The Capstone Experience

Dr. Wayne Dyksen
Department of Computer Science and Engineering
Michigan State University
Spring 2019
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
    o Status Report Presentations
    o Formal Presentations
      ➢ Project Plan
      ➢ Alpha
      ➢ Beta
    o 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

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Michigan State University
Spring 2019
amazon
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
Team Amazon
Colin Zhong, Jonathan Kushion, Eunice Yoon, Rahul Yalamanchili, Liyuan Duan, Megha Erappa
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Team Aptiv

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Michigan State University
Spring 2019
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
    o Other Vehicles
    o Overpasses
    o Tunnels
    o Bridges
    o 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
Team Aptiv
Rebecca Skladd, Patrick Thornton, Harshita Das, Shivaani Annadurai, Diana Xia
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Team Auto-Owners

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Michigan State University
Spring 2019
Auto-Owners
INSURANCE
LIFE • HOME • CAR • BUSINESS
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?
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
    o Accept Input with Business Information
    o Search Relevant SoS Website Using RPA
    o Present Results for Validation by Underwriter
    o Record Statistics
  ▪ Leverage Robotic Process Automation (RPA)
  ▪ Handle All 50 Secretary of State Websites
  ▪ Design and Implement Matching Algorithm
    o Exact or Partial
    o Synonym or Alternate Spelling
  ▪ Provide Reporting Dashboard with Metrics

• Technologies
  ▪ Robotic Process Automation (RPA)
  ▪ UiPath Go!
  ▪ CSS / HTML / JavaScript / PHP
  ▪ Database Technologies
Team Auto-Owners
Brian Jean, Richard Hutchins, Adam Leyrer, Joey Baum, Tiezheng Shao
The Capstone Experience

Team Consumers Energy

Department of Computer Science and Engineering
Michigan State University
Spring 2019
Happy New Year!

Happy New Year from all of us at Consumers Energy.
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
    o Text Link to Responsive Web App
    o Interactive Version of Phone Tree or Chatbot
  ▪ Handle All Phone Tree Options with Smart Phone
    o Billing Inquiries
    o Making Payments
    o Setting Up Payment Plans
    o 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
Team Consumers Energy
Ben Weinstock, Andrew Morrissette, Ibe Saleh, Hang Zhao, Muhammed Zahid
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Team Dow

Department of Computer Science and Engineering
Michigan State University
Spring 2019
Materials Science Solutions for Your Products and Our Planet

Through partnerships and collaboration, our solutions help extend the shelf life of food, bring color to buildings, and pave safer roads. Read on to learn how.
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
    o Upload and View 3D Models Easily
    o Support Various Mobile Devices
    o Eliminate “One-and-Done” Solutions
  ▪ Target Dow Stakeholders
    o Sales and Marketing Professionals
    o Customers
  ▪ Build Cloud-Hosted Backend
    o Handle Role-Based Security
    o Manage 3D Models

• Technologies
  ▪ Apple iOS / Swift
  ▪ Google Android / Java
  ▪ Unity Pro / Collab
  ▪ ARKit / Vuforia
  ▪ App Center / TestFlight
  ▪ Microsoft Azure
Team Dow
David Slimak, Harrison Sanders, Nate Kurt, David Zhou, Matt Dennis, Thomas Diaz
From Students…
…to Professionals

The Capstone Experience

Team DRIVEN-4

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Michigan State University
Spring 2019
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
    o Portfolio Planning for 1, 3 or 5-Year Terms
    o Portfolio Execution with Role-Based Forecast
    o Product Planning for 10-Year Gantt View
  ▪ Provide Web Interface and Visualization
    o Responsive
    o Target End-User
    o Include Administrative Features
  ▪ Deliver Cross-Platform Mobile App

• Technologies
  ▪ CSS / HTML / JavaScript / React
  ▪ PTC Thingworx
  ▪ Xamarin
  ▪ RESTful Web Services
Team DRIVEN-4
Kyle Forbes, Athena Zhang, Dan Tinsman, Hassan Tarar, Kevin Kye
The Capstone Experience

Team Evolutio

Department of Computer Science and Engineering
Michigan State University
Spring 2019
UNDERSTAND WHAT YOUR DATA IS TELLING YOU.
LEVERAGE YOUR BUSINESS
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
Team Evolutio
KP Inuaeyen, Jon Dressel, Cameron Rasico, Ian Guswiler, Ben Haase
The Capstone Experience

Team Ford

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Michigan State University
Spring 2019
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
Team Ford
Rob Sulaka, Wei Dai, Seth Killian, Ning Han, Brett Dziedzic
The Capstone Experience

Team Google

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Michigan State University
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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
Team Google
Dave Ackley, Linghao Ji, Guillermo Jimenez, Casey Schneider, Haylee Quarles, Ben Whitelaw
The Capstone Experience

Team Herman Miller

Department of Computer Science and Engineering
Michigan State University
Spring 2019
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
    o Open Offices
    o Available Conference Rooms
    o 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
Team Herman Miller
John Riley, Zhenru Wang, Matt Rhodes, Stefan Zhang, Aaron Eshleman
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Team Humana

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Humana
New Humana member?

We’re so glad! Get the most out of your new health insurance benefits. Activate your MyHumana account today.
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
    o Develop Key Predictive Model Attributes
    o Include Ability to Tune Key Parameters
  ▪ Incorporate Feedback Loop
  ▪ Visualize Data Effectively

• Technologies
  ▪ CSS / HTML / JavaScript
  ▪ Machine Learning
    TensorFlow / scikit-learn / Spark MLLib
  ▪ Data Visualization
    D3 / Chart.js
Team Humana
Gabe Apaza, Siru Chen, Brendan Vande Kieft, Linda Duong, Katie Sydlik-Badgerow
The Capstone Experience

Team Meijer

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Michigan State University
Spring 2019
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
Team Meijer
Sasha Morford, Jack Studzinski, Blaire Izbicki, Chris Le, Jacob Kalt
From Students…
…to Professionals

The Capstone Experience

Team Michigan State University HPCC

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Michigan State University
Spring 2019
Michigan State University
High Performance Computing Center
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
    o Create Job Scripts
    o Observe Job Progress
    o Observe Group Behavior
  ▪ Create Testing “Playground”
    o Test Job Scripts
    o Understand Resource Requirements
    o 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
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Team Michigan State University

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Michigan State University
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Information Technology Services
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)
Team Michigan State University ITS
Cyndy Ishida, Jacob Dasuqi, Kristin Calder, Jack Wydra, Sarah Abumansoor, Jacob Bickel
The new Firefox

Meet Firefox Quantum.
Fast for good.

Download now
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
Team Mozilla
Ian Kirkpatrick, Avery Berninger, Nick Cowles, Yuan Cheng, Chris Frey, Brian Chen
The Capstone Experience

Team MSUFCU

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Michigan State University
Spring 2019
Apply for a Mortgage via the MSUFCU Mobile App

Learn More
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
Team MSUFCU
Ksenia Pestova, Jiechen Song, David Evenson, Dillon Scott
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Team Principal

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Spring 2019
Staying calm when the market is not.

Tips for keeping a cool head and staying on track with your plan for retirement.

Find out more
Team Principal
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
Team Principal
Ziyi Huang, Ryenn McAdory, Alexana Steck, Carter Trpik, Jacob Rieck
The Capstone Experience

Team Proofpoint

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Spring 2019
Anyone can be a VAP:

VERY
ATTACKED
PERSON.
Team Proofpoint
Project Overview

Defeating Malware Payload Obfuscation

• Functionalities
  ▪ Identify Malware Payloads and Configuration Files
  ▪ Handle Large Scale at Reasonable Cost

• Features
  ▪ Utilize Existing Detonation Technologies
    o Reduce Run Times
    o Maintain High Efficacy
  ▪ Leverage Machine Learning and Heuristics
  ▪ Provide Dashboard
    o Monitor Processing
    o Drill Down
    o 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
Team Proofpoint
Nick Lojewski, Adam Johanknecht, Dan Somary, Vivian Qian, Derek Renusch
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Team Spectrum Health

Department of Computer Science and Engineering
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Team Spectrum Health
Project Overview

Patient Training Tool

• Functionalities
  ▪ Improve Patient Experience
  ▪ Educate Patient on Their Illness
  ▪ Recommend Appropriate Spectrum Health Service
    o Video Chat with Doctor
    o Urgent Care
    o Emergency Room

• Features
  ▪ Support Google Home
  ▪ Ask Patient About Symptoms
    o Headache
    o Fever
    o Nausea
    o Etc.
  ▪ Determine Best Matching Condition
  ▪ Teach Patient About Condition
    o Easy to Understand
    o Suggest Appropriate Spectrum Health Service

• Technologies
  ▪ Google Home SDK
  ▪ Microsoft Azure DevOps
  ▪ Natural Language Processing (NLP)
  ▪ Machine Learning (ML)
Team Spectrum Health
Grant Schonhoff, Blake Williams, Matt Kelley, Mohammed Naji, Ryan Mathews
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Team Surge Solutions

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Spring 2019
Apply Innovation, Surge Forward

Transformation experts obsessed with building great teams and solutions that optimize client experiences.
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
Team Surge Solutions
Erika Lustig, Drew Rutt, Dakota Klatt, Prudhvi Kuchipudi, Pawel Babkowski, Sam
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Team Technology Services Group

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Spring 2019
THE BEST OF BOTH WORLDS

Alfresco™ + AWS

Learn how to move Alfresco to AWS for the best in Enterprise Content Management + the industry leading cloud provider.

Download Alfresco to AWS Guide
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
    o By Timestamp
    o By Location
      ➢ Corporate Campus Map
      ➢ Building Map
  ▪ Aggregate Multi-Video View into Single Event
    o Based on Annotations, Timestamp and Location
    o 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
Adam Gnott, Sam Belcher, Noah Engerer, Matt Wojno, Yichen Zang, Jonathan Little
The Capstone Experience

Team TechSmith

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Michigan State University
Spring 2019
The New Snagit Has Arrived!

Snagit 2019 is the easiest way to create step-by-step instructions and long-lasting content.

Learn More
Team TechSmith
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)
The Capstone Experience

Team Union Pacific

Department of Computer Science and Engineering
Michigan State University
Spring 2019
Building America for more than 155 years by serving customers, communities and shareholders with a passion for performance, high ethical standards and teamwork.
Team Union Pacific
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
Team Union Pacific
Hongyu Yan, Caleb Howell, Gordon Huang, Margaret Wootten, Matthew Howard, Sarah Byrum
The Capstone Experience

Team United Airlines

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Michigan State University
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Team United Airlines
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

Chicago, Illinois
Team United Airlines
Hydra Xu, Nathan Rizik, Brian Lowen, Matthew Libiran, Kailash Saravanan
The Capstone Experience

Team Urban Science

Department of Computer Science and Engineering
Michigan State University
Spring 2019
EVENONE HAS AN OPINION.
WE HAVE SCIENCE.

Since the day we started, we’ve been a force for change. We started with a problem to solve. We scrutinized it, developed a theory, tested it and applied the solution. And we have the same approach today, we listen to our clients’ needs and find a solution. We’re curious, objective, empirical and determined. Through this spirit, we invented The Power of 4™ formula to bring scientific discipline to the business world. It’s how we are Guiding Business Through Science.
Dealer4U

• Functionalities
  ▪ Create Marketplace for Used Vehicle Leads
  ▪ Target Both Dealers and Customers

• Features
  ▪ Build Native Apps or Responsive Web App
  ▪ Provide
    o Customer User Interface
    o Dealer User Interface
    o Backend Data Storage and Processing
  ▪ Include Capabilities
    o To Create or Ingest Leads
    o For Dealers to Bid on Leads
    o To Match Dealers to Leads

• Technologies
  ▪ Apple iOS / Swift
  ▪ Google Android / Java
  ▪ Xamarin
  ▪ CSS / HTML / JavaScript / PHP
  ▪ Angular
  ▪ WebAPI
  ▪ Microsoft .NET Core
  ▪ Mongo DB
Team Urban Science
Riley Hoffman, Hayden Cederstrom, Sara Alshaikhhusain, Blake Weidenfeller, David Kinchen, Tian Yan
The Capstone Experience

Team Volkswagen

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Michigan State University
Spring 2019
Team Volkswagen
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
Team Volkswagen
Maryam Irannejadnajafabadi, Kevin Gu, Amelia Wilson, Fynn Reckhorn, Zachary McCullough
The Capstone Experience

Dr. Wayne Dyksen

Department of Computer Science and Engineering
Michigan State University
Spring 2019
The Capstone Experience Lab
The Capstone Experience Lab
The Capstone Experience Lab
The Capstone Experience Lab
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View of Spartan Stadium
Auto-Owners Exhibition Award
Team Volkswagen, Fall 2018

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 Bhattacharai, David Xuan
Presented by Nik Steele, PMR, Elizabeth Klee and Bill Bye of Urban Science
The Capstone Experience

Design Day Award Winners

December 8, 2017
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 Koepepe and Luke Mercier of Urban Science
The Capstone Experience

Dr. Wayne Dyksen
Department of Computer Science and Engineering
Michigan State University
Spring 2019
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