

# 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



Seattle, Washington  
Detroit, Michigan

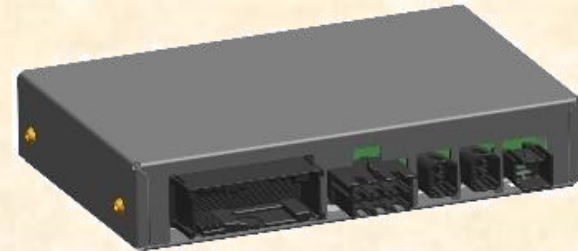


# Team Aptiv

## 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/VR) / 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

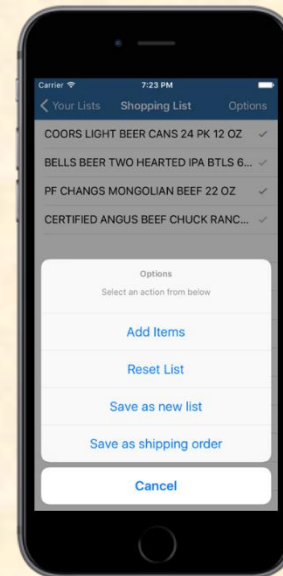


# Team Meijer

## 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



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**<sup>™</sup>  
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)



**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 SpartanNash

## Project Overview

### Volunteer Tracking App

- Functionalities
  - Simplify Tracking of Associate Volunteer Hours
  - Use Web and Mobile Apps
- Features
  - Create Apps for Volunteer Reporting
    - Web
    - Apple iOS
    - Google Android
  - Handle Various Inputs
    - Associate ID
    - Name and Location of Place
    - Type of Service
    - Number of Hours
  - Track Hours
  - Enable Photo and Video Uploading
  - Utilize Geolocation for Easy Location Reporting
  - Gamify with Badging and Leader Board
  - Send Notifications
    - Volunteers
    - Program Facilitators
  - Build Companion Web Administrative App
- Technologies
  - CSS / HTML / JavaScript
  - Apple iOS / Swift
  - Google Android / Java
  - React Native
  - MySQL





# 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



Grand Rapids, Michigan

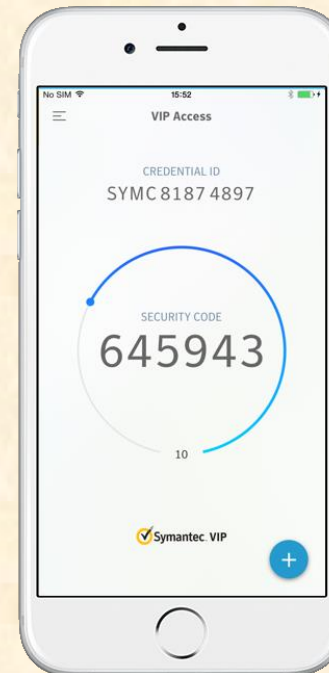


# Team Symantec

## 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

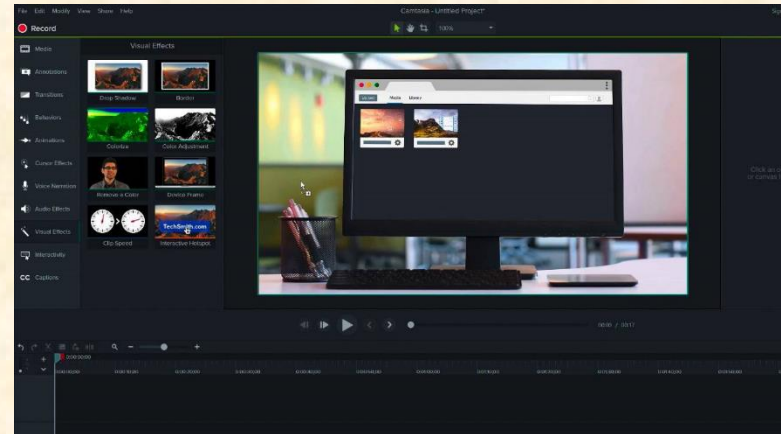


# Team TechSmith

## 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	<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 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

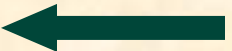
✓ Course Logistics (Continued)

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)

