

# 01/09: Capstone Overview

## The Capstone Experience

Dr. Wayne Dyksen

Department of Computer Science and Engineering  
Michigan State University

Spring 2018



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

# Capstone Overview

---

## ➤ Course Logistics

- Client Projects
- Course Logistics (Continued)



# CSE 498, Collaborative Design

- “The Capstone Experience”
- Instructors
  - Dr. Wayne Dyksen (“Dr. D.”)
  - Jonny Dowdall
  - James Mariani
- Class Meetings  
TTh, 3:00-4:20pm, [1279 Anthony](#)
- [Syllabus](#)
- Web Site
  - [capstone.cse.msu.edu](http://capstone.cse.msu.edu)
  - Check it often.
- Email
  - Check it often.
  - Read it thoroughly and carefully!



# 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 Corporate Clients
- 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 & Documentation
- 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

- 01/09: Capstone Overview
- 01/11: Project Plan
- 01/16: Risks and Prototypes
- 01/18: Schedule and Teamwork
- 01/23: Team [Status Report Presentations](#)
- 01/25: Team Status Report Presentations
- 01/30: Team [Project Plan Presentations](#)
- 02/01: Team [Project Plan Presentations](#)
- 02/06: Team [Project Plan Presentations](#)
- 02/08: Team [Project Plan Presentations](#)
- 02/13: Resume Writing and Interviewing
- 02/15: Creating and Giving Presentations
- 02/20: Team [Alpha Presentations](#)
- 02/22: Team [Alpha Presentations](#)
- 02/27: Team [Alpha Presentations](#)
- 03/01: Team [Alpha Presentations](#)
- 03/06: (Spring Break, No Meeting)
- 03/08: (Spring Break, No Meeting)
- 03/13: Team Status Report Presentations
- 03/15: Team Status Report Presentations
- 03/20: [Design Day](#) and the [Project Videos](#)
- 03/22: Camtasia Demo
- 03/27: Intellectual Property
- 03/29: Ethics and Professionalism
- 04/03: Team [Beta Presentations](#)
- 04/05: Team [Beta Presentations](#)
- 04/10: Team [Beta Presentations](#)
- 04/12: Team [Beta Presentations](#)
- 04/17: Status Report Presentations
- 04/19: Status Report Presentations
- 04/24: [Project Videos](#)
- 04/26: [Project Videos](#) and [All Deliverables](#)
- 04/26: [Design Day Setup](#)
- 04/27: [Design Day](#)
- 05/03: [Project Videos](#)



# Urban Science Capstone Lab

- [3358EB](#), [3352EB](#), [3340EB](#)
- 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 Area
  - 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
- CSE410
- Another 400-Level CSE Course Other Than CSE491

# Capstone Overview

---

✓ Course Logistics

➤ Client Projects

• Course Logistics (Continued)



# Team / Project Generalities

[1 of 3]

- Clients
  - Vary in Size and Type
  - Client contacts/mentors 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 Three 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

- Team Accenture
- Team Amazon
- Team Aptiv
- Team Auto-Owners
- Team Dow
- Team Driven-4
- Team GM
- Team Herman Miller
- Team Meijer
- Team Michigan State University
- Team Mozilla
- Team MSUFCU
- Team Phoenix Group
- Team ProofPoint
- Team Quicken Loans
- Team Rook
- Team SpartanNash
- Team Spectrum Health
- Team Symantec
- Team TechSmith
- Team Union Pacific
- Team Urban Science
- Team USAA
- Team Yello



# Team Accenture

## Project Overview

### AMAP: Automated Malware Analysis Platform

- Functionalities
  - Automate Analysis of Malware
  - Provide All-Inclusive Platform
- Features
  - Ingest Malware Samples
  - Decode Configuration Settings
  - Recover Malware Artifacts
  - Create Relationships in iDefense Platforms
  - Save Payloads in Malware Repository
- Technologies
  - Accenture iDefense Malware Repository
  - Accenture iDefense IntelGraph
  - Database Technologies
    - MongoDB
    - mySQL
  - Python



# Team Amazon

## Project Overview

### AMPED: Amazon Marketplace Podcast Earnings Detection

- Functionalities
  - Play Podcasts
  - Show Listeners Related Amazon Products
  - Support Listener's Favorite Content Producer
- Features
  - Create Integrated Audio Player
  - Enable Uploading of Podcast by Producer
  - Transcribe Speech to Text
  - Comprehend Content
  - Find Related Amazon Products
  - Package Results Into API for Player
- Technologies
  - AWS Compute & Database Services
  - Amazon Transcribe
  - Amazon Comprehend
  - Amazon Item Search
  - Amazon Queuing and Notification Services
  - Amazon Elastic Beanstalk and API Gateway



**amazon**

Seattle, Washington  
Detroit, Michigan

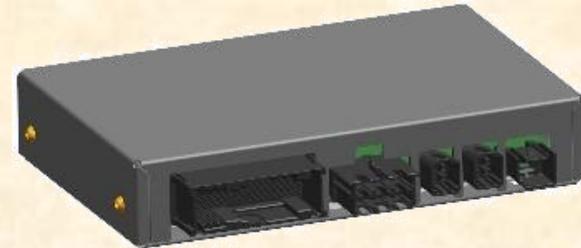


# Team Aptiv

## Project Overview

### Automotive Gateway Security Analysis

- Functionalities
  - Evaluate Security of Automotive Gateway Module (CyberSecure Gateway)
  - Determine Vulnerabilities via Wireless Connectivity
    - Cellular WAN
    - WiFi
    - Bluetooth
- Features
  - Provide Software for Automated Testing
  - Determine Vulnerabilities
    - Injecting and Running Code
    - From Open Source Software Components
    - HIPS (Host Intrusion Prevention Systems) vs non-HIPS Systems
  - Produce Design and Requirements Documentation
  - Create Software Component List with Version Control
- Technologies
  - Cyber Security
    - Threat Analysis
    - Open Source Analysis
    - Host Intrusion Prevention System (HIPS)
  - Networking (TCP/IP, Routing, Firewalls)
  - Wireless Security and Vulnerabilities
  - CyberSecure GateWay (CSGW)
  - Linux Security
  - Embedded Linux



# Team Auto-Owners

## Project Overview

### IMAGINE: IMAGE INTake Experience

- Functionalities
  - Evaluate Physical Environments (for Insurance Purposes)
  - Leverage Virtual Reality
  - Create Virtual Environments Using Spherical Camera
- Features
  - Support Image Import From Spherical Camera
  - Classify the Environment
  - Detect and Identify Objects
  - Create Virtual Environment
  - Provide Playback, Navigation and Inspection
  - Build and Display Inventory View
- Technologies
  - Unity Game Engine
  - Oculus Rift and Touch Controllers
  - Oculus Rift Sensor
  - Ricoh Theta V Spherical Camera
  - Image Processing and Recognition



***Auto-Owners***  
**INSURANCE**

LIFE • HOME • CAR • BUSINESS  
Lansing, Michigan

# Team Dow

## Project Overview

### Virtual Reality Simulation for Railcar Loading

- Functionalities
  - Teach How to Load a Railcar Safely
  - Via First Person Virtual Reality Game
- Features
  - Support Two Levels of Difficulty
    - Non-Certified
    - Certified
  - Handle Various Scenarios
    - Normal Filling
    - Response to Spills
  - Manage Player Points
    - Award for Positive Actions
    - Deduct for Negative Actions
  - Enable Interaction with Game Objects
    - Personal Protective Equipment (PPE)
    - D-Rails
    - Slide Valves
  - Use Audio to Indicate When Action Needed
  - Simulate Different Weather Conditions
  - Provide Feedback to Player at Game End
- Technologies
  - Unity Game Engine
  - Vive and Touch Controllers
  - Vive SDK
  - Microsoft .NET / C#
  - Xamarin



Midland, Michigan



# Team DRIVEN-4

## Project Overview

### 2020 Business in a Box

- Functionalities
  - Develop Futuristic Business Environment
  - Base on Internet of Things (IoT) Architecture
  - Target 2020 and Beyond
- Features
  - Model Five to Ten Components
  - Connect Components via WiFi
  - Validate and Verify Design via Simulation
  - Develop Manufacturing Processes and Artifacts
  - Demonstrate Capabilities for Collaboration and Integration
  - Utilize Various Product Development Software Systems
- Technologies
  - Computer Aided Design (CAD) / Siemens NX and PTC CREO
  - Product Lifecycle Management (PLM) / Siemens Teamcenter and PTC Windchill
  - Design Simulation Tools / PTC and Siemens
  - Factory Floor Simulation / Siemens
  - IoT Platforms / PTC ThingWorx and Siemens MindSphere
  - 3D Printing
  - Conveyor and Sight System
  - Augmented and Virtual Reality (VR/AR) / PTC Thingworx Studio



**DRIVEN-4**

St. Joseph, Michigan



# Team GM

## Project Overview

### Artificially Intelligent Dev Bot for Microsoft Teams

- Functionalities
  - Create and Manage Virtual Machines
  - Manage and Run Test Cases
  - Target GM Developers
- Features
  - Provide Single Unified Environment
  - Integrate with Microsoft Teams
  - Design Simplified User Controls
  - Use Natural Language Processing
- Technologies
  - CSS / HTML5 / JavaScript
  - Microsoft
    - .NET / C#
    - Bot Framework
    - Language Understanding Intelligent Services (LUIS)
    - Team Foundation Server
    - Teams / O365
    - Azure
  - Natural Language Processing (NLP)
  - RESTful Web Services and JSON



Detroit, Michigan  
Warren, Michigan



# Team Herman Miller

## Project Overview

### Chair Adjustment Chatbot

- Functionalities
  - Simplify Adjusting High Performance Office Chair
    - Ergonomic
    - “Developer Chair”
  - Use Chatbot to Explain How
- Features
  - Automatically Identify Chair via Photo
  - Provide Step-by-Step Instructions
  - Customize to User’s Ergonomic Needs
  - Support Apple iOS and Google Android Devices
  - Leverage Facebook Messenger
- Technologies
  - Apple iOS / Swift
  - Google Android / Java
  - Image Processing and Recognition
  - Natural Language Processing (NLP)
  - Facebook Messenger



**HermanMiller**  
Zeeland, Michigan

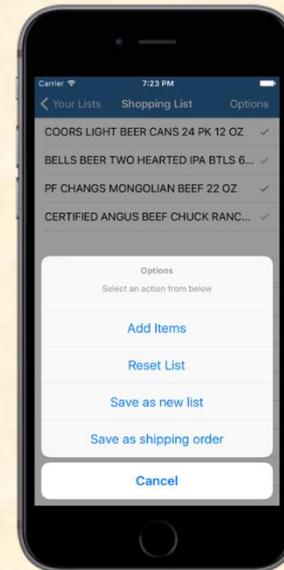


# Team Meijer

## Project Overview

### Personal Shopping Assistant

- Functionalities
  - Streamline Shopping Experience
  - Leverage Mobile App
  - Interact by Voice or Chatting
- Features
  - Create Mobile Apps
    - Apple iOS
    - Google Android
  - Determine Product Information
    - Location in Store
    - Stock
    - Sale
    - Coupon
  - Compare Prices to Other Stores
  - Integrate with mPerks
  - Send Notifications to In-Store Team Members
- Technologies
  - Microsoft
    - .NET Framework (C#, ASP.NET)
    - Bot Framework
    - Language Understanding Intelligent Service (LUIS)
    - Azure
    - Application Insights
    - Visual Studio
  - Xamarin
  - Meijer Web Services
  - SQL Server / MongoDB



**meijer**<sup>®</sup>

Grand Rapids, Michigan



# Team Michigan State University

## Project Overview

### Classroom Engagement App

- Functionalities
  - Provide Real-Time Feedback and Communication During Class
  - Keep Track of Student Attendance
- Features
  - Provide Web App for Instructors
    - Create Questions, Surveys and Quizzes
    - Open Questions and Quizzes at Specific Times
    - View and Save Results in Real Time
      - ❖ Class Results with Charts and Graphs
      - ❖ Individual Results
    - Push Content to Student Devices
    - View Student Questions and Comments
    - Track and View Class Attendance
  - Provide Mobile App for Students
    - Answer Survey and Quiz Questions During Class
    - View Instructor-Posted Content
    - Post Questions and Comments
  - Take Attendance with Mobile Devices via iBeacons
- Technologies
  - Apple iOS / Swift
  - Google Android / Java or Kotlin
  - Amazon Web Services (AWS)
  - iBeacons



Information Technology Services  
East Lansing, Michigan



# Team Mozilla

## Project Overview

### Dark Theme Darkening

- Functionalities
  - Increase Customizability of Firefox
  - Leverage Firefox Quantum Theming API
- Features
  - Provide Ability to Customize New Areas
    - Menus
    - Sidebars
    - In-Product Pages
  - Apply CSS Custom Variables and JavaScript
  - Leverage Inter-Process Communication
    - Pass Messages
    - Between Privileged and Unprivileged Code
  - Support Apple macOS, Microsoft Windows and Linux
  - Ship with Future Release of Firefox
- Technologies
  - CSS
  - JavaScript
  - Python
  - XUL / XBL / HTML
  - Mercurial
  - IRCCloud
  - Bugzilla
  - Review Board
  - Microsoft Windows
  - Apple macOS
  - Linux



Mountain View, California



# Team MSUFCU

## Project Overview

### Digital Assistant and Personal Financial Coach

- Functionalities
  - Offer Personalized Financial Coaching Services
  - Use Digital Assistant
- Features
  - Answer Questions and Provide Recommendations
    - Can I afford to buy that?
    - How much can I spend at the store today?
    - What do people like me spend on rent?
  - Take Actions and Provide Services
  - Handle Text and Voice Input
  - Create Middleware API to MSUFCU
  - Analyze Anonymized Account and Transaction Data
  - Support Apple iOS and Google Android Devices
  - Integrate with Various Services
    - Facebook Messenger
    - Apple iMessage
    - Amazon Alexa
  - Provide Administrative Web Portal
- Technologies
  - CSS / HTML / PHP / JavaScript
  - Apple iOS / Swift
  - Google Android / Java
  - Facebook Messenger API
  - Apple iMessage
  - Amazon Echo / Alexa Skills Kit
  - Machine Learning (ML)
  - Natural Language Processing (NLP)
  - MySQL / Encryption Based on SQL Standards

Hey MSUFCU, what's my checking account balance?

Alright, you want your account balance. Please say your 4 digit PIN.

It's 6781.

Thanks. Your checking account balance is \$3,498.63.



# Team Phoenix Group

## Project Overview

### Customer Service System with Chatbot

- Functionalities
  - Enhance Customer Service Experience
  - Ensure Easy Access to Product User Manuals
  - Answer Customer Questions via Chatbot
- Features
  - Create Web and Android Apps
  - Manage Quick Reference Guides (QRCs)
    - Ingest by Photo or PDF
    - Determine Keywords via OCR
    - Search via Text and Voice
    - Display Like E-Book
  - Provide Companion Administrative App
  - Implement Chatbot on Corporate Website
    - Product Inventory
    - Available QRCs
    - Various Frequently Asked Questions (FAQs)
  - Drive Customers to Contact Sales Reps
- Technologies
  - CSS / HTML / PHP / JavaScript
  - Google Android Tablets and Phones / Java
  - Microsoft Bot Framework
  - Microsoft Language Understanding Intelligent Service (LUIS)
  - Docker
  - Kubernetes
  - MongoDB
  - Optical Character Recognition (OCR)



O'Fallon, Missouri



# Team Proofpoint

## Project Overview

### Next Generation Malware Detection, Clustering and Heuristics

- Functionalities
  - Process Millions of Malware Samples Daily
  - Develop New and Innovative Techniques
- Features
  - Build Lifecycle Processing Dashboard
  - Leverage Many Malware Tools
  - Create Malware Signatures Automatically
  - Identify “Like” Samples and Clusters
  - Visualize Malware Clusters
    - Provide Drill Down Capability
    - Show Signatures Created
  - Prioritize Samples for Further Analysis
- Technologies
  - Malware Sandboxing
  - Network Intrusion Detection Systems (IDS)
  - Statistical Analysis



**proofpoint™**  
Sunnyvale, California



# Team Quicken Loans

## Project Overview

### Fundamenta: Trust in New Home Construction

- Functionalities
  - Enable Collaborative New Home Construction
  - Include All Players
- Features
  - Create Responsive Web App
  - Allow Choice of Home Model, Exterior and Interior
  - Support Various Roles
    - Home Buyer
    - Builder
    - Multiple Contractors
    - City Inspector
  - Use Dynamic Workflow
  - Alert Players When Action Assigned or Due
  - Provide Full Transparency
    - Deliverables
    - Milestones
    - Workflow
    - Complete Transaction History
  - Utilize Blockchain for Storage
    - Home Buyer's Build Requirements
    - Workflow Tasks
- Technologies
  - CSS / HTML / JavaScript / AngularJS
  - Microsoft .NET
  - Blockchain
  - Hyperledger
  - Microsoft Azure or Amazon Web Services (AWS)

DOBBS CONTRACTORS		PROJECT PUNCH LIST							
Project Name:		Project Number:		Address:					
Punch Item	Location	Description	Date Closed	Status	Responsible Party	Priority	Status	Schedule to Complete	Actual Completion
1000.00		General Expenditures							
1000.00									
2000.00		Siderock							
2000.00									
3000.00		Electrical							
3000.00									
4000.00		Plumbing							
4000.00									
5000.00		Mechanical							
5000.00									
6000.00		Wood and Plastics							
6000.00									
7000.00		Roofing and Moisture Protection							
7000.00									
8000.00		Paint and Windows							
8000.00									
9000.00		Finishes							
9000.00									
10000.00		Site Work							
10000.00									
11000.00		Equipment							
11000.00									
12000.00		Permitting							
12000.00									
13000.00		Special Considerations							
13000.00									



**Quicken Loans®**  
Engineered to **Amaze**®  
Detroit, Michigan



# Team Rook

## Project Overview

### Endpoint Data Monitoring and Analysis Agent

- Functionalities
  - Detect and React to Security Threats
  - Capture and Analyze Agent Health Metrics and Log Files
- Features
  - Create Endpoint Dashboard
    - Enable Remote Agent Configuration
    - Do Health Checks and Data Analysis
    - Display Health Check Information
    - Create Alert Thresholds
  - Store Metrics and Log Files
    - RESTful Endpoint
    - Amazon Simple Storage Service (S3)
    - Locally
  - Implement State Awareness
  - Support Cross Platform Compatibility
  - Integrate with Rook's Force Platform
- Technologies
  - Force Platform
  - Go
  - JavaScript / JSON
  - Python / Django
  - React / Redux
  - Ubuntu 16.04
  - Amazon Simple Storage Service (S3)
  - RESTful Web Services





# Team Spectrum Health

## Project Overview

### Spectrum Health Go

- Functionalities
  - Improve Patient and Visitor Experience
  - Help Navigate Spectrum Health Facilities
- Features
  - Create Apple iOS and Google Android Apps
  - Provide Real-Time On-Screen Directions
  - Guide via Pre-Configured Waypoints
  - Use Optical Character Recognition (OCR)
  - Collect Anonymous Route Data
  - Provide Administrative Web App
    - Create and Print Waypoints
    - Configure and Improve Routes
    - Add New Locations and Routes
- Technologies
  - CSS / HTML / JavaScript
  - Apple iOS / Swift
  - Google Android / Java
  - Microsoft .NET / C#
  - Microsoft SQL Server
  - Microsoft Azure
  - GitHub / ZenHub
  - Optical Character Recognition (OCR)
  - Identity Server



**SPECTRUM HEALTH** 

Grand Rapids, Michigan

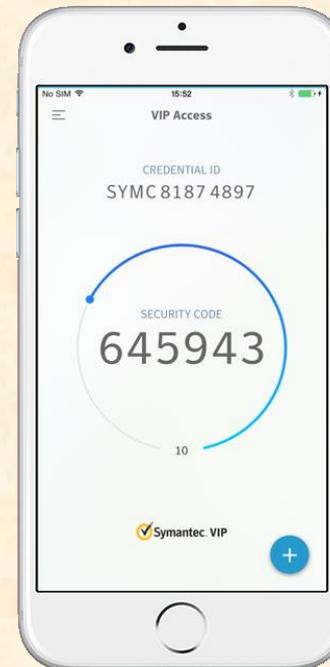


# Team Symantec

## Project Overview

### Detecting Security Threats from User Authentication Patterns

- Functionalities
  - Detect Security Threats
  - Use Symantec Validation and ID Protection (VIP)
  - Visualize VIP Authentication Patterns
- Features
  - Ingest VIP Reporting Service Log Data
  - Create Operational Dashboard with Alerting
    - Number of Authentications Per Time Unit
    - Successful vs Failed Authentications
    - Unique Users Per Time Unit
    - Distribution of Risk Reasons
  - Create Security Dashboard and Alerting
    - Trends of Failed Authentications
    - Find Risky Users
    - Flag Increases in Credential Use
  - Integrate with Splunk Enterprise and Splunk Cloud
- Technologies
  - Symantec VIP Reporting Service
  - Splunk
  - Amazon Web Service (AWS)
  - RESTful Web Services
  - Elastic Search, Kibana, Logstash
  - Apache Spark



# Team TechSmith

## Project Overview

### Snagit and Camtasia Output Extensibility

- Functionalities
  - Simplify Sharing of Media Produced by TechSmith Products
  - Extend Output Capabilities of Snagit and Camtasia
- Features
  - Use TechSmith Extensibility Framework
  - Build Three Plugins
    - TechSmith Video Review
    - Wistia
    - Student Choice
  - Design Highly Polished User Experience (UX)
  - Provide Media Upload Service with Link
  - Create Independent Test Harness
- Technologies
  - Microsoft .NET / C#
  - Windows Presentation Foundation (WPF)
  - TechSmith Cloud SDK
  - TechSmith Extensibility Framework (TEF)
  - Managed Extensibility Framework



# Team Union Pacific

## Project Overview

### Alexa, what's my work schedule look like?

- Functionalities
  - Provide Information About Upcoming Work Assignments
  - Utilize Voice Activated Digital Assistant
  - Target Trainmen, Yardmen and Enginemen (TY&E)
- Features
  - Create Suite of Mobile Apps
    - Responsive Design
    - Support Apple iOS and Google Android Devices
  - Manage Users
    - Register
    - Identify
    - De-Activate
  - Support All Major Voice Interfaces
    - Amazon Echo
    - Google Home
    - Apple Siri
    - Microsoft Cortana
  - Use JSON Web Services
  - Write Documentation for Each System
- Technologies
  - Java
  - JavaScript / AngularJS
  - Amazon Echo
  - Google Home
  - Apple Siri
  - Microsoft Cortana
  - Natural Language Processing (NLP)



**BUILDING AMERICA®**

Omaha, Nebraska  
Okemos, Michigan



# Team Urban Science

## Project Overview

### Mobile Maestro

- Functionalities
  - Control Maestro Exoskeletal Arm
  - Use Mobile App with Voice Input
- Features
  - Handle Various Arm Controls
    - Up, Down, Lock
    - Lock, Standby
  - Provide Voice Control
    - Safe Word for Home/Reset Position
    - All Functions
  - Implement Self-Leveling with Calibration
  - Support Apple iOS and Google Android
  - Collect Usage Statistics
- Technologies
  - Maestro Exoskeletal Arm
  - CSS / HTML / JavaScript
  - Microsoft .NET / C#
  - Apple iOS / Swift
  - Google Android / Java
  - Bluetooth Low Energy (BLE)
  - Natural Language Processing (NLP)



URBAN SCIENCE.

Detroit, Michigan



# Team USAA

## Project Overview

### LIMElight: Life Insurance Made Easy

- Functionalities
  - Obtain Life Insurance Quote
  - Improve the Experience
    - For Applicant
    - For Insurer
  - Decrease Duration, Complexity and Cost
- Features
  - Provide Smooth User Experience
    - Responsive Web
    - Native Apple iOS and Google Android Apps
  - Generate Personalized Quote
    - Use Minimal Inputs from Applicant
    - Leverage Machine Learning
    - Match Underwritten Premium Closely
  - Create Health Record Blockchain
    - Controlled by Applicant
    - Ensure Privacy and Security
    - Accessible via RESTful API
- Technologies
  - Apple iOS / Swift
  - Google Android / Java
  - Blockchain
  - Machine Learning / Python
  - Microsoft Azure
  - RESTful Web Services
  - JavaScript / REACT / Angular 2+ / Vue



# Team Yello

## Project Overview

### Sentiment and Emotional Analysis of Video Interviews

- Functionalities
  - Evaluate Video Interview Automatically
  - Include Sentiment and Emotional Analysis
- Features
  - Design and Build Web App
    - Record Live Video
    - Support Prerecorded Video
    - Enable Viewing and Rerecording by Applicant
  - Transcribe All Recordings and Store with Video
  - Apply Sentiment Analysis on Transcription
  - Run Emotion Detection on Audio and Video
  - Provide Administrative Web App
    - To View Results
    - By Hiring Team
- Technologies
  - CSS / HTML / JavaScript / JSON
  - Ruby on Rails
  - Microsoft Azure Emotion API
  - Microsoft Language Understanding Intelligent Services (LUIS)
  - Machine Learning
    - TensorFlow
    - scikit-learn



**yello**  
Chicago, Illinois



# First Assignments

---

- Read the [Syllabus](#).
- Check out the Lab ([3358EB](#), [3352EB](#), [3340EB](#)).
  - 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
  - Meet Initially by Tomorrow Afternoon
  - Lab Machine Assignments in Lab
  - Start Researching Technologies
  - Start Configuring Lab Machines
  - Team Photos
    - After All-Hands Meeting
      - ❖ Th 01/11: Teams Accenture – MSUFCU
      - ❖ Tu 01/16: Teams Phoenix Group - Yello
    - Dress Casual (But Appropriate)
    - Schedule for it.
- Client
  - Contact by Email by Tomorrow COB (Close of Business)
  - Conference Call or On-Site Meeting by Friday
  - Review Project Proposal



# 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 High Sierra
  - Install VMware Fusion (from [here](#))
  - Create Virtual Machines
    - Windows 10 VM from TAs
    - 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: ???????
  - Only for Mobile 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.
  - ...Teams DRIVEN-4 and Yello 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



# 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

- 01/18: Status Report Presentations
- 01/30: Project Plan Presentations
- 02/20: Alpha Presentations
- 04/03: Beta Presentations
- 04/23: Project Videos
- 04/25: All Deliverables
- 04/26: Design Day Setup
- 04/27: Design Day
- 05/03: Project Videos

- Attendance is required.
- No excuses are accepted.
- Do not schedule anything including during these times 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 05
  - Total 70
- Individual (30%)
  - Technical Contribution 10
  - Team Contribution 10
  - Team Evaluation 05
  - Meeting Attendance 05
  - Total 30



# Grading

[2 of 5]

- Final Grade Sum Of...
  - Individual Total
  - % of Team Total Based on Team Contribution
- Grand Total =  
(Individual Total)  
+  
(Team Total) \* (Team Contribution) / 10.0
- *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

*Nota Bene: Assumes Perfect Score In Every Other Category*



## 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 24 out of 24.
- I did a lot of research about stuff we never used.
- 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.



# Integrity of Scholarship

---

- MSU's policies will be enforced.
- Individual and team work must be original.
- Violators...
  - ...will be referred to the appropriate deans.
  - ...may receive a grade of F in the course.



# 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, April 27, 2018
- 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
  - St. Joseph
  - Metro Detroit
- From East Lansing to Client and Back
- One Car 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.



# Office Hours

---

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

# Capstone Overview

---

✓ Course Logistics

✓ Client Projects

✓ Course Logistics (Continued)

Questions?



# What's ahead?

[1 of 3]

- Team Photos
    - Informal
      - After Meeting Today: Teams Accenture through MSUFCU
      - After Meeting Tuesday: Teams Phoenix Group through Yello
    - Formal
      - After Each Project Plan Presentation
      - Dress code for presenting teams is business casual.
  - Setup
    - Team Machines
      - Dell Server If Needed (Ask TAs)
      - Apple iMacs (with Windows 10 VM)
    - Team Software
      - Microsoft Office
        - ❖ Word and PowerPoint
        - ❖ Microsoft Windows Version
      - Web Server
      - Code Repository
      - SDK's
      - Etc.
- Required.  
Use Windows 10 VM.
- 



# What's ahead?

[2 of 3]

## All-Hands Meetings

- ~~01/09: Capstone Overview~~
- ~~01/11: Capstone Overview~~

### Project Plan

Team Photos: Teams Accenture – MSUFCU

- 01/16: Risks and Prototypes  
Team Photos: Teams Phoenix Group - Yello
- 01/18: Team Status Report Presentations
- 01/23: Schedule and Teamwork
- 01/25: Team Status Report Presentations
- 01/30: Team Project Plan Presentations
- 02/01: Team Project Plan Presentations
- 02/06: Team Project Plan Presentations
- 02/08: Team Project Plan Presentations



# What's ahead?

[3 of 3]

- Team Status Report Presentations

- PowerPoint Template

- Due 4:00 a.m., Thursday, January 18

- One Week

- Email to Dr. D.

- Subject: Team <Company Name>: Status Report  
Subject: Team Auto-Owners: Status Report

- Attachment: team-<company-name>-status-report-presentation.ppt  
Attachment: team-urban-science-status-report-presentation.ppt

 Get on it, now!

- Dr. D. Will Combine Into Single PowerPoint

- To Speed Things Up During Meeting

- Do NOT Modify Master Slide

- Must Use Windows Version of Microsoft Office

- Each Team Presents

- Using Dr. D.'s Laptop

- At Most 3.0 Minutes (Rehearse Timing)

- Single or Multiple Presenters (Your Choice)

