

01/07: Capstone Overview

The Capstone Experience

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Michigan State University

Spring 2020



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

CSE 498, Collaborative Design

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



Professional Meeting Expectations

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



Capstone Overview

➤ Course Logistics

- Client Projects
- Course Logistics (Continued Next Meeting)



Course Goals

[1 of 3]

- Give You Experience In
 - Real World
 - Corporate Setting
- Start Your Transition
 - From Student...
 - ...To Professional
- Start Your Transition
 - From... “Make one of these.” –CSE Professor
 - ...To “Solve my problem.” –Customer/Client



Course Goals

[2 of 3]

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



Course Goals

[3 of 3]

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



Project Deliverables

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

See [Major Milestones](#).



All-Hands Meetings

Presentations By

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



All-Hands Meetings Agendas

- 01/07: Capstone Overview
- 01/09: Project Plan
- 01/14: Risks and Prototypes
- 01/16: Team [Status Report Presentations](#)
- 01/21: Schedule and Teamwork
- 01/23: Team Status Report Presentations
- 01/28: Team [Project Plan Presentations](#)
- 01/30: Team [Project Plan Presentations](#)
- 02/04: Team [Project Plan Presentations](#)
- 02/06: Team [Project Plan Presentations](#)
- 02/11: Resume Writing and Interviewing
- 02/13: Creating and Giving Presentations
- 02/18: Team [Alpha Presentations](#)
- 02/20: Team [Alpha Presentations](#)
- 02/25: Team [Alpha Presentations](#)
- 02/27: Team [Alpha Presentations](#)
- 03/03: (Spring Break, No Meeting)
- 03/05: (Spring Break, No Meeting)
- 03/10: Team Status Report Presentations
- 03/12: Intellectual Property
- 03/17: [Design Day](#) and the [Project Videos](#)
- 03/19: Camtasia Demo
- 03/24: Ethics and Professionalism
- 03/26: Team Status Report Presentations
- 03/31: Team [Beta Presentations](#)
- 04/02: Team [Beta Presentations](#)
- 04/07: Team [Beta Presentations](#)
- 04/09: Team [Beta Presentations](#)
- 04/14: Team Status Report Presentations
- 04/16: Team Status Report Presentations
- 04/21: [Project Videos](#)
- 04/23: [Project Videos](#) and All Deliverables
- 04/23: [Design Day Setup](#)
- 04/24: [Design Day](#)
- 04/30: [Project Videos](#)



Schedules

- Schedules > All-Hands Meeting
- Schedules > Major Milestones
 - 01/16: Status Report Presentations
 - 01/28: Project Plan Presentations
 - 02/18: Alpha Presentations
 - 03/31: Beta Presentations
 - 04/21: Project Videos
 - 04/23: All Deliverables
 - 04/23: Design Day Setup
 - 04/24: Design Day
 - 04/30: Project Videos

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



Urban Science Capstone Labs

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



Scheduled Lab Times

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



CSE498 Prerequisites

Must Have Successfully Completed

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



Integrity of Scholarship

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



Capstone Overview

✓ Course Logistics

➤ Client Projects

- Course Logistics (Continued)

Team / Project Generalities

[1 of 3]

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



Team / Project Generalities

[2 of 3]

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



Team / Project Generalities

[3 of 3]

- Challenges
 - Very Short, Unforgiving Timeline
 - Client Contact
 - Team Dynamics
 - Project Plan (in ~3.0 Weeks)
 - Entirely New...
 - Languages
 - Environments
 - API's
 - SDK's
 - Processes
 - Protocols
 - Etc.
 - Project Management
 - Etc...



Project Specifics

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

Intellectual Property and Non-Disclosure Agreements

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



Project Teams

1. Amazon
2. AppDynamics
3. Auto-Owners
4. Bosch
5. Dow
6. Evolutio
7. Ford
8. GM
9. Harvard Law School
10. Herman Miller
11. Learning A-Z
12. Lockheed Martin Space
13. MaxCogito
14. Meijer
15. Michael Sadler Foundation
16. Michigan State University CSE
17. Michigan State University ITS
18. Mozilla
19. MSUFCU
20. Place Technology
21. Principal AAL
22. Principal IPC
23. Proofpoint
24. Technology Services Group
25. TechSmith
26. United Airlines Airport Operations
27. United Airlines Safety
28. United Airlines Training
29. Urban Science
30. Vectorform

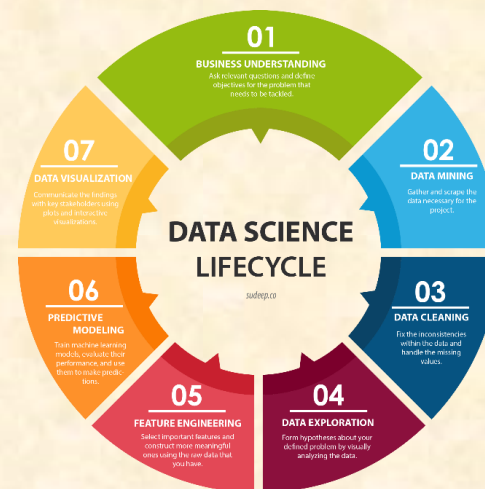


Team Amazon

Project Overview

Amazon Data Hub

- Functionalities
 - Simplify Dataset Acquisition
 - Reduce Repetitiveness of Data Acquisition
 - Enable Faster Model Development
- Features
 - Catalog Data in Central Repository
 - Automatically Add Metadata
 - Develop Tool Available for any Data Scientist
- Technologies
 - JavaScript Framework (React / Angular / Vue)
 - Amazon S3
 - Amazon Web Services (EC2 / Lambda / CLI / DynamoDB)



Seattle, Washington
Detroit, Michigan

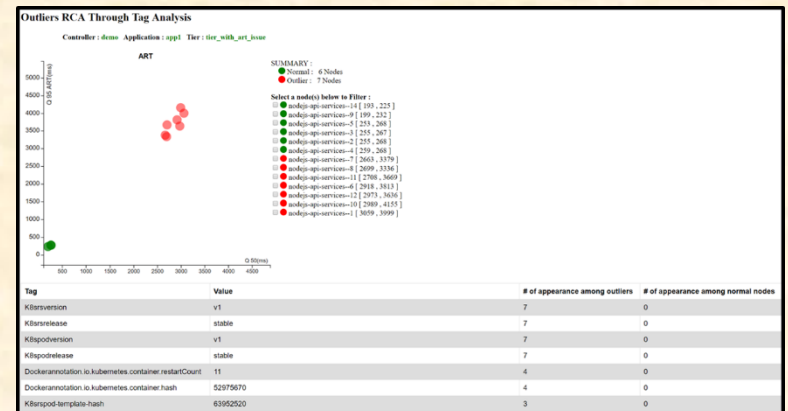


Team AppDynamics

Project Overview

Segmented Data Anomaly Detection

- Functionalities
 - Detect Anomalies in Customer Metadata
 - Using Machine Learning
- Features
 - Analyze Segmented Customer Metadata
 - Discover Anomalies
 - Handle Examples Like
 - Sabre Processing of Travel Bookings
 - AMEX Platinum Customers vs. Other Credit Card Types
- Technologies
 - Python
 - JavaScript / Node.js
 - Machine Learning
(Scikit-Learn / TensorFlow)
 - AppDynamics APM and Analytics
(BizIQ)



Southfield, Michigan
San Jose, California

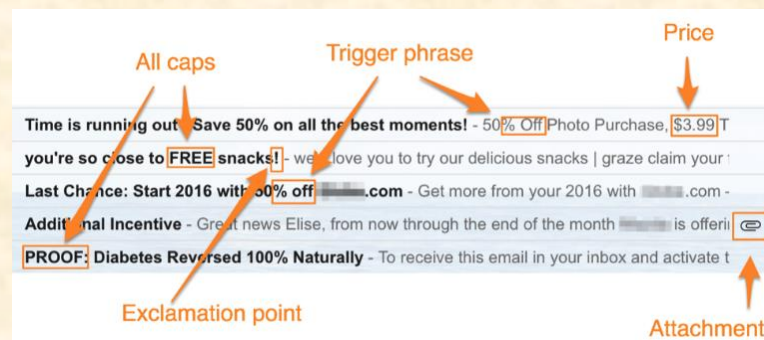


Team Auto-Owners

Project Overview

Phish Phinder

- Functionalities
 - Classify and Cluster Emails
 - Without Machine Learning
- Features
 - Develop an Algorithm
 - Triage Emails into Categories
 - Innocuous
 - Suspected Phish
 - Confirmed Phish
 - SPAM
 - Give Confidence Rating
 - Develop User-Friendly Presentation
 - Provide Analytics Dashboard for Administrators
- Technologies
 - HTML / CSS / JavaScript
 - Microsoft Outlook
 - SMTP
(Simple Mail Transport Protocol)
 - Database Technologies



Auto-Owners
INSURANCE

LIFE • HOME • CAR • BUSINESS

Lansing, Michigan



Team Bosch

Project Overview

Classifying Target Vehicles for Adaptive Cruise Control

- Functionalities
 - Quantify Performance of Adaptive Cruise Control's
 - Target Selection Algorithm
 - Using Machine Learning
- Features
 - Process Recorded Video Data
 - Automatically Label Target Objects
 - "Target Object Present"
 - "Host Vehicle Changing Lanes"
 - "Target Object Cutting into Host Lane"
 - Develop User-Friendly Front-End
- Technologies
 - Python
 - Computer Vision (OpenCV)
 - Machine Learning (TensorFlow)



BOSCH

Invented for life

Plymouth, Michigan



Team Dow

Project Overview

MAPT: Manufacturing Avatar Plant Twin

- Functionalities
 - Apply Elements of Game Playing
 - To Dow's Sensor Assignment Process
 - Using Interactive Visual Sensor Mapping
- Features
 - Assign Sensor Attributes in a Fun Way
 - Physical Location of a Sensor
 - Role of a Sensor
 - Train an AI Model
 - Propose Potential Sensor Mappings to User
- Technologies
 - HTML / CSS / JavaScript
 - Microsoft Azure
 - Machine Learning / Cognitive Services
 - Microsoft SQL Database



Midland, Michigan



Team Evolutio

Project Overview

ERP Air Force: Conservation Threat Detection

- Functionalities
 - Identify Threats from Drone Footage
 - Use Edge-Processing for Near Real-Time Analysis
- Features
 - Alert Rangers of Threats in Real Time
 - Process any Video Codec in Real Time
 - Develop Modular APIs
 - Leverage Existing Libraries and Technology Stacks
- Technologies
 - Image Recognition
 - NVIDIA Jetson Nano Chip
 - Machine Learning (TensorFlow / YOLO)

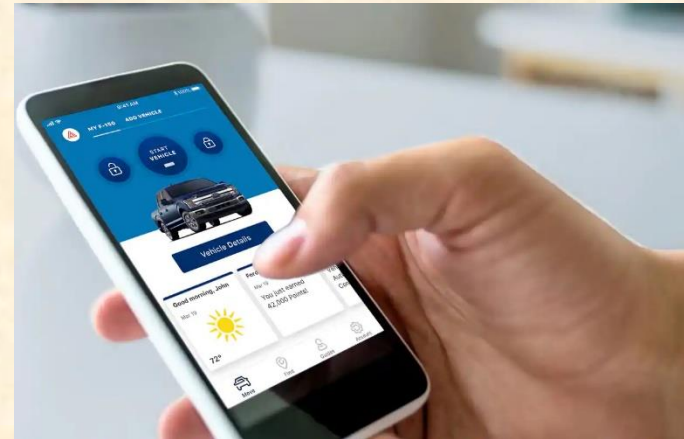


Team Ford

Project Overview

Ford Augmented Reality Owners Manual

- Functionalities
 - Improve the "Owner's Manual Experience"
 - Using Augmented Reality Mobile Application
- Features
 - Identify Locations of Relevant Content
 - View Content with both AR and non-AR Format
 - Provide Data / Media Entry Portal
 - Develop Service / Storage Layer
- Technologies
 - Apple iOS / Swift
 - Augmented Reality Technologies (ARKit)
 - RESTful APIs



Dearborn, Michigan



Team GM

Project Overview

Open Source Intel

- Functionalities
 - Collect, Parse, Present Intellectual Property
 - Pertaining to and Owned by GM
 - For Public Internet Facing Assets
- Features
 - Discover GM Intellectual Property
 - Credentials
 - Secret Keys / API Keys
 - Code Snippets
 - Publicly Disclosed Threats
 - Discovery and Threat Assessment Capabilities
- Technologies
 - Python
 - Expect Cloud Platforms (AWS, Azure)
 - Others as Selected by Students



Detroit, Michigan

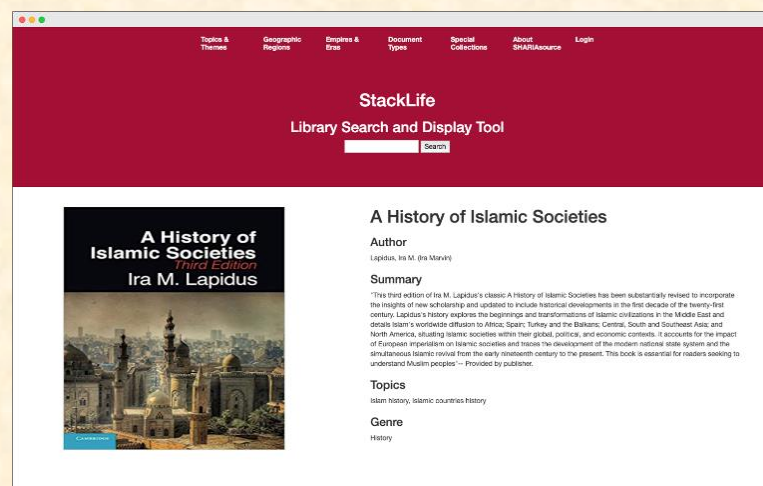


Team Harvard Law School

Project Overview

StackLife 2.0: Library Search and Display Tool

- Functionalities
 - Collect Information on Islamic Law and History
 - Facilitate Universal Access
 - Using a Full-Stack Application
- Features
 - Collect Data from Harvard Library
 - Structure the Data and Store it
 - Build a Filtering Tool
 - Provide Visualizations
 - Physical Descriptions of Books and Authors
 - Relationships between Books and Authors
 - Enable Users to Read Text
 - Determine Location of a Book
- Technologies
 - HTML / CSS / JavaScript
 - Python / Flask
 - MySQL



**HARVARD
LAW SCHOOL**
Cambridge, Massachusetts



Team Herman Miller

Project Overview

Measuring Workspace Impact on Employee Experience

- Functionalities
 - Quantify Quality and Effectiveness
 - Of Different Office Layouts / Floor Plans
 - Using Sentiment and Utilization Data
- Features
 - Review Interviews with Herman Miller Customers
 - Assess Technologies to Measure Employee Sentiment
 - Prototype New Technologies within Workspaces
 - Aggregate Sentiment and Utilization Data via Analytics Platform
 - Develop Mobile Application to Input Sentiment
 - Informally Measure Sentiment on Slack and Teams Channels
- Technologies
 - Apple iOS / Swift
 - Android / Kotlin
 - Python
 - Machine Learning (TensorFlow)
 - Natural Language Processing (NLTK / Natural Language Toolkit)
 - Google Charts API
 - Amazon Web Services



HermanMiller
Zeeland, Michigan

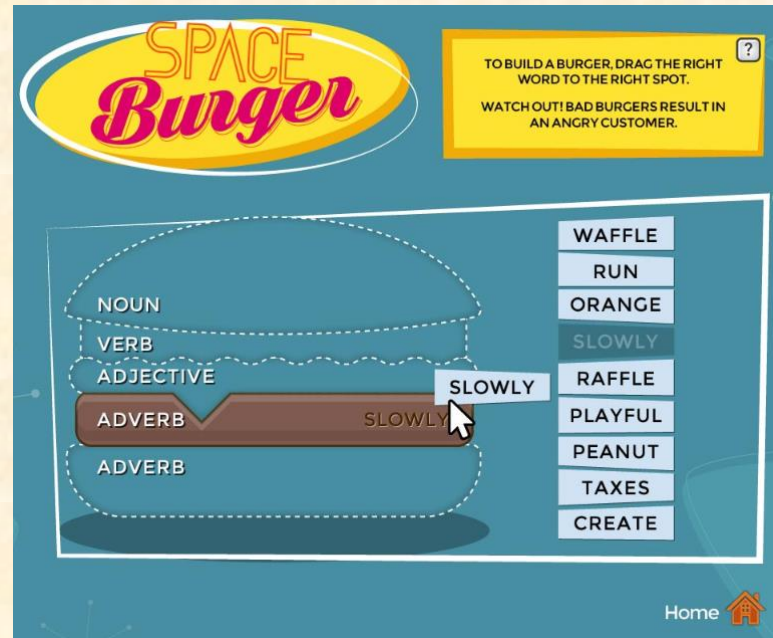


Team Learning A-Z

Project Overview

Sandwich Builder Parts of Speech Guessing Game

- Functionalities
 - Teach Kids the Parts of Speech
 - Of Different Words
 - Using a Web & Mobile Game
- Features
 - Match Word with Part of Speech
 - Highlight Sandwich with Different Colors
 - Give Hints using Definitions
 - Support Bonus Round
 - Incorporate Difficulty
- Technologies
 - PHP
 - Apple iOS / Swift
 - Angular
 - MySQL

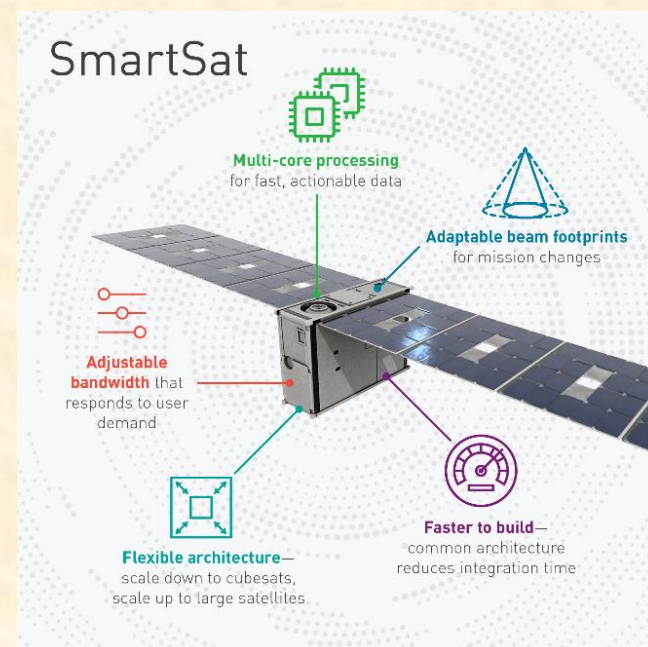


Team Lockheed Martin Space

Project Overview

SmartSat Satellite App Store

- Functionalities
 - Application Store for Satellite SDKs/Software
 - Improve Reusability of SDKs and Software
 - Manage Versioning and Distribution of SDKs
- Features
 - Facilitate Upload of Source Code or Binaries
 - Automate Collection of Application Attributes
 - Implement RESTful API to Automate App Store Functionality
 - Develop Web Front-End
- Technologies
 - React or Angular
 - Python / Flask
 - Docker / Jenkins / Nexus / Conan / C++
 - Embedded Development



Team MaxCogito

Project Overview

Identity Based Communication and Content Services

- Functionalities
 - Analyze and Index All Data Flowing Through Servers
 - With a Robust Cloud Service
 - To Allow Clients to Better Manage Their Data
- Features
 - Process Content of Emails and Messages
 - Direct Messages to Different Services
 - Index and Manage All Data
- Technologies
 - James SMTP Server
 - Kafka
 - RESTful APIs
 - JavaScript
 - GDPR tagging
 - Apache



MaxCogito

The company with big ideas

Boston, Massachusetts



Team Meijer

Project Overview

Reducing Shoplifting Using Machine Learning

- Functionalities
 - Reduce Shoplifting in Meijer Stores
 - Using Mist Wireless APs
- Features
 - Track Shoppers Throughout Store
 - Discover Shopping Behavior Patterns
 - Utilize Artificial Intelligence
 - Distinguish Normal vs Shoplifting Behavior
- Technologies
 - Mist Wireless Networking
 - Microsoft Azure
 - Splunk
 - SQL Database



Grand Rapids, Michigan

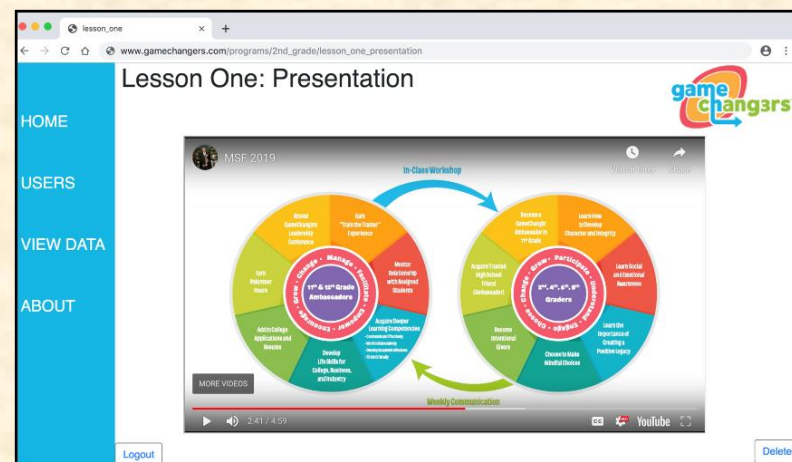


Team Michael Sadler Foundation

Project Overview

GameChang3rs Learning Management System

- Functionalities
 - Gamify GameChang3rs Lessons
 - To Increase Student Engagement
 - Provide Material In-Between Face-to-Face Meetings
- Features
 - Develop Game Environment to Host Educational Games
 - Design Games to Teach and Engage Students
 - Integrate Game Environment into Current LMS
- Technologies
 - HTML / jQuery
 - RESTful APIs
 - Blackboard
 - YouTube / Instagram / Facebook
 - melonJS
 - Hilo
 - InfinitRPS
 - Panda.js
 - Playground.js



MICHAEL SADLER
FOUNDATION

Michael Sadler Foundation
Grand Rapids, Michigan



Team Michigan State University CSE

Project Overview

Using Sensors to Study Human Behavior

- Functionalities
 - Convert Room 3155 EB into Meeting Space
 - With Comprehensive Sensors
 - To Study Human Behavior
- Features
 - Develop Computational Infrastructure and Software
 - Streamline Data from Various Sensors to a Server
 - Store Data to be Analyzed by Researchers
- Technologies
 - Sensor Technologies
 - Cameras
 - Microphones
 - Thermal Sensors
 - Database Technologies



Computer Science & Engineering
East Lansing, Michigan



Team Michigan State University ITS

Project Overview

Degree Navigator

- Functionalities
 - Degree Planning and Auditing Tool
 - Modern and Easy-to-Use
- Features
 - View Completed Courses
 - Track Progress Toward Graduation
 - Plan Upcoming Schedules
 - Support Edge Cases
 - Dual Majors
 - Cognates / Minors
 - Honors Options
 - Show Ramifications of Changing Degree
- Technologies
 - HTML / CSS / JavaScript
 - Apple iOS / Swift
 - Android / Kotlin
 - Amazon Web Services



Information Technology Services
East Lansing, Michigan



Team Mozilla

Project Overview

No More Yellow Screen of Death in Firefox

- Functionalities
 - Ensure Yellow Screen of Death Never Displays
 - By Converting Firefox's Localization to Fluent
 - Support Over 100 Languages of Firefox
- Features
 - Update Old DTD and .properties Files to Fluent
 - Convert Synchronous Code to Asynchronous Code
 - Support Every Kind of Written Language
 - Deliver Code Ready to Ship with Firefox
- Technologies
 - JavaScript
 - HTML
 - C++
 - Mercurial
 - Windows / Mac / Linux / Android

XML Parsing Error: mismatched tag. Expected: </p>.
Location: file:///C:/index.xhtml
Line Number 9, Column 5:

```
</body>  
-----^
```



Nota Bene

- Team members are required to meet with the project sponsors for all day meetings on January 11 & 12.
- Team Members must agree to Open Source licensing.



Firefox
Browser

Mountain View, California

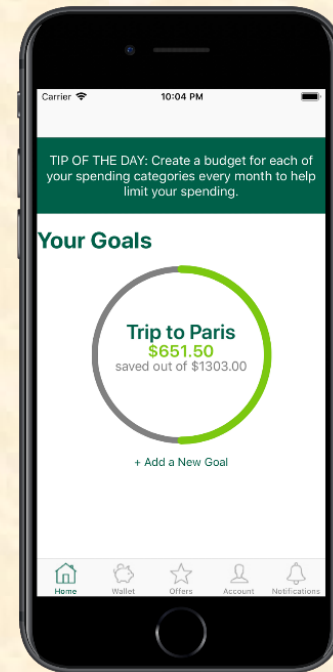


Team MSUFCU

Project Overview

MSUFCU Achieve It

- Functionalities
 - Help Children Learn About Finances
 - With Interactive Mobile and Web Apps
 - While Working with Parent on Achieving Goals
- Features
 - Develop Game-Based Financial Education Activities
 - Allow Children to Set Financial Goals
 - Introduce Members to Standard Banking Activities
 - Give Advice on Achieving Financial Goals
- Technologies
 - Apple iOS / Swift
 - Android / Java / Kotlin
 - JavaScript
 - Amazon Echo / Google Assistant
 - DialogFlow



Team Place Technology

Project Overview

Predictive Support Module

- Functionalities
 - Extend Salesforce Marketplace's PlaceCPM
 - To Enable Customer Support
- Features
 - Customers can Define / Implement a Logging Strategy
 - Upload and Store Logs to Centralized Aggregator
 - Visualize the Data in an Analytics Dashboard
 - Track Existing Issues within Salesforce Environment
- Technologies
 - HTML / CSS / JavaScript
 - Salesforce Lightning and Apex
 - Amazon Web Services or Heroku
 - MEAN Stack
 - ELK Stack



place.CPM
simplify financial forecasting
Austin, Texas

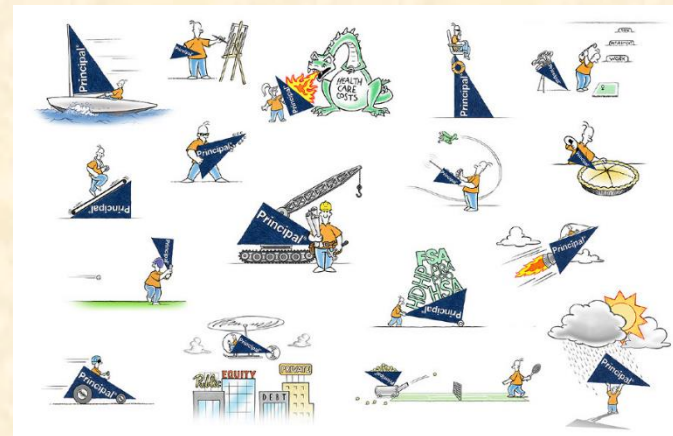


Team Principal AAL

Project Overview

ARIN Application Launcher

- Functionalities
 - Develop an Integrated Experience
 - For Users of Data Science Applications
 - Using a Serverless Architecture
- Features
 - Give Users Information on Applications They Can Access
 - Allow Users to Request Access to Other Applications
 - Provide Admin Portal
 - Review / Update Access
 - Add Applications to Suite
 - Integrate with Active Directory
- Technologies
 - Amazon Web Services
 - Cognito
 - Lambda
 - DynamoDB
 - API Gateway
 - S3
 - CloudFront
 - Microsoft Active Directory



Team Principal IPC

Project Overview

Investment Portfolio Construction

- Determine how to Specify, Store, and Feed
- Optimization Functions into Existing Optimization Engine
- Using a Serverless Architecture
- Features
 - Connect Optimization Engine and Holdings Database
 - Develop a Constraint Builder
 - Provide Objective Function Builder
 - User Interface
 - Save / Load / Open Optimization Parameters
 - Create and Save Optimization Parameters
 - Run Portfolio Construction
- Technologies
 - Amazon Web Services
 - Lambda
 - S3
 - API Gateway
 - DynamoDB
 - JavaScript Framework (React / Angular / Vue)



Team Proofpoint

Project Overview

Predictive Engine for Long Term Malware Detonation

- Functionalities
 - Understand Long-Term Motivation of Malware Developers
 - Through Forced Detonation Over Time
 - And Analysis of Malware Behavior
- Features
 - Develop System to Automate Malware Detonation
 - Implement Malware Monitoring
 - Extract Malware Forensics for Analysis
- Technologies
 - Web Application Development
 - Intrusion Detection
 - Malware Analysis
 - Malware Detonation
 - Cuckoo
 - Suricata
 - Malware-Traffic-Analysis.net

The screenshot displays the Proofpoint Malware Intelligence Dashboard. It features several sections: 'System State' with a progress bar for 'Scripts' and 'Cuckoo'; 'Recently Submitted' with a table of malware samples; 'Top Signatures' with a list of indicators and their counts; and 'Recently Modified' with a table of modified items. A 'Sample Pipeline' section at the bottom shows a progress bar for 'Submitted' and 'Reported' items.

ID	Name	State
172	177.exe	reported
171	malware.exe	reported
170	188.exe	reported
169	malware.exe	reported
168	187.exe	reported

ID	Name	Children
1	1	2
6	5	7
4	4	6
9	8	11
10	10	12

proofpointTM

Sunnyvale, California

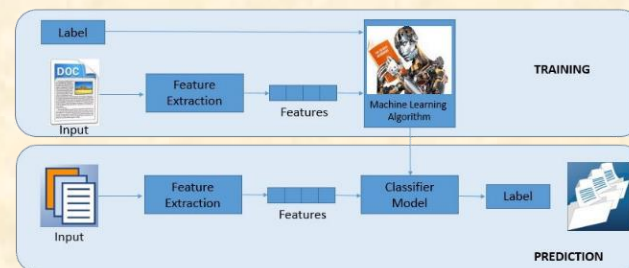


Team Technology Services Group

Project Overview

Machine Learning Document Classification and Redaction

- Functionalities
 - Protect Client's Patient's Personal Information
 - Through Machine Learning
 - To Automate Redaction of Patient Records
- Features
 - Automatically Identify Metadata Fields from Documents
 - Extract Metadata from Medical Records
 - Utilizing Microsoft's Machine Learning Suite
 - To Automatically Redact Private Information
- Technologies
 - Java
 - JavaScript
 - Microsoft Azure
 - BigData
 - HDISight
 - Azure Machine Learning



Team TechSmith

Project Overview

Smart Camera

- Functionalities
 - Help Amateur Film Makers Create Videos
 - With Web and Mobile Apps to Manage Assets
 - Provide Assistance with Common Filming Issues
- Features
 - Build Content Management Hub
 - Store Assets, Scripts and Rendered Videos
 - Leverage Mobile Sensors to Assist With Common Issues
 - Include Framing, Lighting and Green Screen Effects
- Technologies
 - Apple iOS / Swift
 - Web / C# / .NET Core
 - Face Detection
 - Cocoa Touch / UIKit
 - Docker
 - RESTful Service with Swagger



Team United Airlines Airport Operations

Project Overview

Ground Safety Action Program and QC Audit Center

- Functionalities
 - Submit, Track, Manage
 - Ground Safety Action Program Submissions
 - And Quality Control Audit Findings
 - Using Mobile and Web Applications
- Features
 - Submit and Track
 - Quality Control Audits
 - Ground Safety Action Program Reports
 - Allow For
 - Workflow Management
 - Flexible Audit Checklists
 - User-Friendly and Modern Interface
- Technologies
 - HTML / CSS / JavaScript
 - Apple iOS / Swift
 - MS SQL Server Database



Team United Airlines Safety

Project Overview

Virtual Reality Aircraft Walkaround

- Functionalities
 - Help Technicians Safely Identify Aircraft Issues
 - Through a VR Aircraft Simulation
 - Available for Training Anywhere and Anytime
- Features
 - Develop Mobile and VR Headset Applications
 - Implement Many Aircraft and Defect Types
 - Provide Many Use Scenarios for Training
 - Users Can Move Around the Plane and Mark Defects
 - Create an Instructor Portal to Manage Simulations
- Technologies
 - Apple iOS / Swift
 - Unity or Other Game Engine
 - VR Headsets



Team United Airlines Training

Project Overview

Training Scheduling and Optimization System III

- Functionalities
 - Mange United Airlines Technical Operations Training
 - Schedule Classes and Instructors Optimally
- Features
 - Expand Upon Previous Capstone Projects
 - Optimize Course Scheduling
 - Use Machine Learning to Improve Optimization
 - Optimize Overall Performance of Application
- Technologies
 - Microsoft SQL Server Database
 - NodeJS / Angular / Entity Framework
 - ASP.Net Core / C#
 - Apple iOS / Swift
 - LDAP and SAML



Team Urban Science

Project Overview

AutoHook Mobile Redemption Tool

- Functionalities
 - Allow Redemption of Incentive Vouchers
 - By Automotive Dealers Using Mobile Apps
- Features
 - Develop Current Web-Only Voucher Redemption on Mobile
 - Implement Voucher Search Functionality
 - Create Admin Dashboard for Statistics and Visibility
 - Build Barcode Scanner for Quick Voucher Redemption
- Technologies
 - .NET Framework
 - Microsoft SQL Server
 - Web API
 - Angular 8+



URBAN SCIENCE.

Detroit, Michigan

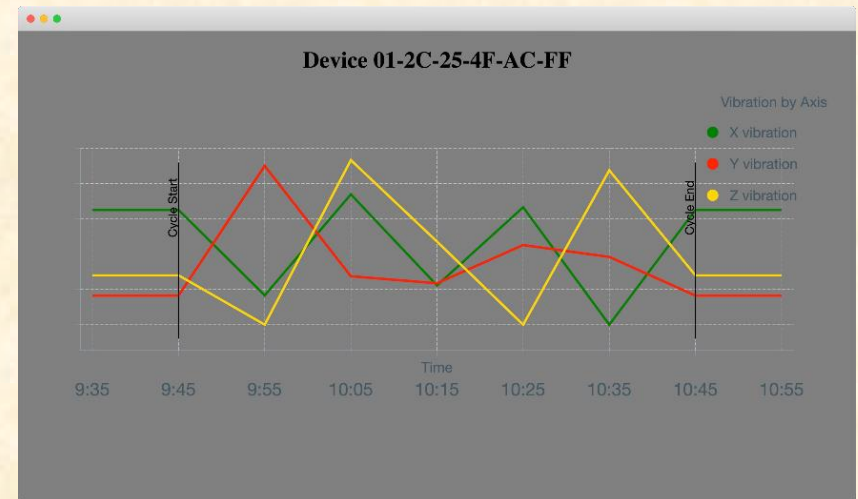


Team Vectorform

Project Overview

Rumble Test Suite

- Functionalities
 - Accurately Predict Wash Cycles with Sensors
 - Allow Management of Rumble Sensors on Mobile
- Features
 - Extend Previous Capstone Project
 - Update NN Models for Washer Cycle Prediction
 - Build Mobile App to Manage Sensors Directly
 - Implement Continuous Learning
 - Develop More Robust Prediction Models
- Technologies
 - C++ Firmware Development
 - Arduino
 - Machine Learning
 - Accelerometer Signal Processing
 - Node.js
 - React
 - Mobile Development



Google Form

- www.capstone.cse.msu.edu
- + Other Links
- > Downloads
- > Team Member Survey: [Google Form](#)



First Assignments

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



What's Next?

- Teams
 - Assignments by Email Tonight
(Keep checking your email.)
 - Meet Initially by Tomorrow Afternoon at the Latest
 - Lab Machine Assignments in Lab
 - Start Researching Technologies
 - Start Configuring Lab Machines
 - Team Photos
 - Friday, January 17 ← **Nota Bene**
 - A schedule will be distributed.
 - Starting at 8:30 a.m.
 - Schedule it.
 - Dress is business casual.
- Client
 - Contact by Email by Tomorrow COB (Close of Business)
 - Conference Call or On-Site Meeting by Friday
 - Review Project Proposal

Questions?



Capstone Overview

✓ Course Logistics

✓ Client Projects

➤ Course Logistics (Continued)



Urban Science Capstone Lab Machines

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



Capstone Lab Miscellany

[1 of 2]

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



Capstone Lab Miscellany

[2 of 2]

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



Mobile Devices Available

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



Expectations & Workload

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

Schedules

- Schedules > All-Hands Meeting
- Schedules > Major Milestones
 - 01/16: Status Report Presentations
 - 01/28: Project Plan Presentations
 - 02/18: Alpha Presentations
 - 03/31: Beta Presentations
 - 04/21: Project Videos
 - 04/23: All Deliverables
 - 04/23: Design Day Setup
 - 04/24: Design Day
 - 04/30: Project Videos

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



Meeting Attendance

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



Team Organization

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



Team Dynamics

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



Grading

[1 of 6]

• 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 (Can Be Negative)	<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 6]

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>					



- In the capstone course, absence does not make your teammates' hearts grow fonder.
 - Miss Meetings
 - All-Hands
 - Triage
 - Client
 - Team
 - Miss Work ← Key
 - In Lab with Teammates
 - During Sprints
 - Before Major Milestones



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 30 out of 30.
- I did a lot of research about stuff we never used.
- I was busy interviewing.
- Etc...



Grading

[6 of 6]

- 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,
 - graduation,
 - mortgage,
 - wedding,
 - visa status,
 - affect on GPA,
 - affect on graduate school application,
 - or anything else.



Using Resources

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



Using Existing Code

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



Travel to Client

- Reimburse for Mileage for Personal Car
- Travel Within Michigan (Outside of Lansing)
 - Grand Rapids
 - Midland
 - Metro Detroit
 - Zeeland
- From East Lansing to Client and Back
- One 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.



Integrity of Scholarship

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



Office Hours

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



Problems

- Address As Soon As Possible
 - Respectfully
 - Within Team
 - With TAs
 - With Dr D.



We don't have one of these.



Capstone Overview

✓ Course Logistics

✓ Client Projects

Questions?

✓ Course Logistics (Continued)

