MICHIGAN STATE UNIVERSITY

The Capstone Experience

Dr. Wayne Dyksen

Department of Computer Science and Engineering
Michigan State University
Spring 2019

From Students…
…to Professionals

Course Goals

- Build a Significant Software System
- Work in a Team Environment
- Learn New Tools and Environments
- Build and Administer Systems
- Develop Communication Skills
- Develop Interview Talking Points
- Consider Issues of Ethics and Professionalism

Course Goals

- Teams of Students
- Build Significant Software System
  - Design
  - Develop
  - Debug
  - Document
  - Deliver
- For Corporate Clients
- In 15 (Short) Weeks

Project Deliverables

- Project Plan Document & Presentation
- Alpha Presentation
- Beta Presentation
- Project Software & Documentation
- Project Video
- Design Day

See Major Milestones.

All-Hands Meetings

- TuTh, 3:00-4:20 p.m., 1279 Anthony Hall
- Presentations By
  - Professor
  - Teams
    - Status Report Presentations
    - Formal Presentations
      - Project Plan
      - Alpha
      - Beta
    - Project Videos
  - Guest Speakers

All-Hands Meetings

- 01/08: Capstone Overview
- 01/10: Project Plan
- 01/15: Risks and Prototypes
- 01/17: Team Status Report Presentations
- 01/22: Schedule and Teamwork
- 01/24: Team Status Report Presentations
- 01/29: Team Project Plan Presentations
- 01/31: Team Project Plan Presentations
- 02/05: Team Project Plan Presentations
- 02/07: Team Project Plan Presentations
- 02/12: Resume Writing and Interviewing
- 02/14: Creating and Giving Presentations
- 02/19: Team Alpha Presentations
- 02/21: Team Alpha Presentations
- 02/26: Team Alpha Presentations
- 02/28: Team Alpha Presentations
- 03/05: (Spring Break, No Meeting)
- 03/07: (Spring Break, No Meeting)
- 03/12: Team Status Report Presentations
- 03/14: Intellectual Property
- 03/19: Design Day and the Project Videos
- 03/21: Camtasia Demo
- 03/26: Ethics and Professionalism
- 03/28: Team Status Report Presentations
- 04/02: Team Beta Presentations
- 04/04: Team Beta Presentations
- 04/09: Team Beta Presentations
- 04/11: Team Beta Presentations
- 04/16: Team Status Report Presentations
- 04/18: Team Status Report Presentations
- 04/23: Project Videos
- 04/25: Project Videos and All Deliverables
- 04/25: Design Day Setup
- 04/26: Design Day
- 05/02: Project Videos

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Team Amazon

Department of Computer Science and Engineering
Michigan State University
Spring 2019

From Students…
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amazon

Amazon.com: Online Shopping

https://www.amazon.com

SEE SOMETHING NEW, EVERY DAY. TAKE A LOOK

amazon Try Prime

All

New Year New You

Deliver to East Lansing 48824

Your Amazon.com | Today's Deals | Gift Cards | EN | Hello. Sign in Account & Lists | Orders | Try Prime | 0 Cart

Unlimited access to 50 million songs

amazon music

Bargain finds

Buy 2 for $50

New Year, New You

Team Amazon
Project Overview

Browser Sharing for Customer Support

- Functionalities
  - Provide Customer Support
  - Utilize Collaborative Browser Sharing
- Features
  - Share Only Browser View
  - No Download or Plugin Required
  - Pass and Maintain Data Securely
  - Offer Chatting and Annotating
  - Provide Session Logging
- Technologies
  - Amazon Web Services Elastic Cloud 2 (AWS EC2)
  - Amazon Web Services Command Line Interface (AWS CLI)
  - HTML / JavaScript / AJAX
  - React / Angular / Vue
  - REST Web Services / XML
  - Database / SQL

amazon

Seattle, Washington
Detroit, Michigan

The Capstone Experience

Team Amazon

Megha Erappa, Rahul Yalamanchili, Colin Zhong, Liyuan Duan, Jonathan Kushion, Eunice Yoon

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Team Aptiv

Department of Computer Science and Engineering
Michigan State University
Spring 2019

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APTIV

Aptiv | Our Journey - Making M

https://www.aptiv.com/our-journey

APTIV

OUR JOURNEY INNOVATION CAREERS | INVESTORS MEDIA

Making mobility work

Team Aptiv
Project Overview

Analysis of Autonomous Vehicle Testing Video

- Functionalities
  - Analyze Autonomous Vehicle Testing
  - Post-Process On-Road Video Logs
- Features
  - Identify Various Environmental Features
    - Other Vehicles
    - Overpasses
    - Tunnels
    - Bridges
    - Overhanging Trees
  - Scan and Tag All Video Logs
  - Synchronize Metadata with Video
  - Support Video Formats from US, Europe and Asia
  - Leverage Machine Learning
  - Integrate into Aptiv's Servers
- Technologies
  - Video and Image Processing
  - Machine Learning (ML)
  - Database Technologies

APTIV
Troy, Michigan

The Capstone Experience

Team Aptiv

Shivaani Annadurai, Harshita Das, Rebecca Skladd, Patrick Thornton, Diana Xia

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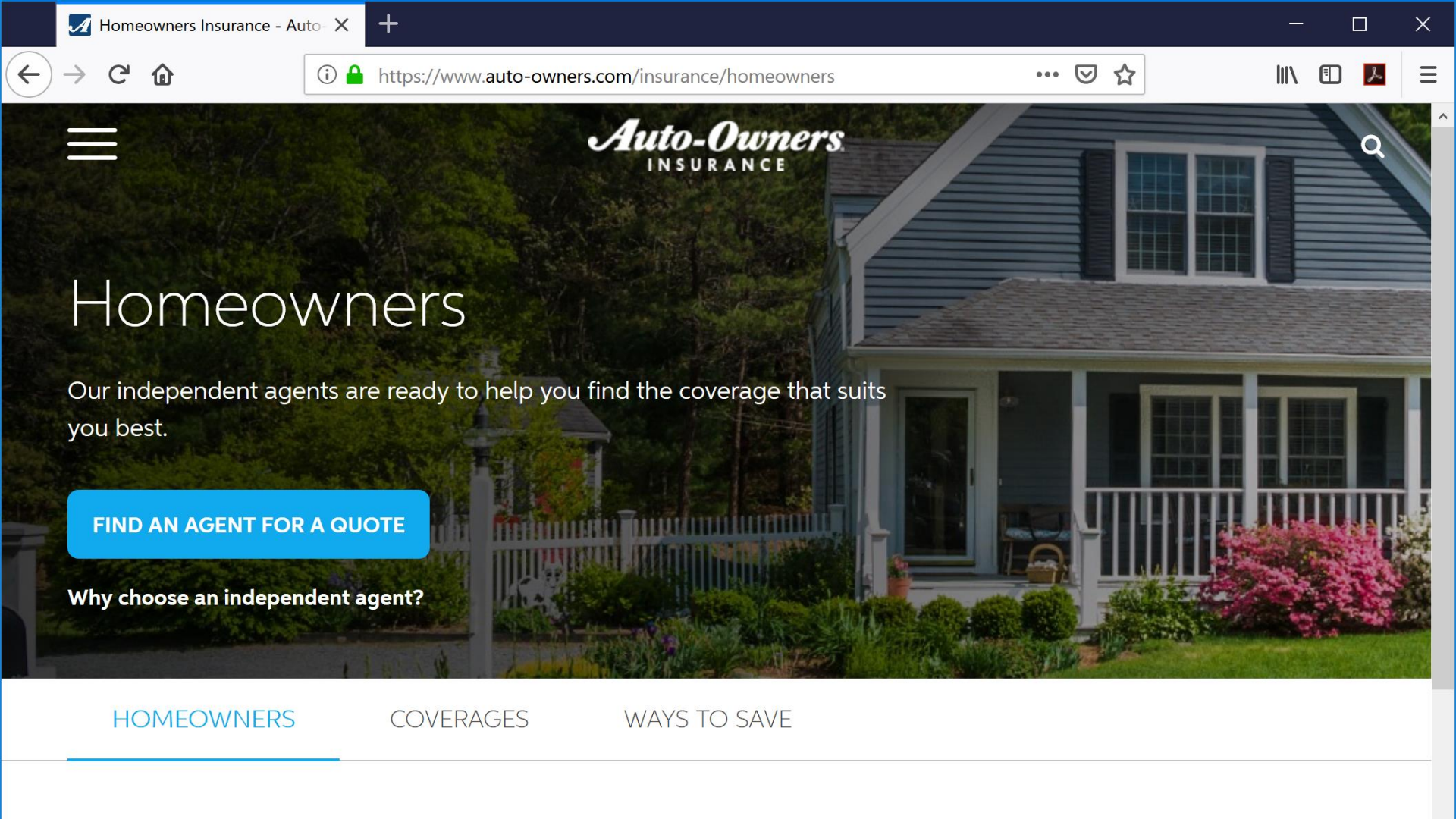
Team Auto-Owners

Department of Computer Science and Engineering
Michigan State University
Spring 2019

From Students…
…to Professionals

Auto-Owners
INSURANCE
LIFE • HOME • CAR • BUSINESS


Homeowners Insurance - Auto
https://www.auto-owners.com/insurance/homeowners
Auto-Owners INSURANCE
Homeowners
Our independent agents are ready to help you find the coverage that suits you best.
FIND AN AGENT FOR A QUOTE
Why choose an independent agent?
HOMEOWNERS
COVERAGES
WAYS TO SAVE

Team Auto-Owners
Project Overview

Secretary of State (SoS) Software Robot

- Functionalities
  - Expedite Worker's Compensation Insurance Claim Submission
  - Reconcile Business Name Against Secretary of State
  - Utilize Software Robots (Soft Bots)
- Features
  - Build Web Application
    - Accept Input with Business Information
    - Search Relevant SoS Website Using RPA
    - Present Results for Validation by Underwriter
    - Record Statistics
  - Leverage Robotic Process Automation (RPA)
  - Handle All 50 Secretary of State Websites
  - Design and Implement Matching Algorithm
    - Exact or Partial
    - Synonym or Alternate Spelling
  - Provide Reporting Dashboard with Metrics
- Technologies
  - Robotic Process Automation (RPA)
  - UiPath Go!
  - CSS / HTML / JavaScript / PHP
  - Database Technologies

Auto-Owners INSURANCE

LIFE • HOME • CAR • BUSINESS

Lansing, Michigan

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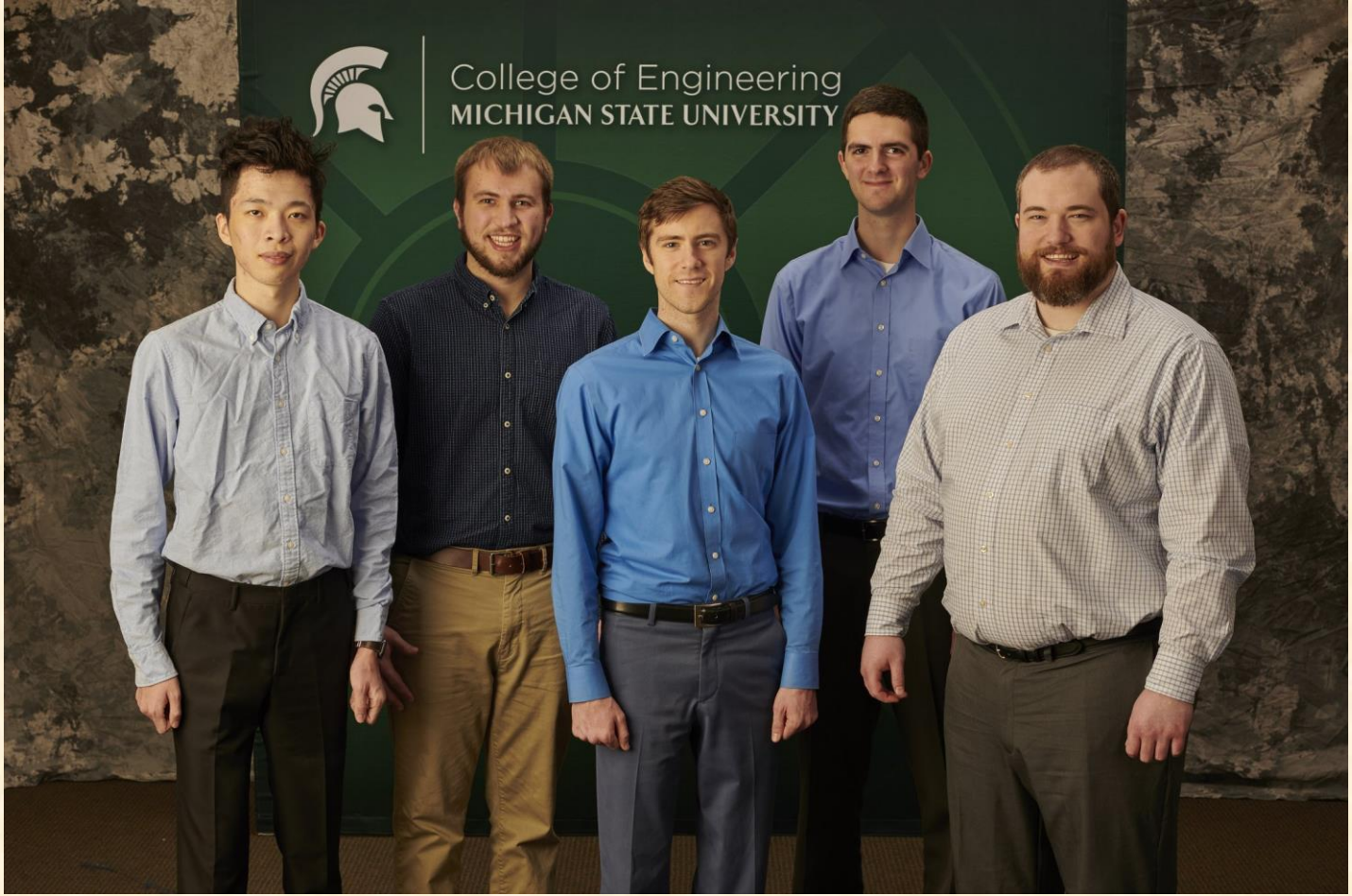

Team Auto-Owners

Tiezheng Shao, Brian Jean, Joey Baum, Richard Hutchins, Adam Leyrer

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The Capstone Experience

Team Consumers Energy

Department of Computer Science and Engineering
Michigan State University
Spring 2019

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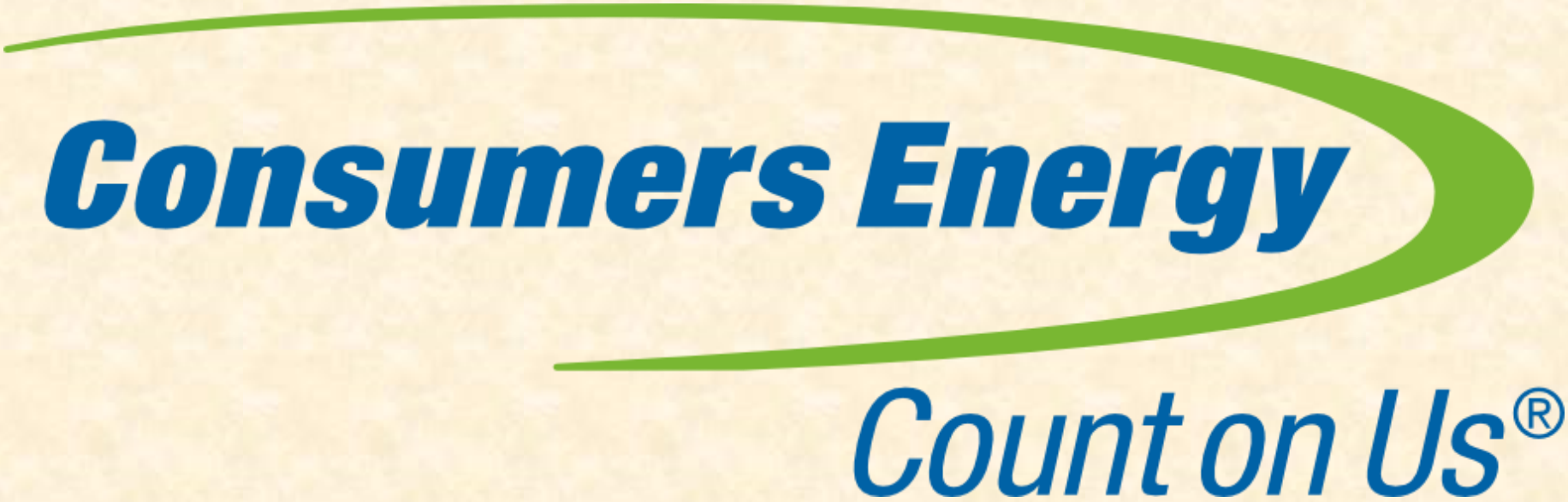
Consumers Energy
Count on Us®

Home | Consumers Energy

https://www.consumersenergy.com

Consumers Energy
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East Lansing, MI 40°

RESIDENTIAL | BUSINESS | COMMUNITY | COMPANY

Team Consumers Energy
Project Overview

New Customer Service Channel

- Functionalities
  - Improve Customer Call Experience
  - Provide New Channel to Interact with Consumers Energy
- Features
  - Enable Callers to Use Smart Phone Capabilities
    - Text Link to Responsive Web App
    - Interactive Version of Phone Tree or Chatbot
  - Handle All Phone Tree Options with Smart Phone
    - Billing Inquiries
    - Making Payments
    - Setting Up Payment Plans
    - Etc.
  - Maintain Phone Call Connection
  - Support Transition to CE Live Agent
- Technologies
  - CSS / HTML / JavaScript / PHP
  - Chatbot Technologies
  - Consumers Energy APIs
  - Customer Journey Tracking
  - SOAP Web Services

Consumers Energy
Count on Us

Jackson, Michigan

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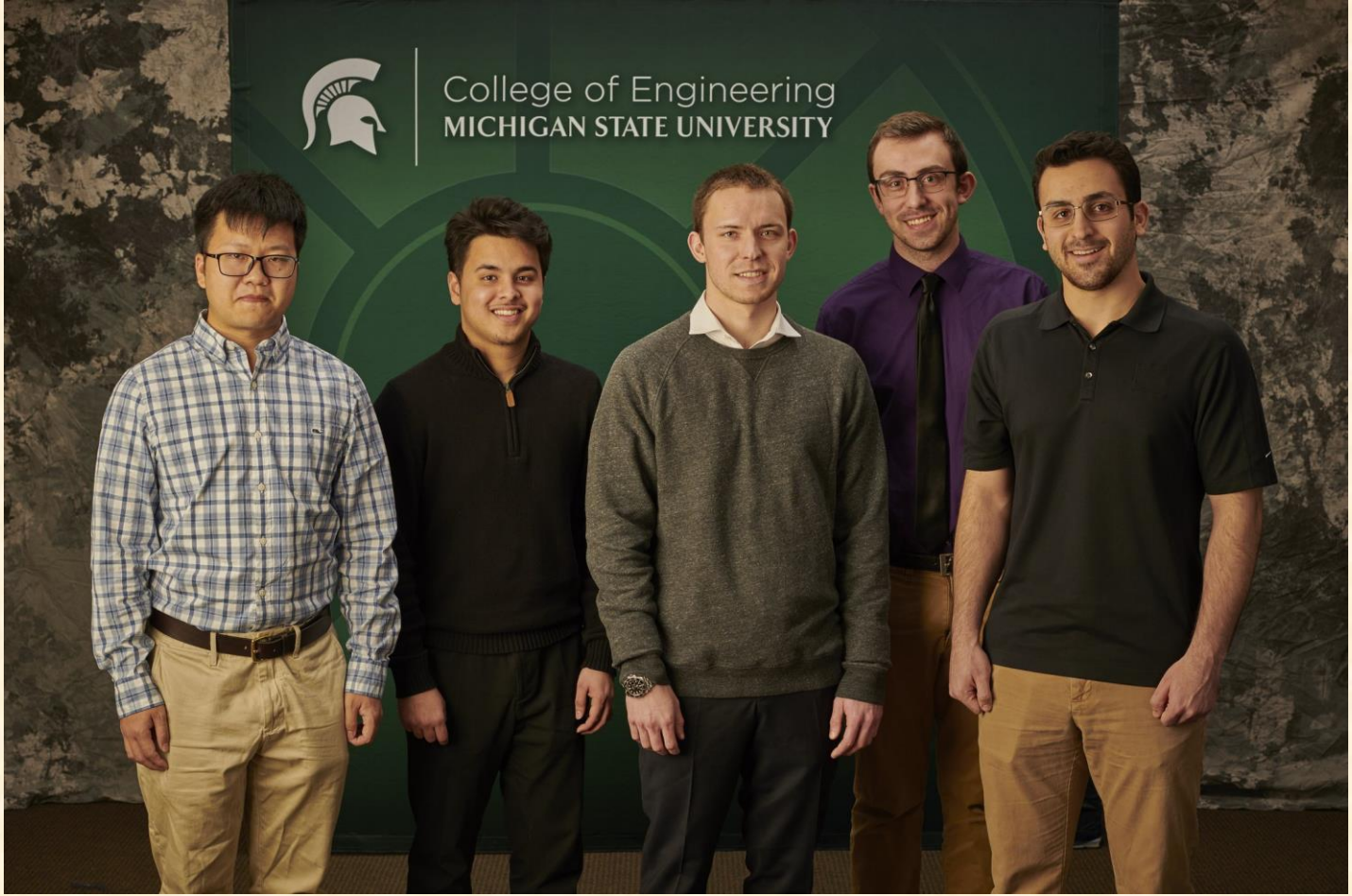

Team Consumers Energy

Hang Zhao, Muhammed Zahid, Ben Weinstock, Andrew Morrissette, Ibe Saleh

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Team Dow

Department of Computer Science and Engineering
Michigan State University
Spring 2019

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DOW
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Welcome to Dow | Materials Sc

https://www.dow.com/en-us

Dow.com | Corporate Dow.com

DOW

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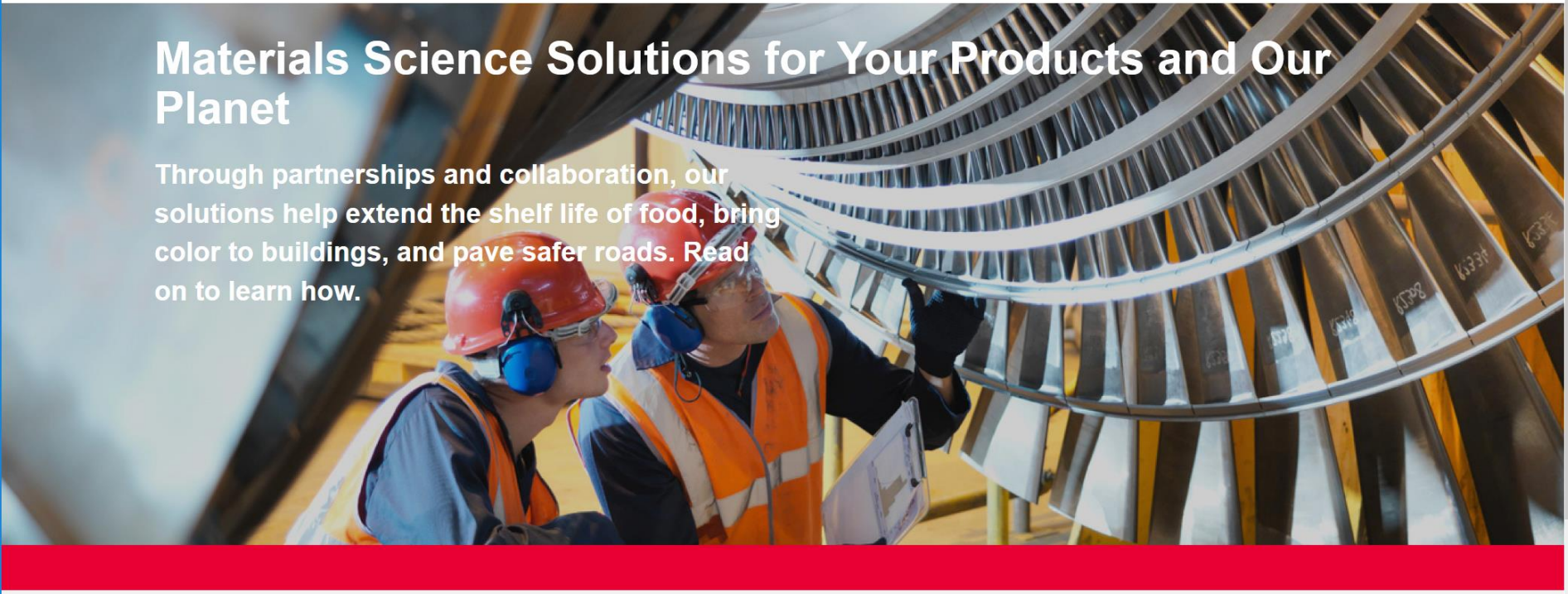
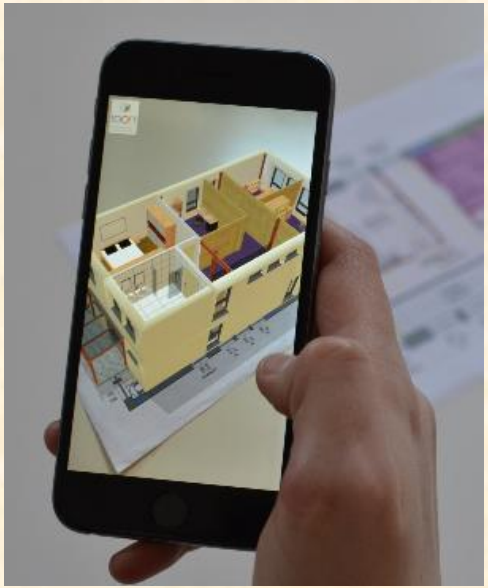


Team Dow
Project Overview

VR Model Management Platform

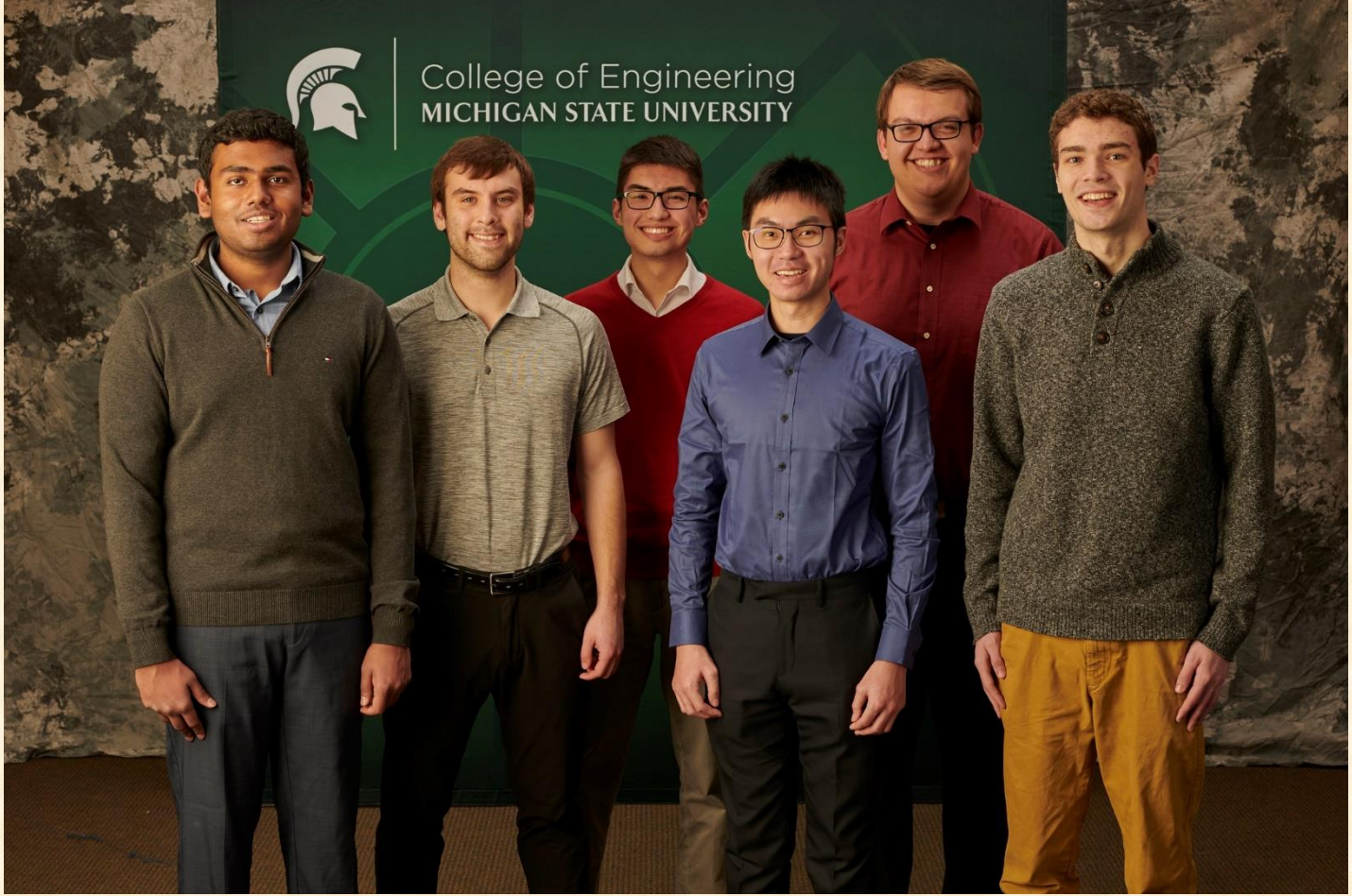
- Functionalities
  - Market Products using Virtual Reality
  - Support Entirety of Dow Chemical
- Features
  - Architect and Build Universal Dow Platform
    - Upload and View 3D Models Easily
    - Support Various Mobile Devices
    - Eliminate “One-and-Done” Solutions
  - Target Dow Stakeholders
    - Sales and Marketing Professionals
    - Customers
  - Build Cloud-Hosted Backend
    - Handle Role-Based Security
    - Manage 3D Models
- Technologies
  - Apple iOS / Swift
  - Google Android / Java
  - Unity Pro / Collab
  - ARKit / Vuforia
  - App Center / TestFlight
  - Microsoft Azure



DOW®

Midland, Michigan

The Capstone Experience



Team Dow

Thomas Diaz, Matt Dennis, David Slimak, David Zhou, Harrison Sanders, Nate Kurt

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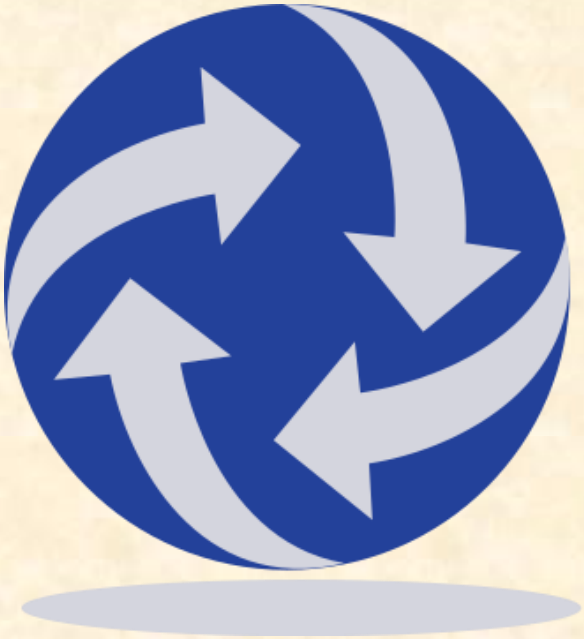
Team DRIVEN-4

Department of Computer Science and Engineering
Michigan State University
Spring 2019

From Students…
…to Professionals



DRIVEN-4

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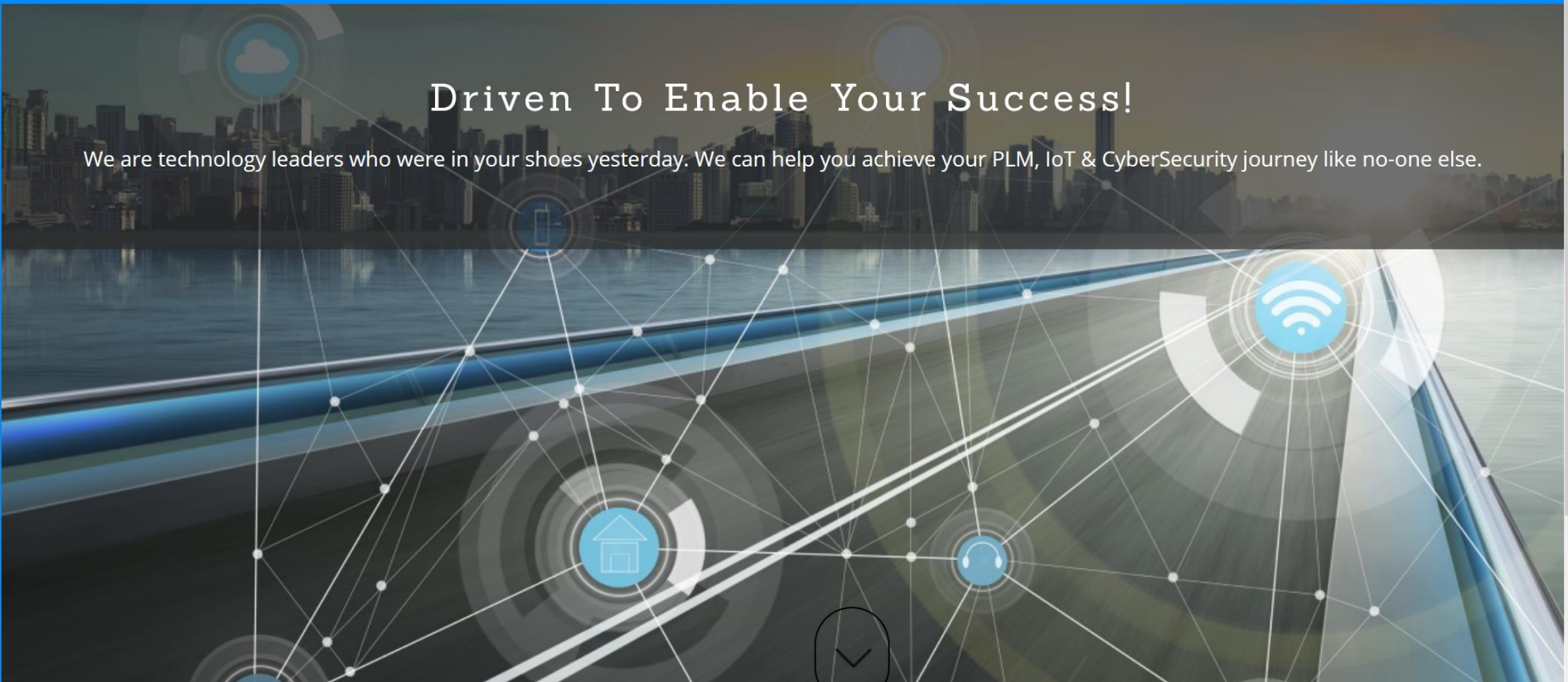
Driven To Enable Your Success!

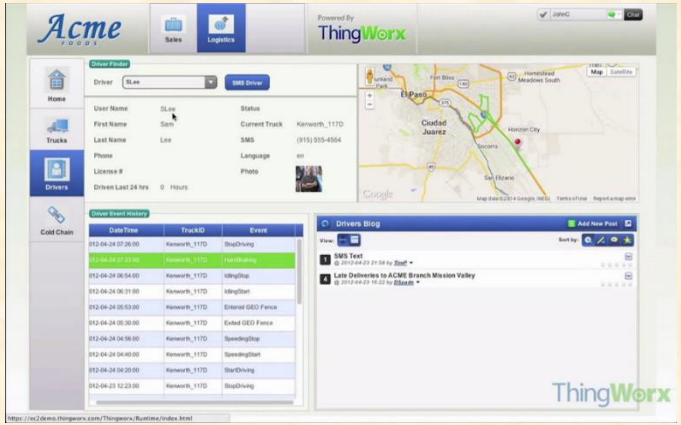
We are technology leaders who were in your shoes yesterday. We can help you achieve your PLM, IoT & CyberSecurity journey like no-one else.



Team DRIVEN-4
Project Overview

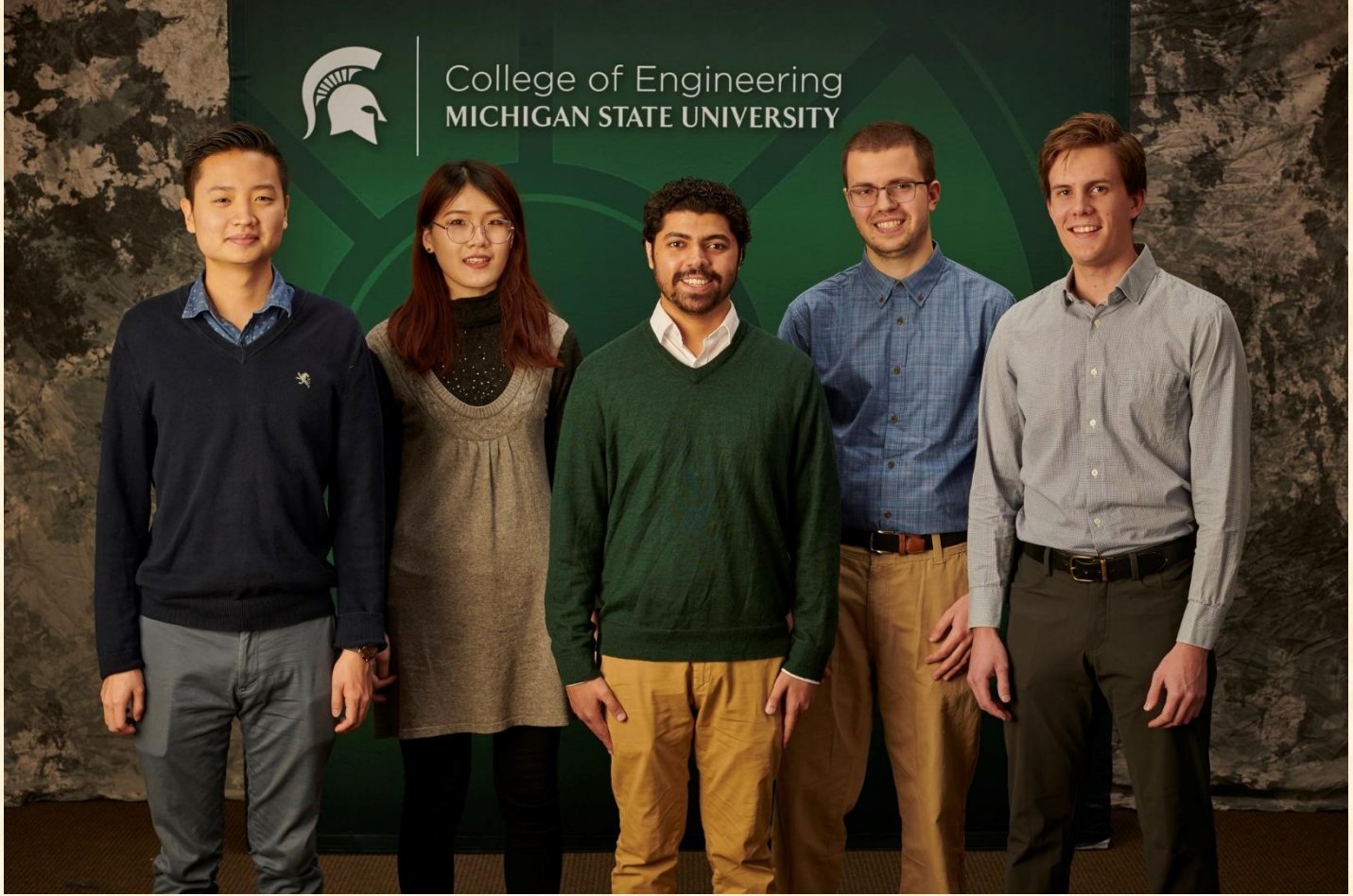
Product Development Portfolio and Planning

- Functionalities
  - Forecast and Track Execution of Annual Product Development Budget
  - Utilize Capacity-Planning Planning Technique
- Features
  - Enable
    - Portfolio Planning for 1, 3 or 5-Year Terms
    - Portfolio Execution with Role-Based Forecast
    - Product Planning for 10-Year Gantt View
  - Provide Web Interface and Visualization
    - Responsive
    - Target End-User
    - Include Administrative Features
  - Deliver Cross-Platform Mobile App
- Technologies
  - CSS / HTML / JavaScript / React
  - PTC Thingworx
  - Xamarin
  - RESTful Web Services



DRIVEN-4
St. Joseph, Michigan

The Capstone Experience



Team DRIVEN-4

Kevin Kye, Athena Zhang, Hassan Tarar, Kyle Forbes, Dan Tinsman

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Team Evolutio

Department of Computer Science and Engineering
Michigan State University
Spring 2019

From Students…
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evolutio

Evolutio

www.evolutiops.com

WELCOME

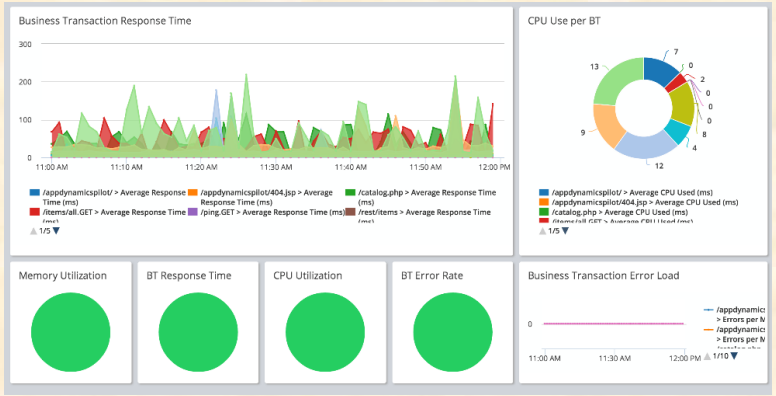
eVolutio

TEAM CONNECT

Team Evolutio
Project Overview

AppDynamics Platform Configuration Tool

- Functionalities
  - Empower Evolutio Clients to Utilize Cisco AppDynamics
  - Easily Configure, Deploy and Manage Environments
- Features
  - Build a User-Friendly Web Application
    - Configure, Deploy and Manage Environments
    - Easily with “Push of a Button”
  - Support Export and Import of Configurations
  - Provide Environment Migration Utility
  - Support Both New and Existing Environments
  - Explore Use of Natural Language Processing
- Technologies
  - Application Performance Management (APM) Software
  - Cisco AppDynamics
  - CSS / HTML / JavaScript / PHP
  - Angular / React / Web Frameworks
  - Java



Indianapolis, Indiana

The Capstone Experience

Team Evolutio

Ben Haase, Cameron Rasico, KP Inuaeyen, Jon Dressel, Ian Guswiler

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Team Ford

Department of Computer Science and Engineering
Michigan State University
Spring 2019

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Ford

2019 Ford® Mustang Sports C

https://www.ford.com/cars/mustang/?gnav=header-all-vehicles

Ford
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Vehicles Shop Finance Owner

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Pricing & Incentives Build & Price Search Inventory

2019 Ford Mustang

Build & Price

Team Ford
Project Overview

Greenfield Labs SHARED Locker System

- Functionalities
  - Encourage Use of Shared High-Value Assets (Devices)
    - Showcase Existence
    - Track via Easy Check-Out / Check-In
  - Target Ford's Greenfield Labs (Palo Alto)
- Features
  - Build
    - SHARED Mobile Apps
    - Web Administrator Portal
  - Implement Various APIs
    - Reservations
    - Metrics
    - Push Notifications
  - Create Event (Check-In/Check-Out) Stream
  - Develop Raspberry PI Event Listener
    - Lock/Unlock Cabinet
    - Adjust RGB Lighting
- Technologies
  - OAuth 2.0
  - Amazon Cognito
  - Apple iOS and Google Android
  - CSS / HTML / JavaScript / PHP
  - Snipe-IT
  - Raspberry Pi
  - Apache Kafka
  - Amazon Web Services (AWS) Kinesis
  - RGB Light Strip
  - 12V Actuated Lock

Dearborn, Michigan

The Capstone Experience

Team Ford

Rob Sulaka, Wei Dai, Seth Killian, Ning Han, Brett Dziedzic

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Team Google

Department of Computer Science and Engineering
Michigan State University
Spring 2019

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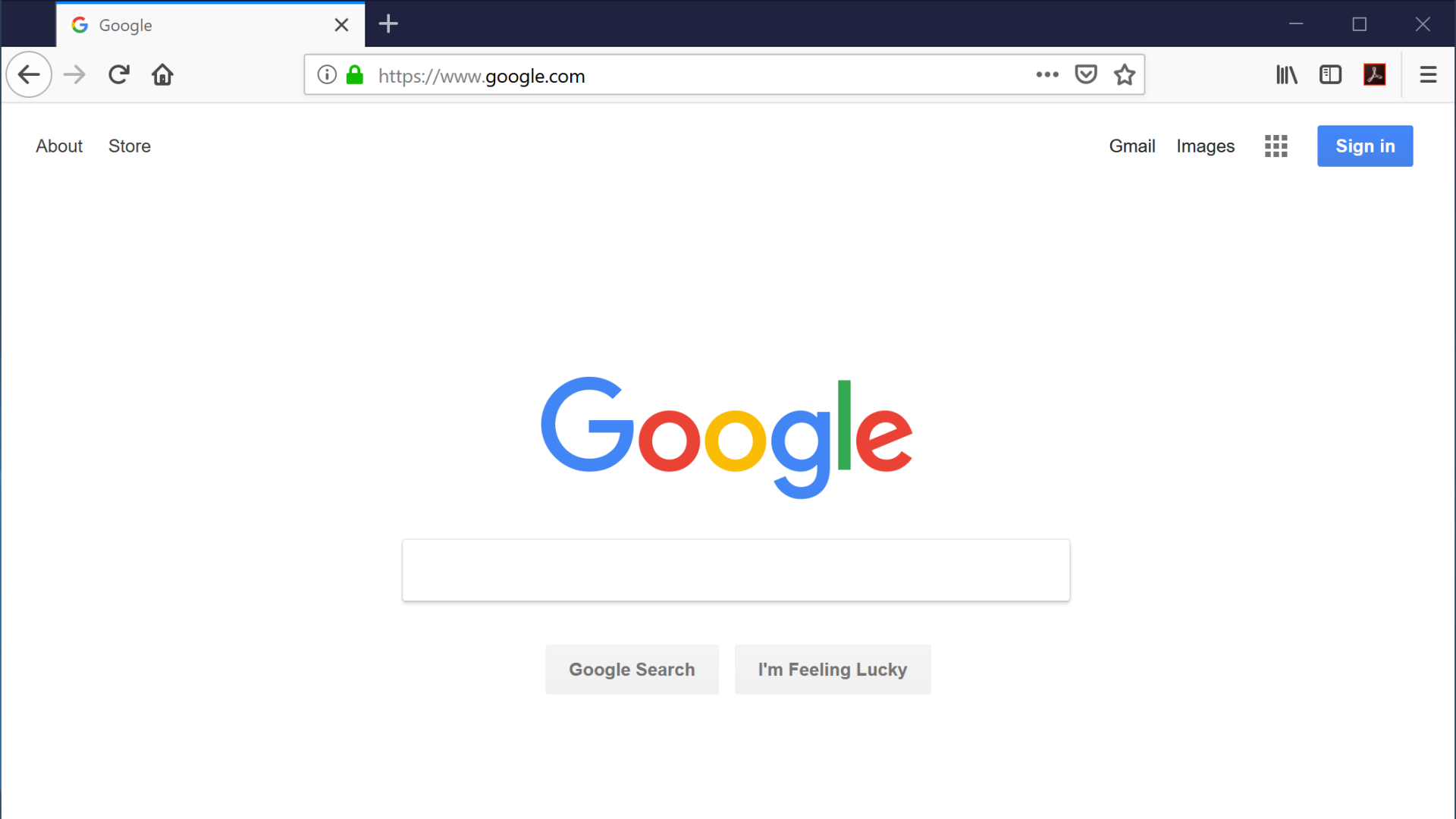
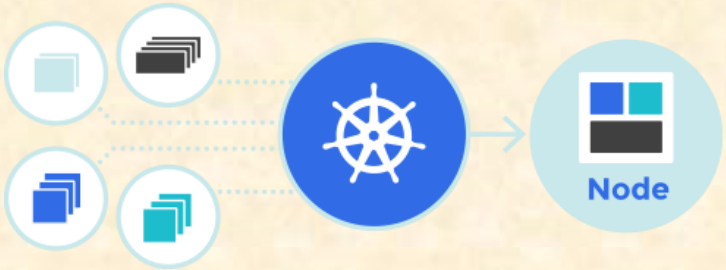
Google


Google
https://www.google.com
About
Store
Gmail
Images
Sign in
Google
Google Search
I'm Feeling Lucky

Team Google
Project Overview

Kubernetes Cluster Inspection Tool

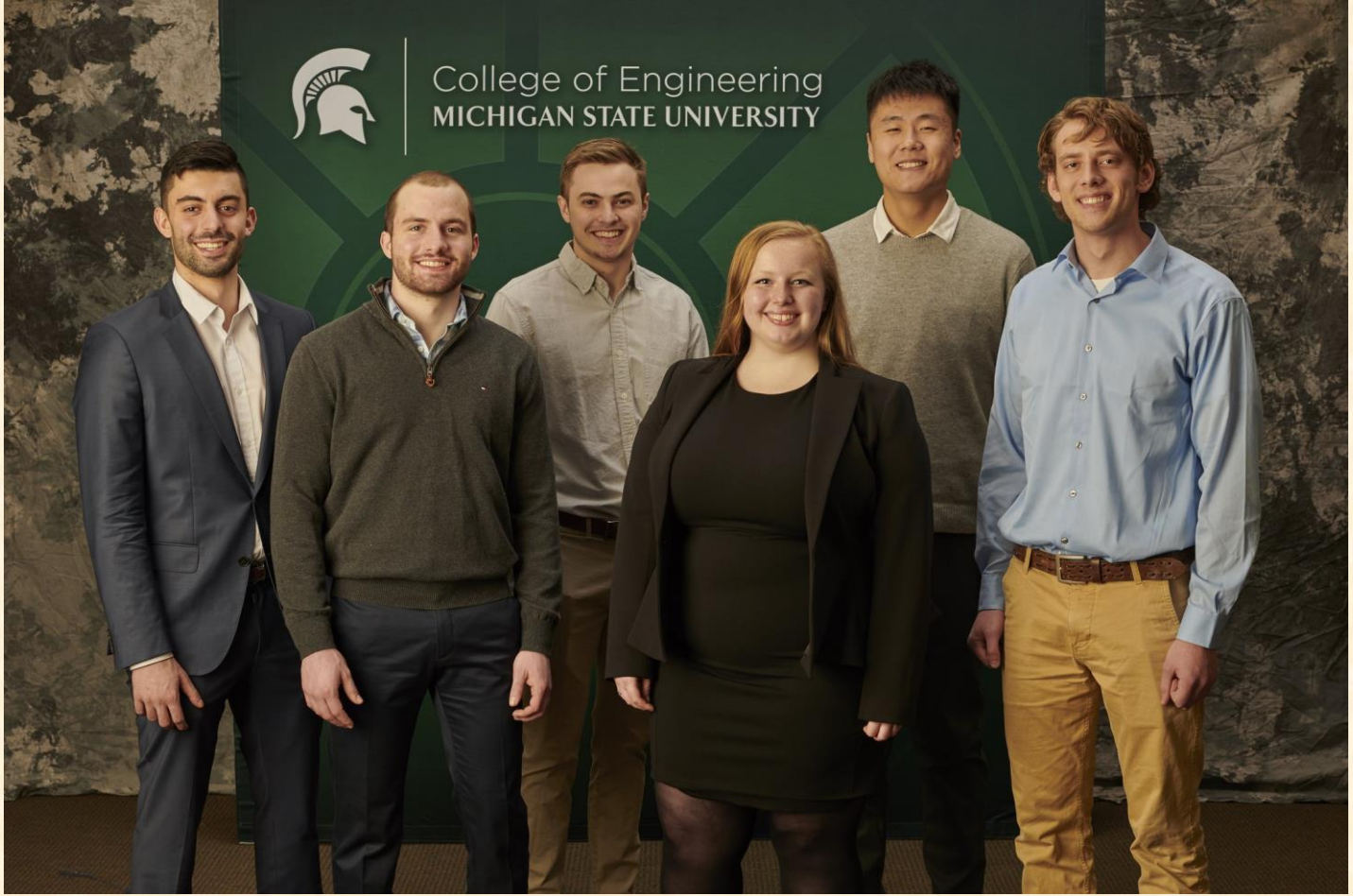
- Functionalities
  - Diagnose Architecture of Kubernetes Cluster
  - Provide Robust Inspection Tool
  - Include Both Current and Historical State
- Features
  - Gather All Cluster Data into Single View
  - Provide Various Insights
    - Health
    - Performance
    - Resource Changes
  - Support Configurable Set of Filters
  - Ingest with K8s Stackdriver Agent
  - Trace Lifecycle of Nodes, Pods and Other Objects
  - Visualize Results Using Default Kubernetes APIs
  - Implement Easily on Any Kubernetes Distribution
- Technologies
  - Kubernetes
  - K8s API
  - Fluentd
  - Stackdriver
  - Prometheus



Google

Kirkland, Washington
Mountain View, California

The Capstone Experience



Team Google

Guillermo Jimenez, Casey Schneider, Ben Whitelaw, Haylee Quarles, Linghao Ji, Dave Ackley

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Team Herman Miller

Department of Computer Science and Engineering
Michigan State University
Spring 2019

From Students…
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HermanMiller

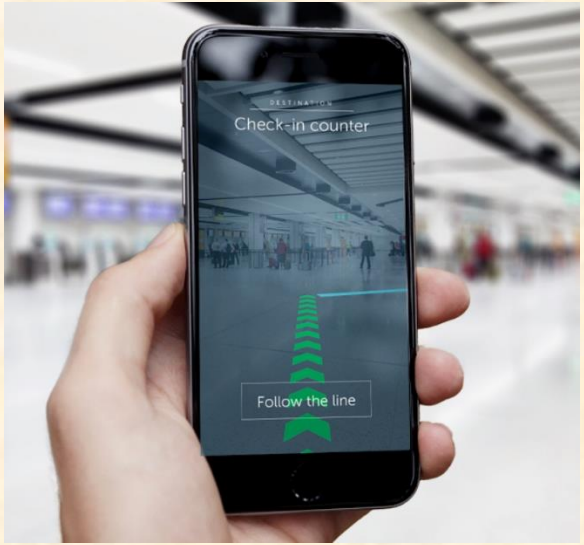
Designed by Joey Ruiter

Canvas Vista

Team Herman Miller
Project Overview

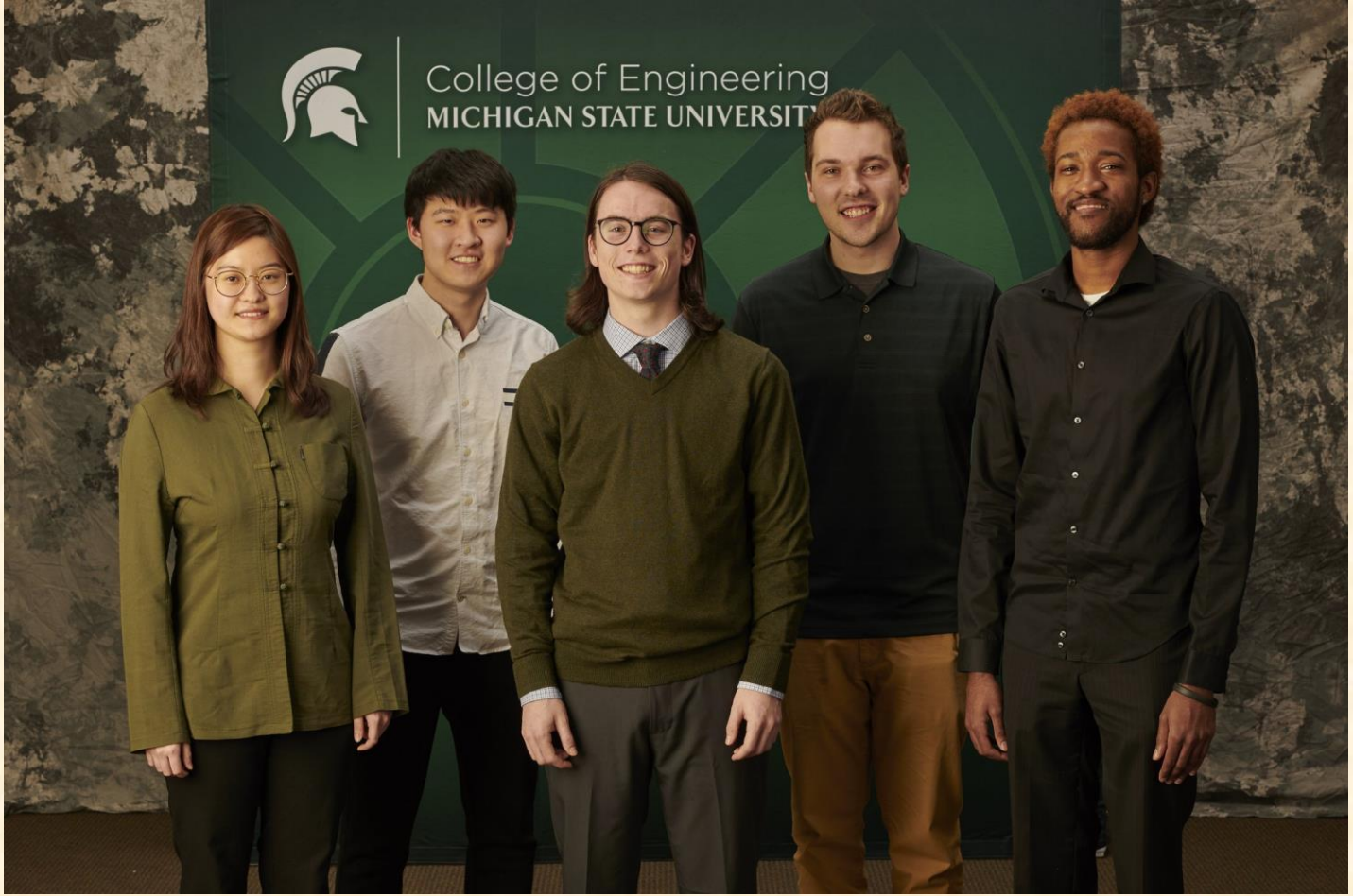
Office Navigation Using Augmented Reality

- Functionalities
  - Navigate Large Complex Buildings
  - Utilize Augmented Reality
- Features
  - Develop Augmented Reality Mobile App
  - Search for Various Spaces
    - Open Offices
    - Available Conference Rooms
    - Cafeterias
  - Give Turn-by-Turn Instructions
  - Leverage Machine and Deep Learning
  - Build on Open Framework with Exposed APIs
  - Be Trainable, Scalable and Flexible
  - Provide Configuration Interface for Building Managers
- Technologies
  - Apple iOS / Swift
  - Apple ARKit
  - Apple Location Services
  - Machine Learning
  - Deep Learning



HermanMiller
Zeeland, Michigan

The Capstone Experience



Team Herman Miller

Zhenru Wang, Stefan Zhang, Aaron Eshleman, John Riley, Matt Rhodes

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Team Humana

Department of Computer Science and Engineering
Michigan State University
Spring 2019

From Students…
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Humana

Find the Right Health Insurance

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Help Español

Humana

Shop for Plans

Member Resources

Sign in

Greetings

New Humana member?

We're so glad! Get the most out of your new health insurance benefits. Activate your MyHumana account today.

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Team Humana
Project Overview

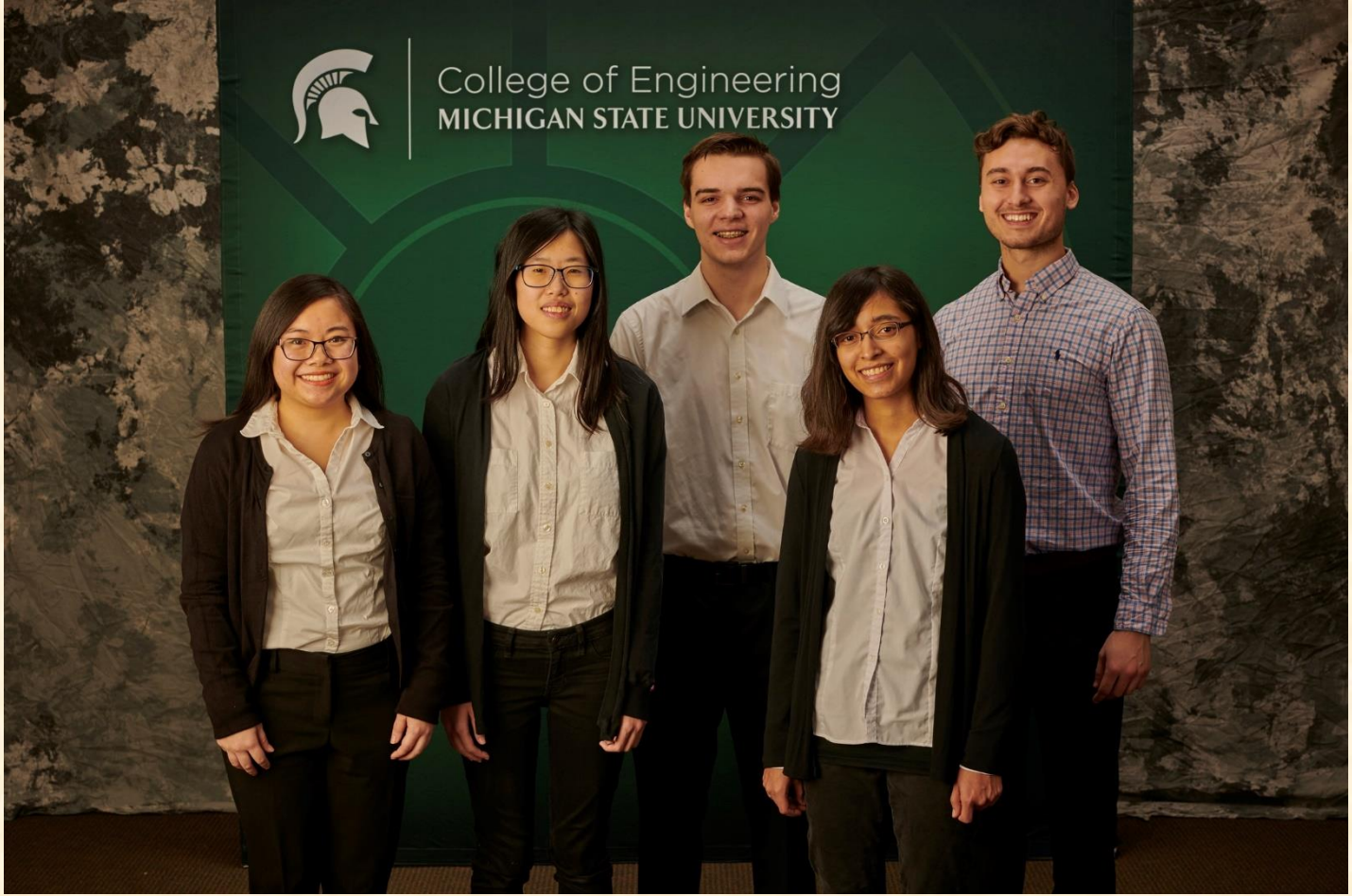
Technology Peripheral Inventory Predictor

- Functionalities
  - Improve Availability of Computer Peripherals
  - Predict Demand Based on History
- Features
  - Build Responsive Web App
  - Target End User Technology Staff
  - Leverage Machine Learning
    - Develop Key Predictive Model Attributes
    - Include Ability to Tune Key Parameters
  - Incorporate Feedback Loop
  - Visualize Data Effectively
- Technologies
  - CSS / HTML / JavaScript
  - Machine Learning
    TensorFlow / sciikit-learn / Spark MLLib
  - Data Visualization
    D3 / Chart.js

Humana

Louisville, Kentucky

The Capstone Experience



Team Humana

Linda Duong, Siru Chen, Brendan Vande Kieft, Katie Sydlik-Badgerow, Gabe Apaza

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Team Meijer

Department of Computer Science and Engineering
Michigan State University
Spring 2019

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https://www.meijer.com/content/content.jsp?pageName=curbside

meijer

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Your Store
East Lansing

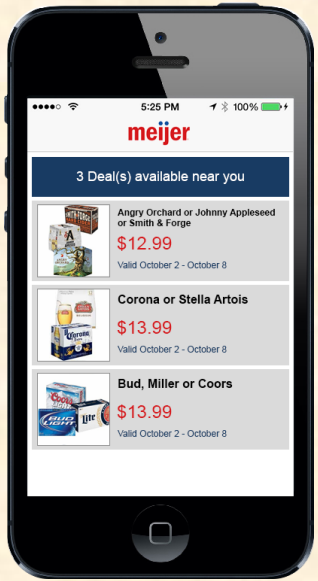
0

Departments | Curbside | Delivery | mPerks | Weekly Ads | Pharmacy

Team Meijer
Project Overview

Location-Based Personalized Shopping

- Functionalities
  - Make Customers Aware of On-Sale Items
  - Provide Personalized mPerks Offers
  - Based on Customer's Affinity and Location In Store
- Features
  - Provide In-Aisle Engagement Experience
  - Leverage Mist Wireless Network for Location
  - Model Customer Shopping Tendencies Using AI and ML
  - Drive Sales of Additional Items
  - Support Apple iOS and Google Android
  - Implement Customer Customization
- Technologies
  - Apple iOS and Google Android
  - Xamarin
  - MIST WLAN / SDK
  - Microsoft
    - .NET Framework / C# / ASP.NET,
    - Azure Mobile Services (Deployment and Notifications)
    - Visual Studio Team Server
  - Artificial Intelligence (AI)
  - Machine Learning (ML)
  - App Insights for Analytics
  - SQL Server / DocumentDB
  - Meijer Web Services



meijer®

Grand Rapids, Michigan

The Capstone Experience

Team Meijer

Chris Le, Jacob Kalt, Sasha Morford, Jack Studzinski, Blaire Izbicki

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Team Michigan State University HPCC

From Students…
…to Professionals

Department of Computer Science and Engineering
Michigan State University
Spring 2019

Michigan State University
High Performance Computing Center

Institute for Cyber-Enabled Res

https://icer.msu.edu

MICHIGAN STATE UNIVERSITY

ICER INSTITUTE FOR CYBER-ENABLED RESEARCH

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iCER Student Highlights: Aseel Bala

Team Michigan State University HPCC
Project Overview

Simplifying High Performance Computing

- Functionalities
  - Make HPC Resources Simpler to Use
  - Target Non-Programmer Researchers
- Features
  - Build Responsive Web App
    - Create Job Scripts
    - Observe Job Progress
    - Observe Group Behavior
  - Create Testing “Playground”
    - Test Job Scripts
    - Understand Resource Requirements
    - Tune Job Submissions
  - Provide Dashboard for HPCC Administrators
  - Mine Years of HPCC Data
- Technologies
  - CSS / HTML / JavaScript / PHP
  - JavaScript / AngularJS / JSON
  - SLURM Workload Manager
  - RESTful Web Services
  - Machine Learning (ML)
  - Data Mining

High Performance Computing Center
East Lansing, Michigan

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Team Michigan State University HPCC

Zach Roush, Christian Luedtke, Matt Williams, Zhihan Wang, Caleb Winner

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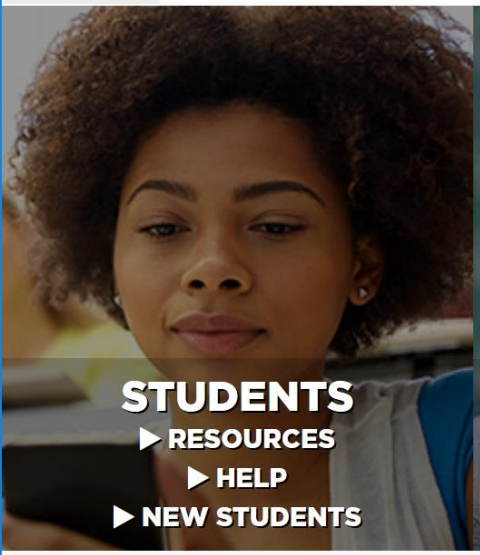
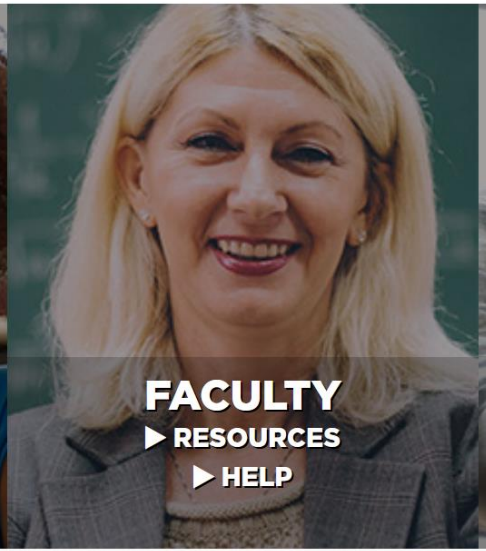
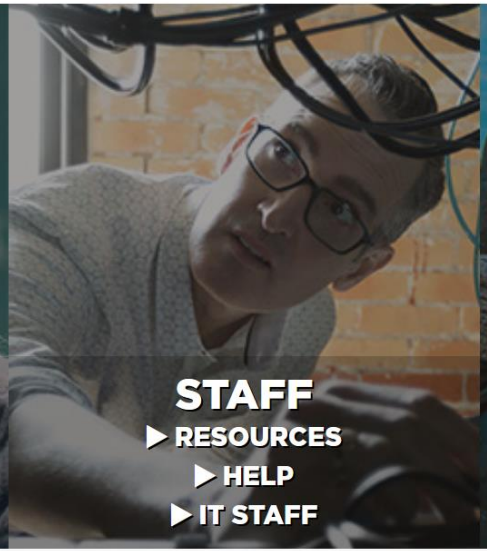
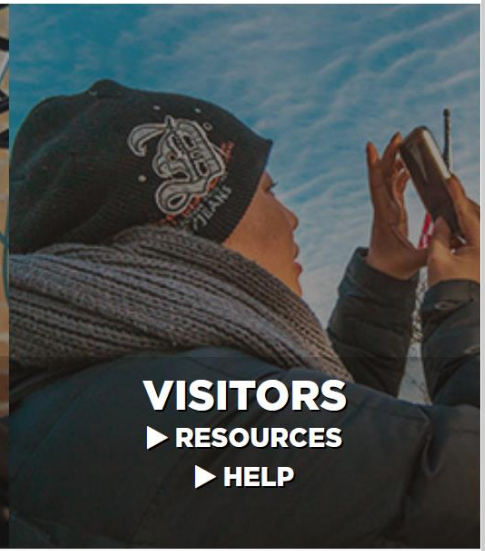








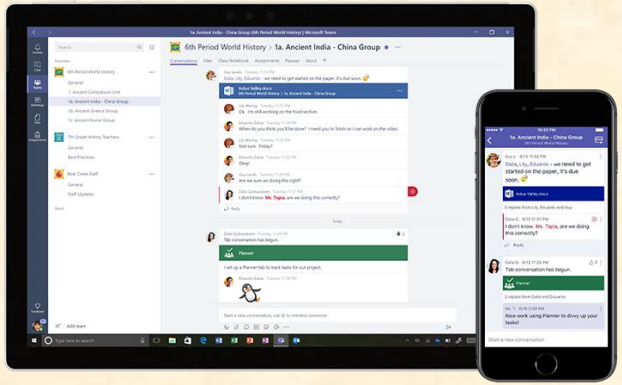
DATA CENTER SAVINGS

Centralization Savings Explored for Human Resources

Team Michigan State University ITS
Project Overview

Group Project Organization and Scheduling

- Functionalities
  - Facilitate Student Group Projects
  - Automate Organizing and Scheduling
  - Utilize Various Technologies
- Features
  - Organize Groups Based on Calendars
  - Find Available Meeting Times
  - Support Various Messaging Platforms
  - Provide Cloud Storage for Collaboration
  - Build Infrastructure Using Amazon Web Services
  - Deliver Production Ready System
- Technologies
  - OAuth 2.0
  - Calendars (O365, Google)
  - Cloud Storage (OneDrive, Google, Dropbox)
  - Messaging (Slack, Teams, Discord)
  - Version Control (GitLab, GitHub)
  - Amazon Web Services (AWS)



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Team Michigan State University ITS

Cyndy Ishida, Jacob Bickel, Kristin Calder, Jack Wydra, Sarah Abumansoor, Jacob Dasuqi

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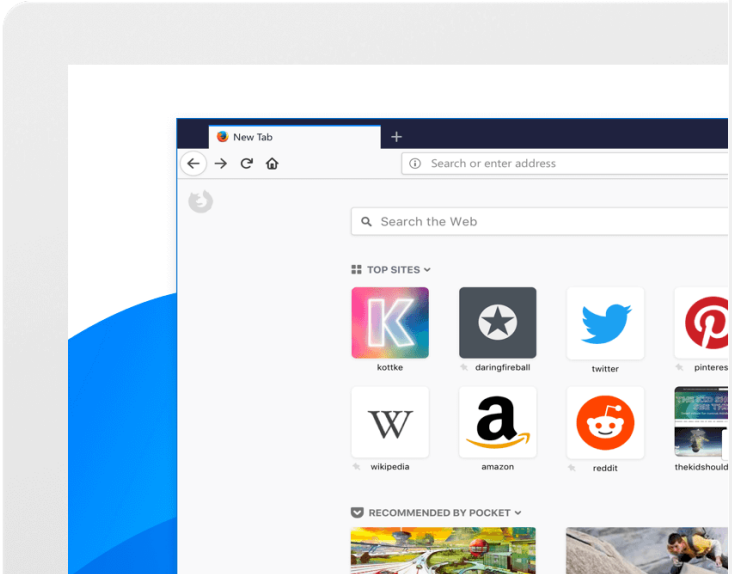
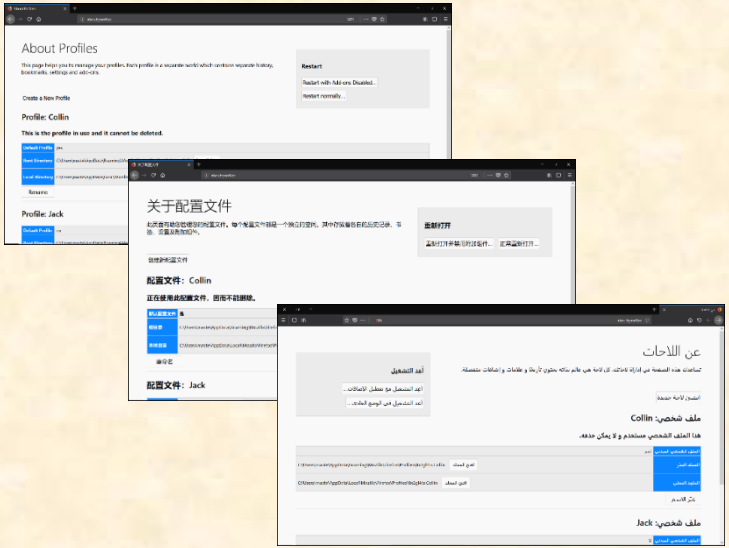


Team Mozilla
Project Overview

Optimizing Firefox Localization

- Functionalities
  - Make Firefox Available in 98 Languages
  - Optimize Localization
    - Streamline
    - Speed Up
- Features
  - Convert Synchronous Code to Asynchronous Code
  - Improve Tooling Around Fluent
  - Investigate Use of Wasm and Rust
  - Support Windows, macOS and Linux
  - Deliver Production Code for Firefox
- Technologies
  - Fluent
  - DTD / .properties Files
  - JavaScript / Wasm (Web Assembly)
  - XUL / XBL / HTML
  - Rust
  - Mercurial
  - IRCCloud (IRC)
  - Bugzilla
  - Phabricator
  - Windows /macOS /Linux



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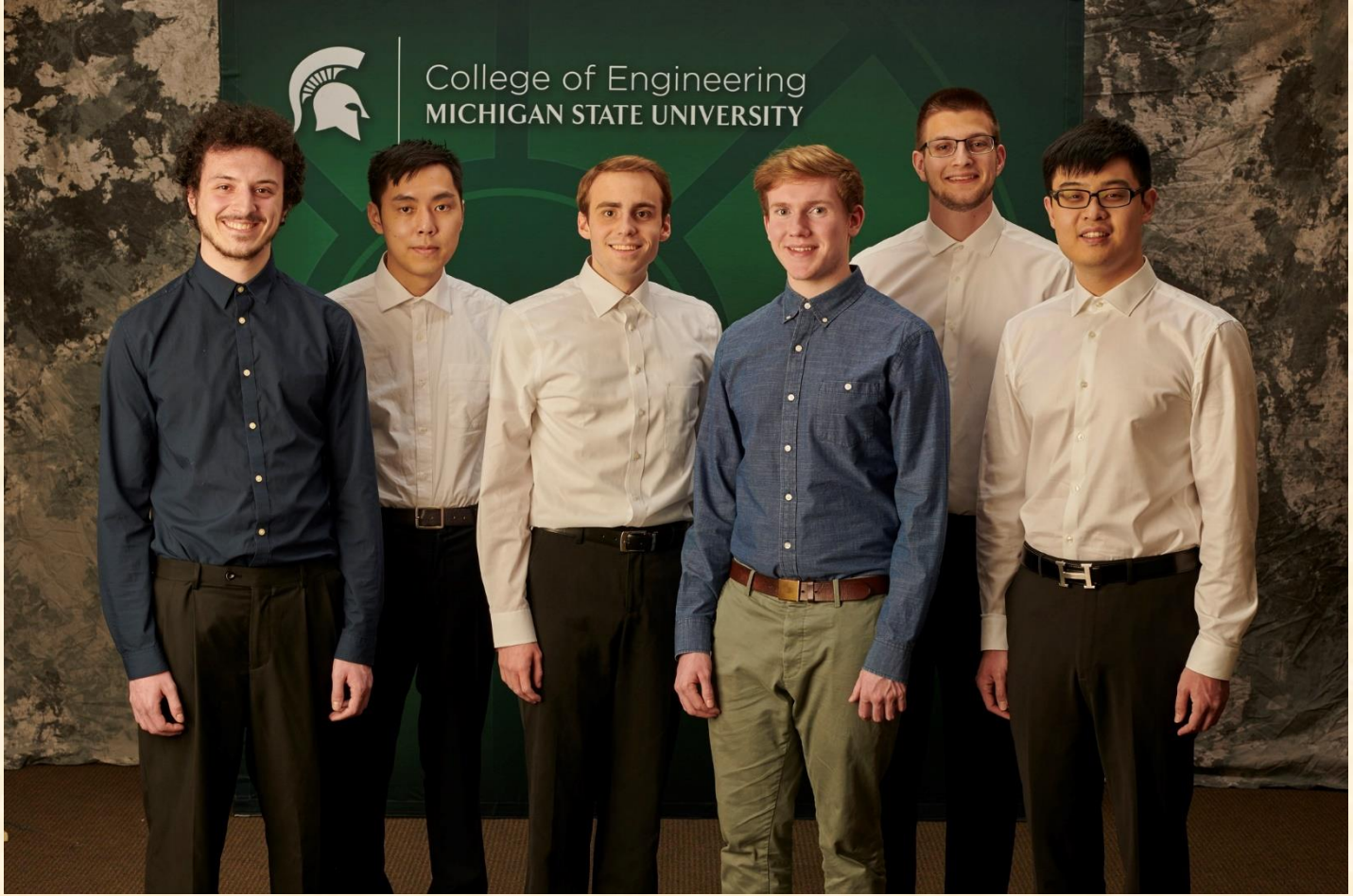

Team Mozilla

Avery Berninger, Brian Chen, Nick Cowles, Ian Kirkpatrick, Chris Frey, Yuan Cheng

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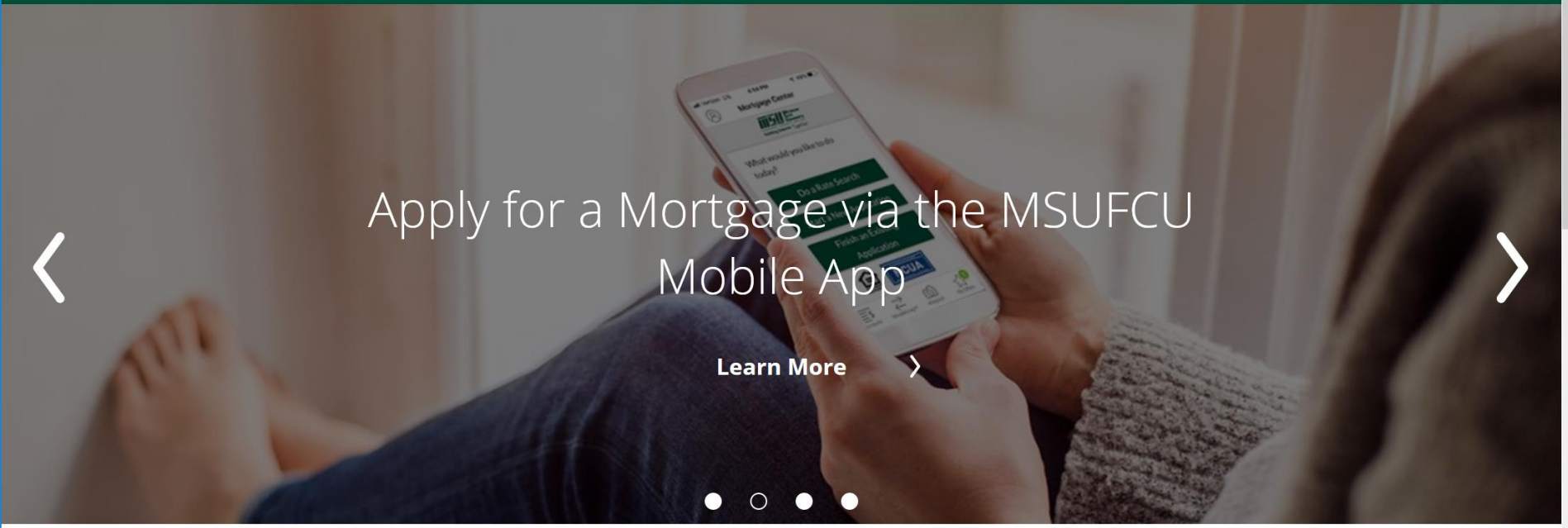

Team MSUFCU
Project Overview

AutoBudget Chatbot

- Functionalities
  - Provide Budgeting Assistance
  - Utilize Chatbot Technologies
- Features
  - Auto-Categorize Transactions
    - Predefined System Categories
    - User Defined Categories
  - Analyze Spending Patterns
  - Suggest Budget
  - Visualize Spending Habits
  - Provide Natural Language Interface
  - Support Various Devices
    - Smart Display (Amazon Spot, Amazon Show, Google Home Hub)
    - Mobile Devices (Apple iOS and Google Android)
- Technologies
  - CSS / HTML / JavaScript / PHP
  - Apple iOS / Swift
  - Google Android / Java
  - Amazon Alexa and Echo
  - Amazon Alexa Skills Kit
  - RESTful Web Services / JSON
  - MySQL

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Team MSUFCU

Jiechen Song, Ksenia Pestova, David Evenson, Dillon Scott

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Project Overview

Integrated Analyst Ratings and Notes

- Functionalities
  - Create Robust Ratings and Notes Capabilities
  - Target Principal Analysts
  - Leverage Cloud Computing
- Features
  - Design and Develop Web App
    - Manage Ratings and Notes
    - Present Unified Software Platform and User Experience
    - Utilize Amazon Web Services
  - Handle Various Numerical Ratings
    - Companies
    - Industries
    - Products
    - Securities
    - Fund Managers
  - Create Prose Notes with Additional Media
    - Links to Web Pages
    - Attachments
    - Video
    - Audio
  - Customize User Experience Based on Analyst Context
    - Stock Analyst
    - Fund Manager Analyst
    - Etc.
  - Maintain Current and Historical Data
- Technologies
  - CSS / HTML / JavaScript / PHP
  - Amazon Web Services (AWS)
  - Microsoft Windows Authentication
  - PostgreSQL Database

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Aa1		AA+		AA+		High grade
Aa2		AA		AA		
Aa3		AA-		AA-		
A1		A+	A-1	A+	F1	Upper medium grade
A2		A		A		
A3	P-2	A-	A-2	A-	F2	
Baa1		BBB+		BBB+		Lower medium grade
Baa2	P-3	BBB	A-3	BBB	F3	
Baa3		BBB-		BBB-		
Ba1	Not prime	BB+	B	BB+	B	Non-investment grade speculative
Ba2		BB		BB		
Ba3		BB-		BB-		
B1		B+		B+		Highly speculative
B2		B		B		
B3		B-		B-		
Caa1		CCC+	C	CCC	C	Substantial risks
Caa2		CCC				Extremely speculative
Caa3		CCC-				Default imminent with little prospect for recovery
Ca		CC				
		C				
C		D	/	DDD	/	In default
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Principal

Des Moines, Iowa

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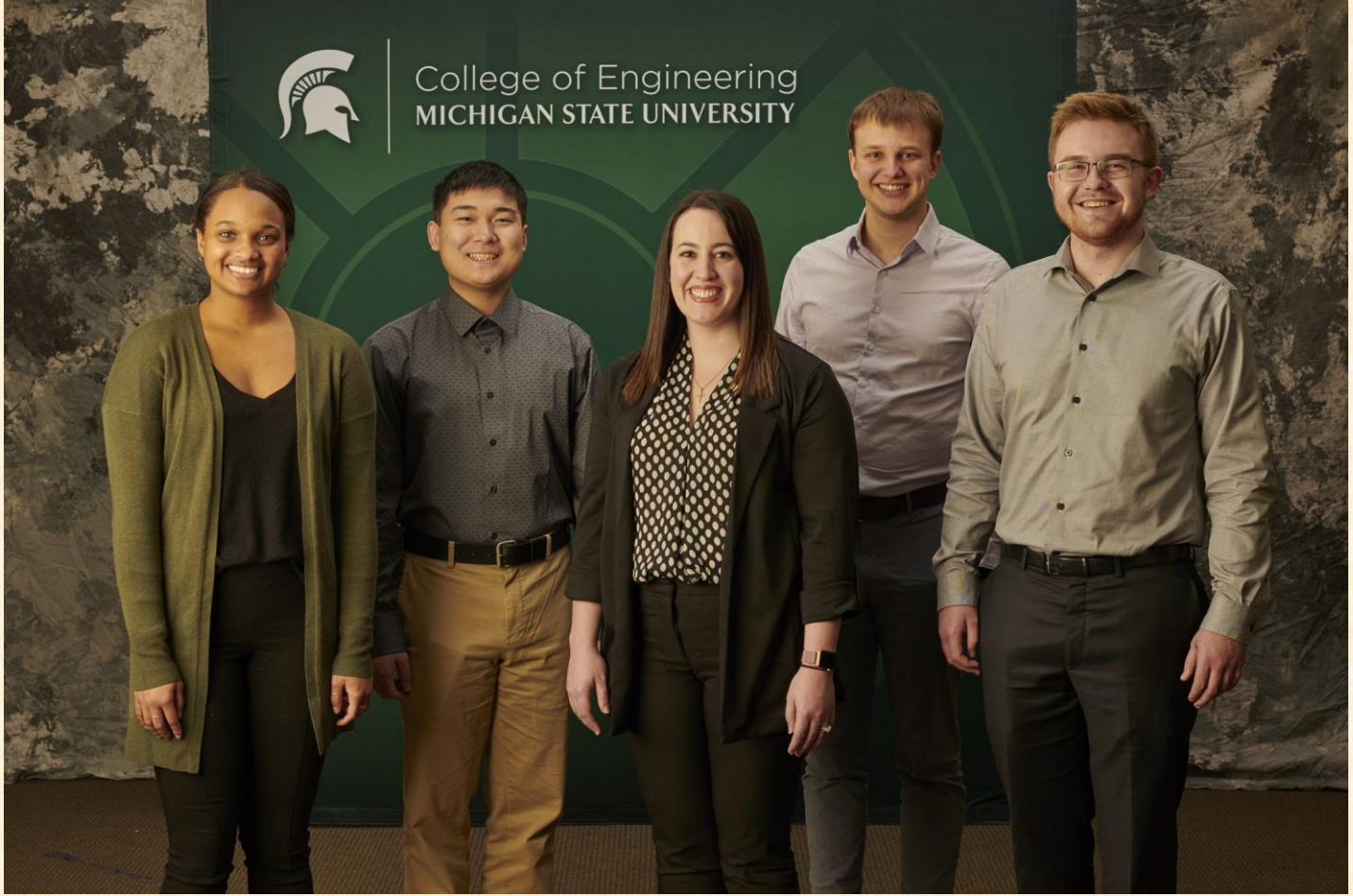

Team Principal

Ryenn McAdory, Ziyi Huang, Alexana Steck, Carter Trpik, Jacob Rieck

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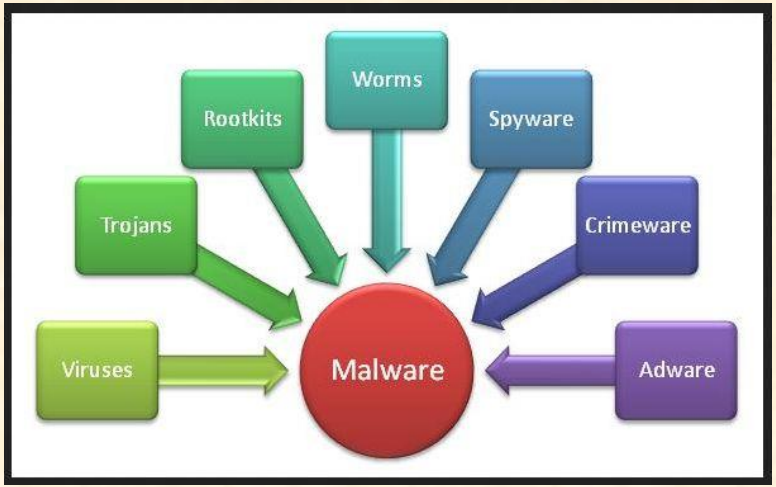
Project Overview

Defeating Malware Payload Obfuscation

- Functionalities
  - Identify Malware Payloads and Configuration Files
  - Handle Large Scale at Reasonable Cost
- Features
  - Utilize Existing Detonation Technologies
    - Reduce Run Times
    - Maintain High Efficacy
  - Leverage Machine Learning and Heuristics
  - Provide Dashboard
    - Monitor Processing
    - Drill Down
    - Reporting
- Technologies
  - Cuckoo (Malware Sandboxing)
  - Suricata (Intrusion Detection System)
  - Steganography
  - Malware Machine Learning
  - Operating Systems and Compilers
  - Reverse Engineering
  - CSS / HTML / JavaScript / PHP
  - Python
  - MySQL



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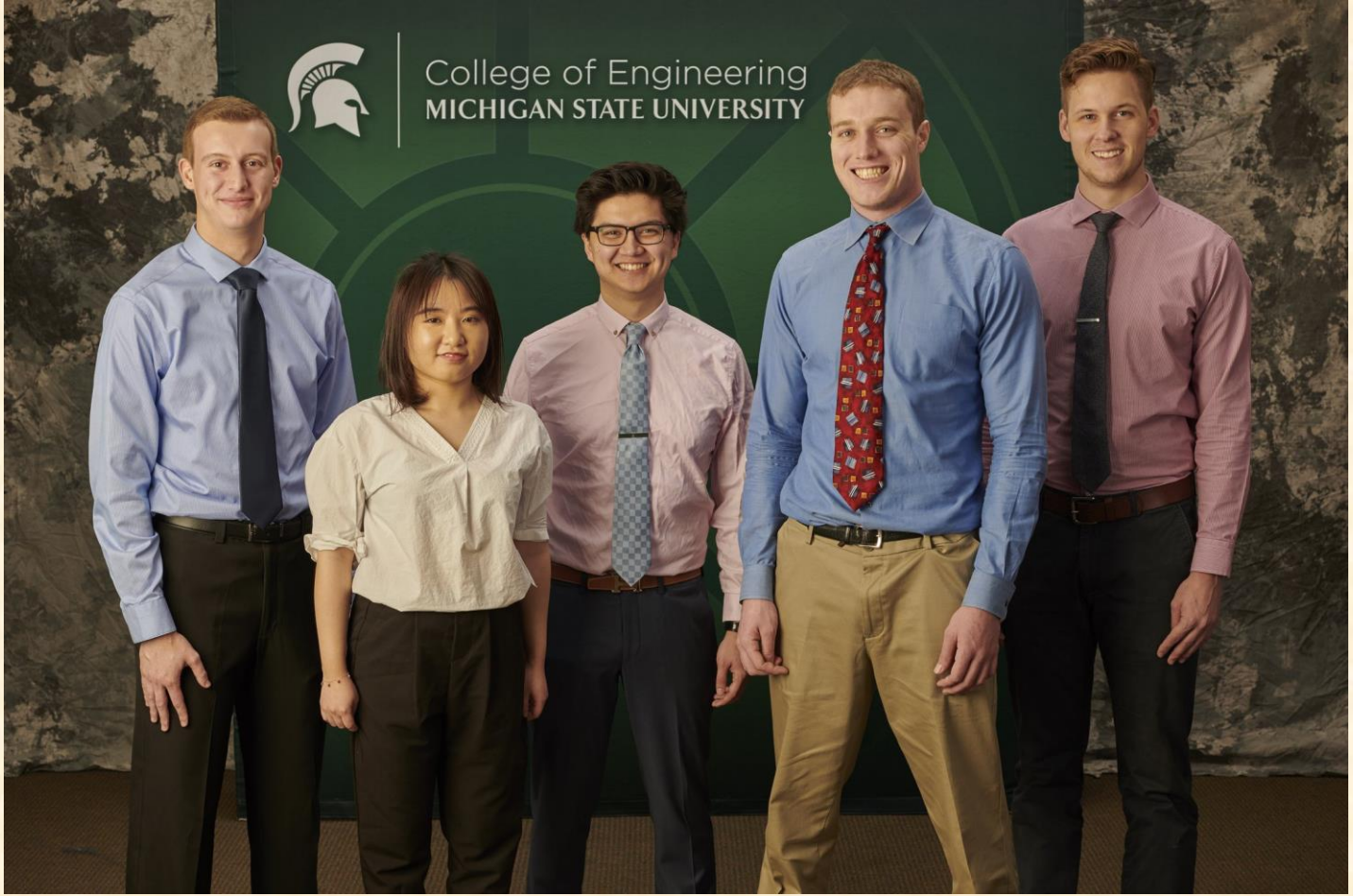

Team Proofpoint

Vivian Qian, Adam Johanknecht, Derek Renusch, Dan Somary, Nick Lojewski

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Team Spectrum Health

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Project Overview

Patient Training Tool

- Functionalities
  - Improve Patient Experience
  - Educate Patient on Their Illness
  - Recommend Appropriate Spectrum Health Service
    - Video Chat with Doctor
    - Urgent Care
    - Emergency Room
- Features
  - Support Google Home
  - Ask Patient About Symptoms
    - Headache
    - Fever
    - Nausea
    - Etc.
  - Determine Best Matching Condition
  - Teach Patient About Condition
    - Easy to Understand
    - Suggest Appropriate Spectrum Health Service
- Technologies
  - Google Home SDK
  - Microsoft Azure DevOps
  - Natural Language Processing (NLP)
  - Machine Learning (ML)

SPECTRUM HEALTH

Grand Rapids, Michigan

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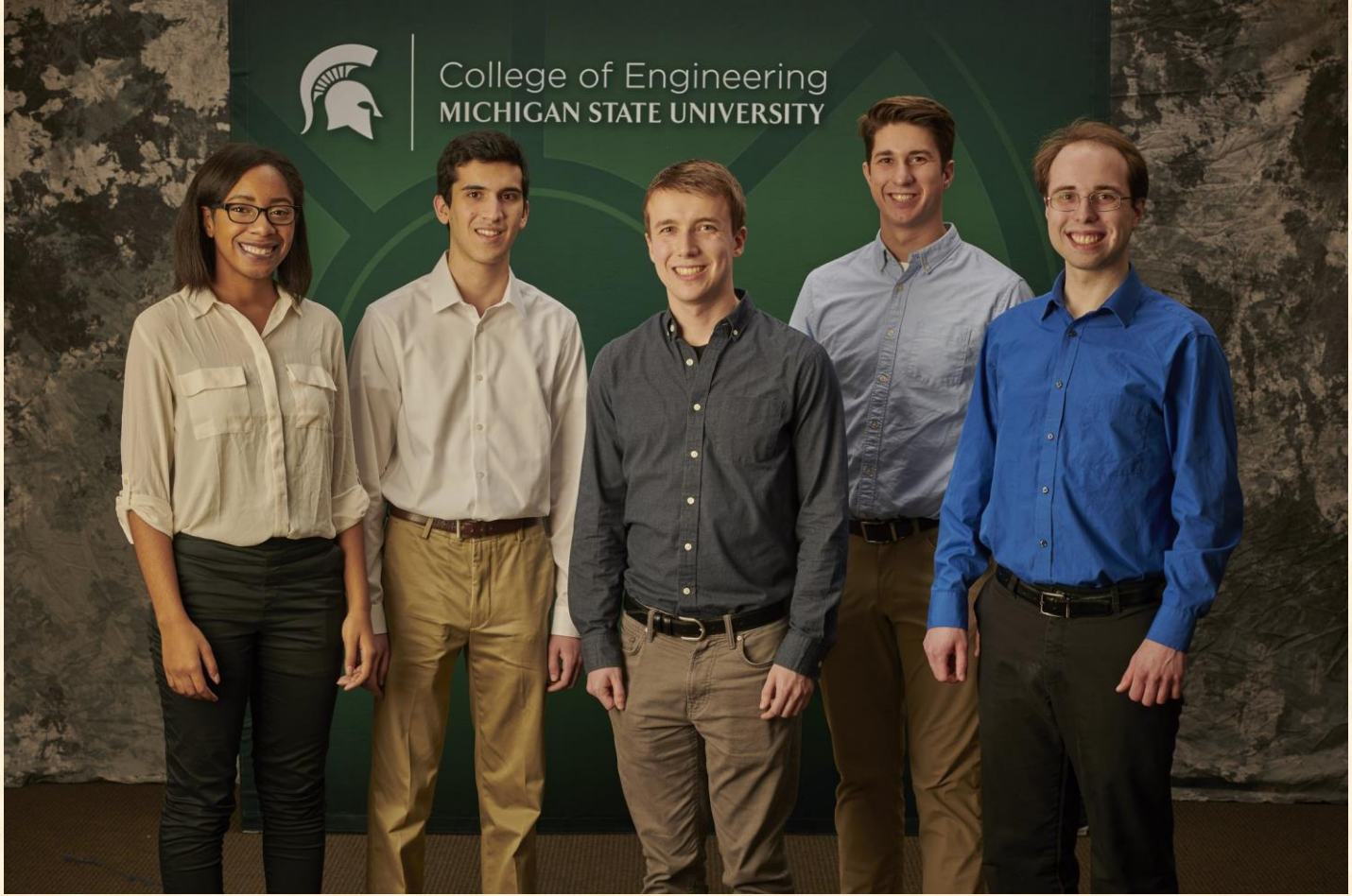

Team Spectrum Health

Blake Williams, Mohammed Naji, Grant Schonhoff, Matt Kelley, Ryan Mathews

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Team Surge Solutions

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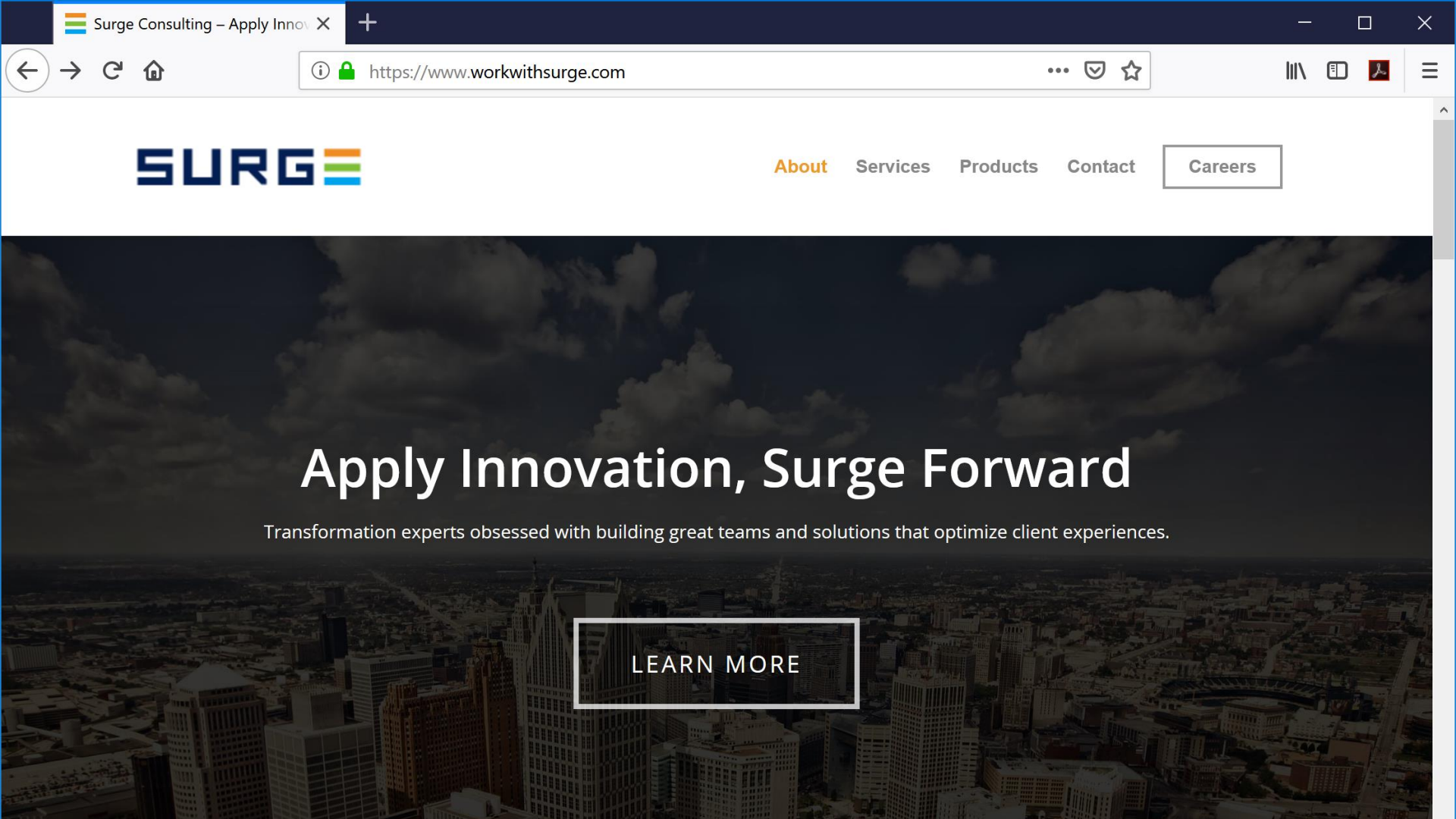
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Project Overview

xOS: Visualization of Automated Underwriting

- Functionalities
  - Make Loan Underwriting Process Fast and Accurate
  - Enable Lenders to Create and Visualize Financial Products
- Features
  - Design and Build Web App
    - Surge xOS Component
    - Displays Loan Decision Path Based on Product Policy
    - Enables Manipulation of Product Policy
    - Executes Monte Carlo Simulations
  - Create Surge xOS Embedded Decision Tree App
    - Embedded into Surge xOS Platform
    - Creates User-Friendly Decision Tree
    - Visualizes Underwriting Decision Paths
    - Assists Underwriter with Credit Risk Analysis
  - Leverage Salesforce
- Technologies
  - CSS / HTML / JavaScript
  - Salesforce (Lightning)
  - React / D3
  - Amazon Web Services (AWS)
  - Agile Software Delivery Methodology

SURGE
Rochester Hills, Michigan

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Team Surge Solutions

Dakota Klatt, Sam Zhou, Prudhvi Kuchipudi, Erika Lustig, Drew Rutt, Pawel Babkowski

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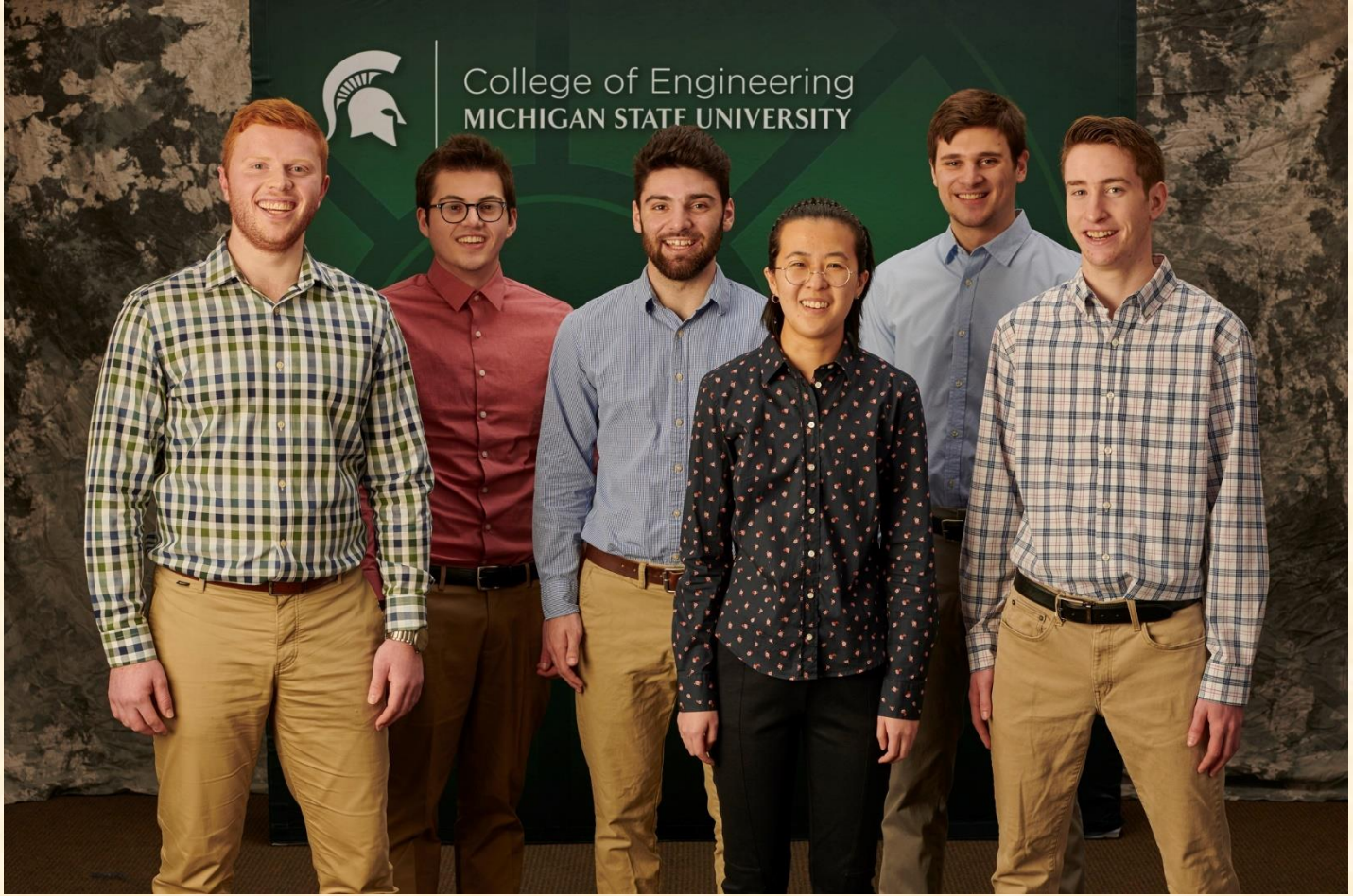
Project Overview

Multi-Video Case Management

- Functionalities
  - Manage Security Video
  - Organize, Annotate and View Video
- Features
  - Handle Security Camera and Mobile Phone Video
  - View and Annotate Videos
    - By Timestamp
    - By Location
      - Corporate Campus Map
      - Building Map
  - Aggregate Multi-Video View into Single Event
    - Based on Annotations, Timestamp and Location
    - Summarize an Incident
  - Create OpenContent Management Suite Actions
- Technologies
  - TSG OpenContent Management Suite (OCMS)
  - TSG OpenAnnotate
  - Amazon Web Services (AWS)
  - DynamoDB / S3



Team Technology Services Group

Matt Wojno, Jonathan Little, Sam Belcher, Yichen Zang, Adam Gnott, Noah Engerer

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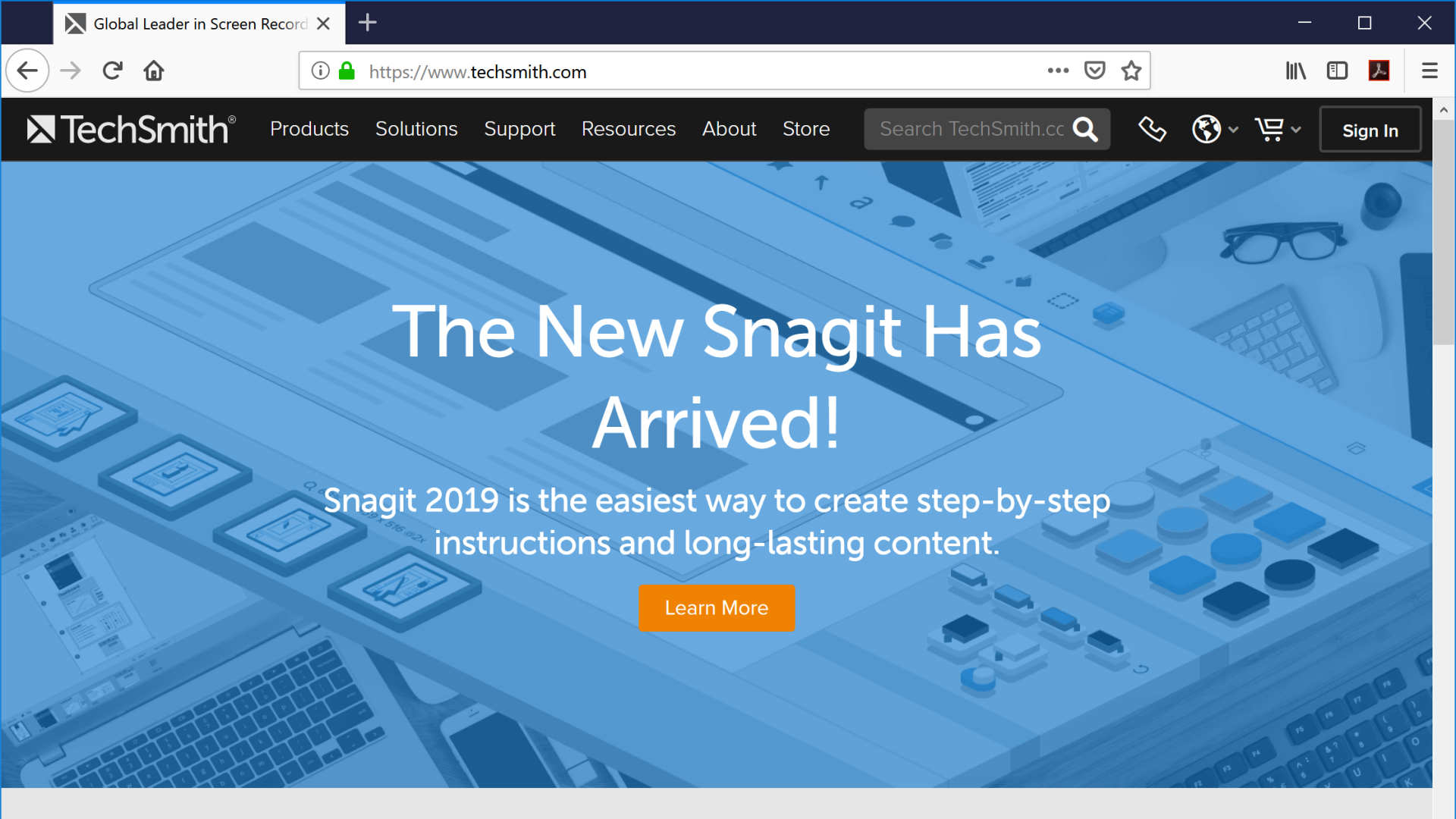
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Project Overview

Internal Telemetry for TechSmith Products

- Functionalities
  - Help TechSmith Developers Improve TechSmith Products
  - Create Telemetry Gathering System
- Features
  - Build Telemetry Framework
    - Integrate with Any Win32 App
    - Provide Simple API
  - Write Application Prototypes
    - Simulate Scenarios
    - Demonstrate Telemetry Framework
  - Provide Web Dashboard to View Telemetry
  - Integrate Into One TechSmith Product
- Technologies
  - Microsoft
    - Windows Presentation Foundation (WPF)
    - Windows Error Reporting APIs
    - Partner Center REST API
    - Visual Studio AppCenter
    - Azure
    - ASP .Net Core
  - C++ / C# / C++ / CLI
  - JavaScript
  - Docker
  - DirectX Diagnostic Tool (DxDiag)

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Team TechSmith

Dakota Locklear, Ben Hickmott, Zhuolun Xia, Ryan Ciffin, Zack Schreur

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Team Union Pacific

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Project Overview

Railroad Arcade

- Functionalities
  - Build Game Hosting System
  - Target Railroad Training Games
- Features
  - Create Three Sample Games
  - Provide Reusable Components
    - Login and Settings
    - Administration
    - Quizzes and Scoring
    - Leader Boards
    - Integrate Adobe Captivate
  - Support
    - Windows and WebGL
    - Mobile?
    - Virtual Reality (VR)?
- Technologies
  - Unity
  - Angular
  - Java / Spring / Tomcat
  - Adobe Captivate

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Team Union Pacific

Sarah Byrum, Margaret Wootten, Gordon Huang, Caleb Howell, Matthew Howard, Hongyu Yan

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Team United Airlines

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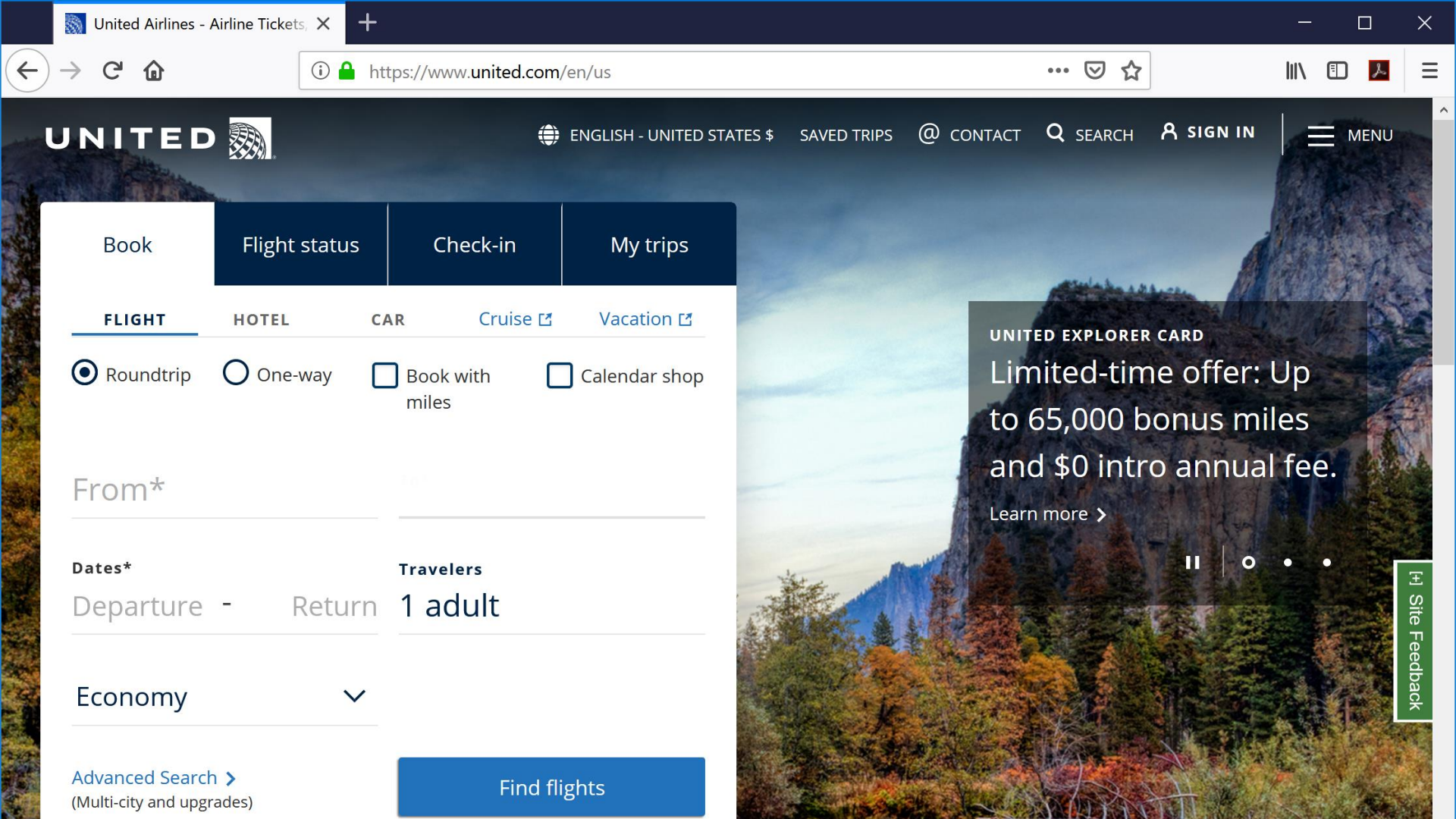
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Project Overview

Training Scheduling and Optimization System

- Functionalities
  - Manage United Technical Operations Training
  - Schedule Classes and Instructors Optimally
- Features
  - Web and Apple iOS Apps
  - Enable Course Request by Location
  - Track
    - Instructor Times
    - Student Attendance
  - Provide Class List of Students
  - Optimize Course Scheduling
    - Number of Classes Per Location
    - Instructor Travel and Overtime
    - Fixed Courses
  - Implement Various Roles (Student, Instructor, Scheduler)
- Technologies
  - CSS / HTML / JavaScript / PHP
  - Apple iOS / Swift
  - Microsoft SQL Server
  - Optimization Software

UNITED

Chicago, Illinois

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Team United Airlines

Matthew Libiran, Hydra Xu, Kailash Saravanan, Nathan Rizik, Brian Lowen

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Team Urban Science

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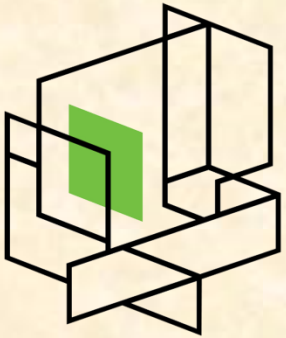

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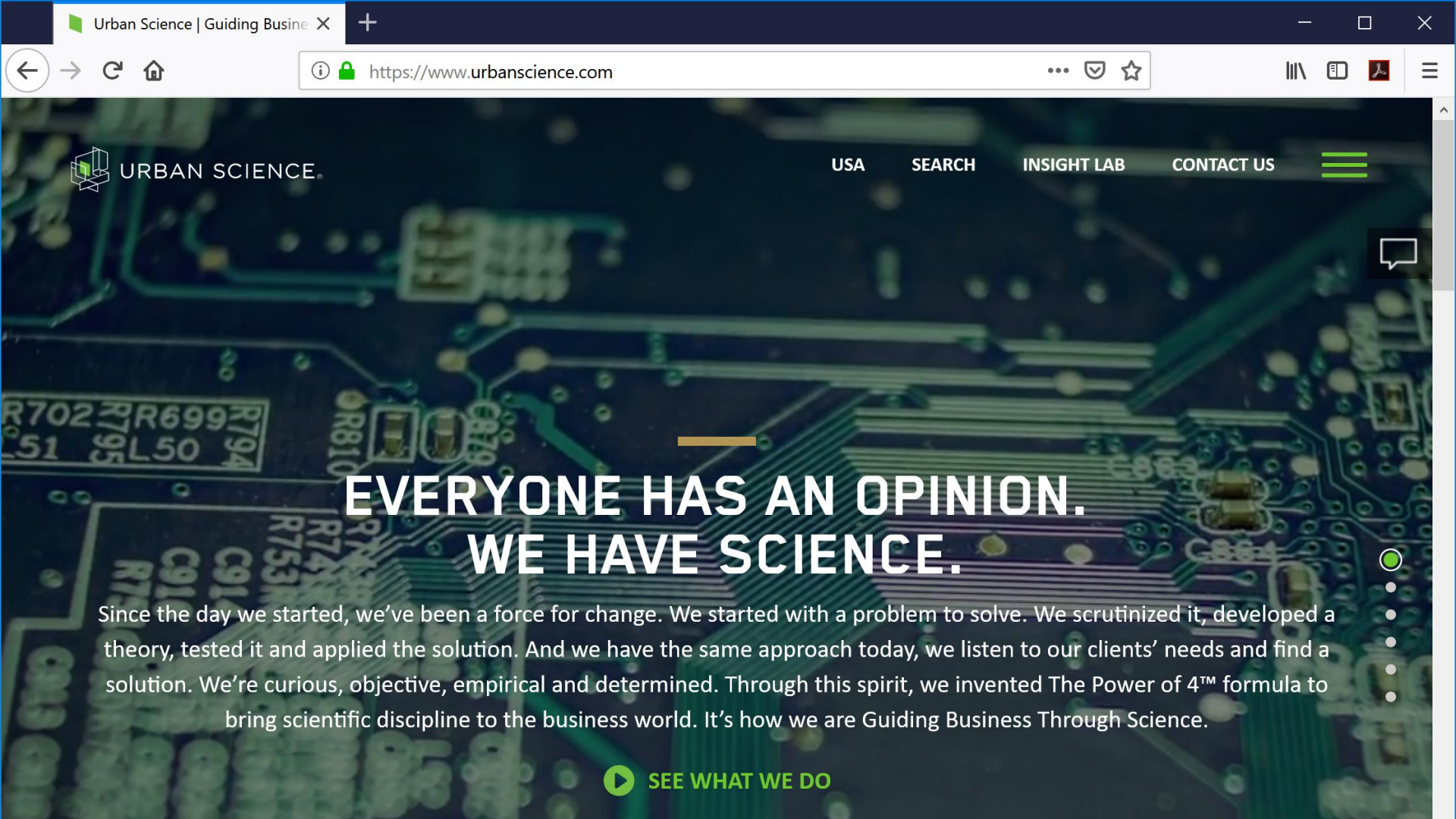
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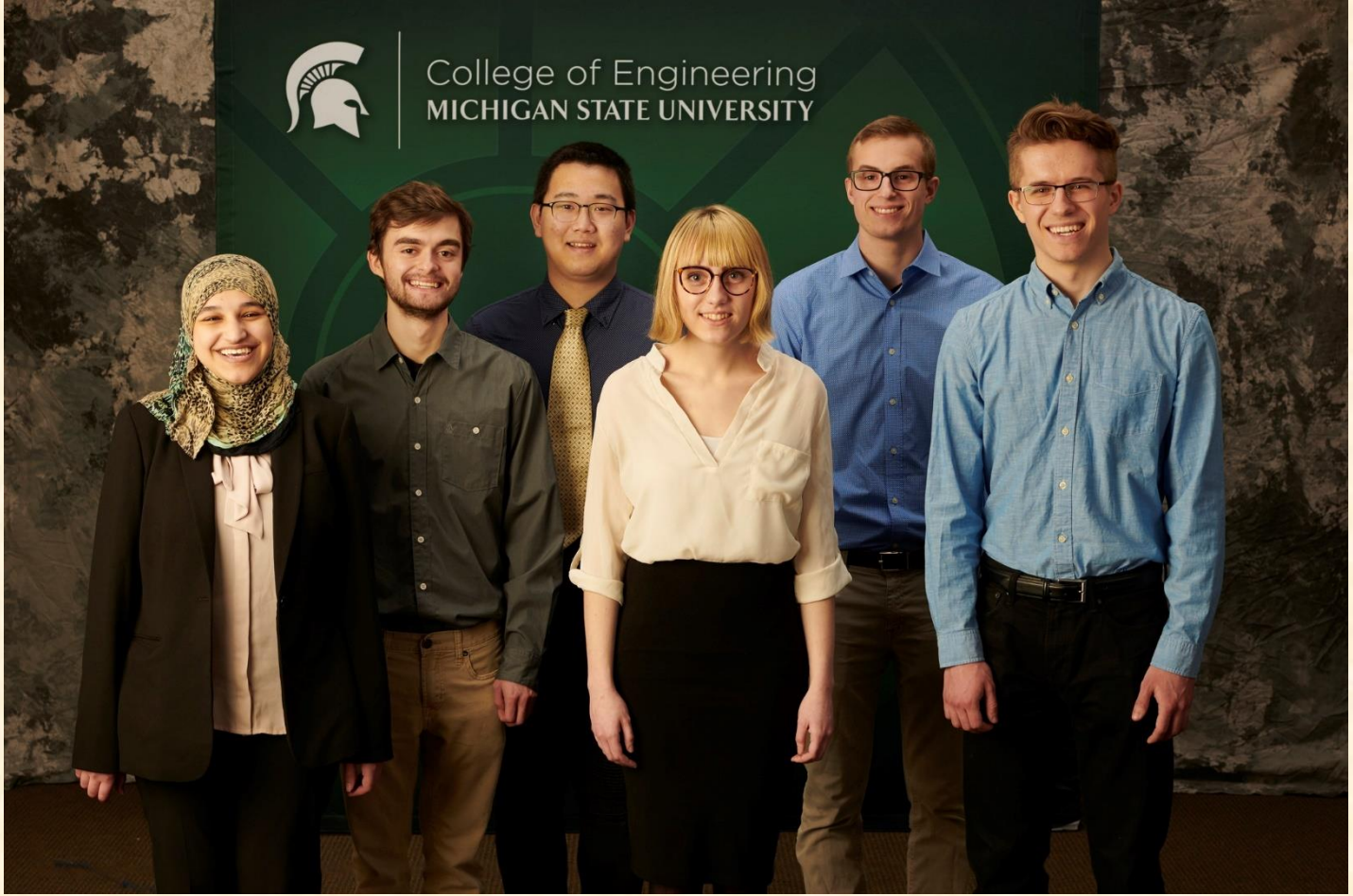
Team Urban Science
Project Overview

Dealer4U

- Functionalities
  - Create Marketplace for Used Vehicle Leads
  - Target Both Dealers and Customers
- Features
  - Build Native Apps or Responsive Web App
  - Provide
    - Customer User Interface
    - Dealer User Interface
    - Backend Data Storage and Processing
  - Include Capabilities
    - To Create or Ingest Leads
    - For Dealers to Bid on Leads
    - To Match Dealers to Leads
- Technologies
  - Apple iOS / Swift
  - Google Android / Java
  - Xamarin
  - CSS / HTML / JavaScript / PHP
  - Angular
  - WebAPI
  - Microsoft .NET Core
  - Mongo DB

URBAN SCIENCE
Detroit, Michigan

The Capstone Experience



Team Urban Science

Sara Alshaikhhussain, Blake Weidenfeller, Tian Yan, Riley Hoffman, Hayden Cederstrom, David Kinchen

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Team Volkswagen

Department of Computer Science and Engineering
Michigan State University
Spring 2019

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Project Overview

Cognitive Enterprise Software Robots

- Functionalities
  - Automate Manual Computer Tasks
  - Utilize Software Robots (Soft Bots)
- Features
  - Teach Soft Bot
    - Set of Business Rules
    - Process Flow
  - Apply Deep Reinforcement Learning
    - Learn Human Behavior
    - Teach Soft Bot to Replicate Human Behavior
  - Enable Soft Bot to Interact with Humans
    - Email
    - Natural Language Processing
- Technologies
  - Python / NumPy / Matplotlib / PyAutoGUI
  - TensorFlow / Keras
  - Git
  - Windows 10
  - Graph Theory
  - Machine Learning

Auburn Hills, Michigan

The Capstone Experience

Team Volkswagen

Maryam Irannejadnajafabadi, Kevin Gu, Amelia Wilson, Fynn Reckhorn, Zachary McCullough

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The Capstone Experience

Dr. Wayne Dyksen

Department of Computer Science and Engineering
Michigan State University
Spring 2019

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The Capstone Experience Lab

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The Capstone Experience Lab

The Capstone Experience Lab
View of Spartan Stadium

Auto-Owners Exhibition Award

Team Volkswagen, Fall 2018

Volkswagen Logo

Zebin Liang, Kira Chan, Emily Brent, Cyprian Blunt, Tim Guertin

Presented by Ross Hacker of Auto-Owners Insurance

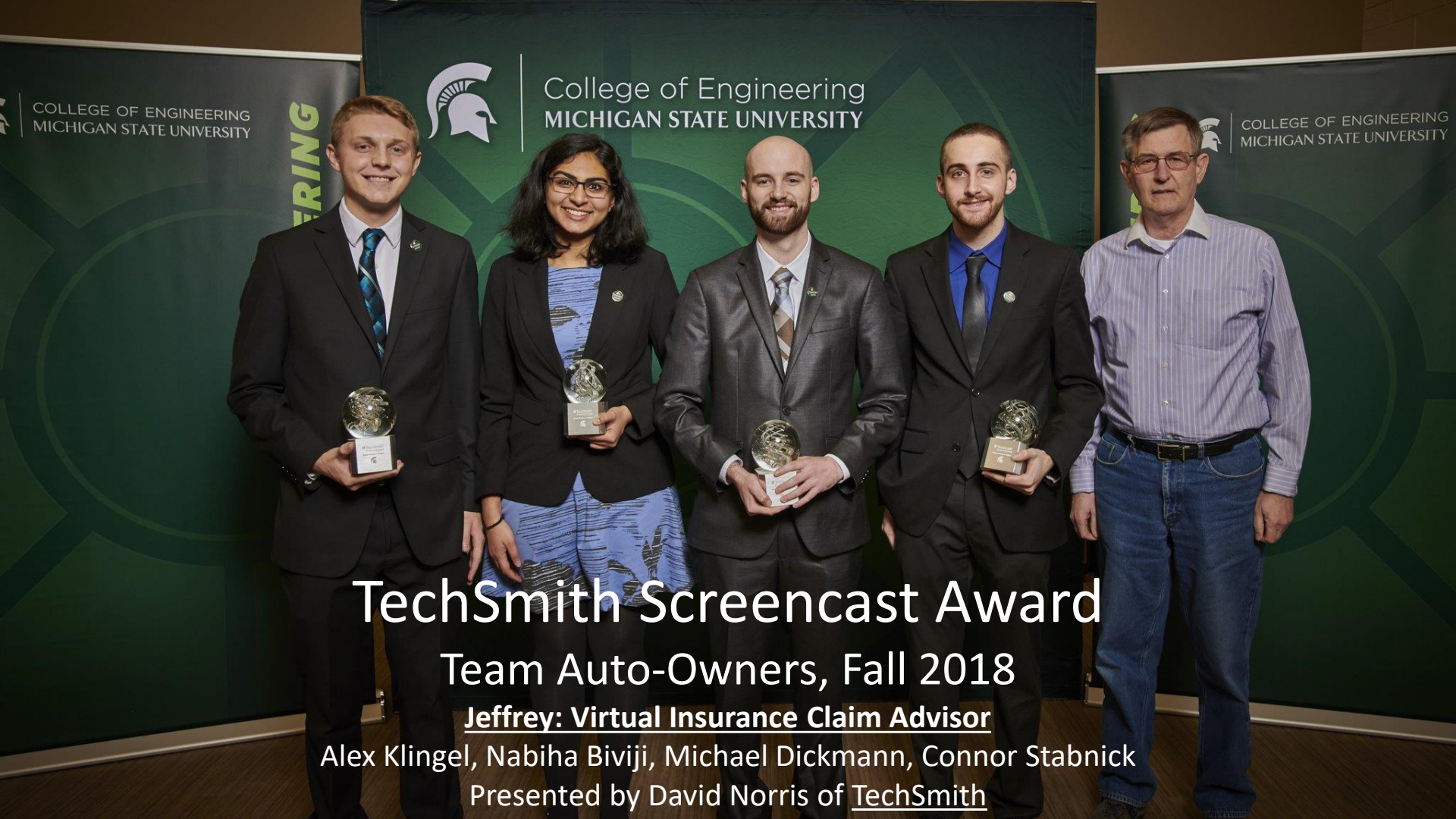
MSU Federal Credit Union Praxis Award

Team Proofpoint, Fall 2018

Improved Detonation of Evasive Malware

Ian Murray, Ryan Gallant, Jack Mansueti, Sean Joseph, Tae Park

Presented by Ben Maxim of MSU Federal Credit Union



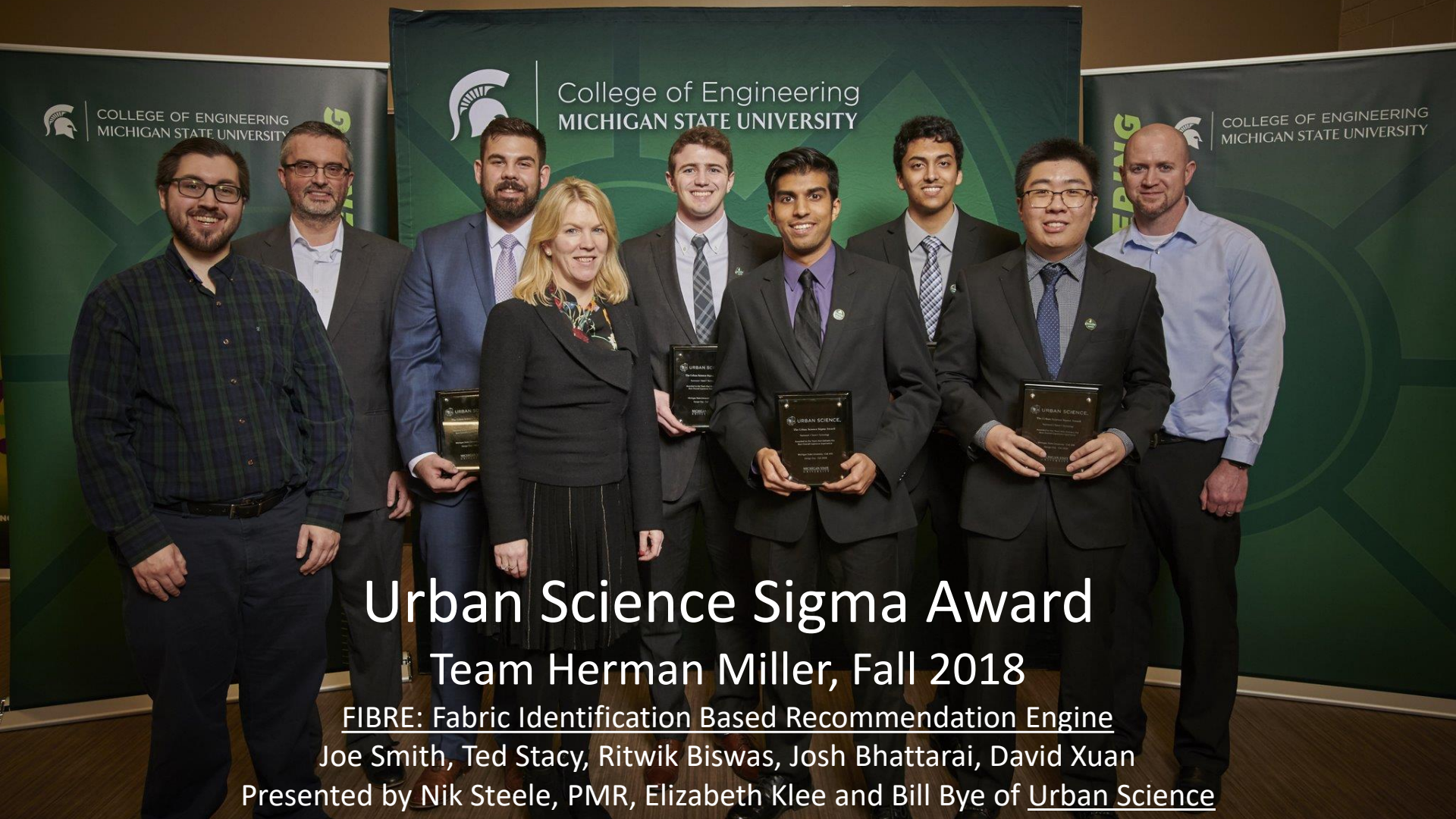
TechSmith Screencast Award

Team Auto-Owners, Fall 2018

Jeffrey: Virtual Insurance Claim Advisor

Alex Klingel, Nabiha Biviji, Michael Dickmann, Connor Stabnick

Presented by David Norris of TechSmith



Urban Science Sigma Award

Team Herman Miller, Fall 2018

FIBRE: Fabric Identification Based Recommendation Engine

Joe Smith, Ted Stacy, Ritwik Biswas, Josh Bhattarai, David Xuan

Presented by Nik Steele, PMR, Elizabeth Klee and Bill Bye of Urban Science

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Design Day Award Winners

December 8, 2017

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All-Hands
Design Day, April 28, 2017

Auto-Owners Exhibition Award

Team TechSmith, Spring 2017

Teacher's Virtual Toolbelt

Alex Crimin, Zeke Zandbergen, Yang He, Ryan Cornillie

Presented by Scott Lake of Auto-Owners Insurance

MSU Federal Credit Union Praxis Award

Team Union Pacific, Spring 2017

Learning New Train Routes

Matthew Schleusener, Kangjie Mi, Nick Summers, Jon Wild

Presented by Liam Petraska of MSU Federal Credit Union

TechSmith Screencast Award

Team Amazon, Spring 2017

ACRA: Amazon Customer Review Analyzer

Jie Wan, Jason Liu, Ian Whalen, Ankit Luthra, Tess Huelskamp

Presented by Wendy Hamilton of TechSmith

Urban Science Sigma Award

Team Michigan State University, Spring 2017

CATAlyst: Mapping CATA Buses in Real-Time

Charlie Ward, Cathy Dinsmoor, Tom Beaver, Jimmy Mkude, James Dodge

Presented by Linda Koeppe and Luke Mercier of Urban Science

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Dr. Wayne Dyksen

Department of Computer Science and Engineering
Michigan State University
Spring 2019

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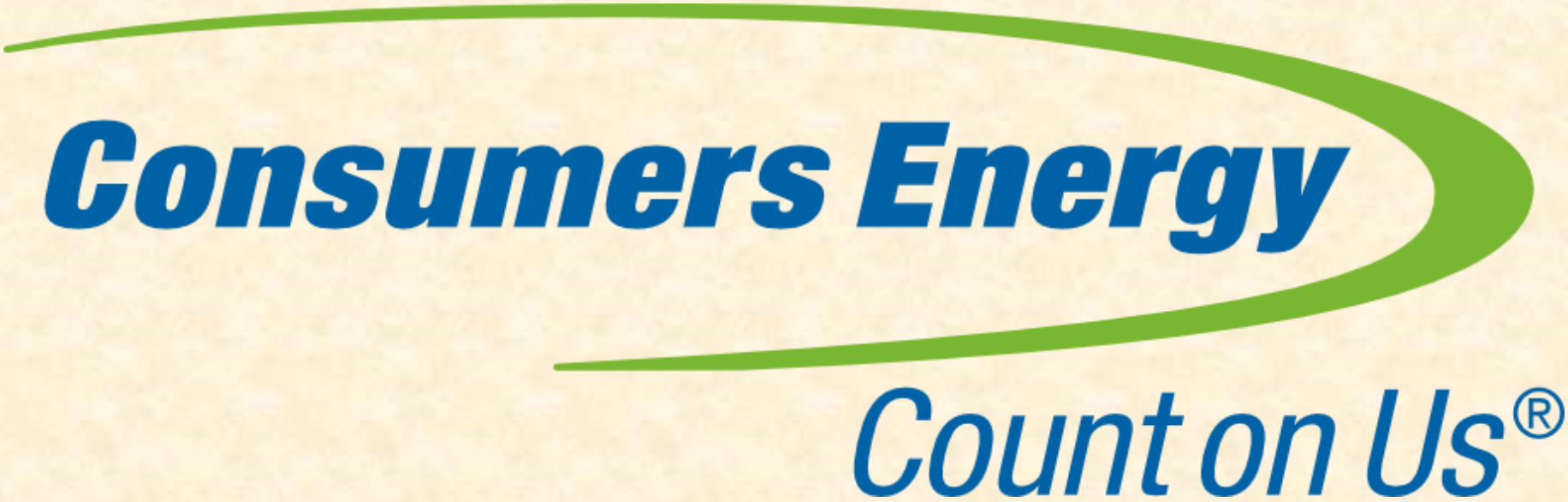
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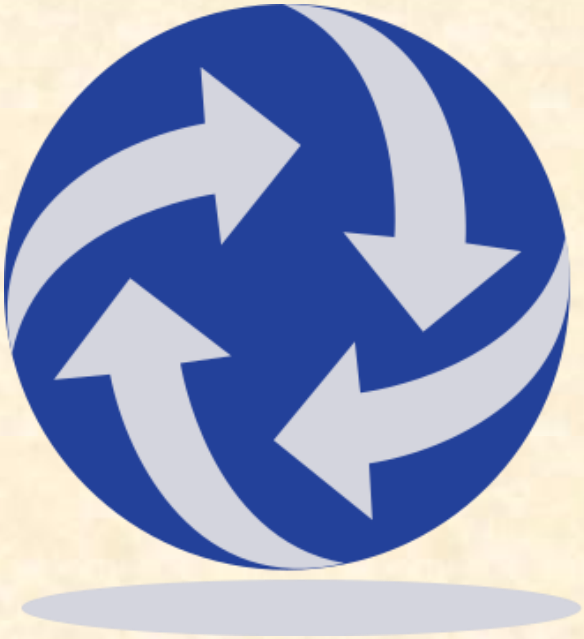

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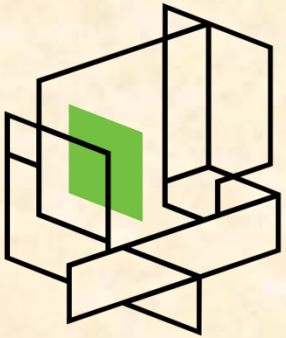

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