The Capstone Experience

Dr. Wayne Dyksen
Department of Computer Science and Engineering
Michigan State University
Spring 2018
Course Goals

• Build a Significant Software System
• Work in a Team Environment
• Learn New Tools and Environments
• Build and Administer Systems
• Develop Communication Skills
• Develop Interview Talking Points
• Consider Issues of Ethics and Professionalism
Course Goals

• Teams of Students
• Build Significant Software System
  ▪ Design
  ▪ Develop
  ▪ Debug
  ▪ Document
  ▪ Deliver
• For Corporate Clients
• In 15 (Short) Weeks
Project Deliverables

• Project Plan Document & Presentation
• Alpha Presentation
• Beta Presentation
• Project Software & Documentation
• Project Video
• Design Day

See [Major Milestones](#).
All-Hands Meetings

- TTh, 3:00-4:20 p.m., 1279 Anthony Hall
- Presentations By
  - Professor
  - Teams
    - Status Report Presentations
    - Formal Presentations
      - Project Plan
      - Alpha
      - Beta
    - Project Videos
  - Guest Speakers
All-Hands Meetings

- 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
The Capstone Experience

Team Accenture

Department of Computer Science and Engineering
Michigan State University
Spring 2018
NEW ISN’T ON ITS WAY.

WE’RE APPLYING IT RIGHT NOW.

Accenture is answering real business challenges for our clients through innovation and deep industry knowledge. Here’s how.
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

iDefense® IntelGraph
Team Accenture
Griffin Metevia, Sam Kling, Julian Ellis, Andrew Mitchell, Teng Xu
Team Accenture
Project Plan Presentation

Screen Mockup: Malware Search

Malware Sample Search

- Strong Password: ID 000000
  - Custom: 14
- File Test: ID 000000
  - Custom: 0
- Slack Install: ID 000000
  - Required Software: 1
- Custom Foo: ID 000000
  - Custom: 32
- api-manual: ID 000000
  - Patch: 22

File Name: 040d71e56512ao786bcx.xls
File Size: 77824 bytes
File Mime: application/vnd.ms-excel
File Type: Composite Document File V2 Document
MD5: 040d71e56512ao786b
SHA1: a4jn43kn34mk34km34km3443mk
Notes:
Team Accenture Project Plan Presentation
Team Accenture
Project Plan Presentation

Architecture Diagram

AMAP Modules

iDefense
Part of Accenture Security

Malware Database

Data Server

AMAP Dashboard

Python

mongoDB

django

HTML

CSS

JavaScript

Amazon Web Services
Team Accenture
Project Plan Presentation
Team Accenture
Project Plan Presentation

Screen Mockup: AMAP Dashboard

Container Status

Malware Processed Per Hour

- Starting Up: 4%
- Running: 18%
- Idle: 2%
The Capstone Experience

Team Amazon

Department of Computer Science and Engineering
Michigan State University
Spring 2018
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 Amazon
Project Plan Presentation
Team Amazon
Project Plan Presentation

Architecture Diagram

Web Application

Request data

JSON response

Retrieve file contents

Store file

Amazon S3

Amazon RDS

Store data

Retrieve data

Python Django API
Running on an EC2 Instance

Update job progress

Add job to respective queue

Lambda Microservices

Transcribe
Begin Transcribe

Comprehend
Begin Comprehend

Product Search
Begin Product Search
System Architecture

Team Amazon
Project Plan Presentation
Team Amazon
Project Plan Presentation

Screen Mockup: Podcast Details Page
The Capstone Experience

Team Aptiv

From Students…
…to Professionals

Department of Computer Science and Engineering
Michigan State University
Spring 2018
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 Aptiv
Dillon Brown, Clayton Peters, Ashtaan Rapanos, Winton Qian, Wei Jiang
Team Aptiv
Project Plan Presentation

Screen Mockup: Incomplete Project Page
Team Aptiv
Project Plan Presentation
Team Aptiv
Project Plan Presentation

Screen Mockup: Vulnerability Assessment

APTIV

Jane Doe
Product Engineer

Main Navigation
Dashboard
Products
Tasks
Pending Requests
Threat Tracker
Vulnerability Tracker
Incident Tracker
Mitigation Tracker
Register a Product
Report an Incident
Calendar
Help
Settings

CSGW > Vulnerability Assessment

Status: Complete

Components
Vulnerable: 19
No known vulnerabilities: 10

Vulnerabilities
Critical: 38
Major: 114
Minor: 8

Licenses
Copyleft: 2
Permissive: 6
LGPL: 1
Proprietary: 0

Component
opensl 1.0.1e
glibc 2.17

Download PDF version of results

Upload File
Uploads
Analysis Results
CSGW_v1.zip
CSGW_v2.zip
CSGW_v3.zip

Dashboard > Products > V2X > V2X FCA > TARA

VULNERABLE
The Capstone Experience

Team Auto-Owners

Department of Computer Science and Engineering
Michigan State University
Spring 2018
Auto-Owners
INSURANCE
LIFE • HOME • CAR • BUSINESS
For What Matters Most

Insurance built around your needs by a local independent agent

FIND AN AGENT FOR A QUOTE

Why choose an independent agent?

Pay Your Bill  Report a Claim

Policies to Meet Your Needs
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 Auto-Owners
Zack Geizer, Reece Cole, Sean Larabell, Nick Frederick, Xinyun Zhao
Team Auto-Owners

Project Plan Presentation

Screen Mockup: Web Application
Team Auto-Owners
Project Plan Presentation
Team Auto-Owners
Project Plan Presentation

Architecture Diagram

Server-Side Applications
- Object Recognition System
  - Select environment and edit object data
  - Submits Environment Images for Object Identification
  - Creates Object Listings in Object Database
- User System
  - Manages User Data, Updates Data, Retrieves Data, Creates Data
  - Database: MariaDB

Client-Side Applications
- VR Application
  - Provides object data and image environments
  - Displays panoramic view of uploaded environment and object info
  - Web Application
    - Provides object data and image environments
    - Creates environments, allows user to create and edit object and environment data

External Hardware
- Oculus Rift Headset
- Oculus Rift Controllers
- Omnidirectional Camera
  - User uploads omnidirectional images to web portal
  - Allows user to interact with UI and select available objects
  - Provides user's visual orientation and microphone input
Team Auto-Owners
Project Plan Presentation
Team Auto-Owners
Project Plan Presentation

Screen Mockup: VR User Interface
The Capstone Experience

Team Dow

Department of Computer Science and Engineering
Michigan State University
Spring 2018
Solutions for Human Progress
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
    o Non-Certified
    o Certified
  ▪ Handle Various Scenarios
    o Normal Filling
    o Response to Spills
  ▪ Manage Player Points
    o Award for Positive Actions
    o Deduct for Negative Actions
  ▪ Enable Interaction with Game Objects
    o Personal Protective Equipment (PPE)
    o D-Rails
    o 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 Dow
Kyle White, Matthew Smith, John Yoo, JD Hayward, David Wang
Team Dow
Project Plan Presentation

Screen Mockup: The Loading Area
Team Dow
Project Plan Presentation
System Architecture

Software

- Ps
- 3DS MAX
- Audacity
- C#
- Unity

Languages

- SDK

Hardware

- VR
- VRTK

Assets

- Steam
- VR

Team Dow

Project Plan Presentation
Team Dow

Project Plan Presentation

Screen Mockup: The Railcar
The Capstone Experience

Team DRIVEN-4

Department of Computer Science and Engineering
Michigan State University
Spring 2018
DRIVEN-4
Driven To Enable Your Success!

We are technology leaders who were in your shoes yesterday. We can help you achieve your PLM, IoT & CyberSecurity journey like no-one else.
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 DRIVEN-4
Brian Pinsky, Nick Mikelsavage, Charles Carroll, Betty Wu, Sam Coffey
Team DRIVEN-4
Project Plan Presentation
Team DRIVEN-4
Project Plan Presentation

Architecture Diagram

1. TECNOMATIX
2. Produce
3. THE BOX
4. Visualize
5. thingworx studio
6. Applications
7. Particle
8. Stream
9. Cloud
Team DRIVEN-4
Project Plan Presentation
Team DRIVEN-4
Project Plan Presentation

Screen Mockup: AR Service
The Capstone Experience

Team GM

Department of Computer Science and Engineering
Michigan State University
Spring 2018
Your new vehicle is waiting

SHOP OUR VEHICLES →
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
Team GM
Alex Lepird, Tao Tao, Simeon Goolsby, Matthew Eaton, Colin Coppersmith
Team GM
Project Plan Presentation

Screen Mockup: VM Creation
Team GM
Project Plan Presentation
Team GM
Project Plan Presentation

Architecture Diagram
Team GM
Project Plan Presentation

Screen Mockup: Web Dashboard

- Microsoft Azure
- Microsoft Azure
- Visual Studio Team Foundation Server

Azure Bot Service

Microsoft Teams

- Robot
- Folder
- Injection

The Capstone Experience
The Capstone Experience

Team Herman Miller

Department of Computer Science and Engineering
Michigan State University
Spring 2018
Chair Adjustment Chatbot

• Functionalities
  ▪ Simplify Adjusting High Performance Office Chair
    o Ergonomic
    o “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 Herman Miller
Kevin Gaban, Mike Bremiller, Kyle Kinsey, Jacob Weber, Han Huang
Team Herman Miller
Project Plan Presentation

Screen Mockup: Identifying Chair

Tap the "Adjust" button and sit in your chair to begin guided adjustment.

Aeron (remastered)
Team Herman Miller
Project Plan Presentation

Architecture Diagram

3D assets -> Model Target Generator

Vuforia matches model target to camera input

Vuforia <-> Camera Input

Unity displays appropriate interactive 3D model

iOS -> Builds -> Xcode

 Builds

Android

Xcode

Builds
Team Herman Miller
Project Plan Plan Presentation
Team Herman Miller
Project Plan Presentation

Screen Mockup: Interactive 3D Model
The Capstone Experience

Team Meijer

Department of Computer Science and Engineering
Michigan State University
Spring 2018
Santa Bucks are back!
last time this year!
save over $50
Team Meijer
Project Overview

Personal Shopping Assistant

• Functionalities
  ▪ Streamline Shopping Experience
  ▪ Leverage Mobile App
  ▪ Interact by Voice or Chatting

• Features
  ▪ Create Mobile Apps
    o Apple iOS
    o Google Android
  ▪ Determine Product Information
    o Location in Store
    o Stock
    o Sale
    o Coupon
  ▪ Compare Prices to Other Stores
  ▪ Integrate with mPerks
  ▪ Send Notifications to In-Store Team Members

• Technologies
  ▪ Microsoft
    o .NET Framework (C# / ASP.NET)
    o Bot Framework
    o Language Understanding Intelligent Service (LUIS)
    o Azure
    o Application Insights
    o Visual Studio
  ▪ Xamarin
  ▪ Meijer Web Services
  ▪ SQL Server / MongoDB

Grand Rapids, Michigan
Team Meijer
Emerson Chen, Zach Richardson, Megan Lippert, Jacob Bonesteel, Aaron Carlso
Team Meijer
Project Plan Presentation

Screen Mockup: Chat Interface

Hi, I'm Thrifty, your personal shopping assistant. Feel free to ask me anything, or you can tap this message for some more options.

Ask Thrifty

mPerks Help

These are some of the FAQ's. Tap one to begin your search.

*Is there a coupon for ___?*

*Is ___ in stock?*

*What are the competitor prices for ___?*

*Where can I find ___?*

Ask Thrifty

mPerks Help
Team Meijer
Project Plan Presentation
Team Meijer
Project Plan Presentation

Architecture Diagram

IOS
Apple Speech

Android
Google Speech

Bot Framework

Azure
mpershks

Competitor Pricing
SQL

LUIS

BLUEBIRD
Team Meijer
Project Plan Presentation

Screen Mockup: Functionality

- Coca-Cola: 24 pk, $7.99 ea, Aisle 12
- Out-Of-Stock: Click here to alert a Meijer Team Member
- Coupon Available
- Competitor Prices
- Ask Thrifty

Here is what I found:
- Coca-Cola: 24 pk
  - Meijer: $7.99
  - Walmart: $7.99
  - Kroger: $7.99
  - Target: $8.99

Competitor Prices on a 24 pack of Coke.
The Capstone Experience

Team Michigan State University

From Students…
…to Professionals

Department of Computer Science and Engineering
Michigan State University
Spring 2018
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 Michigan State University
Project Plan Presentation

Android and iOS Design

Student Engagement App

Question 1
Here is someone describing a issue they have with something related to the class. Students will be able to add new posts, view posts, add posts only for in...

Question 2
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Team Michigan State University Project Plan Presentation
Team Michigan State University
Project Plan Presentation

Architecture Diagram

- Mobile Student Client
- Instructor Web Client
- API Gateway
- Estimote Beacons
- ID
- SNS
- RDS
- EC2
- Elastic Beanstalk
- Node.js
- Amazon Web Services
Team Michigan State University Project Plan Presentation
Team Michigan State University
Project Plan Presentation

Screen Mockup: Forums - Web
The Capstone Experience

Team Mozilla

Department of Computer Science and Engineering
Michigan State University
Spring 2018
The new Firefox

Fast for good.

With 2x the speed, built-in privacy protection and Mozilla behind it, the new Firefox is the better way to browse.

Download Firefox

Firefox Privacy Notice
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
  - IRC Cloud
  - Bugzilla
  - Review Board
  - Microsoft Windows
  - Apple macOS
  - Linux
Team Mozilla
Vivek Dhingra, Connor Masini, Dyl Stokes, Bogdan Pozderca, Zhengyi Lian
Team Mozilla
Project Plan Presentation

Screen Mockup: In-Product Page
Team Mozilla
Project Plan Presentation
Team Mozilla
Project Plan Presentation

Architecture Diagram

Firefox Theme

Chrome Theme
Team Mozilla
Project Plan Presentation

Screen Mockup: Menus
The Capstone Experience

Team MSUFCU

Department of Computer Science and Engineering
Michigan State University
Spring 2018
Your morning coffee could win you $800.

Find Out More

SAYING MEMBERS MILLIONS

Home Loans
Auto Loan

Locations
Careers
Live Chat

Open an Account
Sign In
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
Team MSUFCU
Patrick Dame, Dallas Nowak, Michael Carter, Rachel Beard, Dane Holmberg
Team MSUFCU
Project Plan Presentation

Screen Mockups: Android App

Digital Assistant and Financial Coach Login

Email or account number
Password

LOG IN
Team MSUFCU
Project Plan Presentation
Team MSUFCU
Project Plan Presentation

Architecture Diagram

Admin Portal

Middleware

MSUFCU SQLite Database

iOS App, Android App, Amazon Alexa, Facebook Messenger, and iMessage
Team MSUFCU
Project Plan Presentation

Screen Mockup: Web Admin Portal
The Capstone Experience

Team Phoenix Group

Department of Computer Science and Engineering
Michigan State University
Spring 2018
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)
Team Phoenix Group
James Finch, Sarah Fillwock, Dan Shumaker, Fatema Alsaleh, Aman Goshu
Team Phoenix Group
Project Plan Presentation

Quick Reference Guide Viewer

Search for QRG ...

Hello, Amanda

Add QRG

VERIFONE VX 680
XEVA440
RETAIL

First Data FD130
750FD130
RETAIL

VERIFONE VX 520
XEVA440
RESTAURANT

advanced QRG search
Team Phoenix Group
Project Plan Presentation
Team Phoenix Group
Project Plan Presentation

Architecture Diagram

Chatbot

Microsoft Bot Framework

LUIS NLP

MongoDB Server

MongoDB Driver

Desktop

Windows ASR

Windows App

Tablet

Windows OCR
Quick Reference Guide Viewer

manufacturer
Verifone

terminal type
VX 680

application type
Retail

product number
0300034

version
XEVA440

Add comment ...
The Capstone Experience

Team Proofpoint

Department of Computer Science and Engineering
Michigan State University
Spring 2018
GARTNER MQ LEADER IN ENTERPRISE INFORMATION ARCHIVING FOR 6 YEARS RUNNING

GET THE GARTNER REPORT
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
Team Proofpoint
Graham Thomas, Yash Patel, Crystal Lewis, Brad Doherty, George Zhao
Team Proofpoint
Project Plan Presentation

Screen Mockup: Nodal Graph

Flagged Files
- TMP1CE2.TMP
- Memo.pdf
- DriverPack.exe
- Virus.exe
- NotSpyware.jar

Batch Information
- Files Processed: 103/250
- Time Elapsed: 00:15:23
- Flagged Files: 15
Team Proofpoint
Project Plan Presentation
Team Proofpoint
Project Plan Presentation
Team Proofpoint
Project Plan Presentation

Screen Mockup: File Analysis

Batch Information
Files Processed: 103/250
Time Elapsed: 00:15:23
Flagged Files: 15

File Analysis
File Name: WannaCry.exe
File Signature: File matched known signature of Ransom.WannaCry
Behavior Profile: Behaves like a trojan and a worm
File Size: 5.65MB

Flagged Files
TMP1CE2.TMP
Memo.pdf
DriverPack.exe
Virus.exe
NotSpyware.jar

Flagged
Trojans
Rootkits
Worms
Viruses
The Capstone Experience

Team Quicken Loans

Department of Computer Science and Engineering
Michigan State University
Spring 2018
Providing Affordable Mortgages and Award-Winning Client Service for More than 30 Years
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 Quicken Loans
Vishal Adusumilli, Riley Annis, Erin O'Hara, Turner Anderson, Jaiwant Bhushan
Team Quicken Loans
Project Plan Presentation

Screen Mockup: User Login

[Image of a user login screen with fields for Username, Password, and Role (Home Buyer, Builder, Contractor), and a button labeled "Log In or Sign Up"]
Team Quicken Loans
Project Plan Presentation

Architecture Diagram

Web App
- React JS
- .NET Core
- Service Layer
- Database Layer
- SQL Server
- SQL Database

Hyperledger
- Fabric
  - Blockchain
  - Chaincode
  - Blockchain State Storage
- Composer
  - Business Network Model
  - Transactions
  - Access Control
  - Identities
  - REST Server

REST API

Client API

Azure
Team Quicken Loans
Project Plan Presentation
The Capstone Experience

Team Rook

Department of Computer Science and Engineering
Michigan State University
Spring 2018
Optimize Security Operations

Force is a Security Operations Management Platform that equips your team for success by optimizing security resource workflows, metrics, and outcomes.
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
    o Enable Remote Agent Configuration
    o Do Health Checks and Data Analysis
    o Display Health Check Information
    o Create Alert Thresholds
  ▪ Store Metrics and Log Files
    o RESTful Endpoint
    o Amazon Simple Storage Service (S3)
    o 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 Rook
Jeremy Specht, Bohao Gao, Vikram Thakur, Jared Clark, Drew Gilbertson
Team Rook
Project Plan Presentation

Screen Mockup: System Health
Team Rook
Project Plan Presentation
Team Rook
Project Plan Presentation

Architecture Diagram

- Lambda
- S3 API
- REST API
- React JS
- elastic search
- S3
- django
- Agents
- Local Storage
Team Rook
Project Plan Presentation
Team Rook
Project Plan Presentation

Screen Mockup: Configuration
The Capstone Experience

Team SpartanNash

Department of Computer Science and Engineering
Michigan State University
Spring 2018
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

---

Grand Rapids, Michigan
Team SpartanNash
Project Plan Presentation

Screen Mockup
Team SpartanNash Project Plan Presentation
Team SpartanNash
Project Plan Presentation

Architecture Diagram

- MySQL
- SpartanNash inSite APIs
- Mobile Applications
  - React-Native
    - Android App
    - iOS App
- Websites
  - HTML/PHP
    - Web Form
    - Admin Panel
System Architecture

Mobile Applications
- React Native
- Android App
- iOS App

Websites
- HTML, CSS
- Web Form
- Access Bank

Team SpartanNash Project Plan Presentation
Team SpartanNash
Project Plan Presentation

Screen Mockup

Username
Password
SIGN IN

Forget your Password?
Recover

Organization Name *
Enter The Organization Name

Volunteer Activity or Event Name *
Enter The Event Name

Area of support *
None selected
Area not on the list(optional)
Enter the areas

Commitment *
One Time

Date of Event *
01/29/2018

Hour of Event *

Message
Enter extra message here...

Submit →
The Capstone Experience

Team Spectrum Health

Department of Computer Science and Engineering
Michigan State University
Spring 2018
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
Team Spectrum Health
Andrew Astakhov, Collin Skonieski, Rachel Polus, Pierce Neal, Xin Zhao
Project Plan Presentation

Team Spectrum Health

Screen Mockup: Android App

- Go Upstairs
- Walk Down East Hall

From... East Wing Stairwell
To... Main Lobby

From... Main Lobby
To... Room C114

Waypoint Recognized!
Updating location to: Main Lobby

The Capstone Experience
Team Spectrum Health
Project Plan Presentation

Architecture Diagram

- Web Application
  - ASP.NET
  - REST API

- SQL Database

- iOS Application
  - ALAMOFIRE

- Android
  - Retrofit
Do not delete this textbox.
It's used as a marker in VB code.
See VB Module UTL_PresentationSlidesSend2FB.

Team Spectrum Health Project Plan Presentation
Team Spectrum Health
Project Plan Presentation

Screen Mockup: Web App
The Capstone Experience

Team Symantec

Department of Computer Science and Engineering
Michigan State University
Spring 2018
Securing the Cloud Generation
Fueled by the world's largest civilian threat intelligence network

REPORT
Symantec Named a Leader in

REPORT
Gartner Positions Symantec as
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 Symantec
Robert Novak, Abby Urbanski, Stephen Alfa, Keerthana Kolisetty, Echo Wu
Team Symantec
Project Plan Presentation

Screen Mockup: Dashboard in Splunk
Team Symantec
Project Plan Presentation

Architecture Diagram

[Diagram showing a flow of data and services, including
- Symantec VIP services
- Two-factor authentication
- Data & Event Logs
- VIP Reporting Client
- Data Documents
- ELK
- Splunk
- Customers
- Internet
- AWS
- MSU Team Symantec

Powered by Symantec]
Team Symantec
Project Plan Presentation
Team Symantec
Project Plan Presentation

Screen Mockup: Dashboard in ELK
The Capstone Experience

Team TechSmith

Department of Computer Science and Engineering
Michigan State University
Spring 2018
Create Powerful Visuals. No Design Skills Needed.

TechSmith makes it simple for everyone to create high-quality screenshots, screencasts, and videos.

Shop Now
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 TechSmith
Ryan Schiller, Logan Arent, Collin Dillinger, Carter Chamberlain
Team TechSmith
Project Plan Presentation

Screen Mockup: Output Mockups

Team TechSmith
Project Plan Presentation

Screen Mockup: Output Mockups

Team TechSmith
Project Plan Presentation

Screen Mockup: Output Mockups
Team TechSmith
Project Plan Presentation
Team TechSmith
Project Plan Presentation

Architecture Diagram
Team TechSmith
Project Plan Presentation
Team TechSmith
Project Plan Presentation

Screen Mockup: Test Harness

Test Harness

Choose File ...

Output To:

TechSmith Video Review

Wistia

Imgur

XXX
Media
Thumbnail
XXX

C:\Users\Capstone\Images\...
The Capstone Experience

Team Union Pacific

Department of Computer Science and Engineering
Michigan State University
Spring 2018
The Spirit Locomotive Honors U.S. Armed Forces

Locomotive No. 1943, The Spirit, spotlights Union Pacific’s relationship with thousands of veterans who helped build America after defending the United States – a tradition dating back to the company’s founding. Find out more.
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)
Team Union Pacific
Jared McMillan, Daniel Agbay, M Kim, David Hubble, Austin McGee
Team Union Pacific
Project Plan Presentation

Screen Mockup: Mobile Application
Team Union Pacific
Project Plan Presentation
Team Union Pacific
Project Plan Presentation

Architecture Diagram

- User Preferences
- Train Lineup
- Employee Authentication
- Employee Queue
- Company Database
- JavaScript webpage

Assistants
System Architecture

Team Union Pacific Project Plan Presentation
Alexa, open the PST app.

Hello Sparty, what can I help for you today?

What's my times out?

You are currently 4th out right now.

Thanks, that's all.
The Capstone Experience

Team Urban Science

Department of Computer Science and Engineering
Michigan State University
Spring 2018
EVERYONE HAS AN OPINION. WE HAVE SCIENCE.

Since the day we started, we’ve been a force for change. We started with a problem to solve. We scrutinized it, developed a theory, tested it and applied the solution. And we have the same approach today, we listen to our clients’ needs and find a solution. We’re curious, objective, empirical and determined. Through this spirit, we invented The Power of 4™ formula to bring scientific discipline to the business world. It’s how we are Guiding Business Through Science.
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)
Team Urban Science
Mustafa Jebara, Dane Rosseter, Samantha Oldenburg, Alex Wuillaume, Shun Ran
Team Urban Science
Project Plan Presentation

Screen Mockup: Home Screen

- Level
- Standby
- Voice
- Lock
- Raise
- Lower

The Capstone Experience
Team Urban Science
Project Plan Presentation

Architecture Diagram

Azure

Internet

SQL

Bluetooth

Commands

The Capstone Experience
Team Urban Science
Project Plan Presentation

Screen Mockup: Leveling Settings

Adjust leveling calibration

Raise

Lower
The Capstone Experience

Team USAA

Department of Computer Science and Engineering
Michigan State University
Spring 2018
WE PROUDLY SERVE MILITARY MEMBERS AND THEIR FAMILIES

Since 1922, we have stood by our members. We’ve provided years of guidance and assistance — from helping establish financial independence, to raising a family, to retirement.

WHO WE SERVE
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 USAA
Xingchi Zhou, Nathaniel Finley, Abe Ahmed, Mike Ronayne, Dong Lee
Screen Mockup: Quoting Process

Get a Term Life Insurance Quote

M  F

Age  37
Weight  180
Height  6' 1"

Do you smoke? Y N
Do you exercise? ✓  

GET A QUOTE
Team USAA
Project Plan Presentation

Architecture Diagram

React

Frontend Web Application (Azure)

Execute Smart Contract

*Get Health Record
*Modify Permissions

Blockchain Backend (Azure)

REST API

Ethereum

Data

Execute Smart Contract

Machine Learning Backend (Azure)

REST API

Azure Functions

Machine Learning

Quote

User Input

Data

Result

Data

Result
Team USAA Project Plan Presentation
Team USAA
Project Plan Presentation

Screen Mockup: Patient Login
The Capstone Experience

Team Yello

Department of Computer Science and Engineering
Michigan State University
Spring 2018
yello
Humanize
The Candidate Experience

Provide unprecedented speed and transparency throughout the candidate journey
Sentiment and Emotional Analysis of Video Interviews

• Functionalities
  ▪ Evaluate Video Interview Automatically
  ▪ Include Sentiment and Emotional Analysis

• Features
  ▪ Design and Build Web App
    o Record Live Video
    o Support Prerecorded Video
    o 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
    o To View Results
    o By Hiring Team

• Technologies
  ▪ CSS / HTML / JavaScript / JSON
  ▪ Ruby on Rails
  ▪ Microsoft Azure Emotion API
  ▪ Microsoft Language Understanding Intelligent Services (LUIS)
  ▪ Machine Learning
    o TensorFlow
    o scikit-learn
Team Yello
Jonathon Zeitler, Leo Yao, Jenn Proos, Quan Zhou, Brian Wang
Team Yello
Project Plan Presentation
Team Yello
Project Plan Presentation

Architecture Diagram

- PostgreSQL: Database
- open.tok™: Video Capture
- Video Analysis
- Analysis Results
- HEROKU
- RAILS
- Azure
- Storage
- Video Indexer API
- Text Analytics API
- Emotion API
Team Yello
Project Plan Presentation
Team Yello
Project Plan Presentation

Screen Mockup: Interview Recording Page

Question 1
Talk about your self
The Capstone Experience

Dr. Wayne Dyksen
Department of Computer Science and Engineering
Michigan State University
Spring 2018

From Students…
…to Professionals
The Capstone Experience Lab
The Capstone Experience Lab
The Capstone Experience Lab
View of Spartan Stadium
The Capstone Experience

Design Day Award Winners

April 28, 2017
All-Hands Design Day, April 28, 2017
Auto-Owners Exhibition Award
Team TechSmith, Spring 2017
Teacher’s Virtual Toolbelt
Alex Crimin, Zeke Zandbergen, Yang He, Ryan Cornillie
Presented by Scott Lake of Auto-Owners Insurance
MSU Federal Credit Union Praxis Award

Team Union Pacific, Spring 2017

Learning New Train Routes

Matthew Schleusener, Kangjie Mi, Nick Summers, Jon Wild

Presented by Liam Petraska of MSU-Federal Credit Union
TechSmith Screencast Award
Team Amazon, Spring 2017

ACRA: Amazon Customer Review Analyzer
Jie Wan, Jason Liu, Ian Whalen, Ankit Luthra, Tess Huelskamp

Presented by Wendy Hamilton of TechSmith
Urban Science Sigma Award
Team Michigan State University, Spring 2017

CATAlyst: Mapping CATA Buses in Real-Time
Charlie Ward, Cathy Dinsmoor, Tom Beaver, Jimmy Mkude, James Dodge
Presented by Linda Koepppe and Luke Mercier of Urban Science
The Capstone Experience

Design Day Award Winners

December 8, 2017
Auto-Owners Exhibition Award
Team Amazon, Fall 2017

Faia: Fashion Artificial Intelligence Assistant
David He, Dominic Zottolo, Zizhen Wang, Danielle Schugars, Nikhil Ramu
Presented by Ross Hacker and Scott Lake of Auto-Owners Insurance
MSU Federal Credit Union Praxis Award
Team Yello, Fall 2017
Automatic Resume Verification
Brandon Burt, Ryan Nagy, Giorgio Maroki, Nathaniel Hagan, Wan Kim
Presented by April Clobes of MSU Federal Credit Union
TechSmith Screencast Award
Team Union Pacific, Fall 2017
RailBuilder: The Great Race to Promontory
Declan McClintock, Jacob Young, Zachary Brenz, Kyle Bush, Trever Daniels
Presented by Matt Dupuis of TechSmith
Urban Science Sigma Award
Team Michigan State University, Fall 2017
SEA: Spartan Experience App
Nayana Kodur, Patrick Pale, Roy Perryman, Ryan Johnson, Scott Swarthout
Presented by Elizabeth Klee of Urban Science
The Capstone Experience

Dr. Wayne Dyksen
Department of Computer Science and Engineering
Michigan State University
Spring 2018
Auto-Owners INSURANCE
LIFE • HOME • CAR • BUSINESS
yello