The Capstone Experience

Dr. Wayne Dyksen
Department of Computer Science and Engineering
Michigan State University
Fall 2018
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

- MW, 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

- 08/29: Capstone Overview
- 09/03: (Labor Day, No Meeting)
- 09/05: Project Plan
- 09/10: Team Status Report Presentations
- 09/12: Risks and Prototypes
- 09/17: Schedule and Teamwork
- 09/19: Resume Writing and Interviewing
- 09/24: Team Project Plan Presentations
- 09/26: Team Project Plan Presentations
- 10/01: Team Project Plan Presentations
- 10/03: Team Project Plan Presentations
- 10/08: Creating and Giving Presentations
- 10/10: Team Status Report Presentations
- 10/15: Team Alpha Presentations
- 10/17: Team Alpha Presentations
- 10/22: Team Alpha Presentations
- 10/24: Team Alpha Presentations

- 10/29: Design Day and the Project Videos
- 10/31: Camtasia Demo
- 11/05: Intellectual Property
- 11/07: Ethics and Professionalism
- 11/12: Team Beta Presentations
- 11/14: Team Beta Presentations
- 11/19: Team Beta Presentations
- 11/21: Team Status Reports
- 11/26: Team Beta Presentations
- 11/28: Team Status Reports
- 12/03: Project Videos
- 12/05: Project Videos and All Deliverables
- 12/06: Design Day Setup
- 12/07: Design Day
- 12/11: Project Videos
From Students…
…to Professionals

The Capstone Experience

Team Amazon

Department of Computer Science and Engineering
Michigan State University
Fall 2018
INTERESTING FINDS UPDATED DAILY

YOUR MIX

EXPLORE

YOUR

FUN
AVAST: Amazon Video And Shopping Technology

• Functionalities
  ▪ Leverage Growing Internet Video Watching
  ▪ Market Amazon Products in Contextual and Personalized Ways

• Features
  ▪ Identify Items of Interest in Videos Automatically
    o People
    o Places
    o Things
  ▪ Search for Relevant Amazon Products
  ▪ Display Links to Amazon Product Pages
  ▪ Provide Front-End JavaScript Framework

• Technologies
  ▪ Amazon Web Services (AWS)
    o Rekognition / Komprehend
    o API Gateway
    o Lambda
    o Elastic Compute Cloud (EC2)
    o Command Line Interface (CLI)
    o Product Advertising API
  ▪ JavaScript / React or Angular or Vue
  ▪ Restful Web Services
Team Amazon
Linhawn Fang, Ben Nwachukwu, Patrick McCormick, Ian McGregor, Han Wang
Team Amazon
Project Plan Presentation

Screen Mockup
Team Amazon
Project Plan Presentation
Team Amazon
Project Plan Presentation

Screen Mockup

Video Title
From Students…
…to Professionals

The Capstone Experience

Team Aptiv

Department of Computer Science and Engineering
Michigan State University
Fall 2018
Team Aptiv

Project Overview

Autonomous Vehicle Fleet Connectivity Apps

• Functionalities
   Provide Connectivity to Autonomous Vehicle Test Fleet
   Via Mobile and Web Apps

• Features
   Enable Scheduling Vehicles for Use
   Provide Real-Time Access to Vehicle Data (Location, Speed, Current User, Etc.)
   Handle Various Roles (Drive, Engineer and Manager)
   Support Web, Android and Apple iOS
   Integrate Apps Into Existing Aptiv Tool
   Create Complete Documentation

• Technologies
   Autonomous Vehicle Technologies
   Aptiv AMDAS
   CSS / HTML / PHP / JavaScript
   Apple iOS / Swift
   Google Android / Java
Team Aptiv
Alex Patton, Klint Kaercher, Drew Glapa, Chad Krause, Emilio Castillo
The Capstone Experience

Team Auto-Owners

Department of Computer Science and Engineering
Michigan State University
Fall 2018
Auto-Owners
INSURANCE
LIFE • HOME • CAR • BUSINESS
For Whatever Lies Ahead

Insurance built around your needs by a local independent agent

FIND AN AGENT FOR A QUOTE

Why choose an independent agent?

Policies to Meet Your Needs
Team Auto-Owners
Project Overview

Jeffrey: Virtual Insurance Claim Advisor

• Functionalities
  ▪ Simplify Insurance Claim Submission
  ▪ Use Voice Recognition and Natural Language Processing

• Features
  ▪ Provide Easy-To-Use Voice Interaction
  ▪ Handle Various Roles
    (Policyholder, Agent, Auto-Owners Associate)
  ▪ Handle Various Claims
    (Home and Auto)
  ▪ Build
    o Mobile Interface for Policyholders
    o Web Interface for Agents and Auto-Owners Associates
  ▪ Utilize GPS for Detecting Location
  ▪ Enable Uploading of Images and Video
  ▪ Format and Submit to Claim System
  ▪ Send Confirmation Messages

• Technologies
  ▪ Natural Language Processing (NLP)
  ▪ Image and Video Processing
  ▪ Global Positioning System (GPS)
  ▪ CSS / HTML / PHP / JavaScript
  ▪ Apple iOS / Swift
  ▪ Google Android / Java
Team Auto-Owners
Alex Klingel, Connor Stabnick, Nabiha Biviji, Michael Dickmann
Team Auto-Owners
Project Plan Presentation

Screen Mockup
Screen Mockup: Web Portal Dashboard
System Architecture

Natural Language Processing

Web Portal
MySQL Database

Jeffrey Web Service API
Capstone Server

Android
Smartphone Application

Google Assistant

Dialogflow

Natural Language Processing

Web Portal
MySQL Database

Jeffrey Web Service API
Capstone Server

Team Auto-Owners
Project Plan Plan Presentation
Team Auto-Owners
Project Plan Presentation

Screen Mockup
The Capstone Experience

Team Dow

Department of Computer Science and Engineering
Michigan State University
Fall 2018
Dow Innovation Leads the Way
We're making vehicles safer, lighter, more efficient and more durable.

What can we help you find? Search Here
Team Dow
Project Overview

Assist IT: Mobile IT Help Assistant

- Functionalities
  - Provide IT Assistance to Dow Employees
  - Adjust Dynamically Around Conversation
  - Via Mobile and Web Apps

- Features
  - Provide Natural Language Interface
  - Adjust Content to Maximize Accuracy
    - Apply Machine Learning (ML)
    - Leverage Crowdsourcing
  - Leverage Dow’s Existing Knowledge Base
  - Scale to 80,000 Employees Worldwide
  - Support Web, Google Android and Apple iOS

- Technologies
  - Microsoft Azure
    - Language Understanding Intelligence Service (LUIS)
    - Machine Learning Services (ML)
    - Voice Assistants
  - CSS / HTML / PHP / JavaScript
  - Apple iOS / Swift
  - Google Android / Java

Midland, Michigan
Team Dow
Brandon Brooks, Charlie Benson, Cassie Thompson, Keaton Coffman
The Capstone Experience

Team Ford

Department of Computer Science and Engineering
Michigan State University
Fall 2018
Make Your Ride, Your Ride.

2019 MUSTANG

VIEW ALL CARS
Team Ford  
Project Overview  

Ford Customer App Review Dashboard  

- Functionalities  
  - Summarize Customer Reviews of Ford Apps  
  - Generate Sentiment Analysis Dashboard  

- Features  
  - Fetch Reviews from Google Play Store and iTunes  
  - Categorize Reviews Using Sentiment Analysis  
  - (From Very Negative to Very Positive)  
  - Visualize Sentiment Analysis via Dashboard  
  - Cascade Review Summaries to Slack Channel  
  - Provide Administrative Portal  
  - Create Full Stack of Microservices  

- Technologies  
  - Java / Spring Framework  
  - Python Natural Language Toolkit  
  - Slack  
  - HTML5  
  - RESTful Web Services  

Dearborn, Michigan
Team Ford
Jordan Schroeder, Paul Friesen, Drew Morgan, Noah Keppers, Mingkai Yang
The Capstone Experience

Team Herman Miller

Department of Computer Science and Engineering
Michigan State University
Fall 2018
The Evolution of Comfort
A new seating experience from Studio 7.5

Meet Cosm
Team Herman Miller
Project Overview

Material Normalization Using Computer Vision

• Functionalities
  ▪ Simplify Office Furniture Ordering
  ▪ Standardize (Normalize) Order Material Data
  ▪ Reduce Customer Requests
  ▪ Offer Alternative Recommendations

• Features
  ▪ Ingest New Materials Requests From Customer Orders
  ▪ Apply Computer Vision
    o Inspect
    o Categorize
    o Tag
    o Approve Or Decline
  ▪ Recommend Nearest Approved Alternative When Declined
  ▪ Support Various Herman Miller Systems via Open Framework
  ▪ Be Trainable, Scalable and Flexible

• Technologies
  ▪ Machine Learning / Deep Learning
  ▪ Python
  ▪ TensorFlow (Image Recognition)
Team Herman Miller
Ted Stacy, Ritwik Biswas, Joe Smith, David Xuan, Josh Bhattarai
Team Herman Miller
Project Plan Presentation

Screen Mockup

Material Classification Engine

Your submitted image

We didn’t find your material. Here are some alternatives.

Material ID: 283992
66% match
Link

Material ID: 439472
65% match
Link

Material ID: 264284
48% match
Link

Material ID: 103748
32% match
Link
Team Herman Miller
Project Plan Presentation
Team Herman Miller
Project Plan Presentation

Screen Mockup

The Capstone Experience
The Capstone Experience

Team Meijer

Department of Computer Science and Engineering
Michigan State University
Fall 2018
our biggest back to school sale. ever.

25% off backpacks

Shop Now
Team Meijer
Project Overview

Meijer Shrink Reduction Using Blockchain

- Functionalities
  - Reduce Product Waste and Loss
  - Track and Control High Waste and Loss Items

- Features
  - Capture Essential Product Data
  - Select and Implement Tracking Mechanism
  - Establish Trigger/Alert Mechanisms
  - Ensure Proper Movement of Products
  - Get Close-Dated Products For Sale Quickly
  - Identify Recalled Products
  - Store Data in Blockchain

- Technologies
  - Microsoft
    - .NET Framework (C#, ASP.NET)
    - Azure
      - Notification Services
      - Mobile Services (Both iOS and Windows)
    - Application Insights
    - Visual Studio Team Server
  - Microsoft Azure or IBM Blockchain Tools
  - Meijer Web Services
  - Bluebird Android Devices
  - SQL Server / MongoDB

Grand Rapids, Michigan
Team Meijer
Matt Wilimberg, Lucas Banks, Moritz Greiss, Mohammad Yousafzai, Phillip Litchfield
The Capstone Experience

Team Michigan State University

Department of Computer Science and Engineering
Michigan State University
Fall 2018
DISCOVERING THE GOLD STANDARD OF CANCER DRUGS

MORE

SPARTAN HIGHLIGHTS

MSUTODAY

EVENTS

AUGUST 3
Navigating MSU’s Campus Using Augmented Reality

• Functionalities
  ▪ Provide Assistance Navigating MSU’s Campus
  ▪ Leverage Augmented Reality (AR) on Mobile Devices

• Features
  ▪ Use Mobile Device Camera
  ▪ Overlay Information About Surroundings
    ○ Building Name (Engineering, Wilson Hall)
    ○ Points-of-Interest (Sparty, The Rock)
  ▪ Provide 3D Wayfinding Instructions
  ▪ Give Self-Guided Tours
  ▪ Utilize MSU’s Campus ArcGIS Instance
  ▪ Support Google Android and Apple iOS

• Technologies
  ▪ Apple iOS / Swift / ARKit
  ▪ Google Android / Kotlin / ARCore
  ▪ ArcGIS
The Capstone Experience

Team Microsoft

Department of Computer Science and Engineering
Michigan State University
Fall 2018
**Team Microsoft**

**Project Overview**

**ITPro Company Portal**

- **Functionalities**
  - Expand Functionality of Microsoft’s Intune Portal
  - Enable IT Professionals (ITPros) to Use Intune
    - Directly
    - From Mobile Devices

- **Features**
  - Extend Fall 2017 Capstone Project
  - Get/Set InTune Settings by ITPros
  - Leverage Microsoft Graph
  - Apply Google Jetpack Standards
  - Scale to Support Millions of Users Worldwide

- **Technologies**
  - Microsoft Graph
  - Google Android
  - Java
  - RESTful Web Services
Team Microsoft
Zhanming Bai, Zoe Fu, Jason Brownell, Ayaka Okamoto
Team Microsoft
Project Plan Presentation

Screen Mockup
Team Microsoft
Project Plan Presentation

Architecture Diagram

Cloud Platform
- Azure
- Microsoft Graph API
- HTTP Request & Response
- Microsoft Intune
- MDM Corporate Portal

Development Platform
- IDE Version: 2017
- Windows and macOS
- Visual Studio
- Xamarin
- C# Framework Version: 5.7.2
- Xamarin Ecosystem
- XCode Build Tools

Application Platform
- Android
- iOS
- Target API Version: 27 (Core)
- Legacy Support API Version: 19 (Kiosk)
- Target Version: 12
- Operating System Target: Windows 10 | Build 17134 | Version 1603

User Platform
- ITPro
- Configuration
- Monitoring
- IW #1
- IW #2
- IW #3
- IW #4

Deployment Paths
Team Microsoft
Project Plan Presentation

Screen Mockup
The Capstone Experience

Team Mozilla

Department of Computer Science and Engineering
Michigan State University
Fall 2018
Fast for good.

2x the speed. Built-in privacy protection. Powered by Mozilla.
There's a better way to browse.
Asynchronize All the (Localization) Things!

**Functionalities**
- Present Messages to Firefox Users (e.g. “You are about to close 10 tabs.”)
- “Localize” Messages to Support
  - Multiple Operating Systems
  - 98 Languages
  - Hundreds of Millions of Users Worldwide

**Features**
- Integrate into Single Firefox Download
- Eliminate Need for Special Builds of Firefox
- Support Restartless “Localization” (Restartless Language Switching)
- Convert Synchronous Code to Asynchronous Code
- Leverage Mozilla’s New Fluent System
- Deliver Code Ready to Ship with Firefox

**Technologies**
- Firefox Code Base (~ 51M Lines)
- CSS
- C++ / JavaScript
- XUL / XBL / HTML
- Fluent
- Document Type Definition (DTD)
- Mercurial
- IRCCloud
- Bugzilla
- Phabricator
- Microsoft Windows, Apple macOS and Linux
Team Mozilla
Jim Lennon, Jack Song, Raza Haider, Jack Smith, Collin Wing
Team Mozilla
Project Plan Presentation

Team Mozilla
Project Plan Presentation

openDir = Open Directory
# LOCALIZATION NOTE (macOpenDir): This is the Mac-specific variant of openDir.
# This allows us to use the preferred "Finder" terminology on Mac.
macOpenDir = Show in Finder
# LOCALIZATION NOTE (winOpenDir2): This is the Windows-specific variant of
# openDir.
winOpenDir2 = Open Folder

profiles-opendir =
{
    PLATFORM() ->
    [macos] Show in Finder
    [windows] Open Folder
    *[other] Open Directory
}
Team Mozilla
Project Plan Presentation

About Profiles
This page helps you to manage your profiles. Each profile is a separate world which contains separate history, bookmarks, settings and add-ons.

Create a New Profile

Profile: Collin

Abūūūt Prōōfilēēş
This paqēlē heētēs yālōou teē māaṃqēdē yālōou prōōfilēēş. Each prōōfilēē is aa qēēpaaraaqē wēnēq which qēēmaaqēa qēēpaaraaqē hīyaēqkē, bābēëkówēkē, qēētings qānēq aādē aādēq.
Creēśēsē sā ṕiēq ŕiēqēēqēēş.
Prōōfilēē: Collin

Reēqqēqqēn
Reēqqēqqēn with Agē-sēqqēn Qēeqēēdē...
The Capstone Experience

Team MSUFCU

Department of Computer Science and Engineering
Michigan State University
Fall 2018
Team MSUFCU
Project Overview

Transaction Anomaly Detection

- Functionalities
  - Visualize MSUFCU Members’ Spending Habits
  - Send Alerts About Unusual Account Activity
- Features
  - Identify Member Account Anomalies
  - Apply User-Created and MSUFCU-Created Rules
  - Leverage Machine Learning and Data Science
  - Send Alerts Via SMS, Push Notifications or Email
  - Build Card-Based Member-Facing Module
  - Support Web, Google Android and Apple iOS
  - Integrate with MSUFCU’s Existing Systems
  - Apply Anti Money Laundering (AML) Rules
  - Provide Companion Administrative Web Portal
- Technologies
  - CSS / HTML / PHP / JavaScript
  - JSON
  - Apple iOS / Swift
  - Google Android / Java
  - SQL Database
Team MSUFCU
Caleb Sherman, Andrew Schmidt, Jim Xu, Austin Roberts, Paul Soma
Team MSUFCU
Project Plan Presentation
Screen Mockup
The Capstone Experience

Team Proofpoint

Department of Computer Science and Engineering
Michigan State University
Fall 2018
Improved Detonation of Evasive Malware

- **Functionalities**
  - Protect Users from Malware Threats
  - Counter Evasive Malware Techniques
- **Features**
  - Enhance Existing Malware Technologies
  - Identify and Block Malware Evasive Behavior
  - Modify Malware Execution
  - Extract Valuable Attributes
- **Technologies**
  - Cuckoo (Malware Sandboxing)
  - Suricata (Intrusion Detection System)
  - Operating Systems and Compilers
  - Reverse Engineering
  - Python / JavaScript
  - MySQL
Team Proofpoint
Sean Joseph, Ian Murray, Jack Mansueti, Tae Park, Ryan Gallan
The Capstone Experience

Team Quicken Loans

Department of Computer Science and Engineering
Michigan State University
Fall 2018
Quicken Loans®
Engineered to Amaze™
Introducing RateShield Approval


RateShield Approval Either Way, You Win!

Buy Your Home Using the New Power Buying Process™
Team Quicken Loans
Project Overview

Walter, You Gotta Go

- Functionalities
  - Integrate Legacy Apps With Modern Versions
  - Automate Legacy Apps Processes With Virtual Worker
- Features
  - Leverage Robotic Process Automation
    - Screen Scraping
    - Machine Learning / Artificial Intelligence
  - Create “Legacy” App (Walter)
    - Used for Loan Application Process
    - Receives Information and Documents
  - Write Modern Replacement App (Lindsey)
  - Implement Centralized Database (Leroy)
  - Provide Web Service (Roger)
  - Create Virtual RPA Worker (Debra)
- Technologies
  - Robotic Process Automation (RPA)
  - Microsoft
    - Azure / Azure SQL
    - C# / Visual Studio
    - .NET WinForms
    - ASP .NET Core
  - GraphQL
  - CSS / HTML / PHP / JavaScript
Team Quicken Loans
Austin Robbins, James Nguyen, Dustin Eastway, Gabe Martino, David Flores
The Capstone Experience

Team Spectrum Health

Department of Computer Science and Engineering
Michigan State University
Fall 2018
Team Spectrum Health
Project Overview

Spectrum Health Virtual Reality Experience

• Functionalities
  ▪ Visualize and Annotate Spectrum Health Facilities
  ▪ Answer Questions for Patients and Family Members
  ▪ Use Virtual Reality (VR)

• Features
  ▪ Build Web-Based Virtual Reality App
  ▪ View 360-Degree Media Using VR Googles
  ▪ Provide Explanations via Annotations
    o Cafeterias
    o Visitor Elevators
    o Aspects of a Hospital Room
    o Tools in a Procedure Room
  ▪ Configure Media Based on User Interaction
  ▪ Provide Companion Administrative Web Portal

• Technologies
  ▪ CSS / HTML / PHP / JavaScript
  ▪ A-Frame
  ▪ ASP.NET Core (C#)
  ▪ Entity Framework Core
  ▪ Microsoft Azure
  ▪ Microsoft SQL Server
Team Spectrum Health
Jordan Hill, Jeremy Du, Stefani Taskas, Anthony Flatter
Team Spectrum Health
Project Plan Presentation

Screen Mockup

VR Room Tour
Select a Building:
Big Rapids Hospital
Team Spectrum Health
Project Plan Presentation

Screen Mockup: Web VR Page
Team Spectrum Health
Project Plan Presentation

Screen Mockup
The Capstone Experience

Team TechSmith

Department of Computer Science and Engineering
Michigan State University
Fall 2018
Introducing Camtasia 2018
The fastest way to create professional-looking videos.

Learn More
Team TechSmith

Project Overview

TechSmith Video Review and Slack Integration

• Functionalities
  ▪ Connect Video Authors with Video Reviewers
  ▪ Use Team Messaging Systems

• Features
  ▪ Integrate TechSmith’s Video Review with Slack
  ▪ Provide Interface for Video Author
    o Receive Notification of New Slack Comments
    o Read Slack Comments on Video Review Site
    o Manage Reviews
      - See Existing Reviews
      - Create New Reviews
      - Assign New Slack Users to Reviews
  ▪ Provide Interface for Video Reviewer
    o See Existing Reviews
    o Launch Video Review Site
    o Playback Video with Slack Interface
    o Provide Annotation within Slack
  ▪ Support Other Team Messaging Systems

• Technologies
  ▪ CSS / HTML / PHP / JavaScript
  ▪ TechSmith Video Review API Proxy
  ▪ Microsoft C#/.Net Core
  ▪ Slack App / Slack SDK
  ▪ RESTful Web Services Using Swagger

TechSmith
Okemos, Michigan
The Capstone Experience

Team Union Pacific

Department of Computer Science and Engineering
Michigan State University
Fall 2018
Building America for more than 155 years by serving customers, communities and shareholders with a passion for performance, high ethical standards and teamwork.
Augmented Reality Mechanic Training

• Functionalities
  ▪ Train Union Pacific Mechanics Safely
  ▪ Use Augmented Reality (AR)

• Features
  ▪ Show Holographic Images of Railroad Equipment
  ▪ Demonstrate Standard Repair Operations
  ▪ “Match” Holograms with Physical Objects
  ▪ Use Microsoft Hololens
  ▪ Generate Accurate Holograms from CAD Data

• Technologies
  ▪ Microsoft Hololens
  ▪ Unity Game Engine
  ▪ PiXYZ Plugin
  ▪ Vuforia Plugin
Team Union Pacific
Luke Sperling, Nick MacDonald, Justin Barber, Colleen Little, Jake Cousineau
Team Union Pacific
Project Plan Presentation

Screen Mockup

Connect the Caboose To The Coal Car

Caboose

Coal Car
Team Union Pacific
Project Plan Presentation

Screen Mockup

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Proin dapibus, tellus a laoreet ultricies, massa massa vulputate dolor, sed finibus enim nunc ac risus

Workhead Part
The Capstone Experience

Team United Airlines

Department of Computer Science and Engineering
Michigan State University
Fall 2018
Team United Airlines
Project Overview

Tooling Kit Content Verification System

• Functionalities
  ▪ Verify Aircraft Tooling Kit Contents
  ▪ Use Mobile Device Camera
• Features
  ▪ Build Database of Complete Kits
    o List of Contents
    o Images of Contents
    o Barcodes and RFID Tags
  ▪ Support Mobile Device Cameras
  ▪ Apply Computer Vision
    o Compare Image Taken to Image Stored
    o Determine Kit Completeness
  ▪ Send Notifications
    o Incomplete Kits
    o Missing Tools
  ▪ Provide Companion Administrative Web Portal
• Technologies
  ▪ Computer Vision
  ▪ CSS / HTML / PHP / JavaScript
  ▪ Apple iOS / Swift
  ▪ Google Android / Java
  ▪ SQL Database
Team United Airlines
Evan Childs, Bill Geshwender, Vladimir Otchere, Scott Campbell, Andy Ashton
From Students…
…to Professionals

The Capstone Experience

Team Urban Science

Department of Computer Science and Engineering
Michigan State University
Fall 2018
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.
VIN-Verse

• Functionalities
  ▪ Display Information About Specific Vehicle Identification Number (VIN)
  ▪ Aggregate Data About a Class of VINs

• Features
  ▪ Provide Web and Mobile Apps
  ▪ Enter VIN Using Keyboard or Mobile Device Camera
  ▪ Give Detailed History of VIN’s Life
  ▪ Build Real-Time Authorization Mechanisms
    ○ Dealers
    ○ Independent Repair Facilities (IRFs)
    ○ Owners
  ▪ Protect Vehicle Owner’s Privacy
  ▪ Crawl Google Reviews or Yelp

• Technologies
  ▪ CSS / HTML / PHP / JavaScript
  ▪ Angular JS
  ▪ Microsoft
    ○ C# / ASP.NET Core
    ○ SQL Server
  ▪ Apple iOS / Swift
  ▪ Google Android / Java
  ▪ Firebase

Team Urban Science
Project Overview

Detroit, Michigan
### Vin History

<table>
<thead>
<tr>
<th>VIN</th>
<th>Accessed By</th>
<th>Date</th>
<th>Repair Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1C4BJWFXDL531773</td>
<td>Belle Tire</td>
<td>9/15/18</td>
<td>Oxygen Sensor Replacements</td>
</tr>
<tr>
<td>1C4BJWFXDL531773</td>
<td>Outzhiner</td>
<td>9/15/18</td>
<td>Ignition Coil and Spark Plug Replace...</td>
</tr>
</tbody>
</table>
Team Urban Science
Project Plan Presentation

Architecture Diagram

Data Feeds
- Manufacturer
- Service Repair Facility
- Consumers
- Potential Buyers

Service Records
- Repair orders and service history
- Self-reported repairs and service history
- View vehicle history

FTP Service

Back-End
- Microsoft SQL Server

Front-End
- ASP.NET
- C#
Team Urban Science
Project Plan Presentation

Screen Mockup

Dashboard

- Make
- Model
- Year
- Date

# of issues

Date

No. of Issues by Car Model

No. of Issues by Month
The Capstone Experience

Team Volkswagen

Department of Computer Science and Engineering
Michigan State University
Fall 2018
The all-new Arteon.

Modern art you can really feel.

MEET ARTEON
Team Volkswagen Project Overview

VW Car-Net Demo App

• Functionalities
  ▪ Change the Habits of Car Dealers
  ▪ Communicate the Value of Car-Net

• Features
  ▪ Target VW Dealers and Customers
  ▪ Create Car-Net Demo / Guided Tour
  ▪ Be Easy and Fun to Use
  ▪ Demonstrate End-to-End User Experience
  ▪ Support Google Android and Apple iOS
  ▪ Support Integration of Video and Product Content

• Technologies
  ▪ Car-Net
  ▪ Apple iOS / Swift
    o AVAudioSession and AVPlayer
    o URLSession and Codable
    o NSNotifications
  ▪ Google Android / Java or Kotlin
    o MediaPlayer and MediaController
    o OKHttp and Retrofit
    o Event Bus

Team Volkswagen
Auburn Hills, Michigan
Team Volkswagen
Zebin Liang, Tim Guertin, Emily Brent, Cyprian Blunt, Kira Chan
Team Volkswagen
Project Plan Presentation

Screen Mockup
Team Volkswagen
Project Plan Presentation
Team Volkswagen
Project Plan Presentation

Screen Mockup
The Capstone Experience

Team Whirlpool

Department of Computer Science and Engineering
Michigan State University
Fall 2018
When dinner can’t wait — and he can’t either

Control the brand new Smart Range from anywhere, so life doesn’t revolve around your range.

See What’s New
Team Whirlpool
Project Overview

Image Recognition Annotation and Validation

• Functionalities
  ▪ Annotate and Validate Images of Recipe Ingredients
  ▪ Apply Crowdsourcing and Gamification
  ▪ Target Whirlpool’s Yummly App

• Features
  ▪ Ingest and Annotate Images
    o Via Mobile Apps
    o Validate Annotations as Actual Ingredients
    o Identify Bounding Boxes
    o Detect and Report Poor Lighting
  ▪ Create Image Validation Game
    o Via Mobile Apps
    o Validate Annotations via Crowdsourcing
    o Track User Participation and Accuracy
    o Create Variety of User Experiences
    o Show Leaderboard
  ▪ Support Google Android and Apple iOS
  ▪ Provide Companion Administrative Dashboard

• Technologies
  ▪ CSS / HTML / PHP / JavaScript
  ▪ Apple iOS / Swift
  ▪ Google Android / Java
  ▪ TensorFlow (Image Recognition)
  ▪ Amazon S3 or Google Cloud Datastore

Benton Harbor, Michigan
Team Whirlpool
Shruti Avutapalli, Jackie Li, Savanna Pinkoski, Jack Turak, Jessica Clappison
The Capstone Experience

Dr. Wayne Dyksen
Department of Computer Science and Engineering
Michigan State University
Fall 2018
The Capstone Experience Lab
The Capstone Experience Lab
The Capstone Experience Lab
The Capstone Experience Lab
The Capstone Experience Lab
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 Koepppe and Luke Mercier of **Urban Science**
The Capstone Experience

Design Day Award Winners

April 27, 2018
Auto-Owners Exhibition Award
Team Phoenix Group, Spring 2018
Customer Service System with Chatbot
Aman Goshu, James Finch, Sarah Fillwock, Dan Shumaker, Fatema Alsaleh
Presented by Ross Hacker and Scott Lake of Auto-Owners Insurance
MSU Federal Credit Union Praxis Award
Team Amazon, Spring 2018

AMPED: Amazon Marketplace Podcast Earnings Detection
Zach Whitener, Cam Korzecke, Chess Luo, Dillon Stock, Hansheng Zhao, Hanzhong

Presented by Ben Maxim of MSU Federal Credit Union
TechSmith Screencast Award
Team Quicken Loans, Spring 2018
Fundamenta: Trust in New Home Construction
Riley Annis, Jaiwant Bhushan, Vishal Adusumilli, Turner Anderson, Erin O'Hara
Presented by Wendy Hamilton of TechSmith
Urban Science Sigma Award
Team Herman Miller, Spring 2018
Adjust: Augmented Reality Chair Adjustment Assistant
Kyle Kinsey, Han Huang, Jacob Weber, Kevin Gaban, Mike Bremiller
Presented by Elizabeth Klee, Nik Steel and Andrea Michaud of Urban Science
The Capstone Experience

Dr. Wayne Dyksen
Department of Computer Science and Engineering
Michigan State University
Spring 2018
Auto-Owners
Insurance
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