RAIKES SCHOOL
DESIGN STUDIO

Together we innovate & achieve excellence

Ready to shape the future

To learn more about supporting the Jeffrey S. Raikes School of Computer Science and Management, contact Kathy Schubauer, Director of Development.

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A note from the director

Reflecting upon this past year in Design Studio, it is not hard to see aspects of the program impacted by change.

Cheryl Nelson
Director of
Design Studio

The changes were a result of the evolving world around us, adjusting to hybrid methods of business and education, and changes in staffing. We said goodbye to longtime leaders of the program who left for new opportunities, and we welcomed fresh faces to Design Studio. Despite changes, some things remain the same. Staff, faculty, community, and students came together striving to continue excellence and innovation in Design Studio.

Students have embraced change. Most student teams conduct their business with their sponsors virtually, some hybrid, and a few in person. That is the world we are in right now. Sometimes that also means virtually connecting with your faculty, your coach, or with one of your fellow students. What we realized is the method of meeting really does not matter. It matters that teams have a solid and predictable communication strategy that is consistent and appropriate for the situation.

Students also stepped up to share their ideas on how Design Studio could adapt to the changing environment in which we found ourselves. Student feedback provided the foundation and the opportunity to change how we teach the best practices of product development and how we mentor future student-led startup teams. This is just another example of how faculty, staff, and students work together to make refinements to the program.

Design Studio is excited to share this annual report with you. We are proud of the excellent products that students created for their sponsors and the growth of the student-led startup. As you read the summaries of the projects, the real-world business value is evident in their solutions.

It takes a lot of people to make a program of innovation and excellence, such as Design Studio. This is due to many people working together. We are proud of our university partners that work with us to provide students from other disciplines with the opportunity to join us in Design Studio as associates. We appreciate all students, the sponsors who offered complex problems to solve, the faculty who stepped up when staffing changes occurred, the coaches who volunteered their time to guide students as a trusted ally, and the business office who supported us all. Thank you.

Design Studio is so proud of all the collaboration and teamwork that occurred this year in this program of excellence. With innovative focus and continuous improvement, Design Studio is excited and energized for the future. We cannot wait to see what our Design Studio community achieves next.

Overview

Who
105 students, 20 coaches, 19 industry sponsors, 5 faculty, 3 staff, and 1 student-led startup came together this year to make Design Studio a smashing success.

What
Design Studio is a capstone program in partnership with leading industry sponsors, featuring the best and brightest students focused on the intersection of business and technology. Throughout the year, student-led teams interface directly with sponsors, faculty, staff, and industry experts to deliver an impressive catalog of project deliverables.

When
Students in Design Studio participate in a two-semester partner-sponsored project. Using a release-driven approach, students work in self-organized teams to design, develop, and release project deliverables to sponsors six times over an academic year.

Where
Design Studio itself is housed in the Kauffman Center on the University's city campus, where students enjoy fully equipped workspaces and have immediate access to professional, legal, and technical support. Industry partners come from the local, national, and international arenas.

How
Design Studio students split into small teams and work directly with industry sponsors to deliver impactful value throughout the year. Teams also get involved with industry expert coaches, who provide mentorship and guidance on best practices.

Why
Through strong, collaborative industry partnerships, we strengthen the community and support the transformation of cutting-edge research into innovation. Moreover, the practice of iterative development trains students in both creative solution design and model-driven engineering processes.

Find us at https://raikes.unl.edu/design-studio to partner with us for next year's Design Studio!
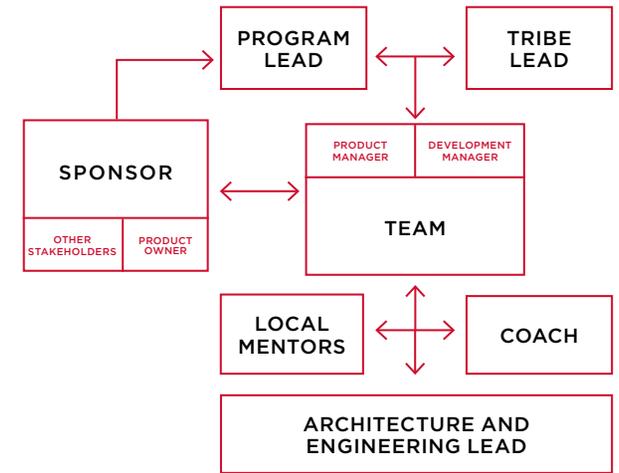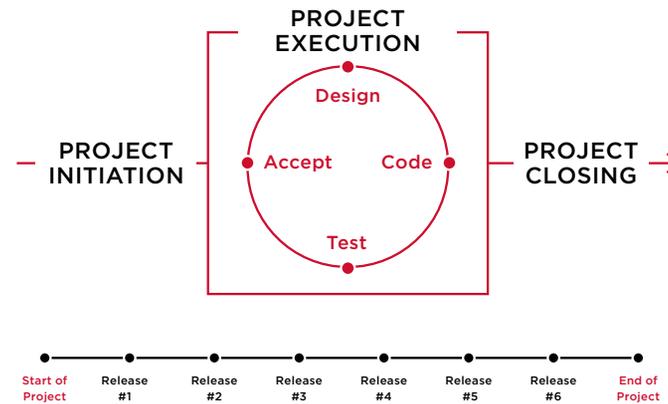
Design Studio Process

Project Initiation
Objective: Become acquainted with sponsor and project. Leverage design thinking to determine process for execution of project.

Checkpoints/Releases
Objective: Demonstrate and defend what you have done to this point. Provide direction and plan for completing remaining project.

Project Execution
Objective: Produce and deliver value for sponsor through cumulative iterations.

Project Closing
Objective: Transition value to sponsor. Finalize, assess project and prove success.

Design Studio Roles

Architecture and Engineering Lead
A staff member in Design Studio who supports the team and offers pragmatic engineering critique from the industry perspective.

Product Owner
The representative from the sponsoring organization who is both the day-to-day contact and has decision making authority within the project scope.

Team
Students self-organize into teams. Teams have two specific roles, the Development Manager and Product Manager, who together share the responsibility of leadership for the team.

Coach
A volunteer from the local community who serves as a professional and technical mentor for the team, an independent sounding board.

Program Lead
A staff member in Design Studio who supports the team and provides professional guidance from the industry perspective.

Tribe Lead
A faculty member in Design Studio who supports the team and evaluates from an educational and learning perspective.

5

Faculty & Staff

Design Studio is a mix of new and familiar faces this year, not just among the students.

The program has a core staff of three full-time employees, plus the support of the Raikes School Faculty. But, of course, eight people cannot possibly support the 100+ students in a program like Design Studio; it takes a village, including our volunteer coaches. See page 34 to recognize their contributions to making Design Studio what it is today.
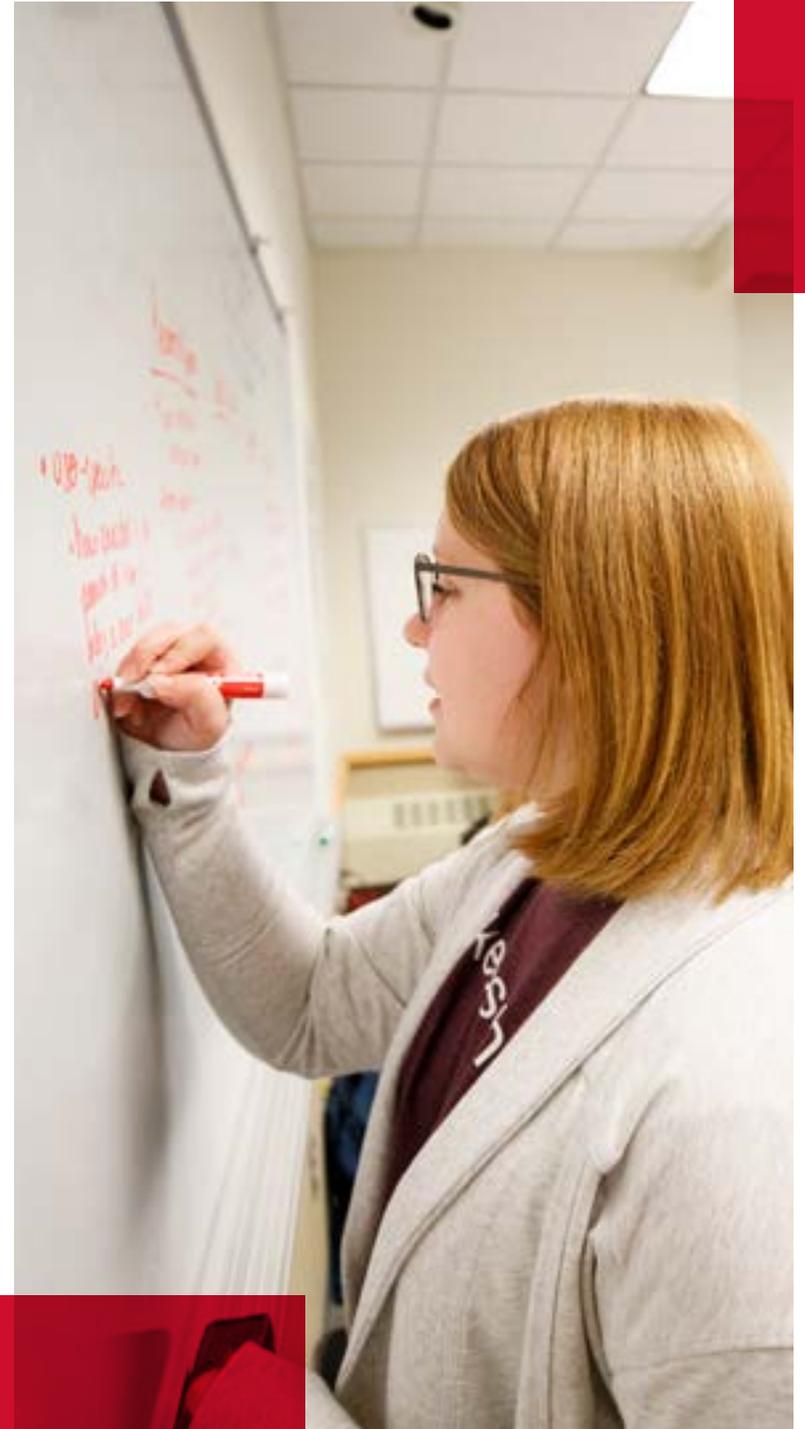
Cheryl Nelson
Director of Design Studio
Newly appointed Director of Design Studio. 20+ years of experience managing and directing software and engineering teams for large fortune 500 companies. Passionate about mentoring students in leadership and agile software development.

Jake Koperski
Design Studio Program Lead
Previously a software engineer and startup entrepreneur, now creating opportunities for students and mentoring teams on best practices.

Rachel Michaela Bradley
Design Studio Graduate Teaching Assistant
British senior IT technician-turned-software engineer with over a decade experience who moved to Nebraska to attend the University of Nebraska-Lincoln and pursue the American dream.

Dr. Steve Cooper
Executive Director of the Raikes School, Tribe Lead
Comes to Nebraska from Stanford University and believes in learning by doing and that changing the world in the 21st century starts with understanding business and computer science.

Dr. Justin Firestone
Assistant Professor of Practice, Tribe Lead
Focused on the intersection of technology, ethics, and law. Instructor for the second-year software engineering courses for the Raikes School and cyber law at the law school. Interested in promoting responsible technological innovations.

Dr. David Keck
Professor of Practice, Tribe Lead
Developed and teaches the school's core sequence in Data and Models, which includes topics from probability and statistics, data science, machine learning, simulation, and optimization. Also teaches the school's finance course.

Dr. Robert Mackalski
Assistant Professor of Practice, Tribe Lead
Software entrepreneur turned academic. Robert teaches marketing courses at the Raikes School.

Dr. Stephanie Valentine
Assistant Professor of Practice, Tribe Lead
Instructor for most underclassman software engineering courses at the Raikes School. Passionate about working with Design Studio teams working on novel interaction design and applied machine learning.

Sponsors

Our industry, government, and non-profit sponsors seek solutions to real-world problems facing their organization. Design Studio teams deliver.

Design Studio leverages our extensive knowledge base, interdisciplinary student body, and wealth of industry experience to bring projects to fruition.

Bridges to Hope — Second Chances... It's What We Do. / Spreetail Foundation
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ML | Page #: 12

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10 Years | Apps | Page #: 15

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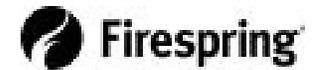
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UBT Union Bank & Trust.
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VIZN Stats
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Projects

Our iterative development methodologies lead to the development of robust software products that address real problems.

Design Studio projects combine agile engineering processes, lean business development, and interdisciplinary design thinking into an iterative process for problem solving and product development - our unique brand of innovation.
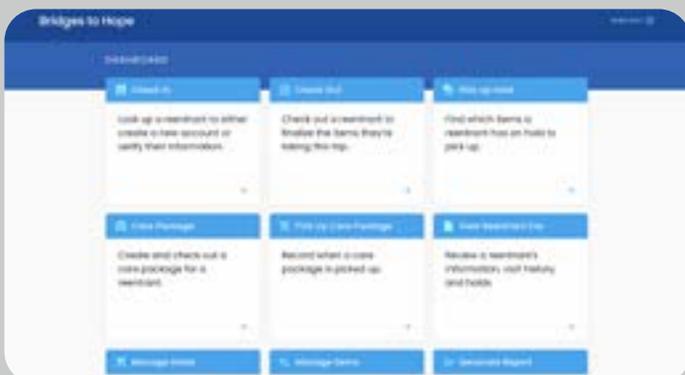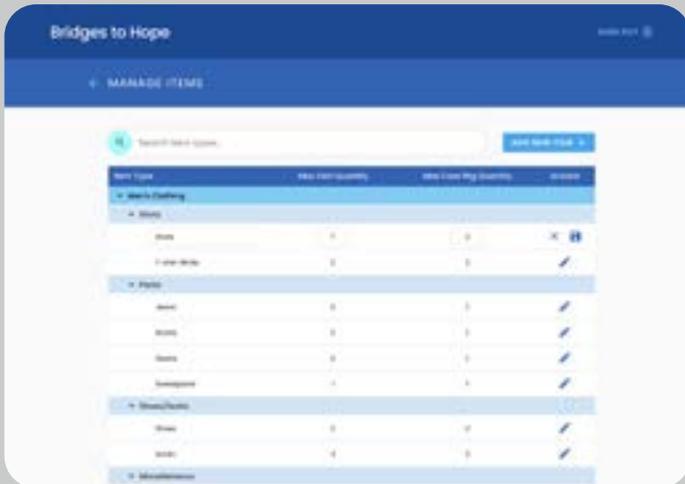
Reentry Data Tracking Platform

Bridges to Hope is a non-profit organization that helps men and women recently released from correctional institutions transition to a productive life after their release. Reentrants can visit the organization to receive basic household furnishings, clothing, personal hygiene products, and connections to services in the area. Previously, Bridges to Hope tracked visitor records by hand through paper and pencil, with the occasional computer spreadsheet. In addition to the quantities of each item that a reentrant received, these documents included demographic and incarceration information for each visitor.

The Design Studio team designed and implemented a top-of-the-line data management system to replace the previously used pencil and paper forms and address these difficulties. The new web-based application increased the ease of tracking this detailed information.

Security was at the forefront of all development, from the database and data access layers built to prevent corruption to the web client, enforced with extensive authentication. Additionally, the software allows the non-profit to generate comprehensive reports that quantify the organization's impact on the community.

With the Design Studio handoff, Bridges to Hope is set up for future success with an accurate, reliable, and secure web application that streamlines all their data management needs. The Design Studio team designed the entire project to be user-friendly with a secure database, an intuitive interface, and built-in administrative tools. As a result, Bridges to Hope can easily manage the application for years to come.

Student Team

Nathan Gentry
Ryan Hruby
Ray Huck

Ryan Olsen
Isabelle Schmidt

Improve Customer Satisfaction with Machine Learning

DMSi customers can submit idea requests on their online portal called The Wedge. These idea requests suggest to DMSi how to improve their products, problems they would like to see solved, and more. They can also vote on other ideas. Product owners assign business value to each idea request to aid in their development prioritization process. Given the lack of filtering capabilities and the magnitude of ideas in the system, customers are not seeing ideas they might have interest in. Therefore, product owners cannot accurately rely on the number of votes on an idea to indicate customer value.

The team decided to attack this problem by showing customers ideas that are relevant and relate to strategic initiatives at DMSi, as well as decreasing the total number of ideas by eliminating duplicates or merging closely related ideas. First, the team created a duplicate detection report and a strategic classification report using TFIDF vectorization and string comparison methods. Second, the team built a recommendation engine using natural language processing methods to cluster similar customers and ideas. The engine generates a list of ideas that are most relevant to customers as well as ideas that have been deemed "strategic". The relevance calculation assigns a value to each idea based on how similar idea texts are, how customers voted on the ideas, and finally takes a random sampling of these weighted ideas to ensure a new result every time the engine runs. Both reports and the engine script are hosted on Dataiku to be further implemented by DMSi on The Wedge.

Student Team

Taylor Bernt
Megan Chaffey
Alexis Delos Reyes

Jessie Guo
Caitlin McCarthy

Farm Credit Services *of* **America**

Customer Operation Relationship Visualizer

Farm Credit Services of America is a leading provider of credit and insurance services to farmers, ranchers, agribusinesses, and rural residents in the Midwest. Before this project, FCSAmerica sales teammates could identify basic customer operation relationships within FCSAmerica's CRM software for their customers/stockholders, but there was no system in place to discover, track or share that operational linkage in the data with other teammates.

The team was tasked with implementing a modern graph database which sourced data from the organization's internal data sources to identify relationships across FCSAmerica's large customer base. Pieces of data (including customer information, product information, relationship to other producers or entities, land ownership, etc.) were combined into

a single dynamic and interactive model visualization to reveal previously unknown relationships through queries engineered by the team.

Now, FCSAmerica's sales teammates can explore over 14,000 nodes with nearly 27,000 relationships identified between them, enabling them to match the right producer or operation with the right products and services. Nodes are also flagged if they are found to have business or financial risks. The team prioritized scalability and the solution is designed to automatically parse and upload new data in mere seconds. These features will allow FCSAmerica to continue adding new data in the future with ease.

Student Team

Sophie Hellebusch　　**Kyle Krueger**
Justin Ho　　**Erik Skoog**
Emily Kraai

![Firespring logo]

Culture Platform

Firespring, Certified B Corp® headquartered in Lincoln, Nebraska, and a leader in the Do More Good® Movement, provides strategic guidance for businesses and nonprofits through creative marketing, printing, and technology solutions. Firespring's mission is to help their customers accomplish their own missions. They have a strong emphasis on building and maintaining robust company culture.

The challenge was to create a platform to help with facilitating internal communication, drive team/vision alignment, and centralize tracking of important internal metrics. Firespring first intends to use this platform for their own internal use. They later intend to evolve it into a SaaS offering for current and future clients. The software offering will be supported by a recurring revenue stream. It will be a pivotal offering to clients on their path to becoming a Do More Good® company.

The goal of the Design Studio team was to prioritize building a solid foundation for future iterations of the project and to fully build out the daily all-hands meeting facilitation tool. Firespring calls this daily meeting the "Firestarter Meeting." The purpose of these meetings is to celebrate employees, acknowledge goal completion, and award those employees who have gone above and beyond. The team built a solution that allows an attendee to enter a meeting and view slides that are navigated and edited by a scribe in real-time. This tooling allows for Firespring scribes to easily facilitate the meetings virtually. In addition, with this solution, metrics and insights can be generated to monitor goal completion and employee engagement.

The Design Studio team's solution will allow Firespring to continue their goal of prioritizing company culture and is the first step in designing a culture portal that will change the way internal operations are conducted.

Student Team

Tomo Bessho   Lilly Moore
Audra Heyne   Daniel Noon
Michael Kovar
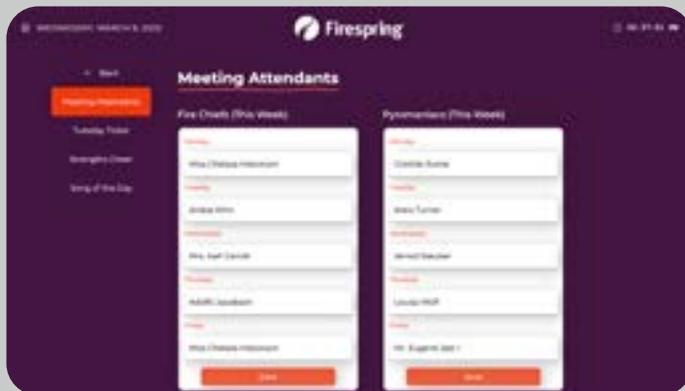
fiserv.

Financial Data Visualization App – Pocket Galleri
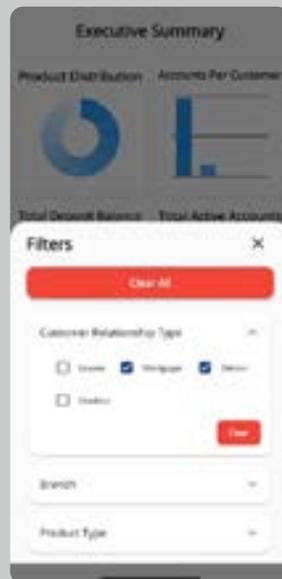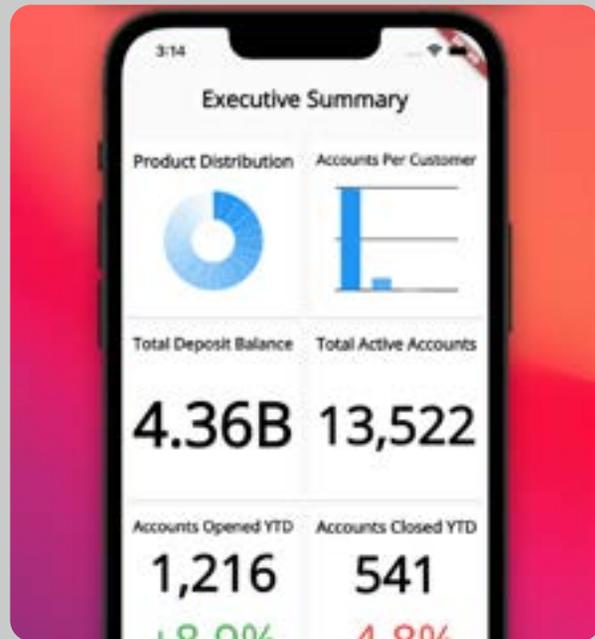
Bank executives have hectic schedules that can keep them away from their desks for long periods of time. While in and out of meetings all day, these executives need access to Fiserv's rich data to enable them to make decisions that directly impact their company's bottom line. Fiserv provides a web-based solution called Galleri to support informed decision-making. Still, executives require an on-the-go solution to fit their on-the-go jobs.

The Fiserv Design Studio team set out to fit Galleri's extensive set of business insights into a mobile-first format accessible from anywhere in the world, not just in the confines of an office. In addition, the solution needed to be easy, quick, and reliable. Executives do not have the time to learn a complicated new interface or question whether their data is fresh and accurate.

Pocket Galleri is a cross-platform mobile application with a stunning Flutter frontend and a powerful GraphQL API to serve all the rich insights that Fiserv is known for. The Pocket Galleri team condensed Fiserv's existing trove of data into a mobile-friendly format that provides an efficient and intuitive experience, delivering substantial value on a tiny screen.

Student Team

Bryce Janke
Nathan Kolbas

Tanner Nash
Brian Reynolds

Bonus Capture

With trends towards virtual contact on the rise, small colleges are struggling to recruit. Recruiters cannot get out to see and evaluate athletes, thus failing to meet enrollment goals and putting their future budget and very existence at risk. Athletes are struggling to know where to start to begin their recruitment journey and keep recruiters up to date, given no direct communication is allowed until sophomore year. With the difficulties faced by recruiters and athletes, we were tasked with answering these questions: What video outside of game footage do recruiters find valuable? What information do athletes lack? How can we best provide athletes instruction through the recruitment process?

Introducing the Athletic Video Resume (AVR), a sports-agnostic video capturing mobile app focused on helping athletes get recruited by guiding them on how and what video to capture in order to incite recruiter interest so that they will investigate the athlete further. With guidance on how to validate their stats for recruiters, we enable athletes to insert themselves into the recruitment pipeline with ease. Recruiters can trust an athlete's progress and easily evaluate them based on drill footage, knowing video doesn't lie.

With this app, the team went beyond simple development. The team spent time interviewing nearly 20 coaches, recruiters, and athletes to find which drills and stats allow recruiters to evaluate athletes and identify the best way to deliver instructions to athletes. The team used the information gathered to build a mobile application available on iOS and Android using React Native. The mobile app allows athletes to record and save videos of themselves completing drills to their devices inside the app. From there, the athlete can share the recordings with recruiters. For Hudl, the ability to easily manage available drills and sports is important when maintaining the app. To allow for maintainability, the team built the app around configuration files containing meta-data about sports, drills, and instructions offered in the app.

Student Team

Dylan Chapin
Sierra Futterman
Caleb Koranda

Patrick Murphy
Brysen Reeser
Liam Seper

PKS Kiewit
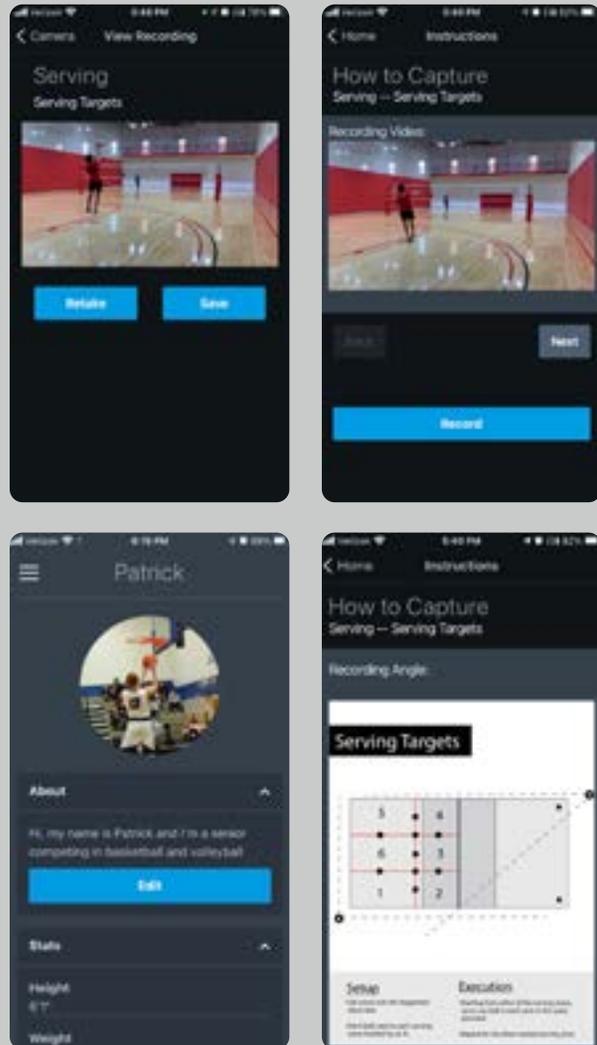
Drone Progress Tracking

Kiewit is one of the largest construction companies globally and has long pushed the standards for innovation within the construction industry. Kiewit operates on an initiative to be a data-driven organization. Construction projects track progress data for various reasons, none more important than meeting contractual obligations. Keeping clients in tune with the status of a given project gives them peace of mind and correlates directly with revenue.

For solar projects, quantity claiming is done by walking up and down rows of solar panels, posts, and torque tubes across the project site and manually entering the status data. The project goal was to create a secondary automated version of the manual quantity claiming process for construction progress tracking.

Kiewit uses drones to capture high-quality, location-based imagery called GeoTIFFs over these solar project sites. An in-house machine learning model utilizes these files to predict the completion of the project sites with up to 95% accuracy.

The primary limiting factor? Training the model to differentiate unclear images, have shadows, or contain warping by manually labeling posts, torque tubes, and solar panels. Kiewit's original solution contained these labeling capabilities, but the user interface was small and overall clunky to use.

The team developed an external application that allows for streamlined labeling in a more intuitive interface. The application also provides more capabilities on the map, separating the GeoTIFF files by project to support long-term project expansion. In addition, it hosts easy to read statistics about the AI model training runs, displays heatmaps for projects, and displays generated masks on the map to show labeling.

Student Team

Laura Derowitsch
Kally Karkazis
Damien Niyonshuti
Rachel Nordgren

Savan Patel
Chaitra Pirisingula
Sam Schneider

Microsoft

Monitoring the Performance of Dynamics 365 Finance

Microsoft Dynamics 365 is an Enterprise Resource Planning (ERP) system used by businesses large and small. This project focused specifically on the Finance modules of the Dynamics 365 application. At the beginning of the project, Microsoft engineers presented the DS team with a problem: Dynamics 365 had a reactive support model, wherein Microsoft engineers wait for customers to report performance issues. This model could not scale. To make performance monitoring more intelligent, the team created a custom solution enabling Microsoft engineers to monitor performance, visualize trends, and receive proactive alerts for Dynamics 365 client environments.

The team began by exploring millions of rows of anonymized telemetry data from Dynamics 365 client environments. From this, team members grew to understand what data points would be useful to visualize performance trends

for a Microsoft engineer. Using Microsoft Power BI, the team created custom dashboards that enable engineers to view performance data for individual client environments as well as Dynamics 365 as a whole.

Building on those dashboards, the team created an automated performance benchmarking and alerting solution. This solution computes a reasonable "baseline" for performance metrics with respect to each client environment and compares real-time telemetry data to these benchmarks. When real-time performance data exceeds the benchmark, engineers receive an alert via Microsoft Teams informing them of the potential slow-down. The alert also provides a link to the Power BI dashboard, where engineers can view more information about the affected client environment.

Student Team

Tom Hermanek
Justin Morrow
Karthik Pagilla

TJ Sandhu
Bennett Wright

MUTUAL OF OMAHA

First Time Homebuyers

The Design Studio team has aided in manifesting Mutual of Omaha Mortgage's vision by developing a video-first home-buying app targeted towards first-time homebuyers. Mutual of Omaha Real Estate (MORE) is Mutual of Omaha Mortgage's new flagship mobile application. It allows customers to search listings, engage with real estate agents, and list their properties for sale all in one streamlined application.

With MORE, users now have access to thousands of videos created by professional realtors and videographers to convey homes and communities' attractions and unique experiences across the nation. By providing a video-first experience potential, homeowners can see properties like never before.

MORE's features extend to homeowners as well as homebuyers. Users can now record videos and images, input property details, and list their property within the app. They also provide a direct line of communication with potential buyers by using the in-app conversations feature. With MORE's unique and powerful features, users can now experience a premium and seamless home search experience.
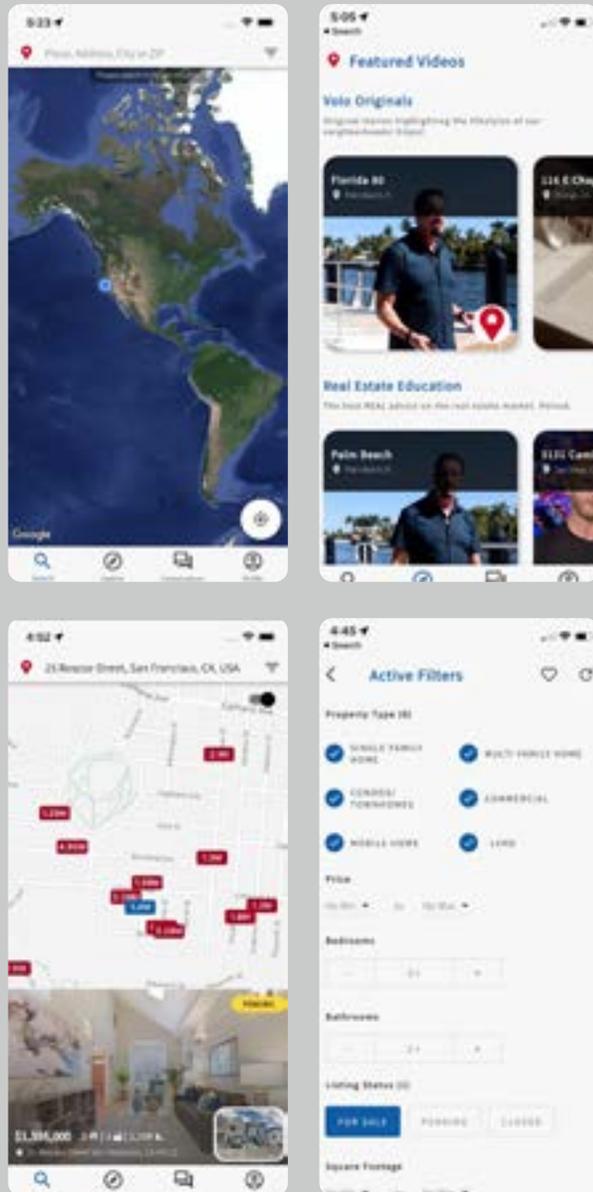
Student Team

Emily Dalton
Jackson Eickhoff
Vivian Jacobitz

Antonio Linhart
Bryce Yong

Event Ticketing System

Nelnet Business Services is a division of Nelnet focused on campus payment and technology solutions. A common request from higher education clients is an event ticketing solution integrated with Nelnet's existing campus product suite. The project's end goal is to provide a cost-effective ticketing solution for Nelnet Business Services' higher education clients.

The event ticketing solution allows higher education institutions to create and manage events, create event venues, and use scanning devices to scan attendees into events. Individual users can explore and filter events created by their institution, purchase event tickets, check in to events, and share tickets with others. In addition, the solution includes seat map images to show ticketholders their seat location before events, and printing functionality is provided for offline ticket scanning. It supports a reservation time for purchasing tickets, configuring a purchasing window for an event, and searching for specific seating criteria.

Features requested by Nelnet Business Services were integrated into the web and mobile scanning applications. The web application allows admins to manage events and venues. It helps users discover new events at their institutions and buy tickets to events. The Wi-Fi-connected Zebra scanning device and mobile application enable event volunteers to scan ticket barcodes to accept users into an event. Overall, this solution aims to simplify event creation, management, and discovery for all higher education institutions and their communities.
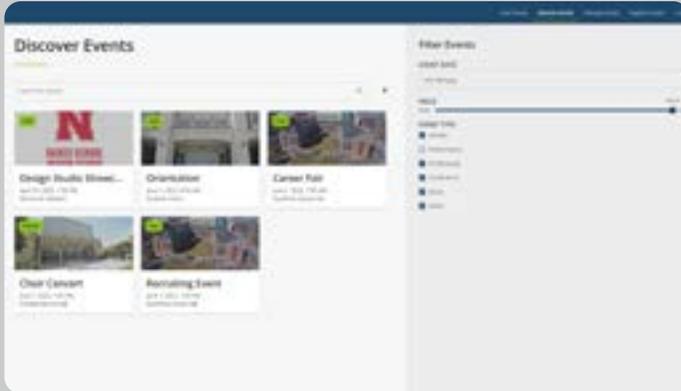
Student Team

John Ang
Ellenna Divingnzzo
Zach Kerkman

Ariel Levi
Jacob Mann
Leah Olson

NEBRASKA
Good Life. Great Journey.
DEPARTMENT OF TRANSPORTATION

Dynamic Intersection Creation and Vehicle Crash Placement

The Nebraska Department of Transportation (NDOT) works to make roads safer, reducing fatalities and injuries from vehicular collisions. NDOT engineers and data partners use collision diagrams to study road crash trends and identify areas for safety-enhancing modifications. However, NDOT currently draws roads and crashes manually, taking days or weeks to complete, limiting the number of possible safety analyses.

Our solution is to add the ability to create accurate collision diagrams in the Nebraska Transportation Information Portal (NTIP). When an NDOT employee or data partner makes a new diagram, the program first downloads an overhead image of the road to serve as the base of the diagram. It then runs the image through a machine learning model to separate roadways from buildings, parking lots, and vegetation. Next, a computer vision algorithm bolds painted lines to make traffic lanes clear. Lastly,

our solution plots crashes onto the outline using the coordinates and orientation of each crash. The color of each collision corresponds to its injury severity so that viewers can quickly see how serious each impact is. Analysts and data partners can use the existing diagram editor features to add metadata, including stop signs, traffic lights, and speed limits.

The new solution can capture real-world roadway details that provide a complete context of the collision environment using overhead images. In addition, the new tool drastically decreases the time needed to create collision diagrams from days to just a few minutes. Our solution complements the work of NDOT analysts who make collision diagrams by allowing them to focus on diagramming complex intersections and creating high-fidelity collision diagrams. All of this supports NDOT's efforts to reduce traffic fatalities by designing safer roads.

Student Team

Grace Clausen
Robert Kirkpatrick

Anna Krueger
Ben Wingerter

Data has been edited and does not reflect real road conditions.
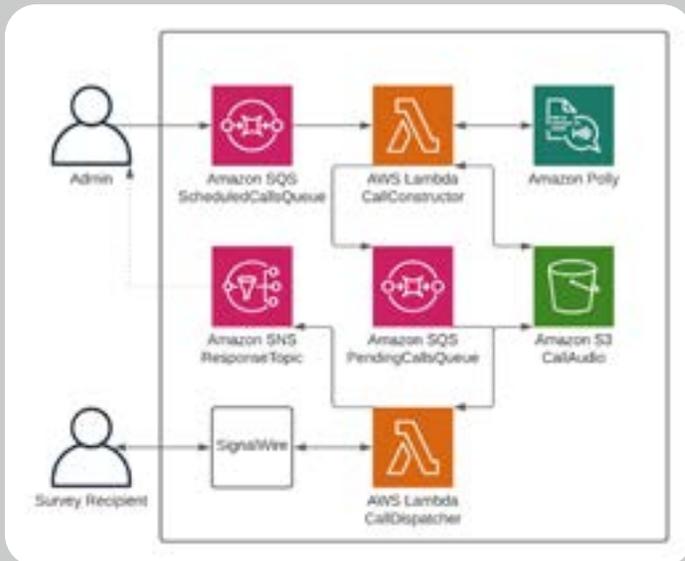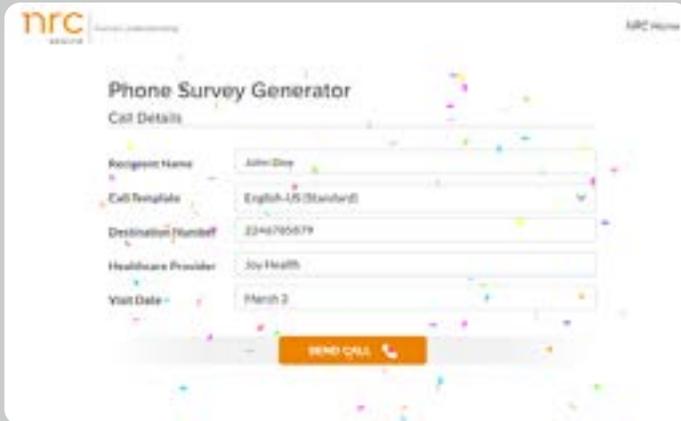
Automated Phone Survey System

NRC Health is in the business of improving healthcare. They partner with healthcare organizations to gather feedback from their patients to offer insights into how organizations can provide better patient experiences and care. NRC Health tasked the team with creating a proof-of-concept phone survey system. We explore how innovative new technologies can provide additional value to their customers at a lower cost while also creating a backup for their existing call system.

The team began the project by researching various calling gateway and text-to-speech vendors and delivering a detailed technical whitepaper justifying vendor selection and design decisions. This research was instrumental to the team for creating cost estimates, discovering scaling limitations, and comparing features. In addition, it provided the team and project stakeholders with the confidence necessary to pursue the final project architecture.

This foundational research was used for the rest of the project, leveraging technologies such as Amazon Polly text-to-speech and the SignalWire calling gateway. The team delivered a proof-of-concept phone survey system capable of handling hundreds of thousands of calls per day.

The microservice leverages recent advancements in speech synthesis technologies, enabling NRC Health to offer increased survey customization in multiple languages. This is significantly cheaper than voice recordings while preserving the existing call experience. The system additionally satisfies NRC Health's nonfunctional requirements for easy integration and can scale to accommodate growing business needs.

Student Team

Andrew Hossack
Nicole Serpico
Zac Streich

Luke Van Drie
Matt Vavricek

NSAAdministrator

The Nebraska School Activities Association (NSAA) is the sanctioning body of high school athletics and activities in the state. With more than 300-member public and non-public schools, the NSAA maintains an extensive amount of data to comply with the rules adopted by its members. The data allows NSAA to organize, develop, direct, and regulate interscholastic activities.

As time progresses, the integrity and reliability of this data becomes more crucial to sustaining the NSAA purpose. To help improve their systems, NSAA came to the Design Studio team to help revamp and improve their current software infrastructure to keep track of interscholastic activities.

For phase one of this multi-year project, the team created a foundational solution to help manage students and games across the state. This solution is aimed at high school athletic directors, coaches, and Nebraska School Activities Association's staff. With 21 sports and 5 activities, NSAA coordinates student-athletes and schools within each sport and exercise.

First, the Design Student team met with various NSAA staff members, high school athletic directors, and coaches to further understand the complex procedure. Next, the team streamlined an application that helps manage students, schools, and sports from these interviews. Member schools can utilize this information, from student eligibility to sporting rosters, to effectively conduct interscholastic activities.

Student Team

Ian Anderson
Caleb Burbach
Erik Konnath

Danny Tran
Keith Tran
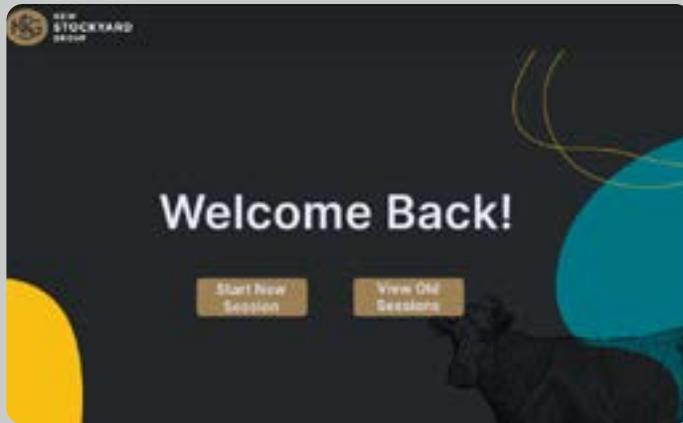
Cattle Counting

The New Stockyard Group Design Studio team worked on an application with the goal of simplifying the process of counting cattle at a feedlot. The current manual methods consist of either counting the cattle as they walk out of a trailer and into their lots, or by solving for the total heads by estimating the amount of grain on a facility. The key problems with these two common methods is that the former is highly labor intensive, and the latter has up to a 20% margin of error. Because this count is used to calculate insurance costs and reserves, a quick, reliable, and duplicable result is desired.

Originally, the project was pitched with the idea of using satellite imaging. However due to the current state of technology, and a high per-image cost, the project pivoted instead to using drone photography. The modeling software used in the solution is called ImageAI, a Python library. Once the team received images from the sponsor or the UNL Feedlots, RoboFlow was used to annotate the images and create augmentations to robustify the training datasets. The frontend was created using Tkinter, another Python library.

Student Team

Stan Drvol
Dom Pelini
Praveen Rao

Chris Wieskamp
Andy Zhang

olsson

Building Efficiency Platform Phase II
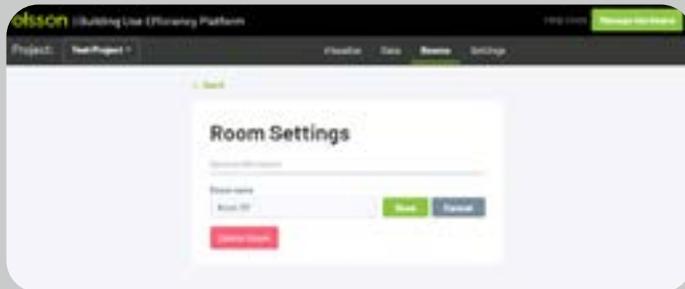
Olsson is prepared for the shift to a hybrid workforce and plans to aid companies improving upon their physical infrastructure. As the world adjusts, they acknowledge physical locations must adjust too. Based out of Lincoln, Nebraska, Olsson is a civil engineering firm ready to handle any issue through the usage of critical data that many companies are not considering yet. They look to answer questions and determine why people unconsciously favor certain parts of the building over others, in addition to how each part of the building is being used. Having this knowledge will allow businesses to be more aware of their carbon footprints, so they can make the necessary improvements to reduce operating costs, make informed decisions on the design of the space they have, and only use the natural resources they need.

This leads into the Olsson Building Use Efficiency Platform, the future of data collection and analysis for buildings. This project was initially created in

August of 2020, and the solution has been greatly expanded in the past year. It went from being only usable in online environments to being available remotely without the internet, allowing for offline data collection and uploading the moment the device is connected to the internet. The dashboard also lacked many features regarding deleting data that is no longer needed, exporting the graph formed by the user's specified inputs, editing sensor information recorded by the device, and adding restrictions to ensure that features act as expected while using the device. Another addition was the implementation of the new Power Measurement Sensor, expanding the device to cover many more aspects of analyzing the efficiency of buildings. These improvements have prepared the Building Use Efficiency Platform to be deployed to a vast array of companies.

Student Team

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Austin Collins

Gracyn Green
Ben Lohrman

AI Sentiment Awareness
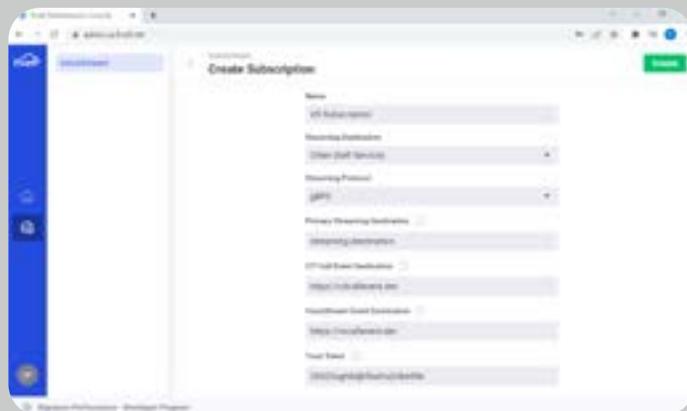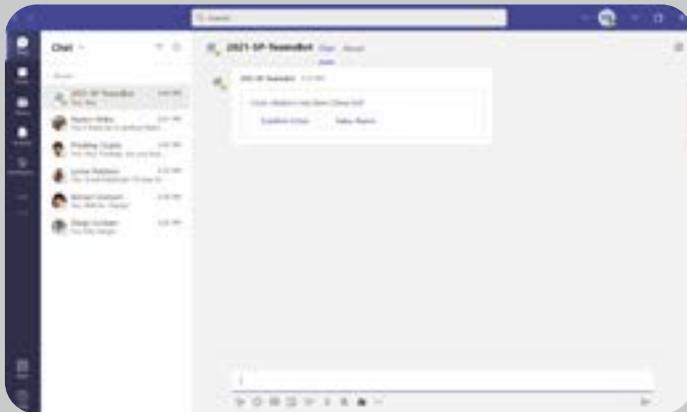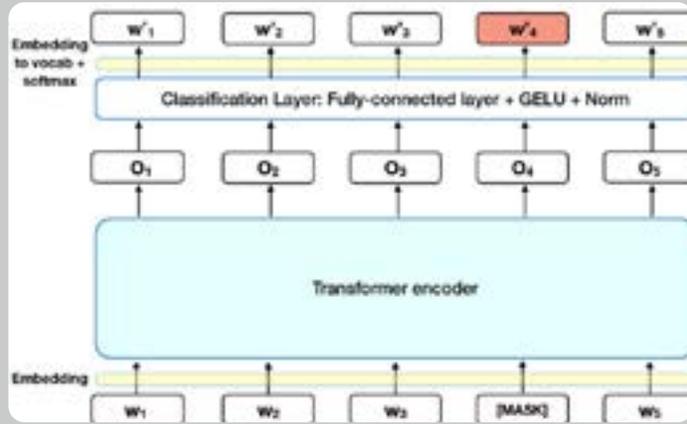
From Veteran's Affairs (VA) and the Department of Defense to hospitals around the country, Signature Performance brings a wealth of health consulting expertise to make people and businesses in the community healthier. Part of this mandate involves the operation and innovation of the VA call center experience. Signature Performance services over 250,000 calls a month and every month a portion of these calls are with veterans undergoing crisis scenarios involving suicidal or homicidal ideation. Signature's commitment to providing the best possible service to our nation's veterans extends to excelling and ensuring their safety, especially in these moments.

Signature Performance has partnered with Design Studio to push forward the frontier of what is considered possible in terms of response times, satisfaction, and health outcomes. To this end, the team designed and built a real-time call flagging system that employs a deep neural network to identify veterans in crisis and alerts call service representatives (CSR) to such a crisis. Feedback from this system is sent to the call service representative via a Microsoft Teams chat, which enables the CSR to at any time (either in response to a crisis message or of their own volition) alert a manager group to a crisis scenario at the click of a single button. This fire alarm mechanism drastically improves response times while our model sets a new standard for accuracy in predicting crisis scenarios.

Student Team

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Devin McGuire

Vishnu Menon

Tom Walton

Multi-Channel Production Information Management (PIM)
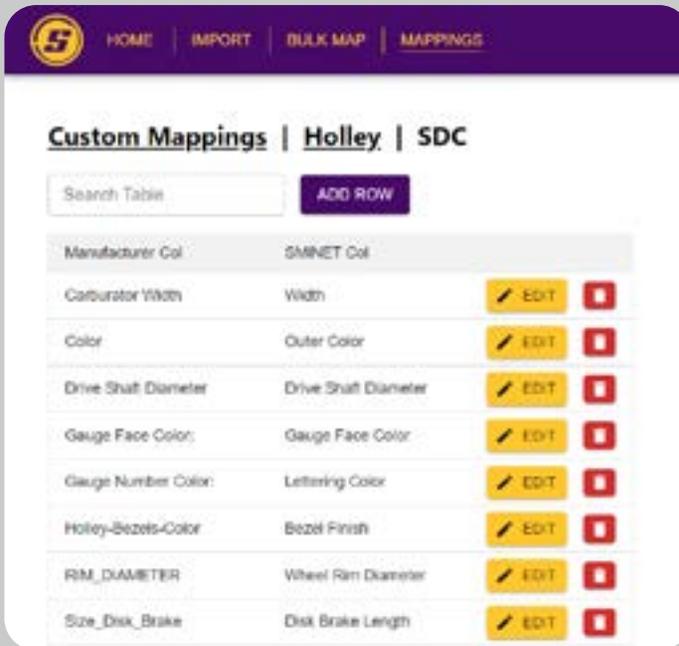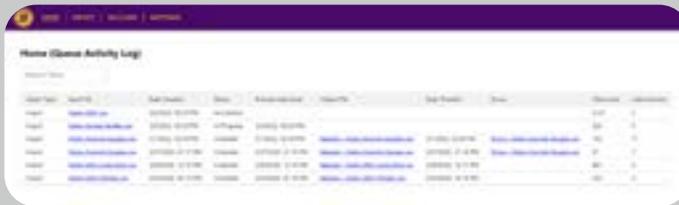
Headquartered in Lincoln, Nebraska, Speedway Motors is the oldest speed shop in the United States. They have been dedicated to helping car enthusiasts find the best parts for their ride since 1952. With over 100,000 products on their website, Speedway takes a significant amount of work to keep their catalog up to date.

Automotive part data comes to Speedway from many different sources and can often be very fragmented. Customers must receive parts that will fit their car. Hence, fragmented and ill-fitting data is a big challenge in the automotive industry. Initial calculations from Speedway Motors estimate that the Design Studio team's solution will add notable revenue opportunities within a year of launching the project.

The team worked to take Speedway's manual data ingestion process and transform it with a streamlined user interface for Speedway content specialists. The new interface supports vendor data uploads, creating customized rules to control how the data will be formatted, and allows Speedway employees to bulk upload data.

The new system delivers in-page help and an easy-to-understand interface for new users while balancing power users' need to manipulate the system at scale. In addition, by automating a previously manual and time-consuming process, the team has helped make product information management at Speedway Motors a smooth ride.

Student Team

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Anna Holmquist

Kieran McWilliams
Tim Roty
Sifat Syed

Uncleaned Data → Cleaned Data

Existing Workflow → New Workflow

Spreetail

Taxonomy Revolution
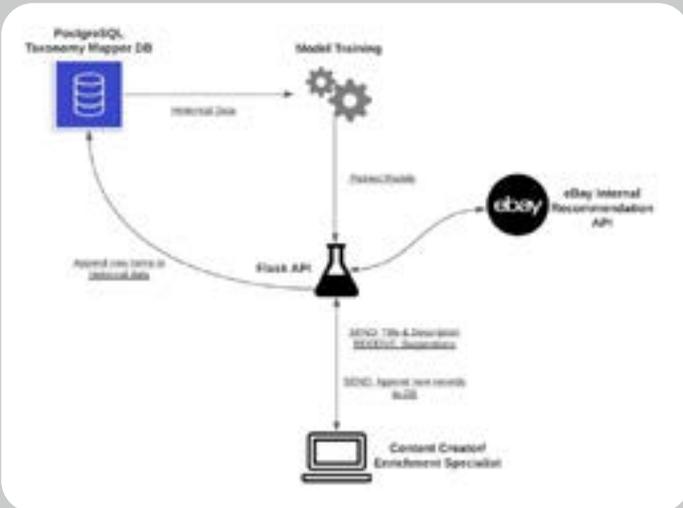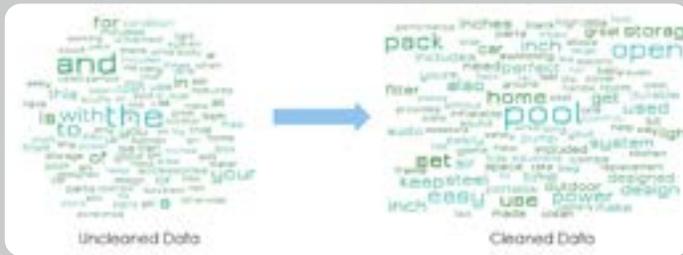
Spreetail is an omni-channel seller, listing products from thousands of vendor partners on over 20 online marketplaces. Content taxonomy – or the mapping of product data according to categories – is at the core of modern internet organization from social media to marketplaces. When taxonomy is done properly and updated consistently to meet evolving changes, Spreetail's products convert to sales at a higher level, are more discoverable by shoppers, and fuel growth for both Spreetail and their vendors.

Currently, the taxonomic process can be highly manual, requiring updates and human intervention to keep products appropriately mapped. Our vision—to develop an efficient and robust machine learning solution that provides high accuracy category recommendations based on dynamic taxonomic data— resulted in a process requiring little human interaction beyond a verification of the recommended category.

Data science and machine learning converged on the Taxonomy Revolution project, generating a dynamic solution that reduces costs tied to manual updates, increases sales conversions, produces higher quality matches across taxonomic categories on multiple marketplaces, and reduces churn in updated multiple marketplace data.

The solution this year was centered on two of Spreetail's largest primary marketplaces partners, Amazon and eBay, but is designed to be expandable to integrate the remaining channels in the future.

Student Team

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**Katie Leger**
Bertrand Sibomana

UBT
Union Bank & Trust.

Project Retail Data Findings
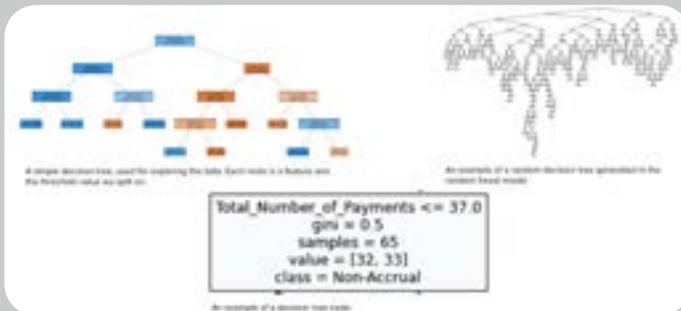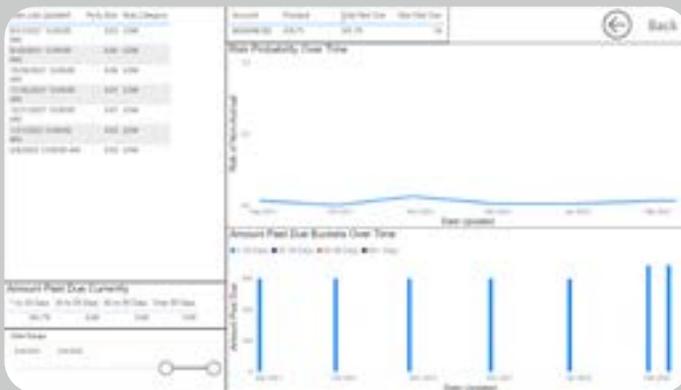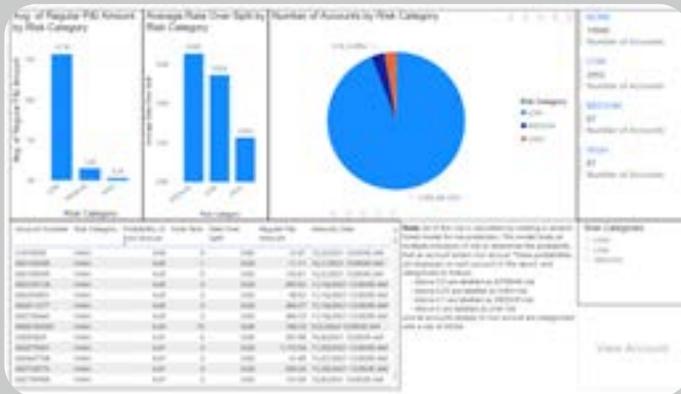
Union Bank & Trust created an expansive data warehouse with customer data and provided the Design Studio team access to an integrated PowerBI environment to implement exploratory machine learning models. Numerous models and products were developed to identify risk across the database. The insights gathered from the initial models were then iterated upon in order to develop risk-aversion strategies and allow UBT to make data-driven decisions to maximize profits.

The team developed two primary risk prediction models for the entire portfolio of loan data to predict the likelihood of defaulting on a loan. Using both a logistic regression and a random forest model, the team created two separate reports, with accuracy metrics over 96% on both models, that assigned a percentage risk of defaulting based on the current state

of the loan. These reports were able to serve as live updating dashboards for the UBT team to reference the state of their loan portfolio and view the loans at the highest risk of defaulting.

Beyond that, the team also developed exploratory reports on the number of times an account could make late payments and its impact on defaulting risk, as well as a specific regression breakdown of automotive dealership loans and the evolution of risk in those accounts. This demonstrated an opportunity for the UBT team to apply their predictive portfolio models to a subset of training and testing data specifically tied to dealership loans, and to specifically isolate features of the dataset that enabled niche predictive capabilities.

Student Team

Landon Borges
Peter Dunbar
Hunter Godina

Cole Johnson
Noah McCashland

VIZN Stats
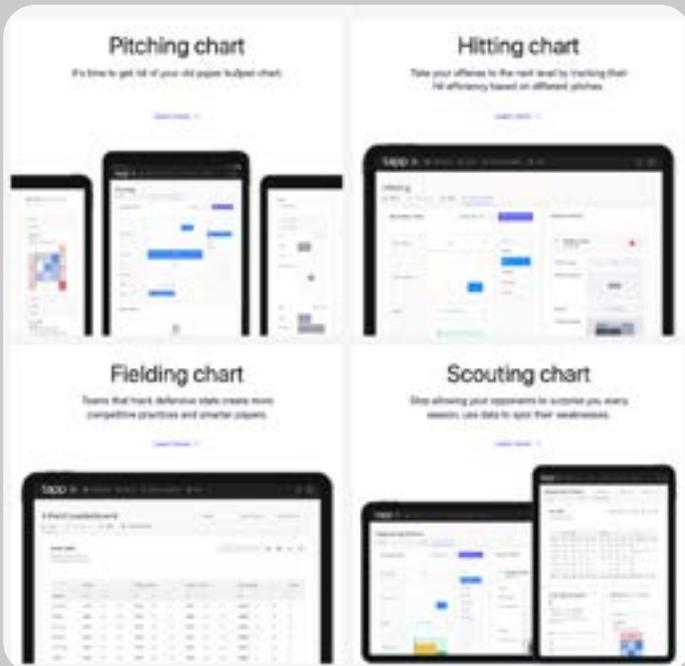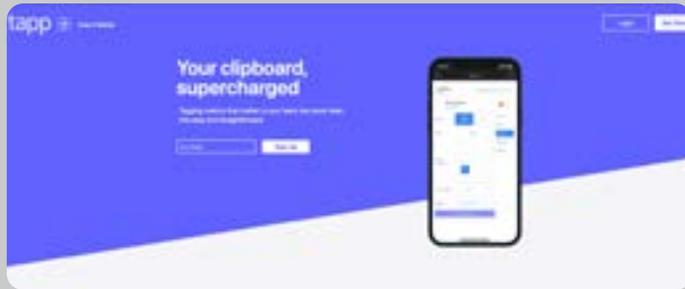
Clipboards Supercharged

To stay competitive, the modern baseball coach must record and analyze hundreds of data points per day. A good portion of these data points are user-entered, currently with clipboard, pen, and paper. Inevitably, these papers pile up and coaches get overwhelmed by the amount of data they must understand, visualize, and communicate to their team daily. Tapp by VIZN Stats exists to solve this problem by giving coaches the most intuitive tagging tools and data analysis blocks to automate these processes.

Currently used by seven baseball teams across the US, including the Husker baseball team, the VIZN team is proud of its product Tapp - a beautiful web application powered by a robust backend API and data analysis engine that it has created in the past year of Design Studio.

Tapp has proven to be useful for coaches across all levels of baseball, and it has the platform for the company to skyrocket into other sports and markets soon.

The team looks forward to continuing to work on VIZN post-DS with the goal of delivering on its mission to empower coaches to make decisions that help players reach their full potential. Visit **https://viznstats.com** for more information!

Student Team

Jayden Boesch
Jordan Boesch
Michael Kelly

Alex Miller
Parker Miller

Carl Olson
Dan Stara

600
Meetings

450
Hours worked

105
Students

20
Coaches

5
Faculty

19
Sponsors

3
Staff

6
Releases

1
Student
Start-up

1
Design Studio Program

Statistics

Design Studio by the numbers

Major Count

Legend:
- Comp Sci.
- Comp Eng.
- SWE
- Act. Sci.
- Econ.
- Other

Rings: 2001, 2006, 2011, 2016, 2021

Project Domains

Legend:
- Analytics
- Embedded/IoT
- Web/Mobile
- R&D
- ML
- Other

Rings: 2017, 2018, 2019, 2020, 2021

Project Count

Total Projects vs Year bar chart, years 2001–2021.
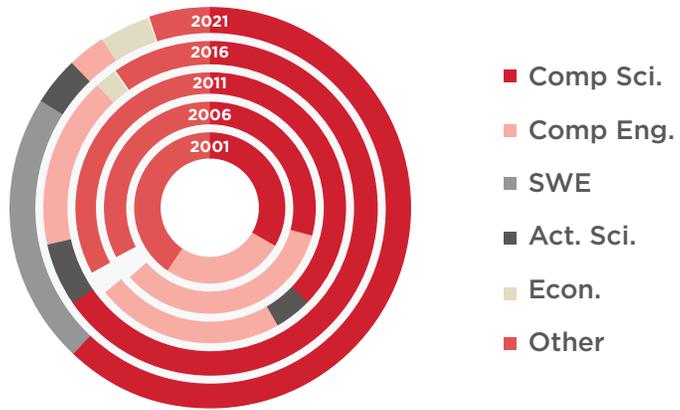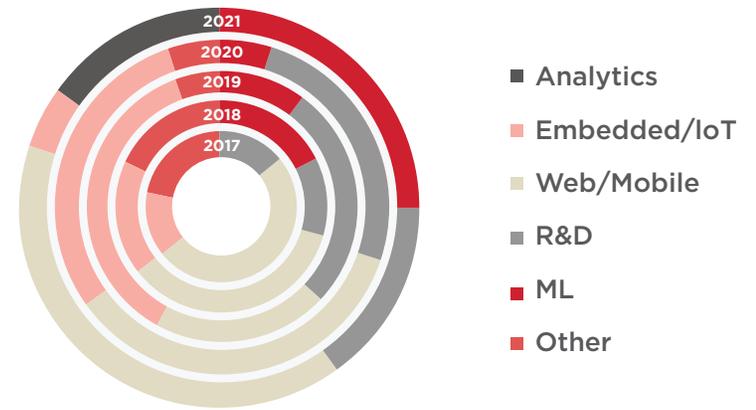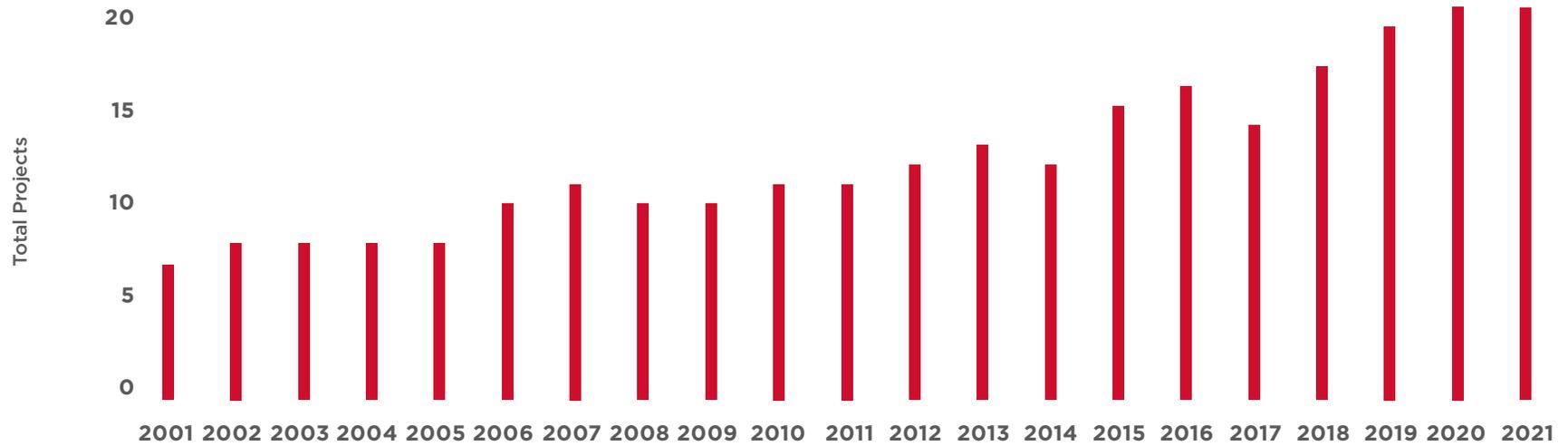
Students & Coaches

Design Studio Students

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Ian Anderson	Ritvik Handa	Noah McCashland	Sifat Syed
Tate Anderson	Ben Hanson	Devin McGuire	Erik Skoog
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Ciara Baumert	Tom Hermanek	Vishnu Menon	Zac Streich
Taylor Bernt	Audra Heyne	Alex Miller	Danny Tran
Tomo Bessho	Justin Ho	Parker Miller	Keith Tran
Jayden Boesch	Anna Holmquist	Lilly Moore	Luke Van Drie
Jordan Boesch	Andrew Hossack	Justin Morrow	Matt Vavricek
Landon Borges	Ryan Hruby	Patrick Murphy	Tom Walton
Tommy Braccia	Ray Huck	Tanner Nash	Chris Wieskamp
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Joey Carrigan	Bryce Janke	Daniel Noon	Bennett Wright
Megan Chaffey	Cole Johnson	Rachel Nordgren	Bryce Yong
Victoria Chin	Kally Karkazis	Carl Olson	Andy Zhang
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Grace Clausen	Zach Kerkman	Leah Olson	
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Emily Dalton	Nathan Kolbas	Savan Patel	
Alexis Delos Reyes	Erik Konnath	Dom Pelini	
Laura Derowitsch	Caleb Koranda	Chaitra Pirisingula	
Ellenna Divingnzzo	Michael Kovar	Praveen Rao	
Stan Drvol	Emily Kraai	Brysen Reeser	
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Charlie Floeder	Katie Leger	TJ Sandhu	
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Nathan Gentry	Antonio Linhart	Sam Schneider	
Hunter Godina	Ben Lohrman	Liam Seper	
Gracyn Green	Jacob Mann	Nicole Serpico	

Design Studio Coaches

Name	Company	Project
Bill Anderson	Optum	Spreetail
Todd Bryant	Independent	Hudl
Paul Cooper	Arbor Day Foundation	Farm Credit
Nick Ebert	Spreetail	Kiewit
Andy Giese	Filevine	Microsoft
Jeff Hale	Agilx	NDOT
Jake Heidelk	Amazon	Nelnet
Nick Hershberger	Ameritas	NSAA
Rees Klintworth	Hudl	Fiserv
Marek Kracl	Compass North	NSG
Tarryn Moss	Hudl	DMSi
Santi Murtagh	Opendorse	NRC Health
Rob Nickolaus	Q2	Bridges to Hope
John Roby	Allstate	Signature Performance
Ashlyn Slawnyk	Hudl	Firespring
Justin Stark	Hudl	Olsson
Sherry Weber	UNL - ITS	UBT
Matt Will	Spreetail	Mutual of Omaha
Brian Zimmer	Don't Panic Labs	VIZN Stats

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