each question. In that picture above, options are grouped into questions by each straight line. At this point I hadn’t settled on how to show the counts of how many people chose each single option, but you can see how many people chose each pair of options by the thickness of the line connecting them.

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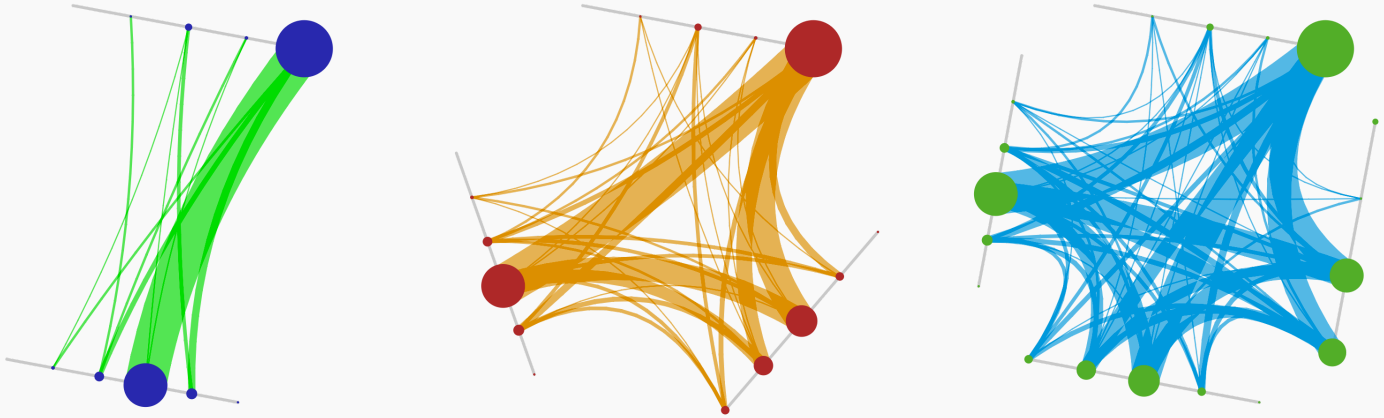
I ended up working way past 5:00 and nearly to midnight since I was having so much fun putting this together. Here's the final product comparing 2 questions, then another comparing 3 and then 4 questions:



As I was writing this program, it felt natural to represent each individual option as a circle of varying diameter like in the last visualization. As always, everything is adjustable. I didn't go through the trouble to label everything (since this is just another proof-of-concept), but it still came from real survey data. Just like the last one, this is designed for data scientists and not the public.

REU|2018 Leave a reply

Day 10

June 13, 2018 kulp

Thursday, June 7

Quite a work day! I already had the visualization code done for the first project, but all that it does is render shapes of variable size at variable locations (actually pretty much everything is variable). It still has to get

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those numbers from somewhere. I wrote a companion program in C++ to sift through the data and count the primary and secondary data relationships to plug into the visualizer. Even after that, though, it's just an image. To turn it into a useful tool for a data scientist, it needs labeling. I added text by hand to say what each node represents and to label each node and edge with how many responses it represents. Here's the result:

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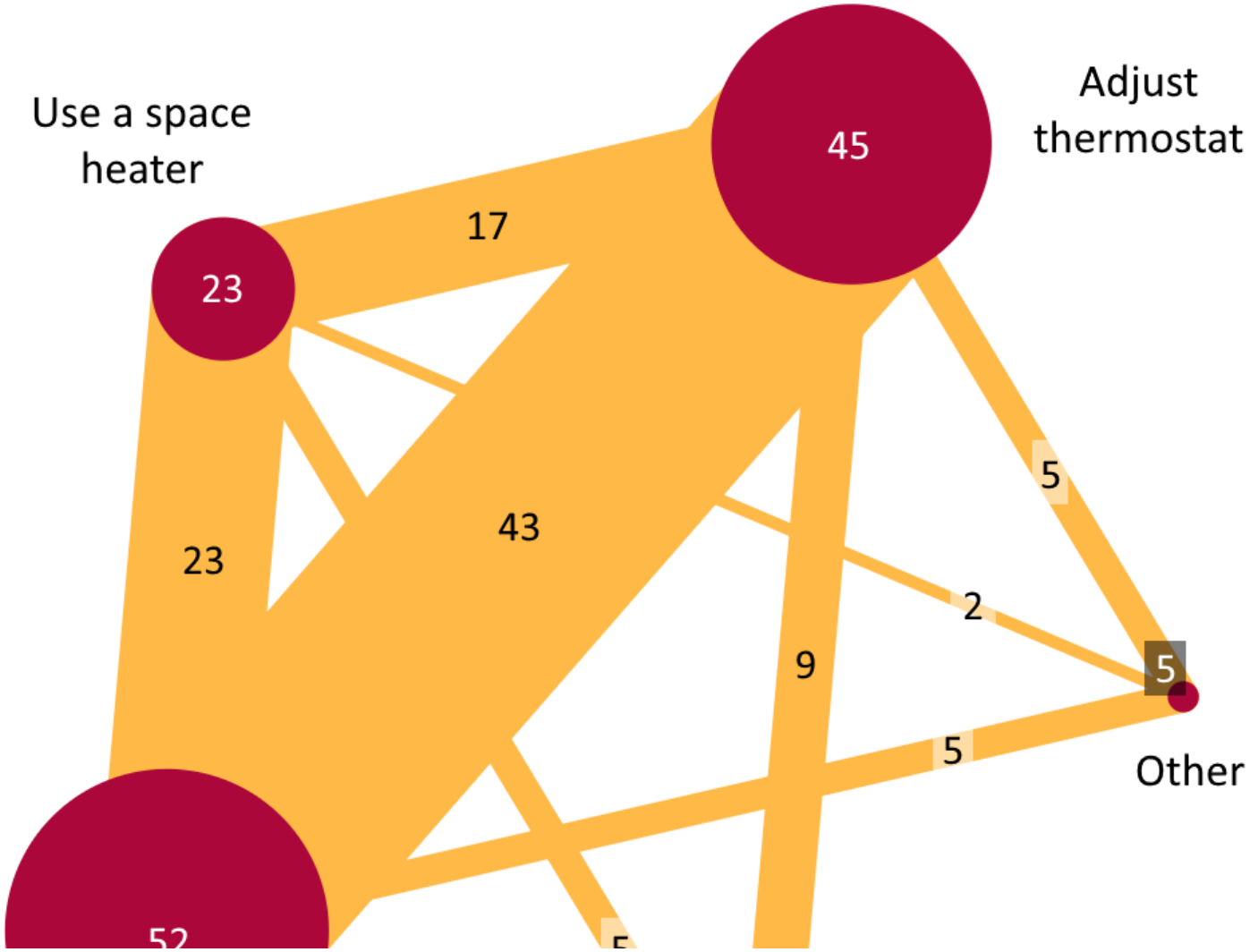
Actions taken to keep the house comfortable during the winter



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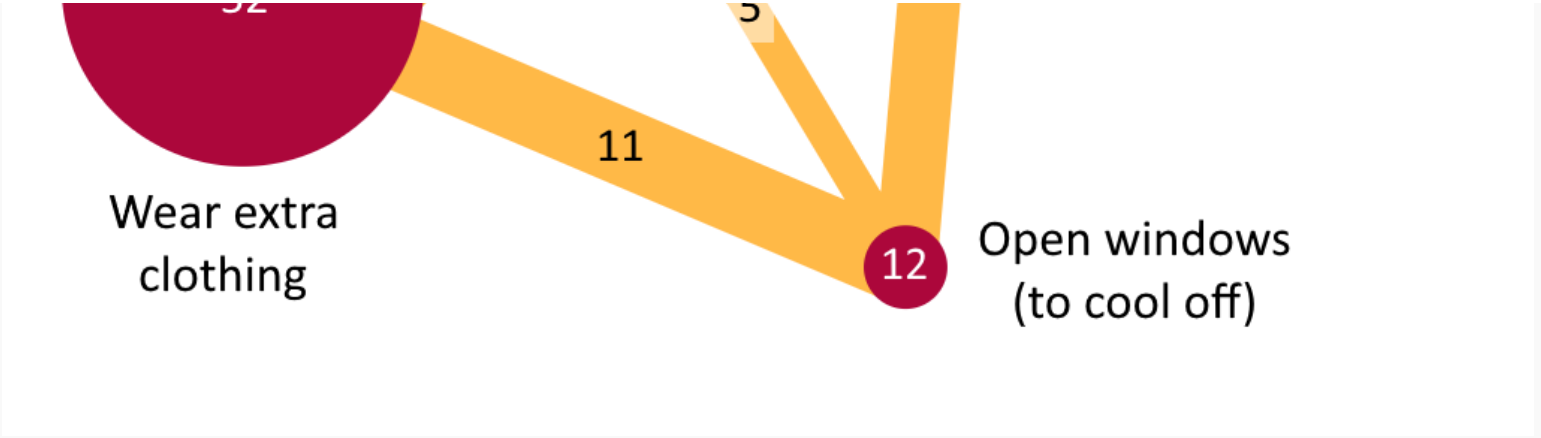
PDFCROWD



I put much more effort into the graphics than the text…

It's important to note that this isn't designed for public consumption. The use-case here is for researchers to explore a set of data to look for trends or surprising relationships. (For example, everyone who uses a space heater also wears extra clothing in the winter.) As such, this visualization needs to be easy to use, and not necessarily easy to learn.

I worked with Ilan a bit while evaluating different options for presentation methods and behind-the-scenes organization, so thank you for that!

Also someone pulled the fire alarm a few hours after we learned where to evacuate to. Suspicious…

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Evidently not a drill

REU|2018 Leave a reply

HCI: Some unfortunate choices

June 11, 2018 kulp

We have an assignment to find 3 things with bad interfaces or interactions. Here is what I found:

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iPad and Apple Pencil

It looks like an expensive picketing sign

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To start, $100 is too much for a stylus. After you pay that much, you expect some fabulous integration and quality. I can't speak to the quality, but the integration is lacking. To charge the Pencil, you remove the cap and plug it in. This leaves the cap loose and easy to lose and provides the perfect lever arm to torque the plug off the end of the Pencil. If you want to use the iPad while the pencil is charging, you're forced to hold it awkwardly so you don't damage its port or the attached Pencil, and you must stay cognizant of the expensive rod sticking out of the bottom whenever you pick it up or put it down. Also, since the iPad only has one port, you can't charge the iPad while charging the Pencil. To sum it up, Apple forces their users to change how they use their devices (in a negative way) to accommodate an add-on that's supposed to improve the experience.

Bus door

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Why are the instructions repeated 3 times?

It was funny to see how many people walked up to this door, stood for a moment, only then read the sign, and then flailed a bit until it opened. I also saw people who watched the door, saw that it didn't open, then walked to the front of the bus instead. In general, the second door on a bus opens when the driver wants it to, but here the driver had to give instructions to people to supplement the sub-par labeling. You shouldn't need a sign on a door, and if you do, it should at least be larger! The warning signs covering public spaces probably exacerbate the issue, since we're used to seeing "CAUTION" and skipping the details (including how to open the door, in this case).

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Bob Pelletier’s Website

I'm back!!!!!!!!

Hi!!!!!!! Sorry I haven't updated this sate in three months,but my computer crashed,due to a virus. Well,I'll update the site weekly from now on.... Subscribe to my new listbot e-mail list!

Join our mailing list!
Enter your email address below, then click the 'Join List' button:

Powered by ListBot

Long ago,in a Galaxy far,far, away.....BOB'S LINKS!

The American Film Institue: A reaaly nice site that has everythin you ever wanted to know about movies and film preservation
Flake: This is a site about classic cereal boxes from the 50's 60's & 70's
Living Island : This is a website devoted to the work of sid and Marty Krofft
The Official Garfield Website: A site devoted to Garfield
NBC.COM: The NBC Website
The Official Star Wars Website: STAR WARS!!!!!!!!!! Need I say more?
ABC Online: The ABC network website
Animation World Network: A fantastic site for fans of all forms of animation
Toon Magazine: The Website of an animation magazine.
Boxoffice: A Fantastic site that informs you about upcoming and recent films
Disney's future : A fantastic Disney site
Movie Trailers: MOVIE TRAILERS!!!!!!!!
Give the rabbit some Trix: A website devoted to finnally fufilling the Trix rabbit's greatest dream.
The Black Cauldron: A cool animated feature.
List of upcoming Animated Features: This site (to use a rather over-used slang expression) is DA BOMB!!!!!!!!!!!!!!!!!!!!!!!!!
Bob's public domain video: My other site!
Godzilla: A great site devoted to one of the screens greatest monsters.
Deet's 70's page: A really cool 70's page!
Yahoo!: Face it . If your online,you'll probably have to visit this site at least once today. Just use this link,get the work done and get back to using the other links on my site.
Aint it cool news: This is THE best site on the net! This site tells you about all the new films that are still in production. From "Freddy V.S. Jason" to "Inspector Gagdet" this site tells you everything.
Like Aint it cool news,but in my opinion,better: Just like AICN but better because it tells you about more films
Marsupilami: A site about the Little-known Disney Character.
Draw Cartoons: Teaches you how to draw spme cartoons and has fantastic links,one which I use on this site
Mother Goose & Grimm: A cool site about the popular Comic strip character
A cartoon site : Features almost every cartoon you would ever want to know about. Even features live action shows like H.R. Puffnstuff.
PBS: Who knew that there could actually be education to be found in a website that was created by me?
Comedy Central: Home of really old episodes of SNL.....and then of course..theres South Park too.
Ultimatetv: TV listings and things
All in the Family: A site devoted to what my posssibly be one of the best Sitcoms of all time. Think about it,almot every dad in a sitcom made after All in the Family owes something to Archie Bunker.
Rubiks: Makers of the Rubiks cube! Download the fantastic Screensaver before leaving!
Disney-U.S.: The United states Disney site.
Disney-Denmark: The Denmark Disney site.
Disney-France: The France Disney site
Disney-Germany: The Germany disney site.
Disney-Italy: The Italy Disney site
Disney-Japan: The Japan Disney site
Disney-netherlands: The Netherlands Disney site
Disney-Spain: The Spain Disney site

How many decades old is this?

http://bobpelletier.tripod.com/index-2.html

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Setting aside the visuals, this website seems to just be a list of links to websites of interest. With that in mind, I would expect the links to be easy to look through so you can find the website you're looking for. Sadly, this is not the case. They aren't even alphabetized. I do appreciate the difference in color between the link and the description, and I like that the text is all legible (many websites from this time had tiled or animated backgrounds that made the text hard to read). A visitor could use the browser's "find" feature to search through the document for the topics they're looking for, but I think that represents a failure in web design; many users don't know that browsers can search pages, and would be stuck scrolling through the long list.

REU|2018 **2** Replies

Day 8, 9

June 8, 2018 kulp

I'm lumping these together since my Tuesday post ended up pretty short.

Tuesday, June 5

We started with the "Craft of Research" class, where we addressed the reasons behind literature reviews and the questions behind our research. We talked about the ISU Institutional Review Board (and IRBs in general).

We attended a lunch lecture about biofuels and globalization by Mark Wright. He discussed the history of biofuels, world-wide energy sources, and predictions for the future. We asked about his work here at ISU and learned about the ongoing energy and biofuel projects and ISU's leading position in the global biofuel research space.

Next, we (DataViz) had a meeting with our professor (Dr. Dorneich) and graduate student (Jacklin) about our lit review progress and our next mini task: make some visualizations to help researchers understand the

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results of a survey on household energy use. This will take some careful thinking, since we're coming up with something new. We spent the rest of the day working on that, getting our pictures taken, blogging, eating, and sleeping.

Wednesday, June 6

Another C++ class in the morning. It gave me an opportunity to help people and some extra time to wake up.

We (DataViz) had a short meeting with Jacklin where we clarified some objectives and got feedback on a visualization we've been brainstorming on the whiteboard. After that, I started programming a way to create that visualization.

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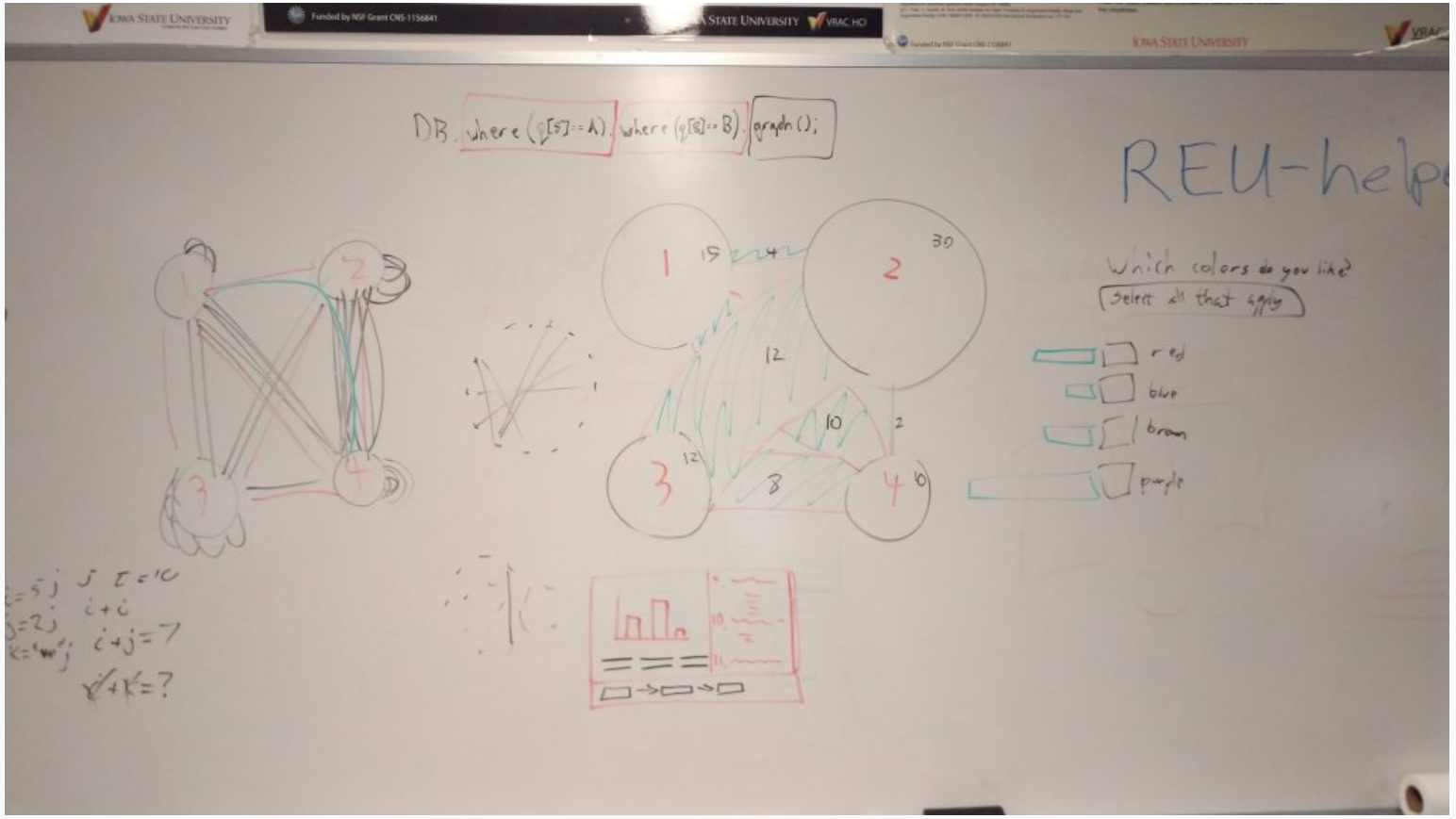

Some brainstorming

We (REU) left for lunch and made a stop at the administrative building to pick up our first paychecks. After making it back to the lab, I blogged and worked some more on the DataViz code.

To briefly summarize what we've been doing, I'll give an example. Let's say you give out a survey asking people to "select all that apply" from a short list. How do you visualize the results? If you make a simple bar chart showing the frequency of each option, you lose all of the relational data; you can no longer tell if , for example, most people who chose option 1 also chose option 3, but people who chose option 2 tend to only select that one. We set out to (partially) solve that problem with a graph (in the mathematical sense, as in

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“graph theory”). Nodes on the graph represent options and have an associated weight that corresponds to how many chose that option. Edges have a weight that represents the number of responses that chose **both** of the options it connects. The weight is visualized as a diameter or thickness.

We had part two of the C++ lesson next, which I hurried through so I could keep working on the DataViz code. I finished the part that uses numbers to create a picture, but it doesn’t find those numbers from the data. I need a second program that finds the prevalence of each option and pair so that I can use those numbers to make the final figure. Here’s an example with a 6-part “select all that apply” question using random numbers instead of real data, since I don’t have a way to sift through real data yet:

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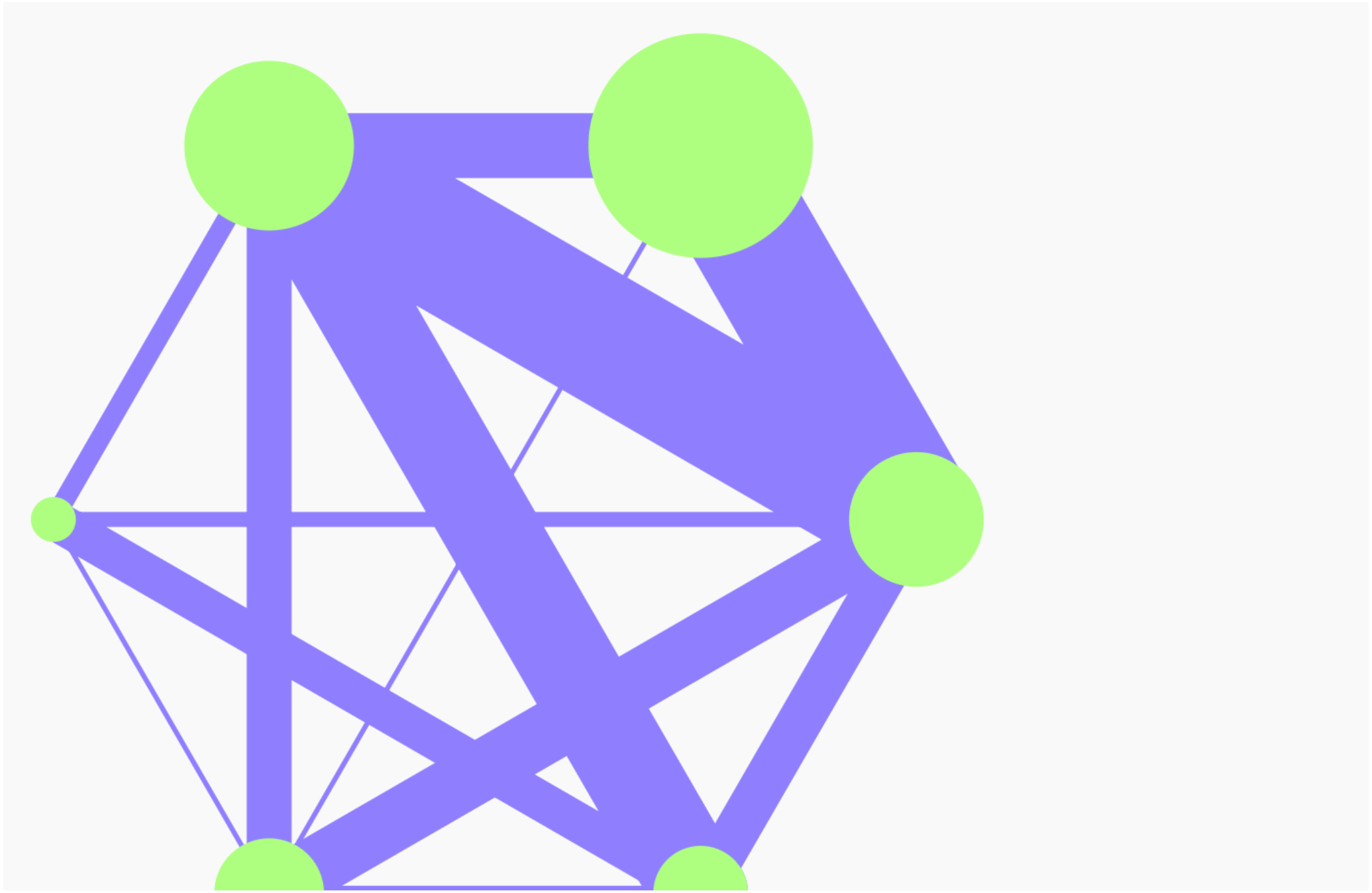

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Created with Shadron. Not because it's the best tool for the job, but it's good enough and I've wanted to learn it for a while anyway.

This lets us quickly see that everyone who selected the one represented in the lower right also selected the one in the upper left (since the widths of the circle and line are equal). We can also see that the one in the lower left was fairly popular, yet uncommon to see at the same time as the one in the upper right. I think my progress on programming this is going quite well and it's nice to have some tangible progress on the overall mini project this week.

Anyway, it rained really hard when we went home today. Lots of lightning and wind and even some hail. I suspect my shoes will be drying for a few days. Thankfully, nothing got water damage. I heard a few complaints about pain from the hail, though.

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It was a little wet outside

Once home, I ate, blogged, and played a game (Jamestown) with all of my roommates.

REU|2018 Leave a reply

Day 7

June 7, 2018 kulp

Monday, June 4

We started the day with a short C++ lesson (all review for me), then 3 hours of unscheduled time. I used that time to catch up on my blog and find papers for the DataViz (my research group focusing on data visualization) literature review. We went out for lunch and found a university food truck standing in for a closed dining center.

When we returned, I went to continue blogging when I saw that all of my posts disappeared! I asked my coworkers if they had seen anything like it, but I seem to be alone. I sent an email to the VRAC IT team and got a prompt and confused reply.

We had a second C++ class (another review session) and then I did some more DataViz lit review. I went to the apartment, called home, and played some games with Ahmed and Stephan before doing a bit of school work and going to bed.

REU|2018 Leave a reply

Weekend 1

June 5, 2018 kulp

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Days 5 and 6

Saturday, June 2

I woke up, cooked a box pancake (so cheap!), did some homework (my home institution isn't done with the term yet) and did some more blogging.

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Pancake

We went to Summerfest, walked around long enough to see that we aren't the target audience, and wandered Ames/campus a bit on the way to the gym. Nearly everybody was there playing Volleyball, Badminton, Basketball, and eventually I pulled Inshira and Stephan off to boulder.

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Beer in the fenced area in the back, and kids activities like face painting and stickers to the right.

We headed back the the apartment briefly before heading upstairs to the girls' room for some card games including Uno, Spot It, Gavitt's Stock Exchange, Egyptian Rat Screw, BS, and Spoons. We went to bed late, but the group only shrank from 11 to 8 (out of 12) by the end.

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Not the best picture, but you get the idea

Sunday, June 3

Typical Sunday morning followed by… lots of ants! We improvised a solution with cleaning supplies, and several hours later it's still looking like they're gone (update: new scouts…). I did a bit more school work, then went to the water park with Aidan, Kira, Victoria, Ohana, and Leila. We had a lot of fun on the slides,

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lazy river, and diving board. The weather was a bad mix of cold when wet and hot when dry, but it didn't take away from the fun.

We got back, made food, then went upstairs for another game night. Not quite as good of a turnout as last time, but still over half of us. We had a great time and went to bed at a much more reasonable time for work in the morning.

REU|2018 Leave a reply

Day 4

June 5, 2018 kulp

Friday, June 1

We started the day by taking Myers-Briggs tests and then discussing the unscientific qualities of that categorization system. After looking through some research papers, we concluded that it isn't a good idea to base any decisions on the results. After that discussion, we heard a presentation by an engineering librarian about what resources the campus library has to offer, how to search for published papers, and who to ask for help.

We took a VRAC technology tour next, which really means trying on some headsets and looking around/demoing the C6. I'm pretty familiar with where the industry is right now in terms of head-mounted displays, so the headsets just offered me the fun of watching other people's first times. The C6, a nearly-unique room-size virtual reality device, might've brought up more questions than it answered. The idea is that you stand in a 10x10x10 ft. box that feels like it's made of glass. Each side has several projectors to put a 3D image on that wall with the perspective dynamically changed according to the position the head tracking system reports. The largest limitation is that it can only create the illusion for one person at a time.

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If your head isn’t tracked, the perspectives are wrong (proportional to your distance from the head that is tracked) and it breaks your sense of presence in the virtual environment. I’m curious about a few of the design decisions, because it seems like the whole setup could be built for a tiny fraction of the price we heard, but it might just be a product of how old it is.

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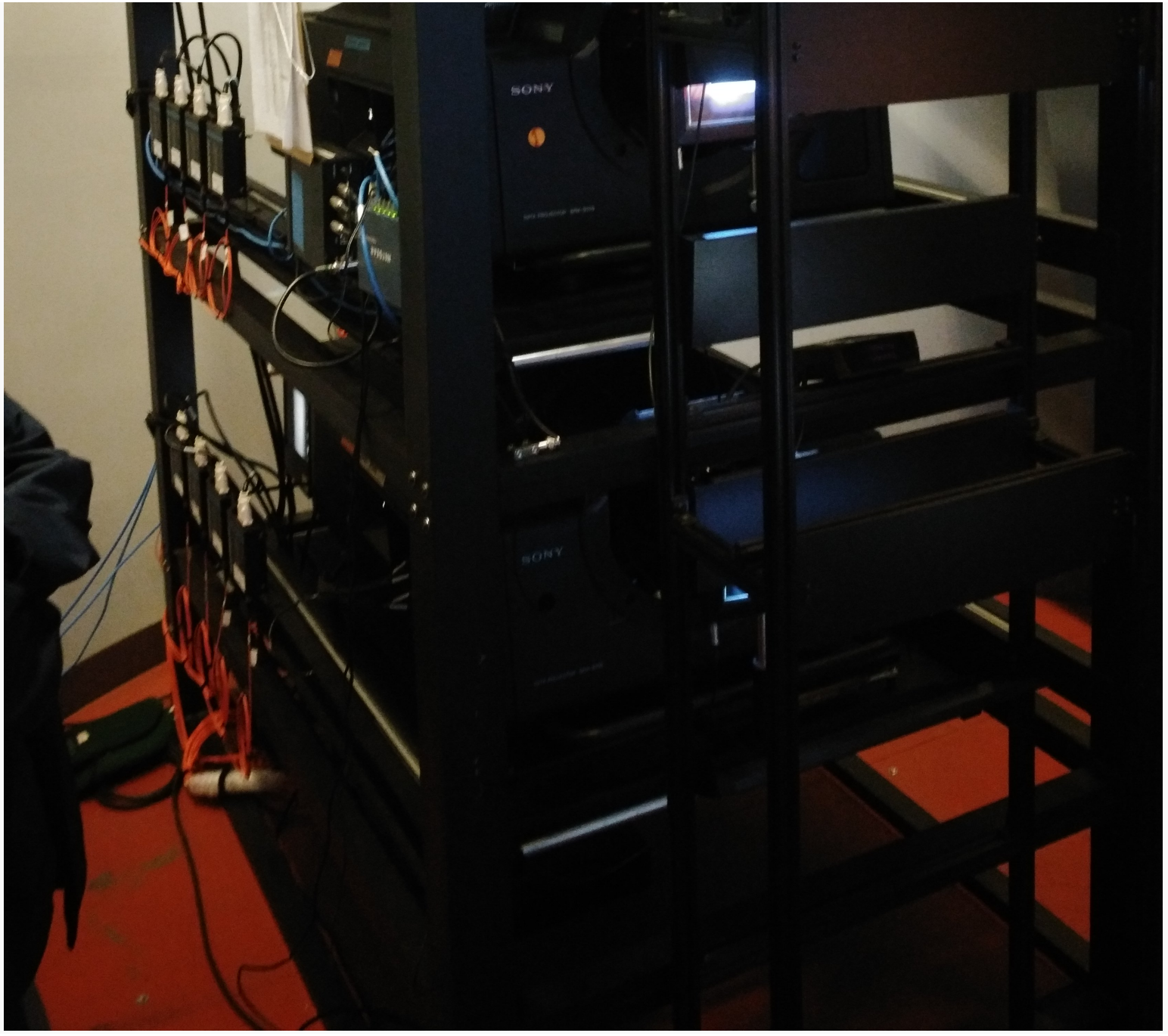

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A stack of very expensive projectors

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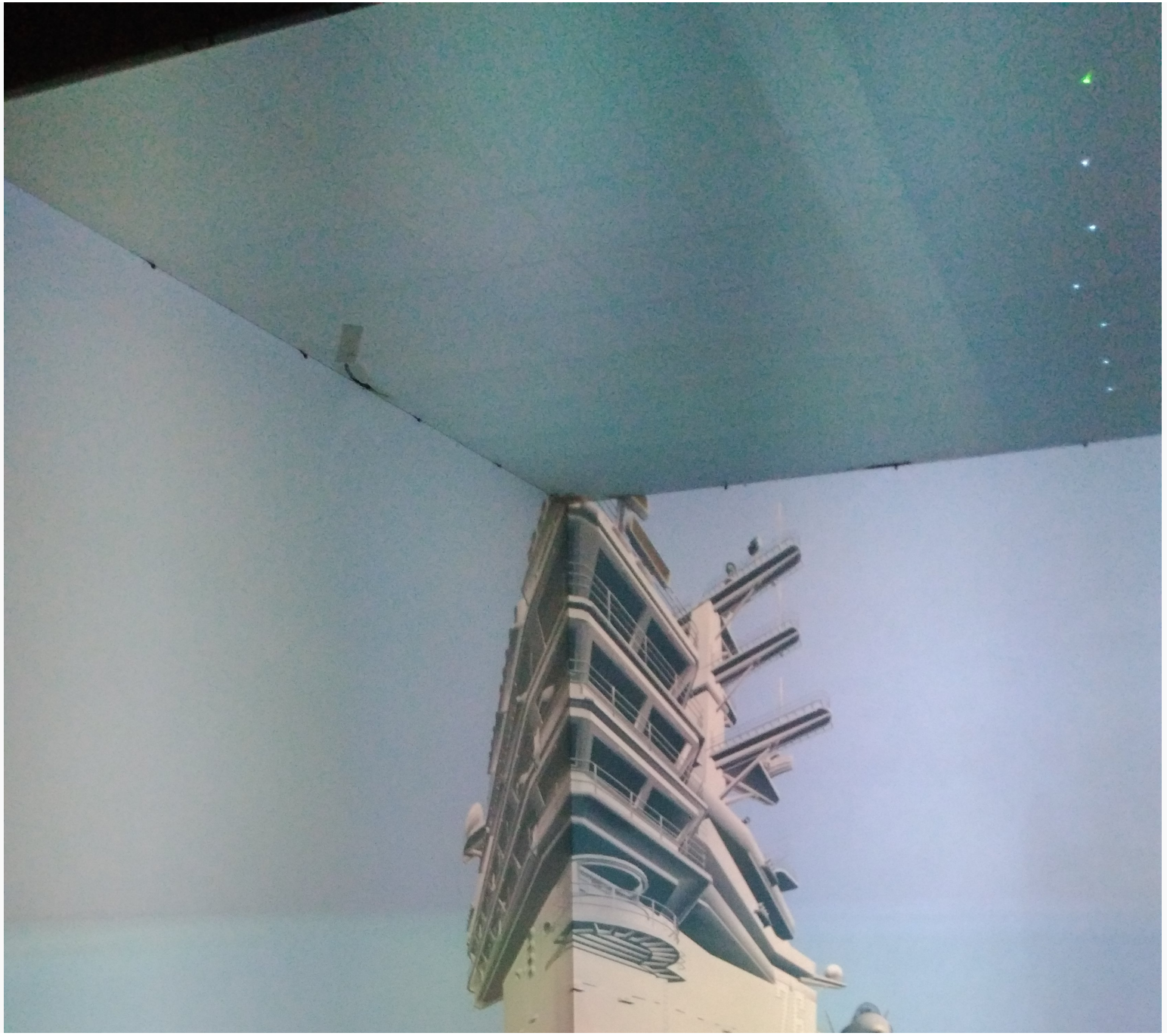

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An example of the perspective distortion when you aren't tracked

We went to a high-calorie sports bar for lunch, blogged for half an hour, then went to ARG (Affinity Research Group) training. This recurring class focuses on providing tools for diverse groups to work well together. At the end of that, we got into our research groups and discussed milestones and meeting times.

We went to one of the gyms on campus, got properly registered, and toured the facility. I hung around at the end and bouldered with Aidan for a little while before heading to the apartment and calling home.

This is the smaller wall. I'll visit the other gym some time. It has a much larger bouldering wall.

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REU|2018 Leave a reply

Day 3

June 5, 2018 kulp

Thursday, May 31

We got our internet usernames (NetIDs) for logging into integrated services like email and WordPress. It took a while to get everyone through the process; there were quite a few hiccups and the VRAC IT team

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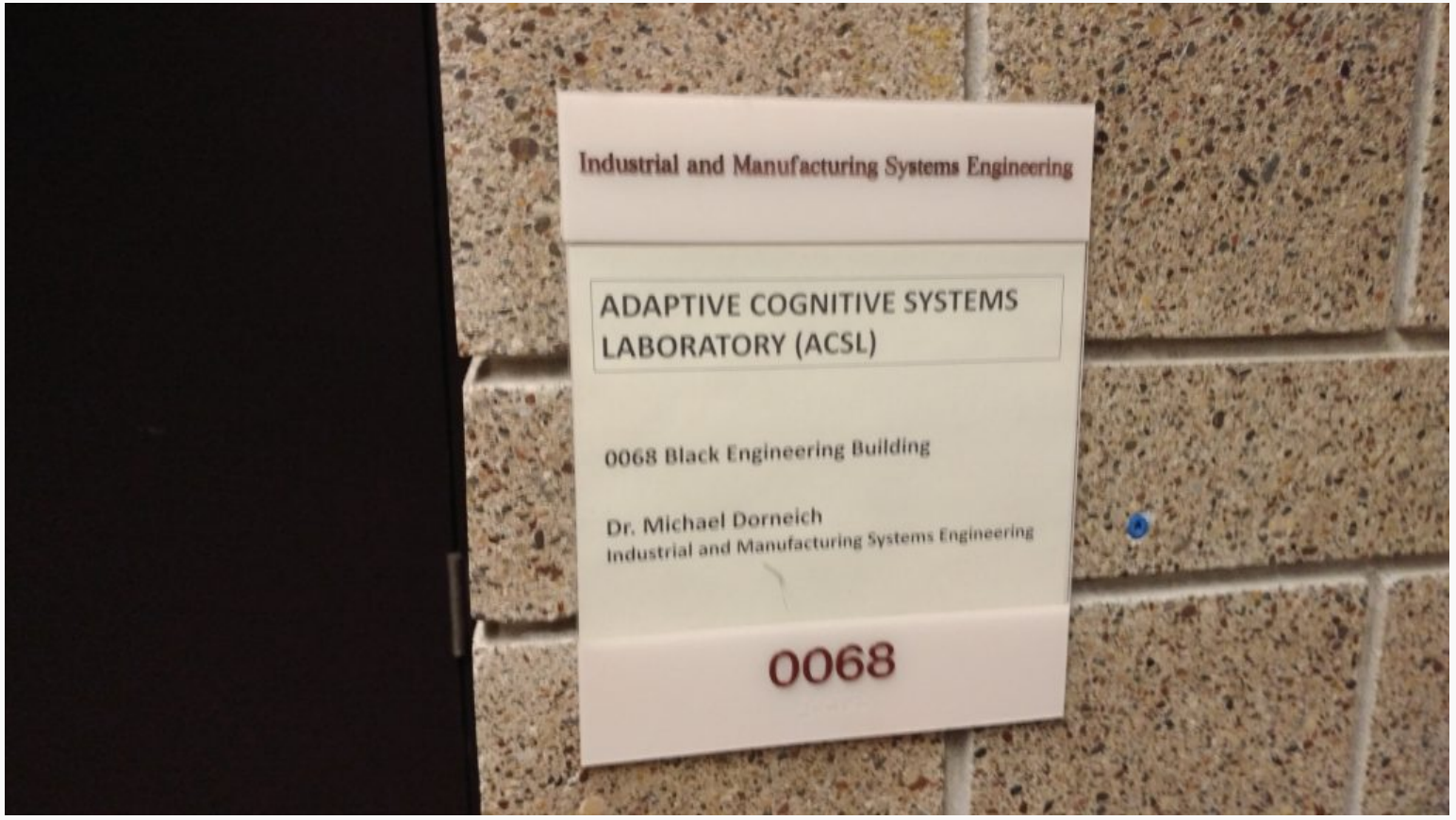
stood by to help.

We heard short presentations from each of the four research leads explaining our projects for the next 10 weeks. I think we were all a bit disappointed to hear that, despite being in the VRAC, none of our projects inherently include VR, and two of them (Biosensors and TIMELI) simply cannot.

After group presentations, the 12 of us split off into our research groups and followed our mentors to their respective labs. Victoria, Ohana, and I went to Black Engineering with Dr. Dorneich and Jacklin Stonewall (a graduate student in his lab). I was pleased to see flight sim hardware and a Vive tracking system set up, but we also might not use any of it.



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Sorry for the blur. Taken in a hurry.

There's a Vive lighthouse just out of frame on top of the aluminum structure

The biggest takeaway I got from the DataViz small group meeting is that this project is incredibly squishy. We're looking to solve a vague problem, then evaluate the result with vague metrics. It's up to us to do a literature review and define the goal and the metrics, but that seems to be the norm in the research world. It's a very big change from the standard school project method, where you're handed specific requirements and have no say in what you're doing (only how).

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Next, we went out to lunch with those same small research groups. We went to a burrito place and talked a little more about our backgrounds. After eating, we returned to the lab and took a survey before starting our first class: Craft of Research.

We learned some basics about why, what, who, etc. in the research world. As an exercise, we answered some questions about our individual projects, like who will benefit from it or what readers will already know before reading the paper.
So far, no signs of homesickness.

REU|2018 Leave a reply

Day 2

June 5, 2018 kulp

Wednesday, May 30

We started the day at 8am and walked to Howe Hall, where the VRAC is. We ate a modest breakfast, signed some paperwork, and did a pre-program assessment, all in the conference room. After all that (about 2 hours), we toured Howe Hall.

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This is the enclosure for the C6, which I'll get to tour later

After leaving Howe Hall, we took a campus tour and got our ID cards along the way. We talked about the places where we can eat and then went to West Street Deli for sandwiches.

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After lunch, we returned to Howe for more activities and orientation. At around 3:30, we headed back to the apartments on our own and had some trouble finding building 43 among the maze. Once inside, I filled out the Inventory and Condition form, which involved testing everything that moves and checking every surface for damage.

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This is the worst of it. Near the corner in the living room

Once that was out of the way, I called friends and family at home (one is at another REU, actually!) and then talked to Stephan extensively about number theory until bed time.

REU|2018 Leave a reply

Day 1

June 5, 2018 kulp

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Tuesday, May 29

The first thing I noticed when I stepped out of the airport was the humidity. I'm from Corvallis, Oregon, and humidity is never a concern. I grew up in Iowa, so the weather was a harsh reminder of a part of the Midwest I don't miss!

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We loaded our luggage into the two SUVs waiting for us in the parking lot and drove up to Ames. Angelica, our driver, is a graduate student at the VRAC. She pointed out landmarks like the gold dome of the state capitol building in Des Moines.

Our first stop on campus was the administrative building for Frederiksen Court. We signed some paperwork, got our keys, and walked over to our respective apartment buildings.

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