SAMPOLL

**SamPoll began as a Facebook-sponsored design project on the democratic process during the turbulent events following the 2016 election.**

The 2016 election was a rapid series of controversies and controversial topics. Everyone was mad: Republicans at party leadership or at Trump voters, Trump voters at anything Trump denounced, Democrats at party leadership and anything Bernie denounced – it was a time of zero compromise. Even with all these strong emotions, however, it seemed nobody wanted to look at the political system for help. In fact, election participation dropped yet again this year, bringing the assumption that “people don’t vote because they don’t care” into scrutiny.

So why aren’t people utilizing the system’s resources to engage in political activity? We started by looked at increasing grassroots activism, but after a few weeks of research we began to realize that a bigger issue was that activists have a hard time being heard. The political system is outdated. Communication between representatives and constituents is monstrously slow relative to how the rest of the world communicates in the Age of Information, causing it to stagnate. In fact, today the average representative falsely gauges constituent support for any policy by around 20 percent, according to a Stanford study. In most cases, this is significant enough to tip the scales in favor of policies that otherwise would not have become implemented.

After interviewing and testing a paper prototype with Doug Kim from the Belmont City Council and Alejandro from the Berkeley City Council, we concluded that the communication gap was real, and large enough to warrant seeking a proper solution. We continued to iterate and test over the course of the six-month project, ultimately moving off of a Facebook-based feature to make coordination between representatives and constituents easier.

The end service was a separate social media platform for neighborhoods that keeps users informed of news closer to home, generally focusing around less controversial, relevant issues. SamPolls are mixed in with normal posts, news links, and event posts that highlighted issues surrounding a community. Representatives are allowed to make the polls and contact constituents directly over messenger, helping their constituents stay active and informed.

**Our tests on ten users showed responses to SamPolls topping three times the traditional 9.5% poll national response rate.**

Of course, SamPolls are not nearly as specific, but answer very simple questions to help representatives get a pulse on constituent opinion while formulating their own positions on issues. It takes half the time of a normal poll to receive the same percentage of constituent participation in a SamPoll, and takes constituents only a fraction of the time to complete. While ultimately not a viable platform due to the requirement of a high percentage of community downloads, the project revealed a few key insights, the most significant being simplifying the polling questions, cutting out the middleman, and humanizing representatives increases the response rate and overall political inclusion of a community.

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DISASTER RELIEF

**Disaster Relief was designed as a response to the many crises in late 2017 such as Hurricane Harvey and the California fires.**

As of now, volunteers can’t truly come together without going through an organization. When it comes to large quantities of smaller issues, such as a missing dog, a request for a few cans of food, etc. it’s tough for organizations to handle. As such, crowdsourced volunteering tends to be a more effective method; for example, asking your neighbors to borrow a cup of sugar is easier than submitting a request to the Red Cross.

We began by looking at platforms that currently organize in local areas. By taking the of strengths of platforms like NextDoor that had similar functions, we created a platform that allowed for simple collaboration on localized relief efforts. Those in need send out a request, which shows up on the global map to volunteers in their area. The requests are segmented by subject, location, severity, and category, categories split into food requests, repair supplies requests, etc.

During testing, we prioritized testing with users that were less accustomed to modern technology and user interfaces, as we found that a large portion of community volunteers are above the age of 50, presumably those with more time. As a result, we ended up simplifying a good portion of our UI/UX, feeding information to users in bite-sized chunks instead of shortening the process.

**Ultimately, Disaster Relief aims to cut out the middleman and organize results into a filterable, user-friendly database that prioritizes location so volunteers can take tasks closest to them.**

Testing the final prototype revealed that the three most important factors volunteers consider in choosing to take a task is location, category, and severity. Location is the most important consideration as its perceived to most greatly inconvenience the volunteer. Category comes next, as volunteers are more likely to help if they already have an excess of what’s requested. Severity only serves to tip the scales when it comes to the small requests that our platform aimed at helping.

Hog Waste Management

**The systems design was created upon request by Smithfield Foods, which was having a tough time managing hog waste.**

Smithfield is the world’s largest pork producer, and as such, it’s expected for them to have quite a lot of pigs. The more pigs you have in an area, and the faster they grow, the more waste is produced - quite obvious. However, in the past years Smithfield had neglected to pay attention to waste management, only focusing on maximizing their factory farming potential. This resulted in policies that further concentrated and boosted the growth of their livestock, causing huge spikes in the amount of waste their system had to process.

Their current system is a wet management system, which uses liquids in the transfer, treatment, and storage of the waste. The hog excrement is flushed into a central lagoon, where it is mixed in with a few chemicals and then passively processed over time. The processed fluid is then pumped and sprayed over fields as fertilizer. As a result, when it rains, the water fills up the lagoon, and the only way to lower water levels is to spray the fluids over fields as fertilizer. Due to the rain, however, the ground becomes highly saturated and the fertilizer can slide right off and into local surface or ground water reserves, costing Smithfield tens of thousands in fines.

We designed a dry waste management system with the objective being minimized costs. This meant taking contracts, transportation, equipment maintenance, and installation fees into account while doing cost calculations. We settled on using as much from the sites that they already possessed as possible, such as modifying an interior waste scraper system to transport waste longer distances and using it for transportation outside of barns. The crown jewel of the design, however was actually our most expensive piece: an anaerobic biogas digester. We discovered that including a digester would be allow us to convert most of the waste to electricity while treating it. After interviewing a few suppliers and industry experts, we decided it was a viable addition and although a bit pricey, was worth the investment.

**The final system design would reduce waste volume by 20% and eliminate over 90% of toxic runoff.**

The system cost 1.5 million per site for installation, but the energy generated from the biogas digester let the system pay itself over 16 years, even without taking the money saved from lawsuits into account. Unfortunately, Smithfield decided that the risk for installing a dry system was too much, given the large initial investment. They are currently looking to reduce the volume of waste through purifying some of the liquid volume in the excrement.

X Hook

**The X Hook was made for the Feinberg School of Medicine, which wanted to help a patient with a paralyzed arm crochet again.**

The problem here is straightforward: not being able to grip a crochet hook or move it makes positioning the second arm tricky. However, as we dug further we began to find that there were actually a few home remedies for the issue. All of them involved sticking the hook into some kind of object- Styrofoam, wood, a pillow- and manipulating the second hand around the object.

I learned the basics of crocheting and tested out a few of the options. They all worked, but were clunky and uncomfortable, as most solutions required me to rest after only a few minutes. The biggest issue was that the angle of the object was stiff, and thus the hook with it, requiring my second arm to move up and down almost half a foot per stitch.

We ended up taking inspiration from the Xbox controller, which allows the protruding joysticks to move in all directions, while giving it resistance back towards the center. Using a wooden base, we attached a spring with high resistance to the base of a crochet hook as seen above. We then modified the neck and the base to allow for more natural movement, as well as adding a sleeve for fitting multiple sizes of crochet hooks.

**The resulting product, the XHook, was a bit clunky and awkward to use, but with practice the experience became much easier than any of the home remedies.**

Moreover, we were able to mimic the path of a hand crocheting without using any electrical elements, making for a very cheap and easily customizable product. The biggest disadvantage was the time taken to get accustomed to it, as it took us around a week to get ready for the demo. It was a success, and after our final presentation we ended up receiving the best design in class award.