01/09: Capstone Overview

The Capstone Experience

Dr. Wayne Dyksen
Department of Computer Science and Engineering
Michigan State University
Spring 2018
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
  ▪ Check it often.
• Email
  ▪ Check it often.
  ▪ Read it thoroughly and carefully!
Course Goals

• Give You Experience In
  ▪ Real World
  ▪ Corporate Setting

• Start Your Transition
  ▪ From Student...
  ▪ ...To Professional
Course Goals

- Teams of Students
- Build Significant Software System
  - Design
  - Develop
  - Debug
  - Document
  - Deliver
- For Corporate Clients
- In 15 (Short) Weeks
Course Goals

• 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
    o Project Plan
    o Alpha
    o 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

• 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

• 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

• Challenges
  ▪ Very Short, Unforgiving Time Line
  ▪ Client Contact
  ▪ Team Dynamics
  ▪ Project Plan (in Three Weeks)
  ▪ Entirely New...
    o Languages
    o Environments
    o API’s
    o SDK’s
    o Processes
    o Protocols
    o Etc.
  ▪ Project Management
  ▪ Etc...
Project Specifics

• Vary
  ▪ Type
  ▪ Current State of Specificity

• Challenge
  ▪ Connect with Client
  ▪ “Nail Down” the Project
    o Hard Enough
    o Not too Hard
    o 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.
    o Copyrightable Program Code
    o 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
Team Aptiv
Project Overview

Automotive Gateway Security Analysis

• Functionalities
  ▪ Evaluate Security of Automotive Gateway Module (CyberSecure Gateway)
  ▪ Determine Vulnerabilities via Wireless Connectivity
    o Cellular WAN
    o WiFi
    o Bluetooth

• Features
  ▪ Provide Software for Automated Testing
  ▪ Determine Vulnerabilities
    o Injecting and Running Code
    o From Open Source Software Components
    o HIPS (Host Intrusion Prevention Systems) vs non-HIPS Systems
  ▪ Produce Design and Requirements Documentation
  ▪ Create Software Component List with Version Control

• Technologies
  ▪ Cyber Security
    o Threat Analysis
    o Open Source Analysis
    o 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
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
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
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
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
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
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
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
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)
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
    o Provide Drill Down Capability
    o Show Signatures Created
  ▪ Prioritize Samples for Further Analysis

• Technologies
  ▪ Malware Sandboxing
  ▪ Network Intrusion Detection Systems (IDS)
  ▪ Statistical Analysis
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)
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
    o Create and Print Waypoints
    o Configure and Improve Routes
    o 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
    o Number of Authentications Per Time Unit
    o Successful vs Failed Authentications
    o Unique Users Per Time Unit
    o Distribution of Risk Reasons
  ▪ Create Security Dashboard and Alerting
    o Trends of Failed Authentications
    o Find Risky Users
    o 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

Mountain View, California
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
    o TechSmith Video Review
    o Wistia
    o 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
    o Responsive Design
    o Support Apple iOS and Google Android Devices
  ▪ Manage Users
    o Register
    o Identify
    o De-Activate
  ▪ Support All Major Voice Interfaces
    o Amazon Echo
    o Google Home
    o Apple Siri
    o 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)
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)

Detroit, Michigan
Team USAA

Project Overview

LIMElight: Life Insurance Made Easy

• Functionalities
  ▪ Obtain Life Insurance Quote
  ▪ Improve the Experience
    o For Applicant
    o For Insurer
  ▪ Decrease Duration, Complexity and Cost

• Features
  ▪ Provide Smooth User Experience
    o Responsive Web
    o Native Apple iOS and Google Android Apps
  ▪ Generate Personalized Quote
    o Use Minimal Inputs from Applicant
    o Leverage Machine Learning
    o Match Underwritten Premium Closely
  ▪ Create Health Record Blockchain
    o Controlled by Applicant
    o Ensure Privacy and Security
    o 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

San Antonio, Texas

The Capstone Experience

Capstone Overview
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

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

• 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
• 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
    o Date, Company, Recruiter Name & Contact Info
    o In Advance
    o 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

• 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

• 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

## Capstone Overview

<table>
<thead>
<tr>
<th>Technical Contribution</th>
<th>Team Contribution</th>
<th>Team Evaluation</th>
<th>Meeting Attendance</th>
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</table>

*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…
• 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
    o Past Capstone Teams
    o Other Capstone Teams
    o 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
    o Fragments
    o Libraries
    o 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)

• Make Appointment
Capstone Overview

✔ Course Logistics

✔ Client Projects

✔ Course Logistics (Continued)

Questions?
What’s ahead?

• Team Photos
  ▪ Informal
    o After Meeting Today: Teams Accenture through MSUFCU
    o After Meeting Tuesday: Teams Phoenix Group through Yello
  ▪ Formal
    o After Each Project Plan Presentation
    o Dress code for presenting teams is business casual.

• Setup
  ▪ Team Machines
    o Dell Server If Needed (Ask TAs)
    o Apple iMacs (with Windows 10 VM)
  ▪ Team Software
    o Microsoft Office
      ❖ Word and PowerPoint
      ❖ Microsoft Windows Version
    o Web Server
    o Code Repository
    o SDK’s
    o Etc.

Required.
Use Windows 10 VM.
What’s ahead?

All-Hands Meetings

- 01/09: Capstone Overview
- 01/11: Capstone Overview
- 01/15: 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?

• Team Status Report Presentations
  ▪ **PowerPoint Template**
  ▪ Due 4:00 a.m., Thursday, January 18
  ▪ One Week
  ▪ Email to Dr. D.
    o Subject: Team <Company Name>: Status Report
    o Subject: Team Auto-Owners: Status Report
    o Attachment: team-<company-name>-status-report-presentation.ppt
    o Attachment: team-urban-science-status-report-presentation.ppt

• 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)