

Design Studio

2016-2017 Annual Report

Jeffrey S. Raikes School of Computer Science and Management





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DESIGN STUDIO PROJECT?



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jsuing@unl.edu

ADVANCING INNOVATION

DESIGN STUDIO HAS ALWAYS SOUGHT TO BE AN INNOVATIVE PROGRAM DEDICATED TO DELIVERING COMPLEX SOLUTIONS TO TOUGH PROBLEMS, ALL WHILE EDUCATING OUR STATE'S GREATEST MINDS.



JEREMY SUING,
SENIOR DESIGN STUDIO PROJECT
MANAGER AND LECTURER



ZACHARY CHRISTENSEN,
ASSISTANT DIRECTOR
OF DESIGN STUDIO

Along the way there have certainly been some changes - the addition of design and model thinking, continued shifts in technologies and frameworks, integration with other capstone programs on campus - but we have worked hard to keep education and innovation at the forefront. As we end another milestone year, it is important to pause, reflect, and learn from the efforts of our partners, students, and staff.

The academic year started with 132 students joining Design Studio to work on this year's portfolio of projects. We partnered with 19 organizations to deliver 24 projects, spanning seven different programming languages and numerous disciplines. Within a few weeks, the students were organized into teams and already making progress. Over the next eight months, the students spent almost 36,000 hours on their projects, completed 144 release meetings, and exchanged over 150,000 Slack messages. The sheer volume of work completed is impressive, and what follows is just a glimpse into the challenges the students faced and the solutions they developed.

But we would be remiss if we did not thank the numerous people who make this possible. This year, Nelnet celebrates their fifth project; Design Studio is successful because companies like Nelnet are willing to repeatedly invest in our program and students. We also welcomed several new sponsors, including WEX Health and Flywheel; when new companies join us, they give our students exciting new opportunities to work on novel problems. Alongside our corporate sponsors, Design Studio is supported by a strong network of local professionals who selflessly give their time to coach and mentor our students. Over the course of the project, the coach fills a crucial role for the team, providing technical support and mentorship, helping our students adjust from the classroom to the real world.

To all of our partners, thank you.

— ZACHARY CHRISTENSEN

ASSISTANT DIRECTOR OF
DESIGN STUDIO



LEGAL AID OF NEBRASKA

They are far and away the best team I've had the pleasure of working with on a project like this as a customer.

—Alex Clark

LEGAL AID OF NEBRASKA PROVIDES LEGAL ADVICE AND REPRESENTATION TO LOW-INCOME NEBRASKANS.

As the state's only statewide civil aid provider, and with almost 300,000 Nebraskans eligible for their services, a significant amount of data is generated. But generating data is far easier than collecting or analyzing it.

Legal Aid of Nebraska's system for business intelligence was inconsistent and labor intensive. Staff were expected to add to an Excel spreadsheet containing information from around 35,000 different cases. This made finding statistics for their annual report a significant undertaking. Design Studio was called upon to develop a tool to quickly recall specific statistics from a mountain of information, and to display those statistics in easily understood graphs.

"They knew what they wanted in the end. They want to be able to create meaningful statistics, and they wanted these statistics to be generated constantly," explains junior Ian Howell. The Design Studio team was also tasked with developing the UI that users would

use to create graphs. "They knew that they wanted to have [data] filters, but they didn't know exactly how to implement them. A lot of the design or UI type things they didn't quite know about."

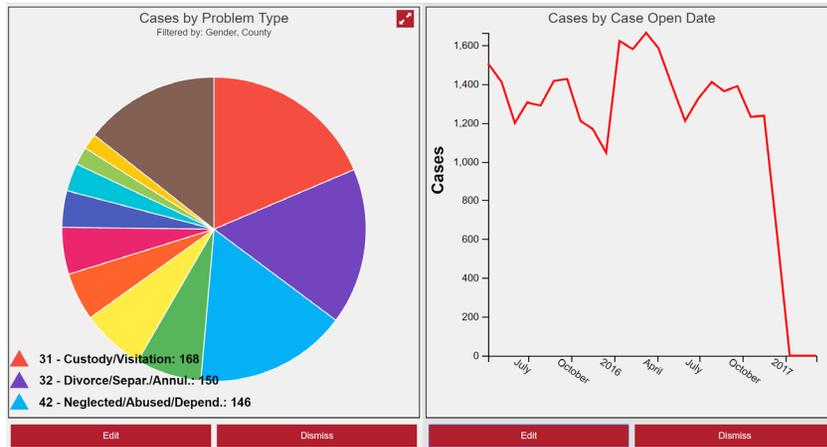
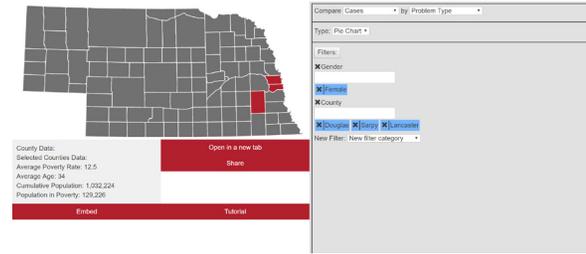
The team rose to the challenge, building an interactive application to be integrated into Legal Aid of Nebraska's website. Users can select filters for the data they want to see, such as number of cases closed in Sarpy County from 1980-1992, and the application returns a graph with the requested information within seconds. For the staff at Legal Aid, this will save countless valuable hours in creating the annual report and in day-to-day operations. Ian says, "We can actually get the same information, if not better and more precise information, and get it much more quickly."

This tool also has profound implications for management decisions within Legal Aid and for those who fund the organization. "They want it to be available first within Legal Aid

so they can analyze themselves," says Ian. "This will also be available to the public so policy leaders can hold them accountable and potential donors can see if their investments are worthwhile."

Perhaps most importantly, the team completed the work in its entirety and on time. "Working with the students has been great," says Alex Clark, IT Manager at Legal Aid. "The project has been very well structured, and communication has been excellent. I have contracted with software development businesses on custom programming work many times before and the Design Studio teams have blown everyone away in terms of professionalism and getting the job done on time and to specification."

If any question remains of Legal Aid's gratitude, Alex adds, "They are far and away the best team I've had the pleasure of working with on a project like this as a customer."





A WAY HOME AMERICA

“Our project took it to the next level because it is for nonprofit and a really cool and important cause.

—Sydney Goldberg

MORE THAN 2 MILLION YOUTH IN AMERICA WILL EXPERIENCE HOMELESSNESS AT SOME POINT THIS YEAR. HUNDREDS OF ORGANIZATIONS AND INITIATIVES ARE WORKING TO BRING DOWN THIS NUMBER.

However, the efforts of these organizations are isolated and uncoordinated, as there is limited communication between them and no central place to house data. One of these organizations, A Way Home America, teamed up with Design Studio to change that.

The Design Studio team got to work to create a website that would serve both as a data collection tool for organizations as well as an educational tool to raise awareness about youth homelessness in America. The result was an interactive website that cleverly displayed data entered by organizations. Users can search for a specific statistic, such as the number of homeless youth enrolled in public schools, and then engage with a heat map displaying that information. A slider beneath the map allows users to see changes on the map over time.

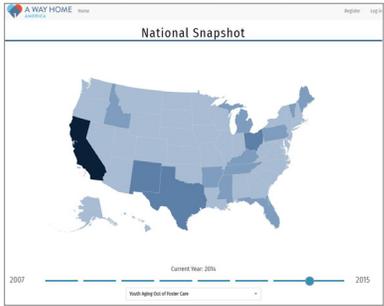
This project came with an added challenge: the website has to survive the organization itself. As senior Sydney Goldberg explains, “Initiatives are unique because they have a

deadline. A Way Home America will actually disband in 2020, so they have a finite timeline. Because of this, the site needs to be able to be managed by like less than one person. It’s not going to be anybody’s full-time job to manage it.”

The team created an easy-to-use system of tools that would allow future site managers to make updates to the site. “There’s a tool for data uploading, there’s the tool for network admins to manage the other admins and users, then there’s the tool for the splash page slideshow...all that was built from scratch, so a few weeks from when the project will be done, the admins can manage the site on their own,” says Sydney. However, the need to create something lasting did more to motivate the team than discourage it. “It’s definitely added pressure, but more than that, it’s added value to know that you’re working on something that’s going to be used and is needed.”

Another important motivator was the nature of

the project itself. Sydney says she and the DM (Development Manager) chose team members that had a passion for the project and for giving back. She says, “Our project took it to the next level because it is for nonprofit and a really cool and important cause. Homelessness is actually a pretty solvable problem if there are concentrated efforts on bringing it down, as evidenced by veteran homelessness in the past decade. There have been more efforts to bring that down and it’s been really successful. So knowing we have a chance to impact youth homelessness, kids our age, was super powerful.”





FIRESPRING

We're not just helping one nonprofit. It's something that can benefit the whole community."

—Andrew Newton

FIRESPRING IS A COMPANY THAT'S ALL ABOUT GIVING BACK.

Its latest project with Design Studio will help nonprofits give back even more. The two teams collaborated to create a more functional website for the Lincoln Community Foundation — one that could handle high visitor volumes for a cheaper price. This new design would allow the foundation to accommodate a large number of visitors on big giving days, while keeping costs low the rest of the year.

"We heard how much [Lincoln nonprofits] were getting charged and were like, 'Holy cow. You guys are losing a lot of your donation money to this,'" said Firespring product manager Andrew Newton. "We have the means to help them set up the same type of platform, but for dramatically less, so more of the money that they raise goes to the actual people they're donating to."

Firespring then teamed up with Raikes students to build a new website using AWS Lambda, a serverless architecture provided by Amazon Web Services primarily designed

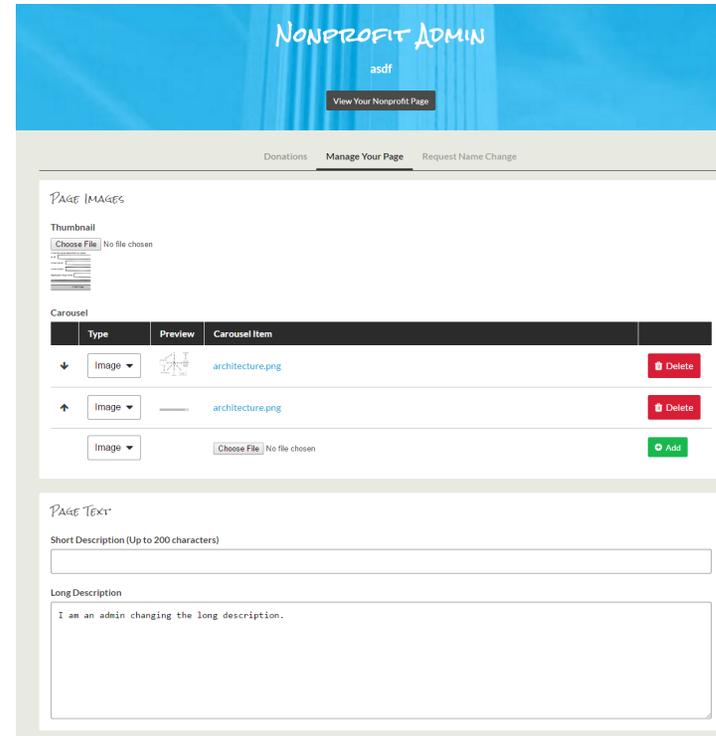
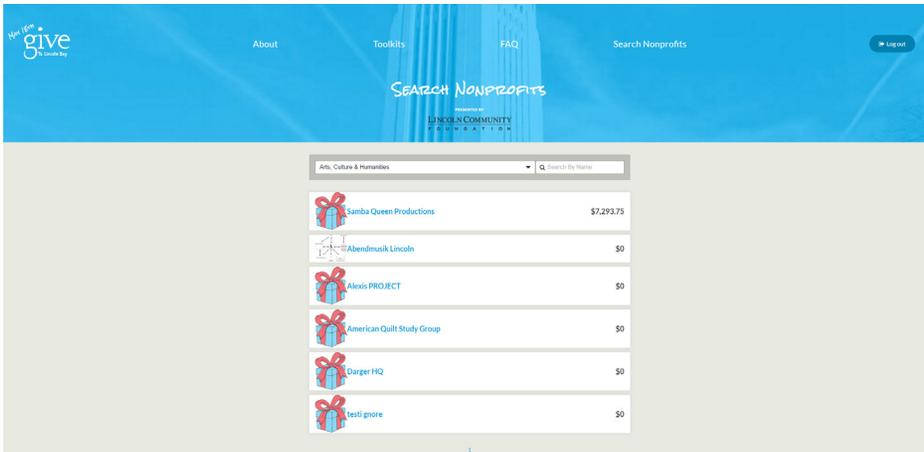
for events like Give to Lincoln Day. Unlike other websites that communicate with one or a few specific servers, a website using AWS Lambda can run its code through Amazon's mass number of servers when web traffic suddenly spikes. "One of the cool things about AWS Lambda is that it has so few components," said senior and project manager Wyatt Goodin.

"So much is handled for you, which has its benefits and drawbacks, but it's an interesting new way of things working. I can see a lot of future applications for it as it becomes more developed and well-grounded."

Not only will the new platform help cut costs for nonprofit clients, but it may help them gain donations too. Major outages and crashes are possible during periods of abnormally high activity, causing them to lose out on even more funds. AWS Lambda is constructed specifically for such occasions. "We built this from the ground up in a way that essentially can't go down," Newton said. "We're using AWS in a way that is very robust and not prone to

having issues that would disrupt the giving day." Newton also said that the technology is new to Firespring, and the team has enjoyed the learning experience. They also plan to transition the product to the company and expand its use with future clients.

"The hope is that we'll be able to take what we're making here and adapt it so another community foundation could use the same thing," said Newton. "We're not just helping one nonprofit. It's something that can benefit the whole community."





NELNET

I think it's going to be a really interesting phase for the project, but I'm confident we have the development power we need."

—Heitor Castro

A NEW APP CREATED BY TWO CAPSTONE CLASSES REALLY COULD CHANGE THE WAY WE LIVE.

Students in Design Studio and Advertising and Public Relations Campaigns came together this year to develop Communitify for apartment managers and residents.

Communitify will serve as an all-in-one web platform for managers where they can organize payments, messages and files in a single system. Residents will use a mobile version to report problems, receive push notifications and engage in a community forum with other apartment community members.

"The community forum fits well with the mission of the product, which is improving the communication among residents and with managers," said Design Studio senior Heitor Castro. "I think they're all really good features. We came up with them from the surveys, so

they're all going to be extensively used."

The surveys and interviews the advertising students conducted with local residents and property managers proved to be extremely valuable in determining what features would make the app appealing to customers. In addition to providing statistical analysis, the advertising team members also advised on the app's overall look and marketing plan.

"We created a new name, new logo, color scheme — pretty much their whole brand," said advertising senior Derek Watson. "It's a brand new business...and all that stuff is really fun to do. And they've been great to work with. They really took our feedback positively."

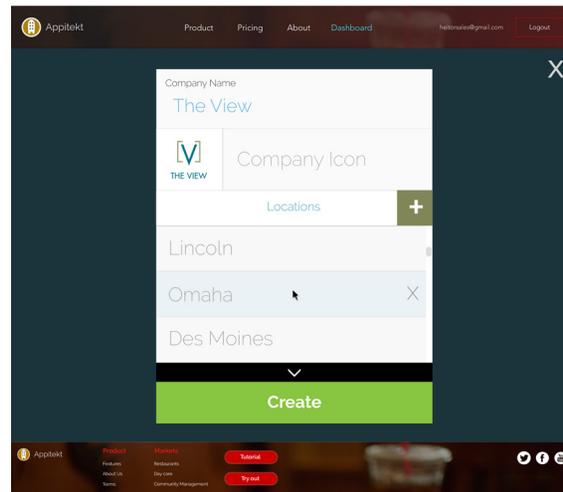
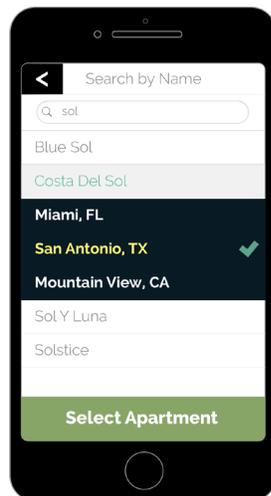
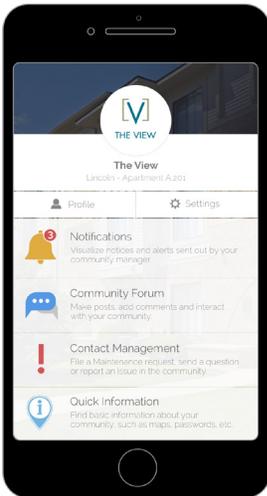
Castro agreed the advertising team's input helped immensely in refining the product's

functionality and marketability.

"I think they definitely have a good methodology for capturing data," Castro said. "That was a good learning experience too — observing how they did it. We really didn't have that skill before and hopefully we get to replicate that in the future."

After graduation, the Design Studio team members will all move to different cities, but four of the five plan to continue to work part time on the project and launching it as a real product.

"I think the scenario looks really good, there's definitely a demand for it," Castro said. "I think it's going to be a really interesting phase for the project, but I'm confident we have the development power we need."



N SWINDR

From the very start, the client had a broad idea of what they wanted and we did all this research and wire framing. It's really cool to see it go from a simple idea to being implemented. Can't wait to see what they're going to do with it and how it's all going to work."

—Alec Skinner

A SENIOR DESIGN CAPSTONE TEAM OF NEBRASKA COMPUTER ENGINEERING AND COMPUTER SCIENCE STUDENTS IS USING 3D CAMERA TECHNOLOGY TO ALLOW FARMERS AND PRODUCERS TO MONITOR THE HEALTH OF INDIVIDUAL ANIMALS IN LIVESTOCK PENS AND INTERVENE BEFORE A PROBLEM BECOMES TOO ADVANCED.

The application, called SWINDR, is one part of a larger Animal Health Tracking project, which is being overseen by the College of Engineering's Perceptual Systems Research Group (psrg.unl.edu).

Levi Hassel is the only engineering student working on project. The team was organized through the Design Studio program in the Jeffrey S. Raikes School of Computer Science and Management. His teammates are three computer science majors – Keith Jett, Alec Skinner and Justin Collier.

The team is using a Kinect camera to capture the movements of the animals, in this case pigs, within a pen, and each animal has a small sensor attached to its ear. The application uses the camera to keep track of the pig's spine and track its movements and/or inactivity.

"If a pig is starting to get sick, maybe it's sleeping a lot more or it's not eating as much," said Hassel. "On its own, that information doesn't seem very useful, but when you use machine learning, like we're going to be using, it's going to determine what makes a pig healthy or unhealthy. That's something we don't even know right now.

"For now it's about getting as much information as possible for the farmers who understand these things much better than we do."

Eric Psota, research assistant professor of

electrical and computer engineering and the group's faculty adviser from PSRG, said designing this application provided a unique challenge for the team – designing a product for use by people who are not the most tech-savvy but are becoming more and more technology dependent.

"We take this idea that our agriculture is moving to a more automated form," Psota said. "Those people want something that's going to present the data to them in a meaningful way. They don't want to have to dig into the numbers. They don't even want to have to look at this thing unless there's some sort of notification."

Psota said the project, basically, boils down to students learning to get out of their comfort zone and find creative solutions. That experience, he said, could give these students a leg up in starting their post-graduation careers.

"The students can handle the data; they're used to dealing with data. But in this project, they have to think of it from a farmhand's perspective, from a user's perspective. It's something they're going to have to deal with after graduation," Psota said. "This gives them a little bit of a head start. It is certainly an advantage for them to say, 'We've designed for a client. We've had to deal with this many issues.'

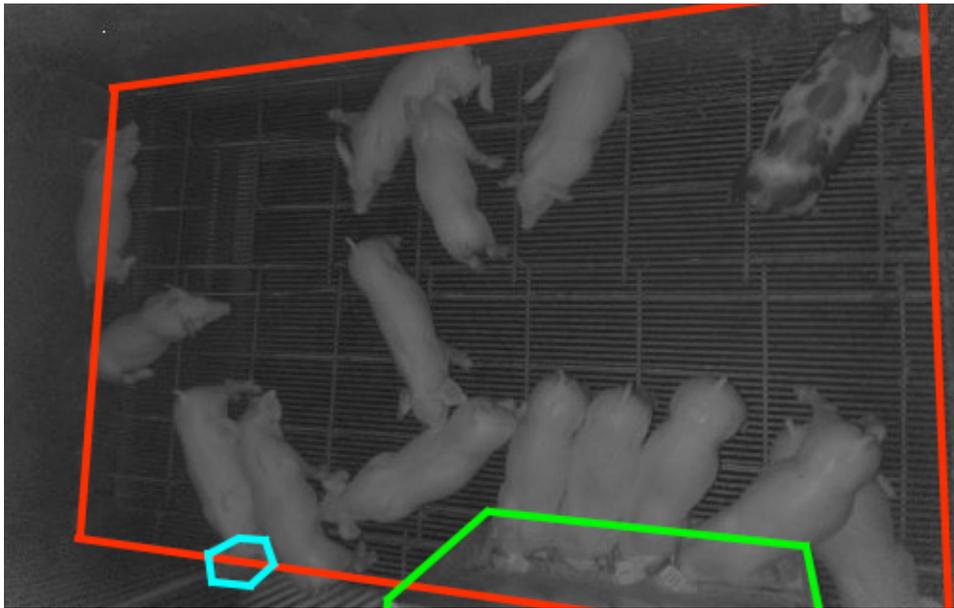
"Plus, some students deal better with open problems and creativity. Some are more inclined to be plugged into a system and given less control. Regardless of what type of a person it is, this project gives them an opportunity to be more aware of themselves when they are looking for jobs."

Taking a multidisciplinary approach to this project was something that the individual team members said has opened up their horizons.

"It's been great to work with people who don't always see things exactly the same way you do," Jett said. "Most computer science people have basically the same way of thinking about things, but when you go to engineering, they have creative ways of getting there."

Looking back to the start of the project, Skinner said it was surprising to realize how much the team has done and learned. And, he said, the team is excited to see the project come together in the coming months.

"At the start, none of us had any experience with any of these technologies," Skinner said, "From the very start, the client had a broad idea of what they wanted and we did all this research and wire framing. It's really cool to see it go from a simple idea to being implemented. Can't wait to see what they're going to do with it and how it's all going to work."



Swindr

Pen 1

Settings

Operation 1 / Location 1 / Pen 1

Details

Capacity: 20

Pig	Health
1	83% ⚠️ 4
2	83% ⚠️ 4
3	83% ⚠️ 4
4	83% ⚠️ 4
5	83% ⚠️ 4
6	83% ⚠️ 4

Swindr

Users

Add User

Alphabetical

By Location

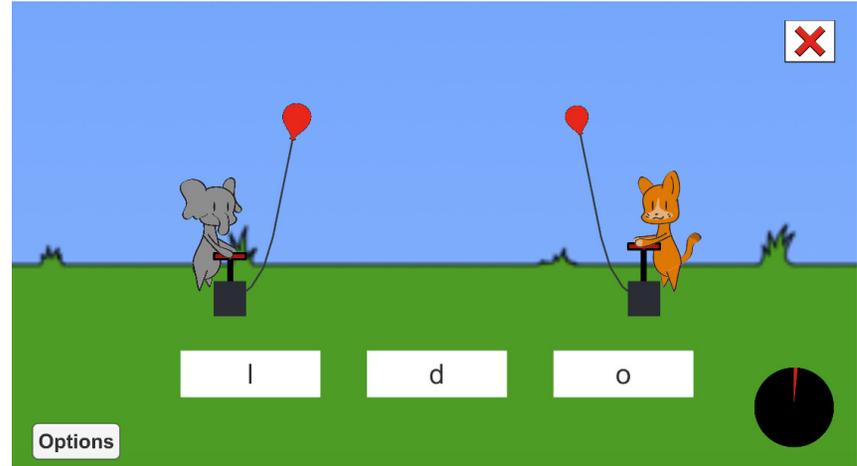
Name	Role
Basic Boy	Basic User at Location 1
Angie Caldwell	Location Admin at Location 6
Brad Drab	Location Admin at Location 4
Basic Dude	Basic User at Location 5
Levi Hassel	Operation Admin at Operation 1
Location Man	Location Admin at Location 1
Tina Pigwoman	Basic User at Location 4
Chuck Testa	Operation Admin at Operation 2

N TECHNOLOGY LEARNING ACADEMY

This project was to create a learning game that would help children in kindergarten and first grade struggling with reading skills. The game focuses on helping the children attain automaticity with letter sounds, letter names, and common sight words.

In order to accomplish this, the game engine Unity was used to create a WebGL game hosted on a custom website. The majority of the website will be used by teachers and parents in order to access statistics on students' performance and also to create student accounts. The home screen, which displays the game, will be the only part of the website accessible to children.

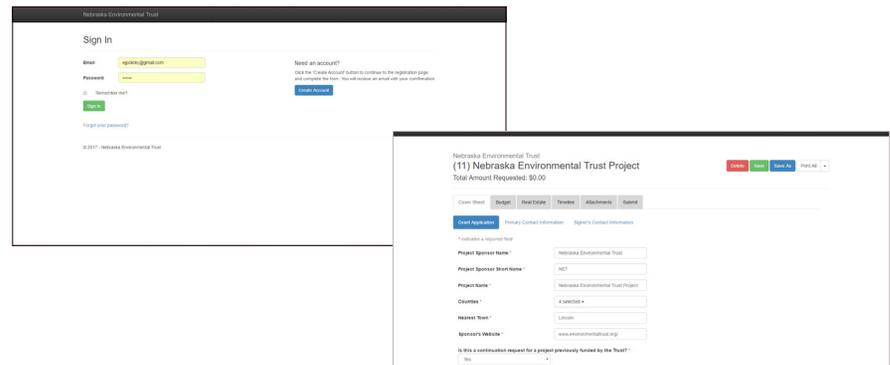
The game itself is organized into 3 lobbies (representing letter names, letter sounds, and sight words) with each lobby containing 3-4 blocks (consisting of a list of letters or words to practice). In order to progress through the blocks and lobbies, the player must pass placement tests which ensure the user has already been taught the necessary material. The user must also prove proficiency in the previous block in order to access the subsequent placement test. Inside each of the blocks are three engaging games that help the user to practice and develop automaticity. Performing well in these games unlocks new costumes, trophies, and new areas for the user to explore.



NET GRANTS MANAGEMENT PROJECT

This project replaces the core business application for managing grants and creates a new web tool to allow citizens to submit their grant applications via the web. The current Microsoft Access Database will be migrated into a new SQL Database that is populated from the new Web Application. This will hold all grant application information as well as track when the application is submitted or reopened for further editing.

The solution to this project was to create a MVC web application in C#. This application allows for all general user login functionality in an easy and safe manner. The user is then able to manage, create, edit, delete, copy or print off a new grant application. The seamless integration into the SQL database will greatly simplify the application process and how it is managed.

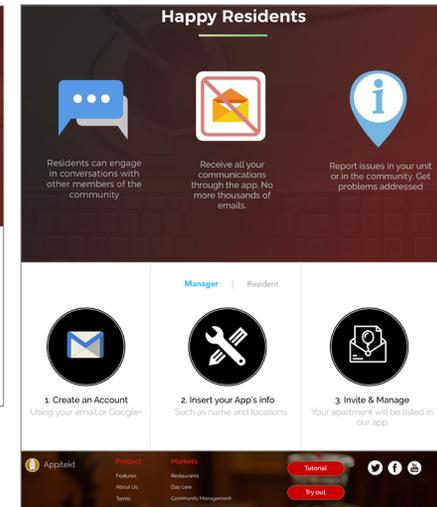
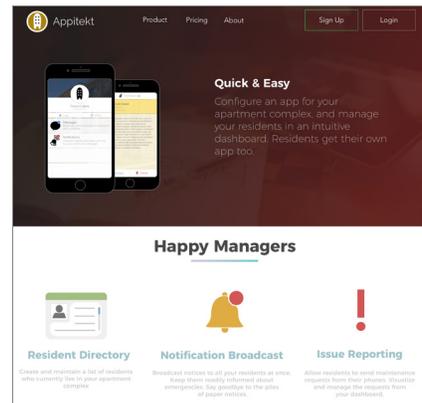


nelnet
COMMUNIFY

Community is a software solution that provides an easy way for landlords to manage their properties and communicate with their residents, while allowing residents to interact more easily with the place they live in. The manager-facing solution includes a web application that provides tools for reports, maintenance requests, notification broadcast, payments, etc. The resident-facing solution consists of a mobile application.

The Community app is available in the iOS and Android store, and allows residents to send messages to managers, report issues, make payments, and create

posts on a community-wide forum. It is a two-fold benefit: managers can centralize their property tools in a single website, being able to easily keep track of issues and reach out to residents in their phones. Residents can also centralize all the information about their apartment unit and community in a single place, without needing to keep track of piles of informational papers in their home.



Legal Aid
OF NEBRASKA

LEGAL OUTCOMES AND PUBLIC ACCOUNTABILITY DATA VISUALIZER

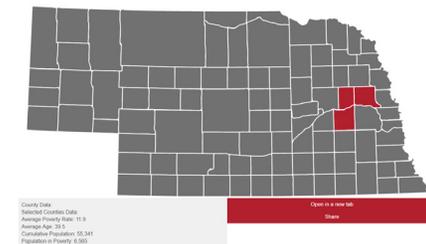
Civil legal work and the outcomes of civil litigation can be complex and difficult to characterize, especially in a uniform manner across the wide range of types of cases handled by Legal Aid of Nebraska. Even greater than the challenge of characterizing and quantifying the work is the challenge of showing various stakeholders and the general public the positive impact of Legal Aid's work in communities.

Legal Aid collects a large amount of data about the work they do as cases are

opened, worked, and resolved in their case management system. However, the case management system is designed for assisting advocates in their work, not for business intelligence. It lacks any built-in system for presentation of data in the form of dashboards, charts, graphs, or maps, and has no public-facing interface at all.

The Legal Aid of Nebraska Design Studio team created an open-source single-page application that provides the public with the means to generate graphs about legal performance. It also assigns meaningful

statistics and allows Legal Aid executives to analyze work done across Nebraska. This solution utilizes the database schema of Legal Aid of Nebraska's case management system, but relies on nothing else of the system. The system safely generates aggregations on the server side and delivers data to client components that create interactive, real-time graphs.





SITE REVIEW

The team was tasked to design and build a tool for WordPress designers to receive feedback from their clients on live websites. Through user interviews, the team discovered three main pain points when a designer wants to gather feedback from a client: (1) a lack of a common vocabulary and feedback scope clarity, (2) traceability, and (3) intuitiveness. To further elaborate, the designers needed to be able to focus and guide their clients in order to get feedback that matters to them. Designers needed to see previous comments in order to reference what clients had said. Clients needed to be able to capture the context of feedback in order to provide the designer with feedback that is easy to understand, and they also needed to be able to quickly

and easily understand how to use the tool in order to give designers feedback that matters to them.

The solution was a WordPress plugin route that the team implemented, as Flywheel is a WordPress hosting company. With the plugin installed and enabled, clients can provide feedback to designers by highlighting areas of their website and leaving comments. Designers have complete control over which parts of the website clients can comment on. This solution is intuitive for designers that are already accustomed to using WordPress and installing plugins. Additionally, this solution is intuitive for clients, as they can leave comments that reference any area of the webpage by simply clicking

and dragging to create a visual region and then leaving a text comment that appears in a sidebar.



INTERNAL TRANSFERS

When the Securities and Exchange Commission eliminated the practice of fixed brokerage commissions on May 1, 1975, none of the major brokerage firms at the time thought anyone would 'break ranks' and offer discounted commissions. But a handful of small firms, including First Omaha Securities, Inc., saw a unique opportunity. First Omaha Securities evolved into TD Ameritrade, and for over 42 years has remained a pioneer in an industry that continues to innovate new ways that make Wall Street more accessible to the individual investor.

Today, TD Ameritrade provides investing and trading services for nearly six million client accounts that total more than \$800 billion in assets, as well as custodial services for more than 4,000 independent registered investment advisors. With clients placing an average of 400,000 trades each day, it maintains the leadership position it assumed when founder Joe Ricketts opened his doors in Omaha, NE, in 1975.

The focus area of this project was Internal Transfers. When a client wants to move securities (stocks, bonds, etc.) from one TD Ameritrade account to another TD

Ameritrade account, the current process and related systems are cumbersome. This is true for both our client as well as associates that process these transfers. The end-to-end process includes paper forms and touching multiple internal systems.

Improving this process will make it faster and easier for TD Ameritrade's clients to move assets between their accounts. Furthermore, the efficiency created by simplifying the process of these transfers would free up associate time to work on more high value activities. Creating systems that are easier to use and understand would

also make training new associates much easier than it is today.

The team implemented a solution that includes extensible backend services to validate internal transfers written in Java using the Spring framework. This framework will be accessed by a variety of applications, including the existing end user application and a prototype web app the team created.





STUDENT MANAGEMENT SYSTEM

The Student Management System project for Westside Community Schools is in its third year of development with Design Studio, and just completed its first year as a live production system. In past years, teams have developed an application that allows students to register for classes, administrators to schedule courses, and administrators and students to see their schedules and set up meetings with each other. This year, the team focused on continued improvements to user experience, scheduling, and attendance.

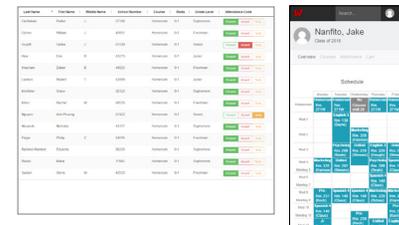
A big achievement was optimizing the website for mobile viewing. Students frequently need to check their schedules

between classes, especially for the first couple weeks of school. With our improvements, students are now able to easily see their schedule on any device.

The system relies on a large amount of data, most of which needs to be updated or reentered every semester. Naturally, this means the website has numerous forms and data entry fields. The team worked with users to determine how the forms were used, and the most common errors that occurred. A robust system of data validation was then implemented, allowing the user to clearly identify and fix problems with any entered data.

At the core of the solution is a complex scheduling algorithm that handles Westside’s unique block scheduling system. In this style of scheduling, most courses have very flexible requirements on when they meet, but the parameters exist to specify more stringent constraints. The team accomplished significant optimizations, greatly reducing the running time of the algorithm. Additionally, tools were created that provide insight into what courses or constraints caused problems if a complete schedule was unable to be generated.

The final major accomplishment was integration with PowerSchool, the program Westside uses to store their attendance data. The team implemented a workflow where teachers can take attendance in our system, and at the end of the day, that attendance data can be exported in a PowerSchool-friendly format.



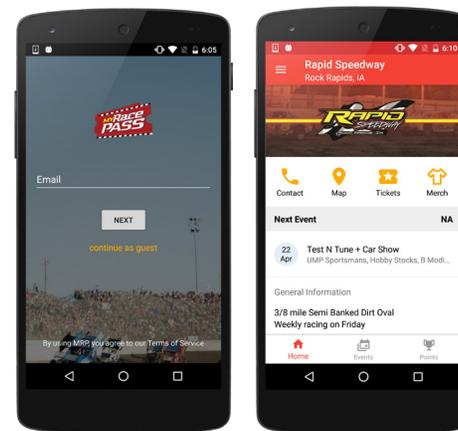
RACING APP

“Our goal is to provide a personalized experience to racing fans that enhances their involvement with the sport, both at the racetrack and at home.”

MyRacePass is a company based in Lincoln that provides results, schedules, standings, news, and event information for dirt track racing across the United States, Canada, and Australia. Currently, the motorsports market does not have an all-in-one mobile solution to aggregate racing data, and the objective of the project was to provide iOS and Android mobile applications for tens of thousands

of fans across the world to connect and consume information.

The primary features of the application include track profiles, event profiles, search/browse functionality, account signup, login, and subscription, and favoriting tracks. Users will also be able to see competition schedules and standings, as well as race-day entries, lineups, and results. Both apps use the MyRacePass API to access and display information, and both the applications are planned to be released to their respective app stores by the completion of the project.

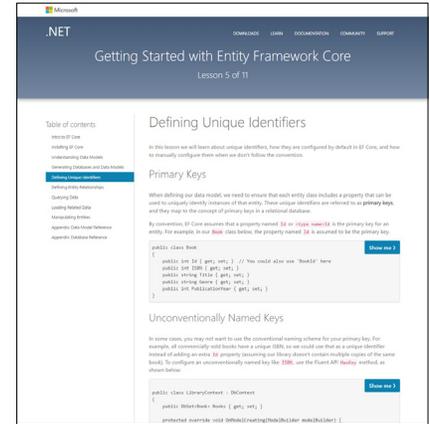
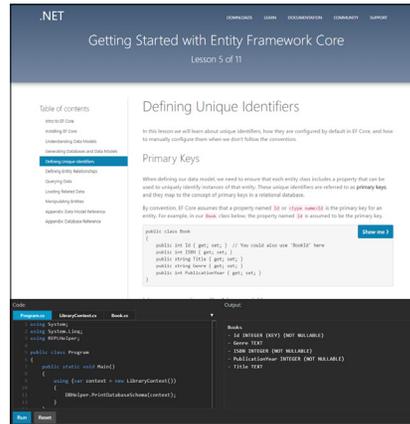




LEARN ENTITY FRAMEWORK CORE

The dot.net website is Microsoft's acquisition and marketing site for .NET. It includes a series of interactive tutorials that introduce developers to the .NET framework and .NET Core. For this project, the Design Studio team was tasked with adding an interactive Entity Framework Core tutorial to the series. The tutorial is intended to introduce developers to EF Core and excite them about the applications they can build, using interactive in-browser code examples to allow users to follow along without the setup cost of installing EF Core.

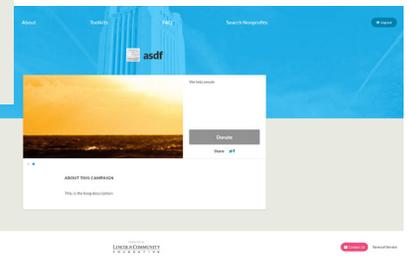
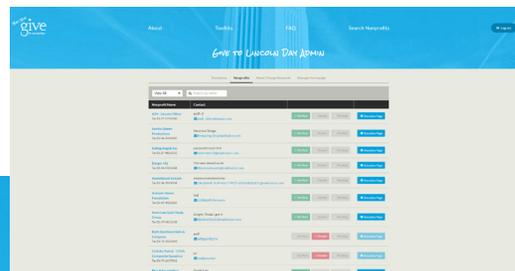
To accomplish this, the team wrote the tutorial content, built the infrastructure necessary to run EF Core in-browser, and updated the existing code example interface to support multi-file examples. The team also refactored the existing project to follow best practices, such as dependency management, code reuse, separation of concerns, and testing.



The Givespring solution hosts the Lincoln Giving Day event of 2017. It handles all website hosting, management, and transactions. By using the relatively new AWS Lambda service, it can scale freely and will only charge per use. This is ideal for the nature of a giving day, with low traffic most of the year punctuated by sudden extreme traffic for one day.

Much of the difficulty in producing this solution came from adapting normal processes that rely on a persistent server to the serverless AWS Lambda service. Not only does Lambda operate quite differently

than traditional application development, it's also still in heavy development with little existing process and only beta level tools. The team adapted what AWS Lambda provides to the needs of the application.



ENHANCING A MOBILE APPLICATION WITH FOUR FEATURES

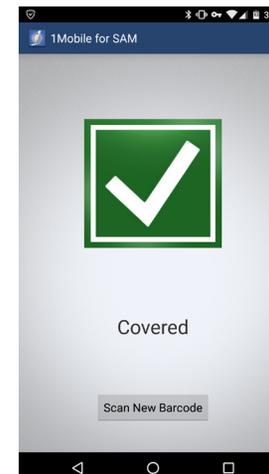
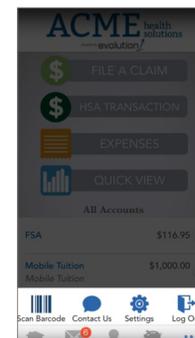
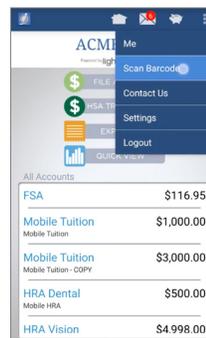
WEX Health (formerly Evolution1) is a leading provider of cloud-based, consumer-directed health care, defined contribution payments, and technology solutions. 1Mobile by WEX Health is an application that provides health care account information access from mobile devices. 1Mobile and other WEX, Inc. applications have been distributed to more than 10,000,000 consumers across the United States.

The Design Studio team was tasked with designing, developing, and implementing additional features to the native Android and iOS applications already in production. Four different

components were placed in the scope of this project: Scan Barcode, File Upload, File Size Reduction, and Fingerprint Authentication. The last feature, Fingerprint Authentication, was limited to design and documentation.

Scan Barcode allows consumers to scan barcodes at stores using the Mobile application already installed on their smartphones. By scanning barcodes, users may check if certain products are covered by their insurance and coverage plans. File Upload allows users to upload receipts for medical expenses from their device. File Size Reduction reduces the resolution and file size of images taken

from within the app. Lastly, Fingerprint Authentication would allow users to use their fingerprint to login into the app.



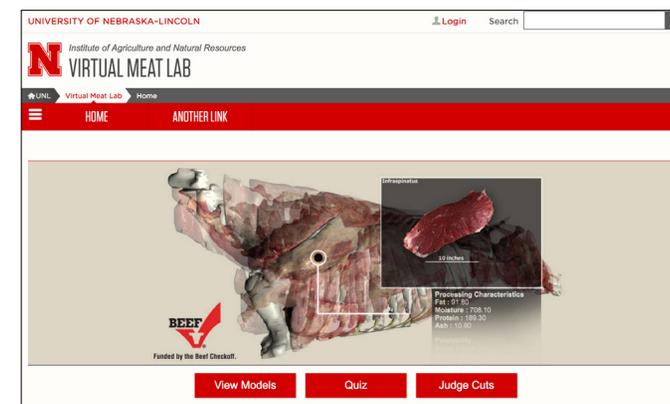
N VIRTUAL BEEF CARCASS ANATOMY DISPLAY

The Design Studio Team was tasked with creating a website for viewing and learning about beef carcasses by using the 3D modeling tools provided by Sketchfab. To accomplish this, three pages were created: Model Viewing, Identification, and Quality Judging. They were created and styled with the University of Nebraska-Lincoln in mind.

The Model Viewing page allows users to view all of the parts of a carcass organized into a hierarchy, as well as extra information about each cut. The Identification page tasks the user with

naming a randomly selected cut of meat using multiple-choice answers. The Quality Judging page tasks the user with ordering four cuts of the same type. The order must be based on the quality of each shown cut. Users are presented with official reasons for the ordering when the correct order is chosen.

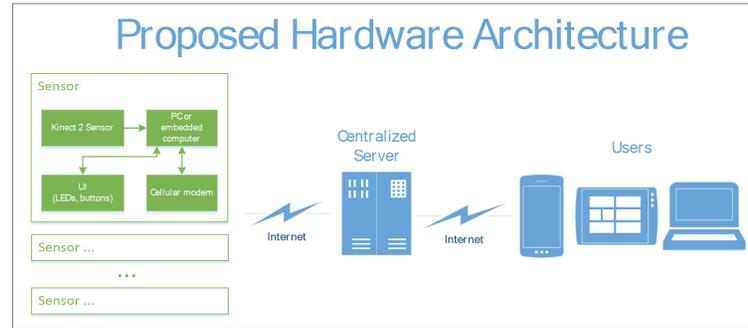
This project was started for use with Beef Carcasses, but it is fully extensible. Websites could be made quickly and with minimal effort for other meat carcasses such as pork, lamb, etc.



N SWINDR

The team built a cutting-edge platform to automatically diagnose illness and behavioral problems in pigs. The system combines latest generation Microsoft Kinect sensor-based 3D vision tracking with analytical processing in order to achieve the highest level of accurate data processing from the swine subjects. Producers can access a web app that allows them to manage their pigs and pens in a simple manner. It also gives them access to useful statistics and metrics to better inform future decisions. The web app is designed to be used on both computers and mobile platforms, with a focus on mobile design.

The team used MongoDB for the more volatile real-time data obtained from the Kinect sensors, while a SQL database holds most of the management data. The real-time data from the sensor device is streamed to a database. It is then streamed from the server to the client's view, allowing users to see and use real-time data as it is collected. This data about the pigs' activities is used to determine their changes in health over time. Additionally, this data can be used to generate predictive models to forecast how certain pigs' health may change positively or negatively due to a variety of environmental information.



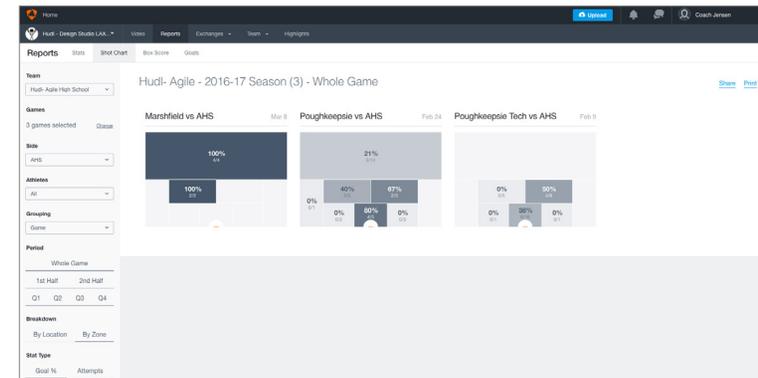

HUDL LACROSSE

Lacrosse is one of the fastest growing sports in the United States — from 250k athletes playing in 2001 to over 800k in 2015. Even with no specific product support, Hudl has 5000 lacrosse teams on its platform. With a massive opportunity to provide tools and insights to coaches and athletes, Hudl tasked the Design Studio team with identifying a strategy and developing a product to increase lacrosse engagement to 10,000 teams by 2018.

To reach this goal, the Design Studio team developed a dedicated tagging application

for lacrosse teams on the latest version of Hudl, allowing coaches to break down post-game action in their film. In addition to post-game breakdown tagging, coaches are able to generate statistical and box-score reports for individual games or entire seasons — all linked back to the exact moments in video.

Hudl Lacrosse assists lacrosse athletes and coaches by creating analytical tools to provide context and meaning to every moment in their game.





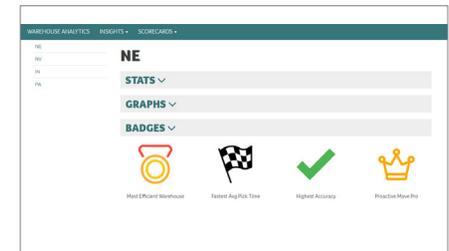
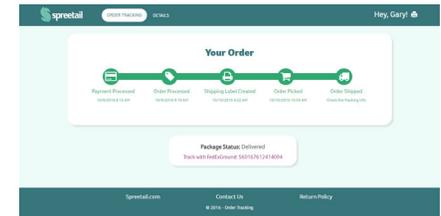
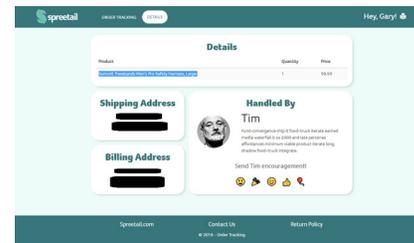
WAREHOUSE DATA CENTER & CUSTOMER LIVE TRACKING

Spreetail came to the Design Studio team with an open mind and one word: warehouse. From there, the team dove into the design thinking process. They visited the warehouse, questioned the processes, and interviewed the employees to understand the current systems. Taking this data, they ideated, iterated, and eventually narrowed their recommendations down to three solutions, while including other recommendations that may have been out of scope for this project. Spreetail chose one, and the team spent the remainder of their time developing the solution. The chosen project is principled on using checkpoints throughout the warehouse to develop two different solutions, one that is internal, and one that is customer-facing.

The original vision statement for the internal solution reads: “The Warehouse Data Center is a suite of tools for warehouse employees and managers that provides insights into the fulfillment process by allowing employees to see patterns, track progress, and visualize warehouse operation metrics quickly and easily.” The solution has evolved as the team continues to get feedback from Spreetail employees, and is wrapping up with a focus on making metrics more fun using gamification and visually appealing displays.

The original vision statement for the customer facing solution reads: “The Customer Live Tracking feature is a customer experience enhancement for

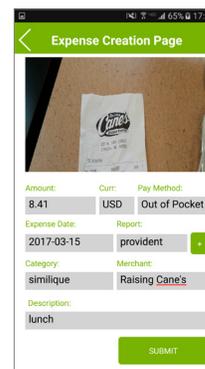
Spreetail.com customers that provides complete transparency of the entire fulfillment process while engaging the customer on a personal level.” This solution has undergone numerous rounds of feedback from diverse groups of users, and will ideally be used when Spreetail launches Spreetail.com.



MICROSOFT DYNAMICS 365 FOR OPERATIONS MOBILE EXPENSE CAPTURE

The team was tasked with creating a cross-platform, mobile, expense capture companion app for Microsoft’s ERP Solution, Microsoft Dynamics 365 for Operations. This app is intended to provide a quick and easy way to capture receipts and create expenses as they occur. This Dynamics app is built in Xamarin.Forms, a cross-platform app creation framework, allowing developers to create a single app that looks and feels the same on both Android and iOS devices.

When designing the mobile app, the team wanted users to be able to quickly capture receipts with as few taps as possible. The app’s layout is modeled after other popular picture sharing apps, as this allows users to quickly take pictures and save receipts and continue with their day. To further enhance the user’s experience, the team investigated and used Optical Character Recognition (OCR) solutions to read the text in a receipt. This allows users to simply take pictures of receipts, and the app can automatically fill out expense details.



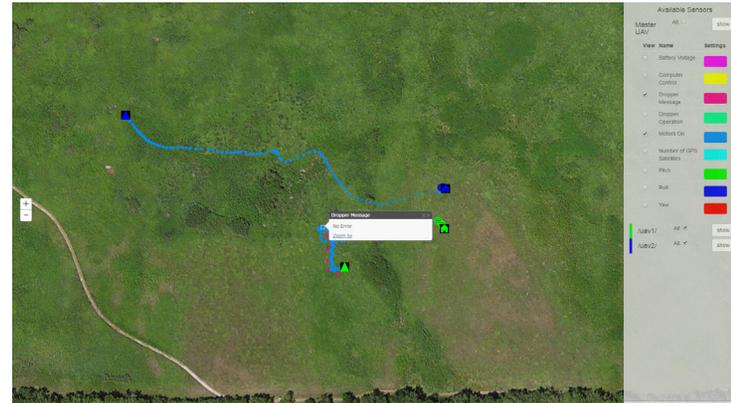
N EXTENSIBLE UAV INTERFACE

The primary objective for this project was to create a base interface for Unmanned Aerial Vehicles (UAVs) that can be extended to the current and future projects undertaken by the lab. The interface needed to have a base map with data on it from UAVs. The UAVs produce a range of data to be displayed, which includes things such as temperature, pitch, battery levels, or custom messages. This data is displayed with its respective temporal and spatial information. The map also has the function to replay the UAV flights once they have finished.

The product lets users play UAV flights live and also replay previously recorded flights.

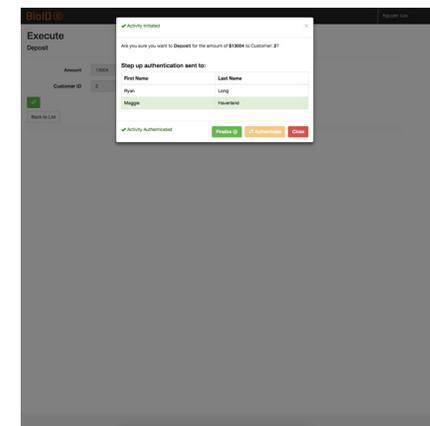
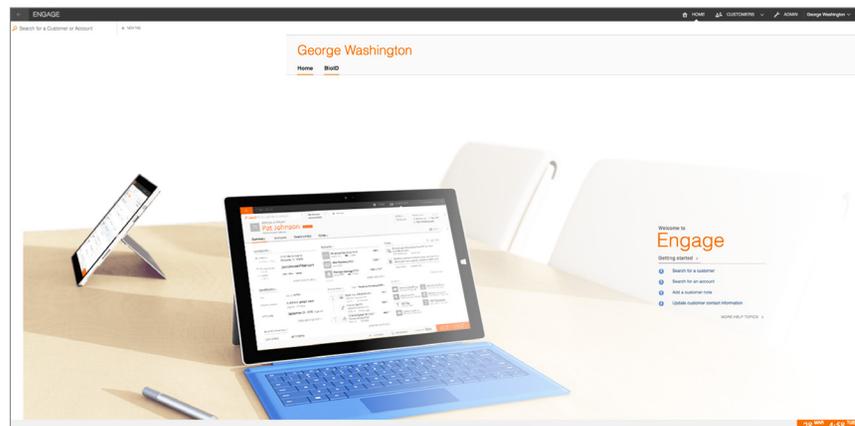
Users are able to pick which sensor data they would like to display on the map as well as manipulate characteristics of its display. The UAVs altitude is displayed with a dynamic scale that adjusts according to the current flight's characteristics. Users can also replay multiple flights simultaneously.

Despite being a web application, the product is usable without an internet connection. Users take a credit-card sized server with them into the field. This server communicates with the UAVs and users can connect to it via a WLAN.



fiserv. BIOID

The team is developing a proof of concept system for incorporating biometric identities within a bank. Specifically, they worked around the use case of a bank teller needing to complete a high-risk transaction that requires a manager's approval. The aim is to demonstrate how this workflow can be made more secure and efficient through the creation of a web portal and mobile app (iOS) that incorporates the use of biometric identities, such as fingerprint scanning and facial recognition.

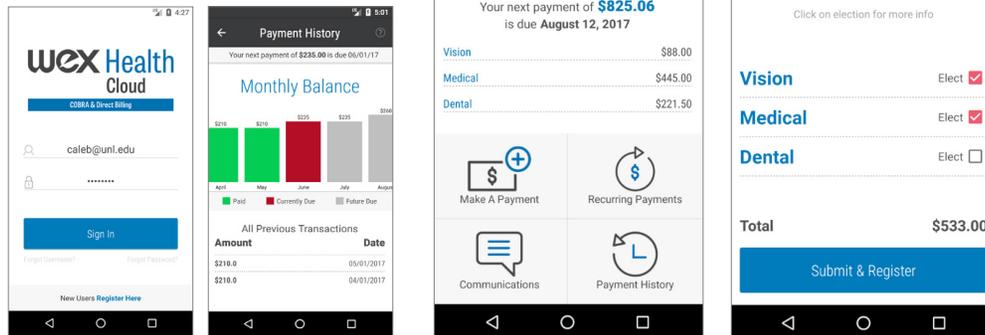


WEX Health COBRA & DIRECT BILLING SYSTEM

The WEX Health COBRA & Direct Billing System project is an initiative to provide customers with a more accessible way to access their health insurance billing. Mobile applications developed for Android and iOS provide the functionality that consumers have come to expect from WEX Health's web portal. From their phones, customers can view their current and upcoming premiums and make payments by card, check, or bank account.

A thin mobile client allows for a responsive application, while data is served to the device from a series of API endpoints. User information is kept secure by a PIN lock that prompts the user for credentials

when reopening the application. The mobile applications were designed to have a coherent and consistent user experience, making them easy to use while providing users with the functionality that they need.

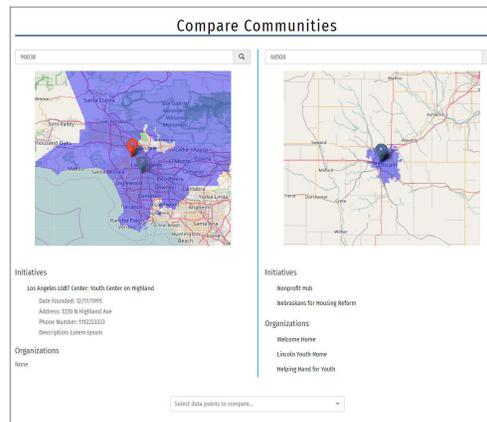


INTERACTIVE VISUALIZATIONS RAISING AWARENESS FOR HOMELESS YOUTH

A Way Home America is a national initiative dedicated to ending youth homelessness. More than two million youth in the United States will experience a period of homelessness each year. There are hundreds of organizations and initiatives across the country that are working to help homeless youth, but they do not communicate with each other or coordinate their efforts. A Way Home America tasked Design Studio with creating a website that allowed both an informed audience and the general public to view and interact with data pertaining to youth homelessness.

The website can upload data to share with other organizations and initiatives, allowing experts to gain insights. The Design Studio team development team utilized React, .NET Core, and MongoDB to create a website and database to support A Way Home America's present and future needs.

In the future, A Way Home America looks forward to expanding this project to include more data, interactive visualizations, and ways to communicate.





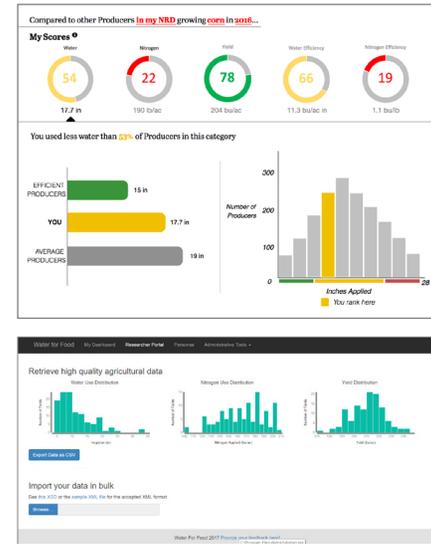
ONLINE AGRICULTURE DATA MANAGEMENT SYSTEM

Field-level data collection in agriculture has grown enormously during the last few years. Data is collected from farmer-produced surveys, from field-level sensor networks, as well as from remote sensing and other public and private sources. Such data has the potential to revolutionize our understanding of agricultural production and the food-energy-water nexus. However, primarily due to concerns over privacy and difficulties with data standardization, neither agricultural producers who produce data, nor resource management agencies that rely on data to achieve regulatory goals, nor researchers working within the food-energy-water nexus, can take full advantage of available data.

The Water for Food Institute Design Studio team worked to create a central database and web analytics tools to help academic researchers, natural resource managers, and agricultural producers visualize and break down agricultural data to learn how to grow more food with less water. The website creates a central location for agricultural data to be entered and maintained, boasting access to the largest producer field database in the world. This tool is responsive to the unique needs of all three previously mentioned user groups, each with their different pain points and system needs.

Academic researchers are able to import and export large amounts of data safely and

easily, allowing them access to the wealth of data within the system to further research purposes around the world. Additionally, agricultural producers are able to use the system as an educational tool to identify both efficient and inefficient resource management within their operations and compare themselves to similar producers via a benchmarking system. The goal of this benchmarking is to help inform producers on how to begin making wiser decisions with their various field inputs. By doing so, the system will help producers remain good stewards of the land and increase long-term sustainability.

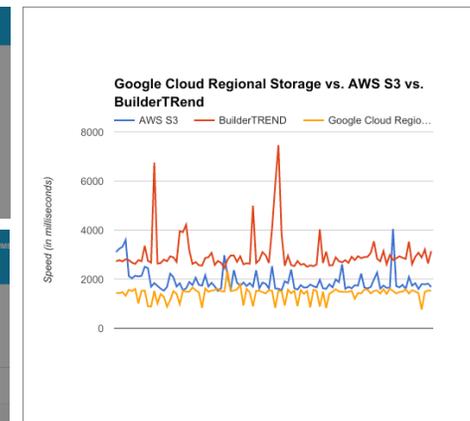
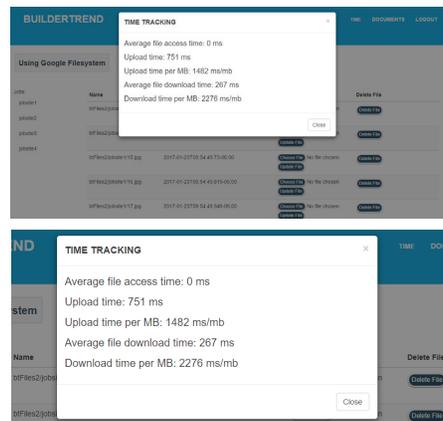


SCALING BUILDERTREND'S FILE ARCHITECTURE

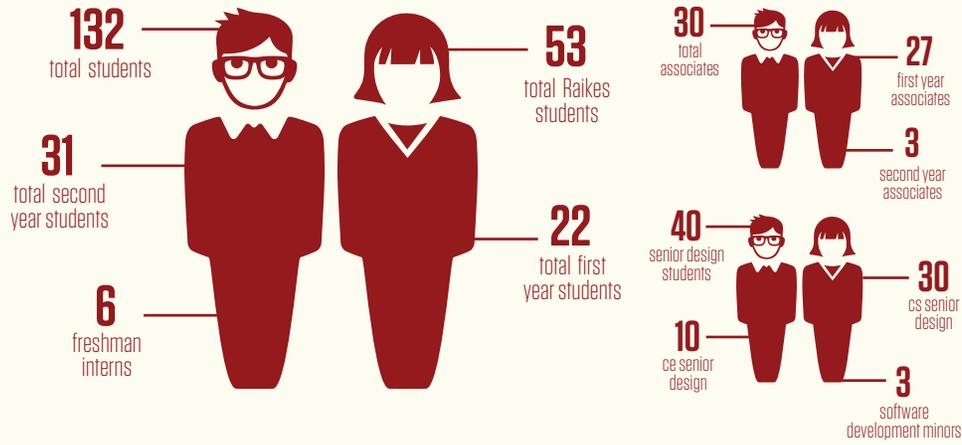
Buildertrend is a construction management software company based out of Omaha, NE. There are almost 400,000 users in over 40 countries that use their software. Buildertrend grants unlimited file storage to their users so keeping their file system at peak performance is an important part to their business. The initial description of the project given to the Design Studio team was focused on improving their file system, including load balancing, optimizing file access, analytics, and data integrity.

The Design Studio team created a Windows service application that could run in the background of one of Buildertrend's computers, monitoring their server size and arranging files as necessary to ensure any one server is

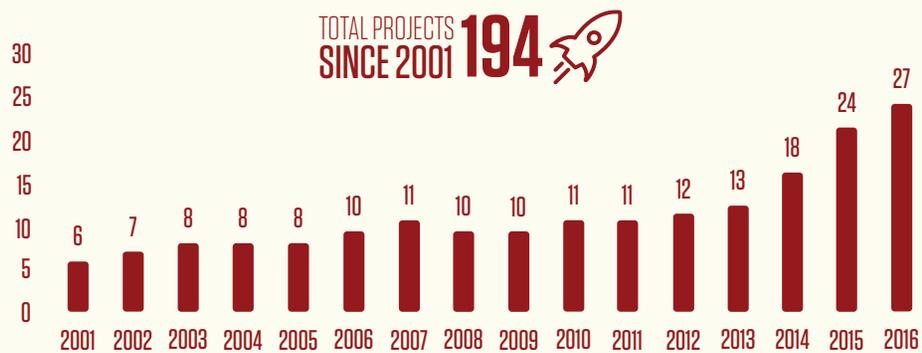
not overloaded with heavily accessed files. This project was built using C# within the .NET framework. The team also performed and presented research on the efficiency and effectiveness for several different cloud hosting platforms, and showed that Amazon Web Services and Google Cloud Platform solutions were significantly faster in file uploads and downloads. Lastly, the team helped improve issues with data integrity by making adjustments to the user database to add a column for last data check time. The application can comb through either a specified user or the least recently checked user and determine if there are any inconsistencies across platforms.



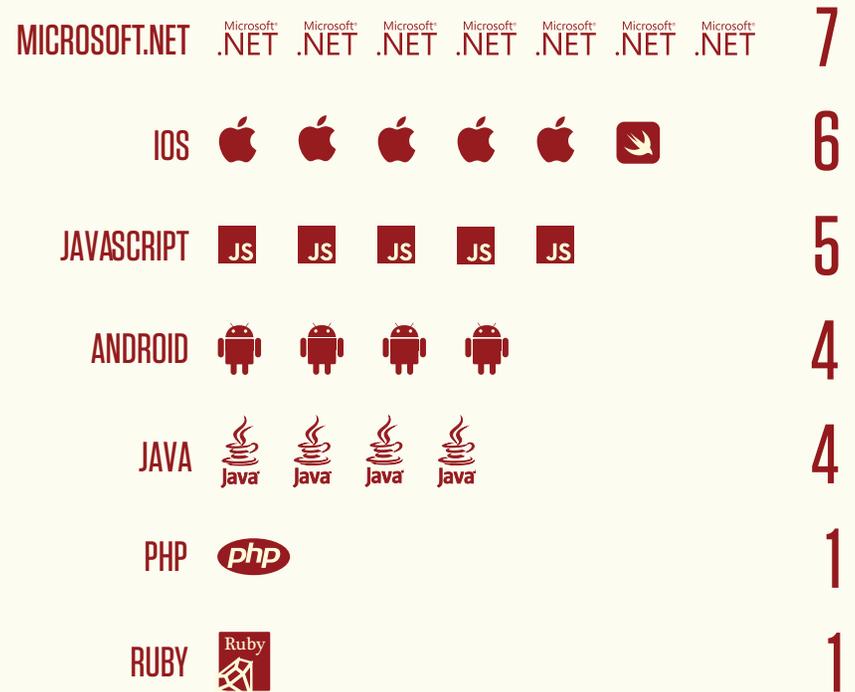
DEMOGRAPHIC STATS



PROJECT STATS



TECHNOLOGY USED



slack STATS

36
custom slackbot
RESPONSES

OVER
75
SLACK
CHANNELS

1169
CUSTOM EMOJIS

OVER
150 K
MESSAGES

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Nathan Blazek	Crete Carrier Corporation	Wex Health - Edina
Timothy Braun	Nelnet	Spreetail
Joel Brehm	Bolero Information Systems	Water for Food
Frank Dolezal	UNL Central Administration	Nebraska Environmental Trust
Nick Ebert	Spreetail	Fiserv
Brady Garvin	UNL Computer Science & Engineering	Animal Science
Brian Grieb	Hudl	Legal Aid of Nebraska
Jeff Hale	Agilx	Microsoft - Fargo
Jake Heidelk	Spreetail	Microsoft - Redmond
Michael Hollman	Hudl	A Way Home America
Cody Leach	T*Work	UNL Technology Learning Academy
John McCarthy	Nelnet	TD Ameritrade
Beth McKeon	NMotion	Nebraska Environmental Trust
Chad Michel	Don't Panic Labs	Firespring
Rob Nickolaus	Arbor Day Foundation	UNL NIMBUS Lab
JR Noble	UNL - ITS	MyRacePass
Derek Nordgren	Hudl	Hudl
Suzette Person	UNL Computer Science & Engineering	Sandhills Publishing
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