

08/28: Capstone Overview

The Capstone Experience

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James Mariani

Department of Computer Science and Engineering
Michigan State University

Fall 2019



*From Students...
...to Professionals*

CSE 498, Collaborative Design

- “The Capstone Experience”
- Instructors
 - Dr. Wayne Dyksen (“Dr. D.”)
 - James Mariani
 - Ryan Johnson
- Class Meetings
MW, 3:00-4:20pm, [1279 Anthony](#) & [1300 Anthony](#)
- [Syllabus](#)
- Web Site
 - capstone.cse.msu.edu
 - Check it often.
- Email
 - Check your email often.
 - Read my email thoroughly and carefully!



Professional Meeting Expectations

- Seated, Ready to Go by 3:00 p.m.
- No...
 - Electronic Devices
 - Hats or Hoods
 - Coats
 - Eating
 - Sleeping
 - “Breaks”



Capstone Overview

➤ Course Logistics

- Client Projects
- Course Logistics (Continued Next Meeting)

Course Goals

[1 of 3]

- Give You Experience In
 - Real World
 - Corporate Setting
- Start Your Transition
 - From Student...
 - ...To Professional



Course Goals

[2 of 3]

- Teams of Students
- Build Significant Software System
 - Design
 - Develop
 - Debug
 - Document
 - Deliver
- For Project Sponsor / Client
- In 15 (Short) Weeks



Course Goals

[3 of 3]

- Build a Significant Software System
- Work in a Team Environment
- Learn New Tools and Environments
- Build and Administer Systems
- Develop Your Communication Skills
- Develop Interview Talking Points
- Learn to Do Stuff on Your Own
- Etc...



Project Deliverables

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

See [Major Milestones](#).

All-Hands Meetings

Presentations By

- Dr. D.
- TAs
- Teams
 - Status Reports
 - Formal Presentations
 - Project Plan
 - Alpha
 - Beta
 - Project Videos
- Guest Speaker(s)



All-Hands Meetings Agendas

- 08/28: Capstone Overview
- 09/02: (Labor Day, No Meeting)
- 09/04: Project Plan
- 09/09: Risks and Prototypes
- 09/11: Team [Status Report Presentations](#)
- 09/16: Resume Writing and Interviewing
- 09/18: Career Days
- 09/23: Team [Project Plan Presentations](#)
- 09/25: Team [Project Plan Presentations](#)
- 09/30: Team [Project Plan Presentations](#)
- 10/02: Team [Project Plan Presentations](#)
- 10/07: Creating and Giving Presentations
- 10/09: Team Status Report Presentations
- 10/14: Team [Alpha Presentations](#)
- 10/16: Team [Alpha Presentations](#)
- 10/21: Team [Alpha Presentations](#)
- 10/23: Team [Alpha Presentations](#)
- 10/28: [Design Day](#) and the [Project Videos](#)
- 10/30: Camtasia Demo
- 11/04: Intellectual Property
- 11/06: Ethics and Professionalism
- 11/11: Team Status Reports
- 11/13: Team Status Reports
- 11/18: Team [Beta Presentations](#)
- 11/20: Team [Beta Presentations](#)
- 11/25: Team [Beta Presentations](#)
- 11/27: Team [Beta Presentations](#)
- 12/02: [Project Videos](#)
- 12/04: [Project Videos](#) and All Deliverables
- 12/05: [Design Day Setup](#)
- 12/06: [Design Day](#)
- 12/09: [Project Videos](#)



Schedules

- Schedules > All-Hands Meeting
- Schedules > Major Milestones
 - 09/11: Status Report Presentations
 - 09/23: Project Plan Presentations
 - 10/14: Alpha Presentations
 - 11/18: Beta Presentations
 - 12/02: Project Videos
 - 12/04: All Deliverables
 - 12/05: Design Day Setup
 - 12/06: Design Day
 - 12/09: Project Videos

- Attendance is required.
- No excuses are accepted.
- Do not schedule anything during these times including interviews, travel home, etc.
- Will coordinate with your interviews.



Urban Science Capstone Labs

- [3322EB](#), [3340EB](#), [3352EB](#), [3358EB](#)
- Door Lock
 - Electronic Keypad
 - Code = #####
 - Do Not Give Out to Other Students
- Systems
 - Up to Four per Team
 - Two 27" iMacs
 - One Dell Rack-Mounted Server (Optional)
 - One Mac Book Pro (Optional)
 - Team 100% Responsible
 - Building
 - Maintaining
 - Securing
 - Backing Up
- Books
- WiFi
 - SSID: CSE498, CSE498 5MHz
 - Key: ???????
- Conference Room ([3322EB](#))
 - Team Meetings
 - Client Conference Calls
 - Google [Conference Calendar](#)
- Appliances
 - Water Cooler/Heater
Nota Bene: The water cooler is not connected to a drain. Do not pour things into it, like rinsing out your water container.
 - Whirlpool Refrigerator
 - Cold Water From Bottled Water
 - Ice From Bottled Water
 - Microwave
 - Keurig Coffee Maker
- Lockable Storage
 - One Drawer Per Team
 - As Needed
 - Assigned by Dr. D. and TAs
 - Obtain Keys from CSE Office



Scheduled Lab Times

- No Formal Lab Sessions
- “Credit” for Scheduled Weekly Meetings
 - Team Meetings
 - Client Conference Calls
 - Triage Meetings with TAs
- Meeting Times TBA With
 - Team
 - Client
 - TAs
- Students must be available to meet in person.
 - Team Meetings
 - Triage Meetings
 - Client Conference Calls



CSE498 Prerequisites

Must Have Successfully Completed

- Tier I Writing Requirement
- CSE335
- CSE325 or CSE410
- One of CSE 402 or CSE 415 or CSE 422 or CSE 431 or CSE 440 or CSE 450 or CSE 471 or CSE 476 or CSE 477 or CSE 482
- One of CSE 402 or CSE 420 or CSE 425 or CSE 435 or CSE 440 or CSE 460 or CSE 472 or CSE 477 or CSE 480 or CSE 482



Integrity of Scholarship

- MSU's policies will be enforced.
- Individual and team work must be original.
- Providing false information to the professor, teaching assistants or fellow team members about matters related to the course will be considered academic dishonesty.
- Violators...
 - ...will be referred to the appropriate deans.
 - ...will receive a grade of F (0.0) in the course.



Capstone Overview

✓ Course Logistics

➤ Client Projects

- Course Logistics (Continued)

Team / Project Generalities

[1 of 3]

- Clients
 - Vary in Size and Type
 - Client/mentor contacts are “volunteers.”
- Team Contact Person
 - Picked By Team
 - Main Point of Contact for Client



Team / Project Generalities

[2 of 3]

- Project Types
 - All Significant Software Development
 - Vary in Specifics
- Project Level of Difficulty
 - Hard Enough
 - But Not too Hard
- Deliverable
 - To the Client
 - By the Due Date



Team / Project Generalities

[3 of 3]

- Challenges
 - Very Short, Unforgiving Time Line
 - Client Contact
 - Team Dynamics
 - Project Plan (in ~3.5 Weeks)
 - Entirely New...
 - Languages
 - Environments
 - API's
 - SDK's
 - Processes
 - Protocols
 - Etc.
 - Project Management
 - Etc...



Project Specifics

- Vary
 - Type
 - Current State of Specificity
- Challenge
 - Connect with Client
 - “Nail Down” the Project
 - Hard Enough
 - Not too Hard
 - Avoid Feature Creep
 - Course Feature, Not Bug



Intellectual Property and Non-Disclosure Agreements

- Intellectual Property Agreement
 - You agree to assign ownership of intellectual property that may be created as a result of your project to your client.
 - Copyrightable Program Code
 - Patentable “Ideas”
 - Most clients will require an IP agreement.
- Non-Disclosure Agreement
 - You agree not to disclose client confidential information.
 - Most clients will require an NDA.
- To date...
 - Most code has not gone directly into production.
 - No patents have resulted.
- Use agreements provided by MSU.
- Always Contact Dr. D. Before Signing Anything



Project Teams

1. Accenture
2. Amazon
3. AppDynamics
4. Auto-Owners
5. Bosch
6. Dow
7. Evolutio
8. Ford
9. GM
10. Harvard Law School
11. Herman Miller
12. Learning A-Z
13. Meijer
14. Michael Sadler Foundation
15. Michigan State University ITS
16. Microsoft
17. Mozilla
18. MSUFCU
19. ProofPoint
20. Technology Services Group
21. TechSmith
22. Union Pacific
23. United Airlines
24. Urban Science
25. Vectorform
26. Volkswagen
27. Yello

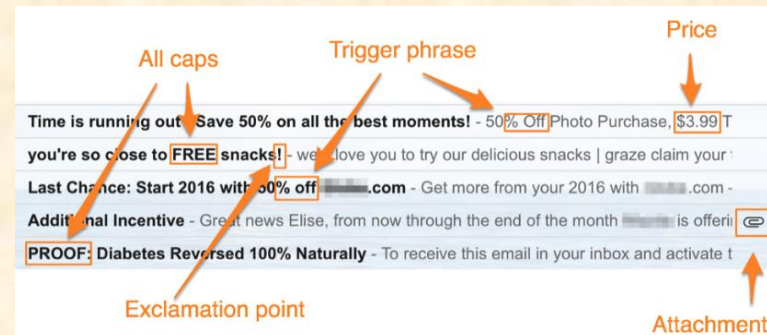


Team Accenture

Project Overview

Email Classification using Machine Learning

- Functionalities
 - Classify and Cluster Emails
 - To Detect Malicious Emails
 - Using Machine Learning and NLP
- Features
 - Enhance Models
 - Triage Into Categories
 - Email with Malicious Attachments
 - Email with URL to Payload
 - Credential Phishing Emails
 - Non-Interesting Emails
- Technologies
 - Machine Learning (Python and TensorFlow)
 - Amazon Web Services
 - MongoDB
 - Bootstrap Front-End Framework

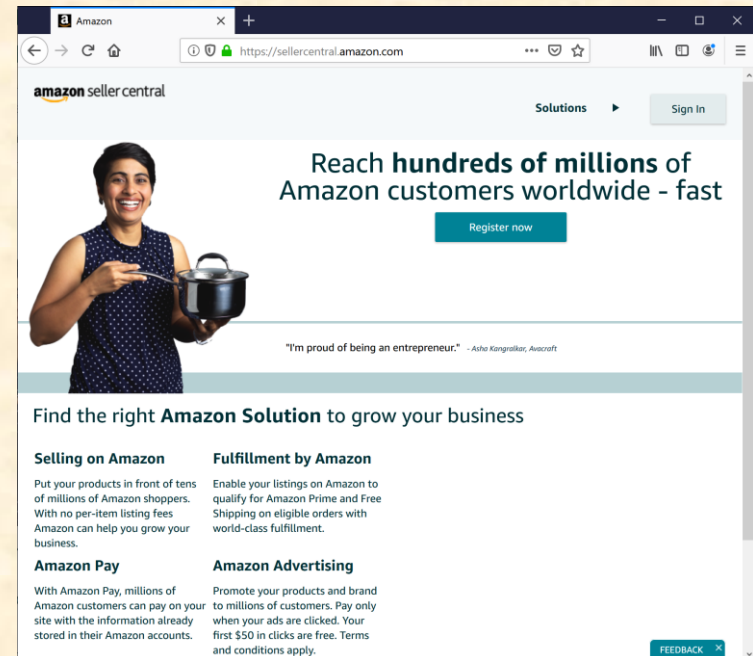


Team Amazon

Project Overview

SPARTI

- Functionalities
 - Simplify Use of Amazon Sellers API
 - Used by Amazon Third-Party Sellers
- Features
 - Help Sellers Use Amazon APIs Easily and Quickly
 - Eliminate Need for Non-Differentiated Code
 - Security
 - Telemetry
 - API Integration
 - Provide Turnkey Integration with AWS
- Technologies
 - Marketplace Web Service / Selling Partner APIs
 - AWS Docker, CloudFormation, DynamoDB, CloudWatch, ECS
 - OAuth
 - Login with Amazon
 - AWS CodeStar, CodePipeline



Seattle, Washington
Detroit, Michigan

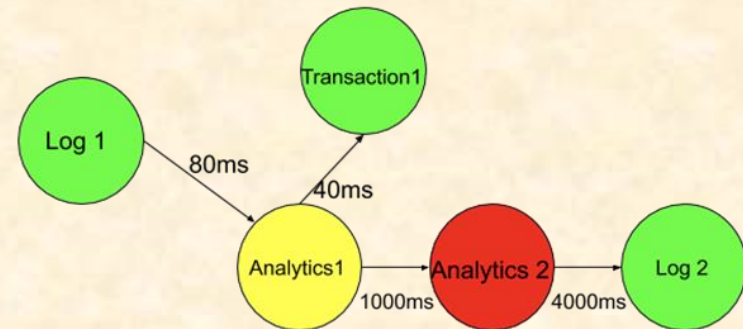


Team AppDynamics

Project Overview

BizIQ Flow Map Using Sequential Analytics Data

- Functionalities
 - Expand AppDynamics APM Flow Map Functionality (Application Performance Management Platform)
 - With a Web Application
- Features
 - Visualize Analytics
 - Transaction, Log, Custom Event
 - Unique Identifier for Single Call
 - Datetime Timestamp
 - Using AppDynamics REST API, ADQL Queries
 - Choose Data to Build Flow
- Technologies
 - D3.js
 - Node.js
 - AppDynamics APM and Analytics



Southfield, Michigan
San Jose, California



Team Auto-Owners

Project Overview

“Danger Diner” VR Training

- Functionalities
 - Teach Users Positive Safety Practices
 - With a Virtual Reality Game
 - Simulator of Restaurant Environment
- Features
 - VR Game
 - Model Restaurant Environment
 - Identify Objects
 - Hazard
 - Positive Safety Practices
 - Select Objects for Hints
 - Review Panel
- Technologies
 - Unity Game Engine
 - Oculus Rift
 - Oculus Rift Sensor and Touch Controllers



Auto-Owners
INSURANCE

LIFE • HOME • CAR • BUSINESS

Lansing, Michigan

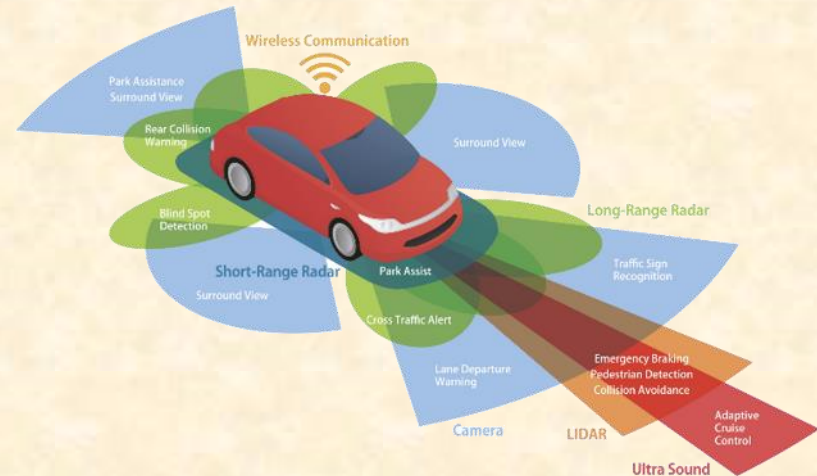


Team Bosch

Project Overview

Integration and Testing Suite for ADAS Radar Sensors

- Functionalities
 - Determine if Critical Software is “Broken”
 - Instantaneously on Bosch Radar Sensors
 - With an Automated Testing Suite
- Features
 - Automatically
 - Flash Software Binary Onto Radar Sensor
 - Test CAN Communication
 - Check if Radar is Modulating
 - Detect Active Diagnostic Troubles Automatically
 - Automate Sanity Checks
- Technologies
 - Jenkins
 - Git
 - Vector CANape / CANalyzer
 - CAN Protocol



BOSCH

Invented for life

Plymouth, Michigan

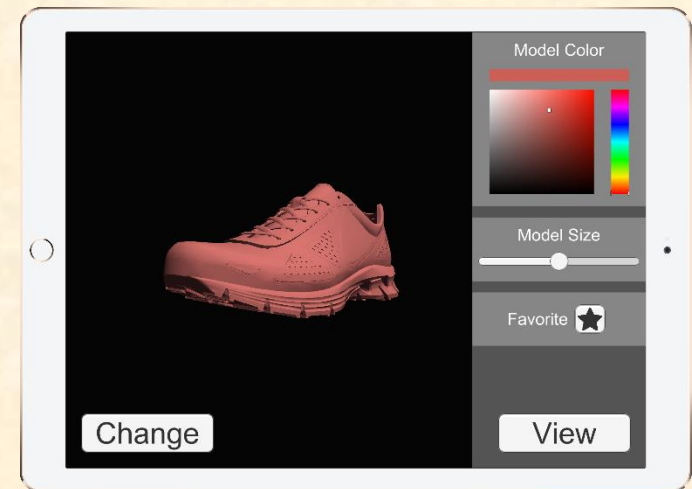


Team Dow

Project Overview

3D Product Showcase Application

- Functionalities
 - Showcase Dow Products
 - Showcase Products Manufactured with Dow Material
 - Using Augmented Reality Mobile Application
- Features
 - AR Mobile Application
 - Ask Users Questions
 - Provide Product Information
 - 3D Models for Users to Interact With
- Technologies
 - Unity Game Engine
 - Apple iOS / Swift
 - Google Android / Java
 - ARKit / ARCore / Vuforia
 - App Center / TestFlight
 - Microsoft Azure



Midland, Michigan



Team Evolutio

Project Overview

ERP Air Force: Drone Elephant Recognition and Tracking

- Functionalities
 - Provide Facial Recognition of Elephants
 - Predictively Track Elephants
 - Aid Combatting Elephant Poaching
- Features
 - Auto-Identify Elephants from UAVs
 - Predictively Track Specific Elephants
 - Quickly Locate Animals
 - Auto-Identify Rhinos in Drone Footage
- Technologies
 - Image Recognition
 - Machine Learning
 - Artificial Intelligence
 - MVC Architecture
 - TensorFlow



Team Ford

Project Overview

Ford Mobility Product Metrics

- Functionalities
 - Answer Key Questions About Ford Mobility Products
 - Using a Metrics Platform
 - Targeted at Software Engineers
 - With a Chat Bot
- Features
 - Build a Metrics Platform
 - Bot Interfaces for Slack and WebEx
 - Chat Bot Engine
 - Metrics Dashboard
 - Admin Portal
 - Data Interface
 - Pixel Tracker, Alert Configuration, Report Dispatcher
- Technologies
 - Azure APIM
 - Azure Log Analytics
 - Slack
 - WebEx Teams



Dearborn, Michigan



Team GM

Project Overview

Profiling Manufacturing Plant Computer Network Traffic

- Functionalities
 - Ensure Legitimate Computer Network Traffic
 - In GM Manufacturing Plants
 - Using Data Analysis and Machine Learning
- Features
 - Categorize Network Flows
 - Classify Communication Type
 - Learn Normal Traffic
 - Identify Anomalies
 - Establish Traffic Patterns
- Technologies
 - Data Profiling Tools (SILK, Wireshark, Scapy)
 - Data Analysis Tools (SSIS, KNIME, Tableau, SAS)
 - Development Environment (Eclipse, Visual Studio)
 - Machine Learning Frameworks



Detroit, Michigan



Team Harvard Law School

Project Overview

“StackLife” Library Search and Display Tool

- Functionalities
 - Collect Information on Islamic Law and History
 - Facilitate Universal Access
 - Promote New Research
 - Using AI / Data Science
- Features
 - Full-Stack Web Application
 - Collect Structured Data
 - Store in Relational Database
 - Filtering Tool
 - Query Tool
 - Informative Visualizations
- Technologies
 - Python Flask
 - MySQL 8+
 - HTML, CSS, JavaScript



**HARVARD
LAW SCHOOL**
Cambridge, Massachusetts

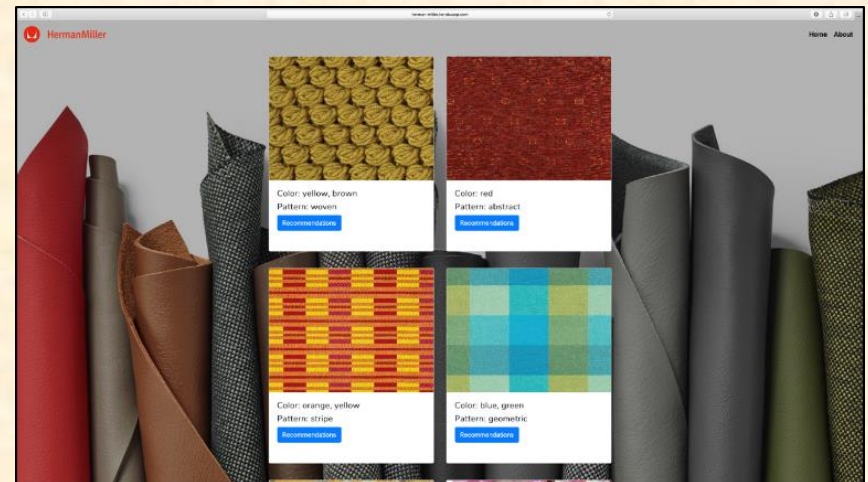


Team Herman Miller

Project Overview

Computer Vision for Furniture Manufacturing

- Functionalities
 - Automate Verification and Inspection
 - Of Fabric Installation
 - Using Deep Learning
- Features
 - Classify Material Offerings
 - Validate Correct Fabric and Orientation
 - Install Camera and Controls System
 - Capture Images of Products
 - During Construction
 - Open and Scalable Framework
- Technologies
 - Deep Learning (Python & TensorFlow)
 - Raspberry Pi / Arduino
 - Embedded Systems APIs



HermanMiller
Zeeland, Michigan

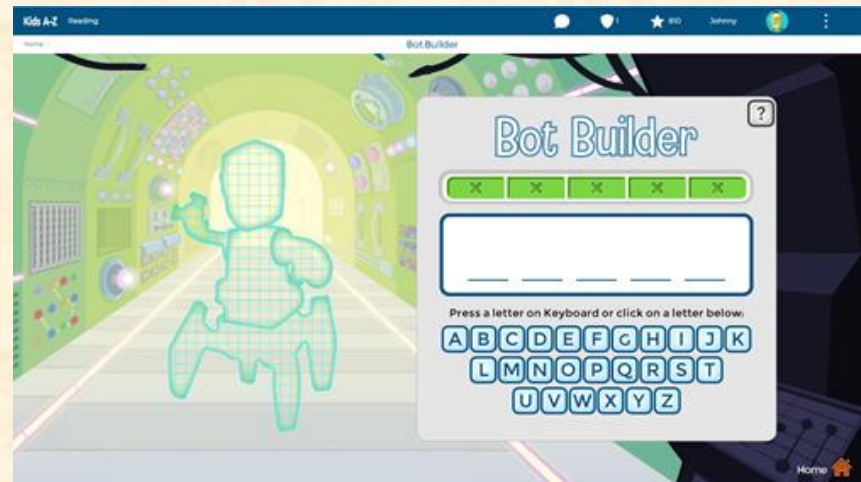


Team Learning A-Z

Project Overview

Robot Builder Word Guessing Game

- Functionalities
 - Teach Kids Vocabulary Words
 - Using a Robot Game
- Features
 - Randomly Choose a Vocab Word
 - Student Chooses Letter
 - Robot Part Appears if Correct
 - Otherwise, Incorrect Letter Choices Used
 - Give Hints to User
 - Success Screen
 - Bonus Round to Choose Definition
- Technologies
 - Angular
 - PHP
 - MySQL



Team Meijer

Project Overview

Creating Picking and Fulfillment Efficiency

- Functionalities
 - Optimize Shopping Routes Through Meijer Stores
 - For Order Picking and Fulfillment App
 - For Professional Shoppers
 - To Reduce Time and Cost
- Features
 - Mobile Apps to Navigate Stores
 - Novel Order Picking Algorithm
 - Machine Learning to Identify Common Items
 - Robust To
 - Store Layout
 - Fulfillment Centers
 - Batching Systems
- Technologies
 - Microsoft Azure Services
 - Microsoft .NET, C#, ASP.NET
 - Xamarin
 - SQL Server
 - Microsoft Visual Studio Team
 - Machine Learning Technologies



meijer[®]

Grand Rapids, Michigan



Team Michael Sadler Foundation

Project Overview

GameChang3rs Learning Management System

- Functionalities
 - Teach Kids How To Build a Legacy
 - Develop Strong Character
 - Make Good Choices
 - Become Socially and Emotionally Engaged
 - Develop Learning Management System
 - Replace Spreadsheet Based System
- Features
 - Track
 - Training
 - Lesson Plans
 - Activities
 - Communication System
 - Integrate with Current LMSs and Social Media
 - Provide Scalability
- Technologies
 - HTML and jQuery
 - WordPress / Drupal / Moodle
 - Blackboard / CMS / Instagram / Facebook / YouTube APIs



MICHAEL SADLER
FOUNDATION

Michael Sadler Foundation
Grand Rapids, Michigan



Team Michigan State University ITS

Project Overview

Spotlight: Discovering Clubs and Student Organizations

- Functionalities
 - Help Students Find Clubs and Organizations
 - Using Mobile / Web Applications
- Features
 - Collect User Interests and Backgrounds
 - Club and Organization Suggestions
 - Provide Information on How to Connect
 - Register and Administer Clubs
 - Register for Clubs and Organizations
- Technologies
 - Amazon Web Services
 - Apple iOS 13 / Swift
 - Android / Kotlin
 - Front-End Web Framework (Vue.js, React, Angular)
 - GitLab

STUDENT
CLUBS
AND
ORGANIZATIONS



Information Technology Services
East Lansing, Michigan

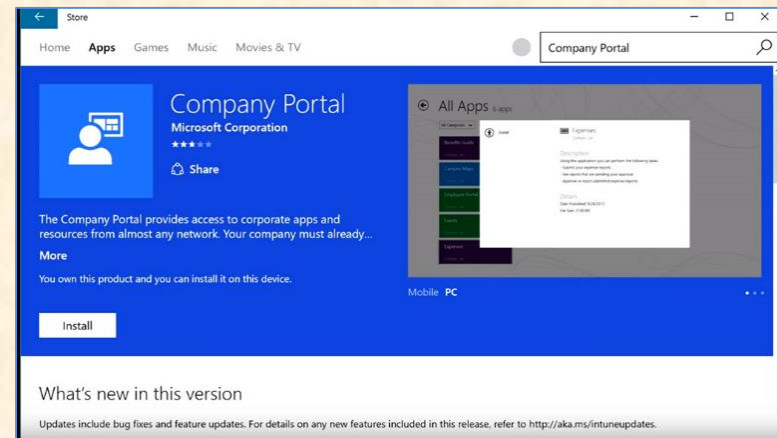


Team Microsoft

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 2018 Capstone Project
 - Support iOS, Android, and Windows
 - Allow ITPros to Set and Push Intune Settings On the Go
 - Scale to Support Millions of Users Worldwide
- Technologies
 - Xamarin
 - Microsoft Graph
 - C#
 - Android / iOS / Windows
 - Azure DevOps
 - RESTful Web Services

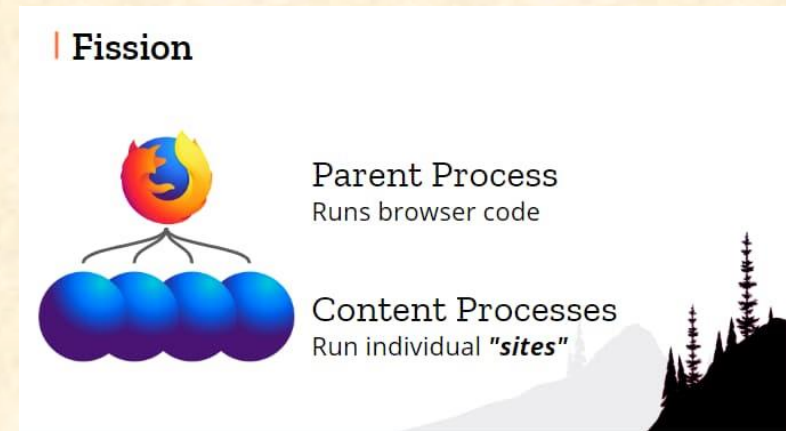


Team Mozilla

Project Overview

Splitting the Atom. Again.

- Functionalities
 - Protect Firefox Against Spectre and Meltdown
 - Integrate “Fission” Into the Browser
 - Cope with Multiple Content Processes
- Features
 - Distinguish Messages Between Frames
 - Indicate Origin of Permission Requests
 - Update JavaScript and C++ of Browser
 - Deliver Code Ready to Ship With Firefox
- Technologies
 - JavaScript
 - C++
 - Mercurial
 - IRC
 - Bugzilla
 - Phabricator
 - Windows / macOS / Linux



Nota Bene:

- Team members are required to meet with the project sponsors for all day meetings on September 14 & 15.
- Team Members must agree to Open Source licensing.



Mountain View, California



Team MSUFCU

Project Overview

Building Hopes and Dreams Together

- Functionalities
 - Enable Banking to be “Hyper-Personalized”
 - Banking Advice for User’s Hopes and Dreams
 - Support iOS, Android, Facebook Messenger, iMessage, Alexa
- Features
 - Quiz to Build a User Profile
 - Machine Learning to Analyze Transaction Data
 - Messaging System
 - User and Admin Functionality
- Technologies
 - HTML / CSS
 - PHP / JavaScript
 - Java
 - Swift
 - MySQL
 - Alexa Skills Kit
 - Facebook Messenger API

Hey MSUFCU, what's my checking account balance?



Could you give me a budget tip?



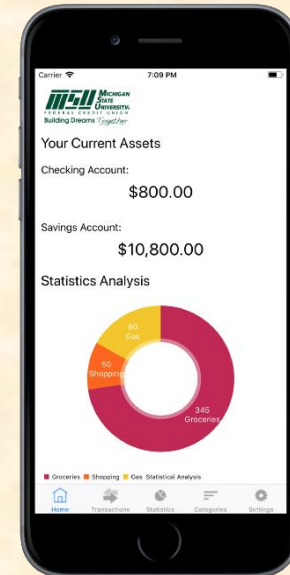
Your checking account balance is \$800.00.



Sure.



According to your spending habits in the last six months, you could try to reduce the spending on category “Clothes”.



Team Proofpoint

Project Overview

Detecting State Sponsored Computer Security Terrorists

- Functionalities
 - Protect Users from Computer Security Terrorists
 - Detect and Analyze State Sponsored Security Threats
- Features
 - Detect Sophisticated Security Threats
 - Create High Quality Lures
 - Provide Suitable Environment for Threats
 - Study Methodology of Threats
- Technologies
 - HoneyPot
 - Natural Language Processing / Machine Learning
 - Intrusion Detection Systems (IDS)
 - Server Side Technologies (Web, File, Email)



proofpoint™

Sunnyvale, California



Team Technology Services Group

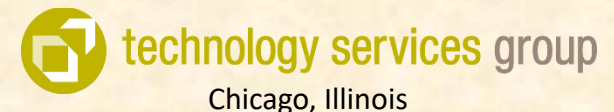
Project Overview

Document Management Using Google Cloud Platform

- Functionalities
 - Improve TSG's Document Import / Ingestion
 - Leverage Big Data Toolsets
- Features
 - GCP to Improve Document Import
 - GCP Bigtable for Storage
 - Big Data Analysis of Documents
- Technologies
 - Java (Back-End)
 - JavaScript (Front-End)
 - Hadoop / HBase
 - Google Cloud Platform (GCP)
 - GCP Bigtable
 - GCP BigQuery
 - Cloud Machine Learning
 - Cloud Natural Language



Google Cloud Platform



Team TechSmith

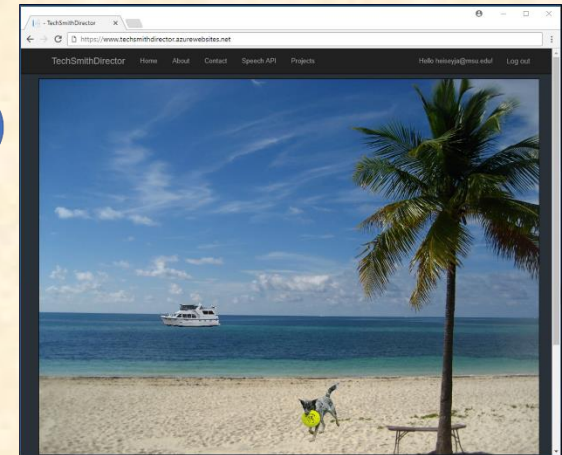
Project Overview

Smart Automatic Video Creation

- Functionalities
 - Auto-Generate Videos Based Script
 - Using Web App to Manage Users and Projects
 - With Translation Services for Multiple Languages
- Features
 - Utilize AI to Summarize Script
 - Collect Assets Based on Summary
 - Rendering Engine to Produce Video
 - Allows Users to Manage their Projects
 - Automatically Select Music Based on Assets
- Technologies
 - C# / .NET Core
 - Docker Containers
 - Azure
 - JavaScript / HTML

I'd like a beach background for my video.

Let's place a dog with a Frisbee on the beach.



Team Union Pacific

Project Overview

Railroad Physics Data Visualization

- Functionalities
 - Provide Graphical Outputs of Railroad Physics Data
 - To Aid With Diagnosis of Problems
 - Using Excel and a Web App
- Features
 - Input CSV Files Containing Physics Data
 - Provide a REST Endpoint
 - Output Exportable Excel File
 - With Animated Images
 - Different Train Forces
 - Output to Web UI
- Technologies
 - Java
 - Angular
 - Excel



BUILDING AMERICA®

Omaha, Nebraska
Okemos, Michigan

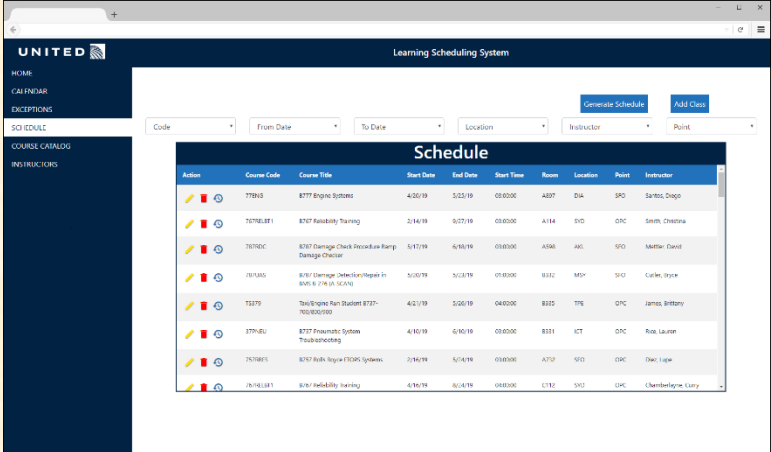


Team United Airlines

Project Overview

Training Scheduling and Optimization System II

- Functionalities
 - Manage United Airlines Technical Operations Training
 - Schedule Classes and Instructors Optimally
- Features
 - Expand Upon Spring 2019 Project
 - Optimize Course Scheduling
 - Number of Classes Per Location
 - Instructor Travel and Overtime
 - Fixed Courses
 - ML to Improve Optimization Over Time
 - Create iOS and Web Apps
- Technologies
 - MS SQL Server Database
 - Node.js
 - Angular
 - ASP.NET Core
 - C#
 - Swift



Action	Course Code	Course Title	Start Date	End Date	Start Time	Room	Location	Point	Instructor
✓	77943	8777 Engine Systems	4/30/19	5/23/19	08:00:00	A837	DIA	SPD	Sanjay, Diego
✓	76780L81	8767 Reliability Training	5/14/19	6/27/19	09:00:00	A114	DID	QMC	Smith, Christina
✓	76780C	8767 Damage Check Procedure Ramp Damage Checker	5/13/19	6/19/19	09:00:00	A586	AGC	SPD	Mattar, David
✓	767405	8767 Damage Detection/Repair in 3000 & 3000-3000	5/13/19	5/23/19	09:00:00	B332	MDX	SPD	Carlin, Bryce
✓	73279	7327 Engine Run Station 8727-7327/8000/8000	4/22/19	5/26/19	04:00:00	B333	TRE	QMC	James, Brittany
✓	37948U	8757 Pneumatic System Troubleshooting	4/10/19	6/10/19	09:00:00	B331	ICT	QMC	Ross, Lauren
✓	76780E5	8767 Aids Intra FIDMS Systems	5/14/19	5/14/19	09:00:00	A712	SPD	QMC	Dani, Lique
✓	76780L81	8767 Reliability Training	6/19/19	6/19/19	09:00:00	C712	SPD	QMC	Chamberlaine, Lorry

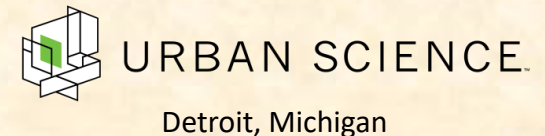


Team Urban Science

Project Overview

AutoHook Creative Tool

- Functionalities
 - Make Visual Changes to AutoHook in Browser
 - Share AutoHook UI Templates
 - Replace Current Tools That
 - Require Extensive Knowledge
 - Do Not Work Well Together
- Features
 - Easy to Use Interface
 - Edit in Browser
 - HTML
 - JavaScript
 - CSS
 - Export and Import of Templates
- Technologies
 - .NET Core
 - MS SQL Server
 - Angular



Team Vectorform

Project Overview

Rumble

- Functionalities
 - Detect When Washing Machine is On or Off
 - Visualize Data and Effectiveness With a Web App
- Features
 - Decipher Status Robust to:
 - Handling of Device
 - Machine In-Between Steps of Wash
 - Identify / Predict End of Cycle
 - Stream Data to Server
 - Use ESP32 SOC
- Technologies
 - C++ Firmware Development
 - Arduino
 - Machine Learning
 - Accelerometer Signal Processing
 - Web Development

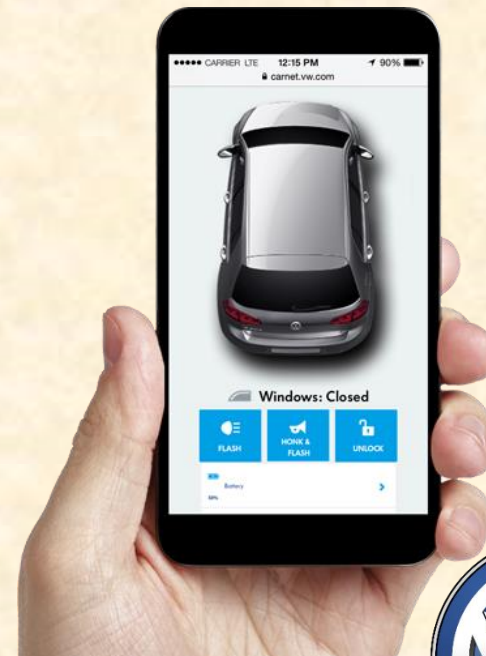


Team Volkswagen

Project Overview

VW Car-Net Smart Hub Web Apps

- Functionalities
 - Connect VW Cars with Existing Apps
 - Utilize IoT (Internet of Things) and Telematics Services
- Features
 - “Smart Hub” Web App for Integration
 - Use Cases
 - Automatically Close Garage Door When Leaving
 - Connect Apple Play Automatically
 - Define End-to-End Experience
 - Effective Work Flows
- Technologies
 - TypeScript
 - Angular
 - Node.js
 - HTML



Auburn Hills, Michigan

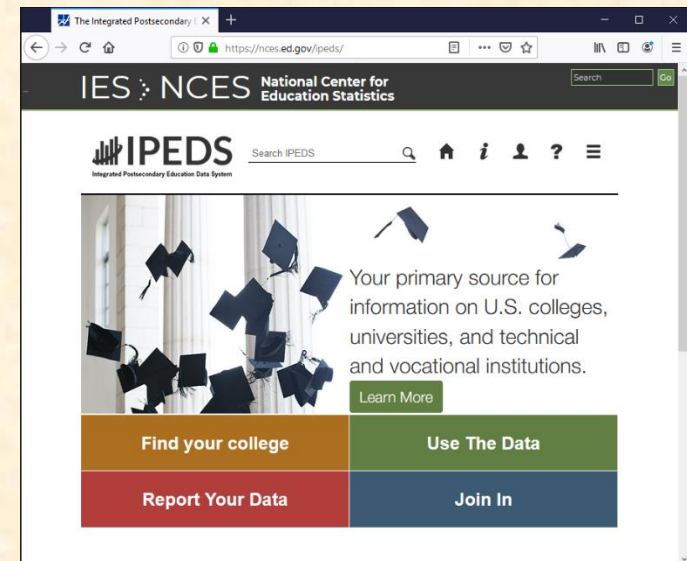


Team Yello

Project Overview

Intelligent and Adaptive Data Mapping

- Functionalities
 - Match Synonymous Data Entered by Students
 - At Career Fairs and On Resumes
 - Using an Intelligent Matching Algorithm
- Features
 - Match Data to Standardized List in Real-Time
 - Persist to a Database
 - Provide UI for Entering Data
- Technologies
 - Database Technologies
 - Web / Mobile Development Technologies
 - RESTful Web Services



yello
Chicago, Illinois



Google Form

- www.capstone.cse.msu.edu
- + Other Links
- > Downloads
- > Team Member Survey: Google Form



First Assignments

- Read the [Syllabus](#).
- Check out the Lab
([3322EB](#), [3340EB](#), [3352EB](#), [3358EB](#)).
 - See if you can find it.
 - See if you can get in.
- Check out the [Web Site](#).
- Research your [Project](#).
 - Sponsor
 - Technologies



What's Next?

- Teams
 - Assignments by Email Tonight or Tomorrow Morning (Keep checking your email.)
 - Meet Initially by Tomorrow Afternoon at the Latest
 - Lab Machine Assignments in Lab
 - Start Researching Technologies
 - Start Configuring Lab Machines
 - Team Photos
 - Thursday, September 19
 - Starting at Noon
 - Dress is business casual.
 - Schedule it.
- Client
 - Contact by Email by Tomorrow COB (Close of Business)
 - Conference Call or On-Site Meeting by Friday
 - Review Project Proposal

Questions?



Capstone Overview

✓ Course Logistics

✓ Client Projects

➤ Course Logistics (Continued)



Urban Science Capstone Lab Machines

- Up to Four per Team
 - Two 27" iMacs
 - Dell Rack-Mounted Server (Optional)
 - Connected to Outside World
 - Keep Secure
 - Mac Book Pro (Optional)
- Operating Systems on iMacs and MBPs
 - Run macOS Mojave
 - Install VMware Fusion (from [here](#))
 - Create Virtual Machines
 - Windows 10 VM from TAs
 - Allocate Sufficient Cores and Memory
 - Others as Needed
 - Don't use Apple Boot Camp



Capstone Lab Miscellany

[1 of 2]

- Security
 - Keep lab doors closed.
 - Do not open doors for strangers
 - Do not give out door key code to others.
 - Do not invite non-capstone students to work in the lab with you.
 - Email Dr. D. if door becomes unlocked.
- Wireless
 - SSID: CSE498
 - Key: ??????
 - Intended for Devices Requiring Lab Subnet
- Coffee
 - Some Provided by Dr. D.
 - Bed, Bath & Beyond (Get 20% Off Coupon)
- Game Playing / Video Watching
 - Not On Monitors Facing Hallway
 - Not If Other Team Members Need Machine



Capstone Lab Miscellany

[2 of 2]

- Do not “maniac” the wires and cables.
- Keep the lab neat and clean.
 - Lived In, Okay.
 - Messy, Not Okay.
- Respect...
 - ...other teams’ spaces.
 - ...shared spaces.
- Garbage Containers
 - Empty the small one by the coffee maker into a larger one.
 - Put larger ones out in the hall at night if near full.
 - Put back in the lab in the morning if empty.
- Turn the lights out if you’re the last one out.
- Close the windows if you open them.
- Be careful with cabinet drawers; don’t “maniac” them.



Mobile Devices Available

- For Capstone Project Use
- By Team for the Semester
- iOS
 - iPads
 - iPhones
 - iTouch
- Android
 - Tablet
 - Phone
- Surface Pro 3
- If you need something, ask.



Expectations & Workload

- Extremely High For Both
- Your MSU Career Capstone
- Addition to Your Personal Portfolio
- Experience Viewed Like an Internship
- Interview Talking Points
- Leverage Into a Job Offer



Schedules

- Schedules > All-Hands Meeting
- Schedules > Major Milestones
 - 09/11: Status Report Presentations
 - 09/23: Project Plan Presentations
 - 10/14: Alpha Presentations
 - 11/18: Beta Presentations
 - 12/02: Project Videos
 - 12/04: All Deliverables
 - 12/05: Design Day Setup
 - 12/06: Design Day
 - 12/09: Project Videos

- Attendance is required.
- No excuses are accepted.
- Do not schedule anything during these times including interviews, travel home, etc.
- Will coordinate with your interviews.



Meeting Attendance

- Required
 - All-Hands (Class) Meetings
 - Team Triage Meetings
 - Team Meetings
 - Team Conference Call Meetings
 - 5% of Final Grade
 - Late == Absent
 - 1% of Final Grade for Each Unexcused Absence
 - Attendance Grade Can Be Negative (See Syllabus)
 - If > 5 Absences Team Contribution Grade Will Be Affected
 - Almost No Excuses Accepted
 - One or Two Excused Possible for Interviews
 - Must Provide Information
 - Date, Company, Recruiter Name & Contact Info
 - In Advance
 - To Both Dr. D. and TAs
 - Must Attend (No Excuses Accepted)
 - Your Team Presentations
 - All Project Video Viewing
 - Design Day
- Do NOT schedule interviews.
Do NOT schedule ANYTHING.
Do NOT buy plane tickets.



Team Organization

- Up to Each Team
- Organize into Roles
 - Client Contact
 - Program Manager
 - Developer
 - Tester
 - Systems Administrator
 - Etc...
- Everyone must make technical contributions.



Team Dynamics

- Key to Success
- Significant Component of Course Grade
- Address Problems Immediately
 - Within Team
 - With Dr. D. and/or TAs
- Be Ready to Discuss During Interviews



Grading

[1 of 5]

• Team (70%)	
▪ Project Plan Document & Presentation	10
▪ Alpha Presentation	10
▪ Beta Presentation	10
▪ Project Video	10
▪ Project Software & Documentation	25
▪ Design Day	<u>05</u>
▪ Total	70
• Individual (30%)	
▪ Technical Contribution	10
▪ Team Contribution	10
▪ Team Evaluation	05
▪ Meeting Attendance	<u>05</u>
▪ Total	30



- Final Grade Sum Of...
 - Individual Total
 - % of Team Total Based on Team Contribution
- Grand Total =
$$\begin{aligned} &(\text{Individual Total}) \\ &+ \\ &(\text{Team Total}) * (\text{Team Contribution}) / 10.0 \end{aligned}$$
- *Nota Bene*: Your Team Contribution will have a very significant effect on your final grade.



Grading

[3 of 5]

Effect of Team Contribution					
Technical Contribution	Team Contribution	Team Evaluation	Meeting Attendance	Team Total	Grand Total
10	10	5	5	70	100
10	9	5	5	70	92
10	8	5	5	70	84
10	7	5	5	70	76
10	6	5	5	70	68
10	5	5	5	70	60
10	4	5	5	70	52
10	3	5	5	70	44
10	2	5	5	70	36
10	1	5	5	70	28
10	0	5	5	70	20
<i>Nota Bene: Assumes Perfect Score In Every Other Category</i>					



Unacceptable Excuses for Not Contributing

- They never asked me to do anything.
- They never let me do anything.
- I wrote 1000's of lines of code but they weren't included in the project.
- My features were not included in the project.
- I work 40 hours per week at my job.
- I live 60 minutes from MSU.
- I didn't want to work on this project team.
- I ranked this project 27 out of 27.
- I did a lot of research about stuff we never used.
- I was busy interviewing.
- Etc...



Grading

[5 of 5]

- We reserve the right to make changes with sufficient notice.
- No special consideration will be given for final grades including but not limited to
 - status in any academic program including CSE,
 - financial aid,
 - rank in the armed forces,
 - job while a student at MSU,
 - job after anticipated graduation from MSU,
 - commute to MSU,
 - graduation,
 - mortgage,
 - wedding,
 - visa status,
 - ability to enroll in CSE498 next semester,
 - or anything else.



Using Resources

- Ok For “Help”
 - People
 - Past Capstone Teams
 - Other Capstone Teams
 - Faculty Members
 - Articles
 - Sample Code
 - Etc...
- Not Ok For “Entire” Project
- If Unsure, Ask Dr. D. and/or TAs



Using Existing Code

- Ok
 - Examples
 - Prototypes
 - Open Source Code
 - Fragments
 - Libraries
 - Utilities
- Not Ok
 - Vast Amounts of Your Project
 - Not Open Source
- Ask Client in Advance
- Document and Report All Existing Code Used
- Be Careful!
- If Unsure, Ask Dr. D. and/or TAs and/or Your Client



Design Day

- College of Engineering Event
 - Engineering Building
 - Friday, December 6, 2019
- Displays (Booths) of Design Projects
 - CSE Capstone
 - ECE Capstone
 - ME Capstone
 - Etc...
- Presentations and Awards
 - Panel of Judges
 - CSE Team Project Videos



Travel to Client

- Reimburse for Mileage for Personal Car
- Travel Within Michigan (Outside of Lansing)
 - Grand Rapids
 - Midland
 - Metro Detroit
 - Zeeland
- From East Lansing to Client and Back
- One or Two Cars Per Team Per Trip
- See Brenda in the CSE office in advance.



VISA

- Verified Individualized Services and Accommodations
- Let us know immediately.
- We will work with you.



Integrity of Scholarship

- MSU's policies will be enforced.
- Individual and team work must be original.
- Providing false information to the professor, teaching assistants or fellow team members about matters related to the course will be considered academic dishonesty.
- Violators...
 - ...will be referred to the appropriate deans.
 - ...will receive a grade of F (0.0) in the course.



Office Hours

- Any Time...
 - Visit: 3149 EB
 - Call: 353-5573
 - Email: (dyksen@msu.edu)
- Make Appointment



Problems

- Address Immediately
 - Within Team
 - With TAs
 - With Dr D.
 - Respectfully



We don't have one of these.



Capstone Overview

✓ Course Logistics

✓ Client Projects

Questions?

✓ Course Logistics (Continued)

