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# 09/12: Team Status Reports

## The Capstone Experience

Dr. Wayne Dyksen  
James Mariani  
Luke Sperling  
Griffin Klevering  
Tommy Hojnicky

Department of Computer Science and Engineering  
Michigan State University  
Fall 2023



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...to Professionals*

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**U N I V E R S I T Y**

# Status Report Presentation

## Money Moves

### The Capstone Experience

Team Ally

Blake Morris

Tim Moran

Odon Mulambo

Jack Patton

Bohan Zhang

Department of Computer Science and Engineering  
Michigan State University

Fall 2023



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# Team Ally

## Status Report

[1 of 4]

### Ally Financial Education Program

- Sponsor Overview
  - Digital Financial Services Company
  - Assists with online banking and lending
  - As well as auto financing and wealth management
- Project Overview
  - Educate consumers on money management
  - Through the use of an online web application
  - Consumers will work through various financial topics provided by the web application (content page)
  - Assists those who are not well educated on financial topics



# Team Ally

## Status Report

[2 of 4]

### Ally Financial Education Program

- Server Systems / Software
  - Working with Ally to setup Docker Services
  - Initial api connection is set up with node express
  - NodeJS and React app are established on VSCode
- Development Systems / Software
  - Created initial react app
  - Gitlab repository has been set up
  - Node.js works on everyone's computer
- Project Plan Document
  - Skeleton document is complete
  - Making mockups of website with given templates
  - 10% Complete



# Team Ally

## Status Report

[3 of 4]

### Ally Financial Education Program

- Client Contact
  - Scheduled weekly conference calls every Friday
  - Have met with client 2 total times
- Team Meetings
  - Team has met 3 total times
  - Team meetings scheduled once weekly to touch base
- Team Organization
  - Front End: Blake, Bo
  - Back End: Jack, Tim
  - Dev-ops: Odon



# Team Ally

## Status Report

[4 of 4]

### Ally Financial Education Program Risks

- Risk 1
  - Heavy use of JavaScript frameworks like React might slow down the site for users with slower connections or devices.
  - Mitigation : Optimize React components, consider lazy loading components, and use tools like Google Lighthouse for performance checks.
- Risk 2
  - Different browsers (and versions of those browsers) might render website differently.
  - Mitigation : Regularly test the website using tools like BrowserStack. Use CSS reset stylesheets or normalize.css to ensure consistency.
- Risk 3
  - There's a risk of data being tampered with during transfer or serialization/deserialization issues leading to data corruption.
  - Mitigation : Validate and sanitize incoming and outgoing data. Use tried and tested serialization methods.



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**U N I V E R S I T Y**

# Status Report Presentation

## Email Improvement Tool

### The Capstone Experience

Team Amazon

Nafisa Ahmed

Will Gamba

Annika Karlstrom

Jack Sleeman

Byzjon Speights

Michael Than

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Fall 2023



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# Team Amazon

## Status Report

[1 of 4]

### Email Improvement Tool

- Sponsor Overview
  - Amazon is a multinational technology company founded in 1994 by Jeff Bezos
  - World's largest online retailer that focuses on customer obsession
  - Specializes in e-commerce, cloud computing, and digital streaming
- Project Overview
  - Goal: Improve quality of Amazon internal emails using Machine Learning/AI
  - Creating web application that compares new emails with pre-existing Amazon email templates
  - Provides feedback to content creator on how to improve email
  - Service will detect duplicate templates, assess empathy, evaluate clarity, and more





# Team Amazon

## Status Report

[2 of 4]

### Email Improvement Tool

- Server Systems / Software
  - Lambda: Runs code virtually for application without need to provision or manage resources
  - AWS Amplify: Provides easy web application development, deployment, and connection – created “Hello World” website
  - Databases: Stores data and template information, deciding on DynamoDB or RDS
  - ML/AI: Comprehend vs SageMaker, currently researching the pros and cons of each to decide which is best for each use case
- Development Systems / Software
  - React running on VSCode (“Hello World”)
  - Python running on PyCharm and Jupyter Notebook (“Hello World”)
- Project Plan Document
  - Document skeleton started and parts delegated
  - Met with client about project specifics regarding use cases and design mockups
  - 15% Complete



# Team Amazon

## Status Report

[3 of 4]

### Email Improvement Tool

- Client Contact
  - Met with client three times so far
  - Two 30 minute meetings on Mondays & Wednesdays
- Team Meetings
  - Official weekly scheduled meeting for two hours on Wednesdays
  - Typically meet at least three times a week
- Team Organization
  - Divided our team into three groups of two
    - Front-end, Database (Back-end), and Machine Learning (Back-end)
  - Primary points of research, may change going forward



# Team Amazon

## Status Report

[4 of 4]

### Email Improvement Tool

#### Risks

- Project Expense
  - AWS services cost money to run, must remain under a monthly limit
  - Determining cost friendly services and practices, by research and sponsor support
- Machine Learning
  - Deciding which AI model is best for specific given cases provided by our sponsor, Comprehend vs SageMaker
  - Extensive research and experimentation, larger teams to work on such
- Data and Storage
  - Determining the source, volume, and type of training data from sponsor, Relational Database vs DynamoDB (NoSQL) storage limit and cost
  - Consulting sponsor and researching given base information and future training data



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**Status Report Presentation**  
**Machine Learning for Optimization of**  
**Carbon Removal**  
**The Capstone Experience**

**Team Anthropocene Institute**

Edie Haase

Jack Holscher

Ishita Kokil

Nick Wang

Hemanth Yalamanchili

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Michigan State University

Fall 2023



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# Team Anthropocene Institute

## Status Report

### Machine Learning for Optimization of Carbon Removal

- Sponsor Overview
  - Founded by Carl Page in 2012.
  - Mission to make Earth sustainable by knowing and investing in the right technology.
  - Partnered with entrepreneurs, investors, governments, non-profits, universities etc. to achieve this goal.
- Project Overview
  - The removal of carbon dioxide is important to stabilize the Earth's climate.
  - Use machine learning to determine the best sites for carbon capture.
  - Create a web app that shows the best places and techniques for the same.



# Team Anthropocene Institute

## Status Report

### Machine Learning for Optimization of Carbon Removal

- Server Systems / Software
  - Set up iMacs in the capstone lab and installed VMWare.
  - Downloaded the frontend and backend software on the iMacs.
  - Created a Trello board to manage the entire project.
- Development Systems / Software
  - Frontend : React, HTML/CSS, Javascript
  - Backend : Flask, Python, PyTorch/TensorFlow
  - Set up Gitlab repository and cloned on iMacs, personal computers.
- Project Plan Document
  - Created the sketch outline.
  - Completed the executive summary, risk analysis, and weekly schedule.
  - 35% Complete



# Team Anthropocene Institute

## Status Report

### Machine Learning for Optimization of Carbon Removal

- Client Contact
  - First meeting on 09/01 with Melinda and Frank.
  - Weekly meetings on Fridays.
- Team Meetings
  - Previously met 5/6 times.
  - Weekly meetings Tuesday after class and Thursday before triage meetings.
- Team Organization
  - 3 people working on Frontend – Edie, Jack, and Nick.
  - 2 people working on ML and Backend – Ishita, Hemanth.



# Team Anthropocene Institute

## Status Report

### Machine Learning for Optimization of Carbon Removal Risks

- Risk 1
  - Risk: Relevant Data Collection
  - Mitigation: Scraping websites, looking at the government and institutional websites, asking MSU sustainability professors, Kaggle, etc.
- Risk 2
  - Risk: Keeping the web tool up to date with new data continuously being added
  - Mitigation: Create data scraping scripts that will get/train data once a month.
- Risk 3
  - Risk: Would the web app be able to handle the data scraping and training the new model using the scraping scripts?
  - Mitigation: Continuous testing of the data scripts against the web app once it is up and running.
- Risk 4
  - Risk: Expanding the scope of the project.
  - Mitigation : Work on just the United States first, then expand if possible.





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**U N I V E R S I T Y**

# Status Report Presentation

## Help Me See!

### The Capstone Experience

#### Team Auto-Owners Insurance

Cale Linabury

Timothy Sung

Benny Schulz

Nash Longmire

Joesph Pauls

Department of Computer Science and Engineering

Michigan State University

Fall 2023



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# Team Auto-Owners Insurance

## Status Report

[1 of 4]

### Help Me See!

- Sponsor Overview

- Founded in 1916, headquartered in Lansing since 1917
- \$10 billion yearly revenue with \$32.5 billion total assets
- Provides Home, Car, Business, and Life insurance to the Mid West

- Project Overview

- Using a new form of media in AR with the Hololens
- Overlay and detect household appliances using the Hololens and show the customer the loss info of the appliance
- This hopefully will reduce the number of insurance claims
- Wide target demographic (renters and owners, all ages)



# Team Auto-Owners Insurance

## Status Report

[2 of 4]

### Help Me See!

- Server Systems / Software
  - We will be uploading our application to the Unity Hub to host
- Development Systems / Software
  - Unity – Game development software
    - Set up on our computers & using feature
  - HoloLens – Augmented Reality
    - HoloLens set up & being used to test applications
    - Developer mode has been used to test unity
  - C# - Coding language
    - Installed and being used to code with our unity engine
- Project Plan Document
  - 3 Mockups of app features have been made
  - Risks have been discussed and noted
  - About 20% complete



# Team Auto-Owners Insurance

## Status Report

[3 of 4]

### Help Me See!

- Client Contact
  - We have meet with our client, Ross Hacker
  - Scheduled weekly meetings for Fridays at 3:00
- Team Meetings
  - 9/5 Triage Meeting 10:30, [Weekly] Monday Triage Meeting 17:00
  - Tuesdays and Thursday Team Meetings 16:30
- Team Organizations
  - Unity/HoloLens Front-End: Timothy Sung, Nash Longmire
  - Unity/HoloLens Back-End: Cale Linabury, Benny Schulz
  - API Machine Learning: Joseph Pauls



# Team Auto-Owners Insurance

## Status Report

[4 of 4]

### Help Me See!

#### Risks

- Working with Augmented Reality
  - Learning the design philosophy of AR
  - Playtesting applications to see what feels good
- Working with the HoloLens
  - What is the best way to develop for this device?
  - Create a prototype and see how to get it onto the HoloLens
- Object Detection
  - Using the HoloLens cameras and machine learning to detect objects
  - Researching common object detection methods in AR
- Using Unity
  - Utilizing Unity to create our objects
  - Practicing with simple objects and testing them in AR



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**U N I V E R S I T Y**

# Status Report Presentation

## Trailer Safety Using Computer Vision

### The Capstone Experience

Team Bosch

Matthew Zaleski

Fangjun Huang

Sarah Clay

Austin Mills

Moriah Casas-Ponce

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Michigan State University

Fall 2023



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# Team Bosch

## Status Report

[1 of 4]

### Trailer Safety Using Computer Vision

- Sponsor Overview

- Founded by Robert Bosch in 1886.
- Leading and worldwide German supplier in automotive equipment and services.
- Commonly known for appliances from washing machines to power tools.

- Project Overview

- Prevents injuries, vehicle accidents, and vehicle damages.
- Ensures vehicle has properly hitched trailer.
- Algorithm detects missing component in the hitching process.



# Team Bosch

## Status Report

[2 of 4]

### Trailer Safety Using Computer Vision

- Server Systems / Software
  - N/A
- Development Systems / Software
  - Project coded using Python
  - Machine Learning algorithms to detect objects in images
  - Using ffmpeg and OpenCV to create stills from videos
- Project Plan Document
  - Currently not started
  - Waiting for clarification points
  - 0% Complete





# Team Bosch

## Status Report

[3 of 4]

### Trailer Safety Using Computer Vision

- Client Contact
  - Meet virtually on Fridays 11 am-12 pm.
  - Provided initial resources, expectations, and approach recommendations.
  - Have currently met twice
- Team Meetings
  - Meet Thursdays 4:20-5:40 pm in Capstone lab.
  - Working on hitch components detection and video trimming.
- Team Organization
  - Matthew Zaleski is the Client Contact.
  - Research is done independently and shared in meetings.



# Team Bosch

## Status Report

[4 of 4]

### Trailer Safety Using Computer Vision

#### Risks

- Limited and Unlabeled Data Set
  - Concerned data set will have insufficient variety of trailers or hitching styles.
  - Exploring open-source data sets, collecting public domain images, and/or creating our own data.
- Hitch Classification
  - Concerned with how to determine the class of hitch given an image, which is necessary to determine if the correct ball and hitch are used.
  - Determine the features of each class of hitch and identify those features in the images.
- Ball Hitch Size
  - Concerned with how to determine the size of the ball hitch, especially without an obvious reference length in the image.
  - Find some feature of the hitches or vehicles with a consistent length to reference or learn how to estimate the size without a reference.



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**U N I V E R S I T Y**

Status Report Presentation  
DRIVEN-4 Connect Update and Upgrade

The Capstone Experience

Team DRIVEN-4

Byerly Andrew

Gidwani Rian

Pieters Flora

Patel Het

Zihao Qian

Department of Computer Science and Engineering  
Michigan State University

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# Team DRIVEN-4

## Status Report

[1 of 4]

### DRIVEN-4 Connect Update and Upgrade

- Sponsor Overview

- Offers customers strategies of integrated process and technology
- Expertise in PLM, product development, cloud services, and cybersecurity
- Utilize IoT solutions to increase efficiency and profit of OEMs

- Project Overview

- Improve upon website that allows users to analyze and view cloud data
- Simpler way for users to manage devices and collect data
- Administrators can add new users, update settings, and push firmware
- Users can add CC and make payments directly on website



# Team DRIVEN-4

## Status Report

[2 of 4]

### DRIVEN-4 Connect Update and Upgrade

- Server Systems / Software
  - Able to connect to AWS EC2 Instance
  - Connected to MySQL tables
  - Able to run website using Flask
- Development Systems / Software
  - Codebase runs on local machines
  - Gitlab is set up and base project is pushed
  - Python, Flask, and JavaScript
- Project Plan Document
  - Completed introduction and functional
  - Working on system mockup
  - 30% complete



# Team DRIVEN-4

## Status Report

[3 of 4]

### DRIVEN-4 Connect Update and Upgrade

- Client Contact
  - Met with client twice
  - Weekly Conference Call Thursday 4:50 PM EST(1:50 PM PST)
- Team Meetings
  - 4 team meetings
  - In-person Meeting Sunday 4:00 PM EST
  - Once a Week
- Team Organization
  - Back End(SQLAlchemy, Database, Pandas)
  - Front End(Flask, JavaScript, React)



# Team DRIVEN-4

## Status Report

[4 of 4]

### DRIVEN-4 Connect Update and Upgrade

#### Risks

- Risk 1

- Changing the SQL interface to SQLAlchemy for ORM
- Understand how current queries and tables in codebase work

- Risk 2

- Password resets and user password changes may involve security issues
- Enforce a strong password policy by encrypting passwords

- Risk 3

- Making a GUI responsive may cause display issues on different devices
- Testing on various devices to ensure compatibility



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**U N I V E R S I T Y**

# Status Report Presentation

## Evo Observability Platform

### The Capstone Experience

#### Team Evolutio

Abhinay Devapatla

Haoxiang Zhang

Max Resch

Spandan Chatterjee

Tyler Triplett

Department of Computer Science and Engineering

Michigan State University

Fall 2023



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# Team Evolutio

## Status Report

### Evo Observability Platform

- Sponsor Overview
  - Mission: Bring visibility, simplicity, and usability to a client's complex platform
  - Four specialized practices:
    - Observability, Security, Data Science & Analytics, and Automation
  - Utilizes industry-leading technologies to address business challenges
- Project Overview
  - Focuses on the Observability practice
  - Project seeks to add traceability for APM
  - Geared toward Developers and System Admins
  - Allows monitoring of applications in real-time



# Team Evolutio

## Status Report

### Evo Observability Platform

- Server Systems / Software
  - Kubernetes – Containerization
  - Temporary Firebase database for storage
    - Switch to Druid/Neo4J later
  - Apache Kafka - Tracing data streaming
- Development Systems / Software
  - Basic React.js template initialized
  - Python packages for backend development setup
  - OpenTelemetry (OTel) – CNCF incubating project
- Project Plan Document
  - Document Skeleton and Navigation of document implemented
  - System Architecture – First draft created
  - Currently filling in sections according to our roles (20%)



# Team Evolutio

## Status Report

### Evo Observability Platform

- Client Contact
  - Introductions took place 9/1
  - Weekly meetings established Fridays @ 10:00 A.M. EST
- Team Meetings
  - Triage Meetings Monday @ 5:00 PM
  - Daily Standup within the team
- Current Team Organization
  - Login & Registration UI and functionality – Haoxing
  - Front End Design – Tyler & Max
  - Full Stack Infrastructure – Abhinay & Spandan



# Team Evolutio

## Status Report

### Evo Observability Platform

#### Risks

- Risk 1 – Establishing Pipelines
  - A plethora of new applications will need to be connected
  - Prioritize integrating external applications into our ecosystem
- Risk 2 – Organizing the Data
  - Plenty of information gathered from logs, organization is necessary
  - Create models consistent across the front end & back end
- Risk 3 – Sending SMS/Email/Slack Notification Alerts
  - Sending alerts based on errors found in applications
  - Research APIs and create test accounts to send to one alert system at a time
- Risk 4 - Thresholds for Sending Alerts
  - Initial idea of sending alerts was ML, but data could not be provided, so a new measurement metric had to be introduced.
  - Communication with the client about what they think is a good metric



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**U N I V E R S I T Y**

# Status Report Presentation Application Lifecycle Framework 2.0

## The Capstone Experience

Team GM

Anthony Masini

David Cirenese

Conner Roy

Elio Zoto

Harika Gatla

Department of Computer Science and Engineering

Michigan State University

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# Team GM

## Status Report

[1 of 4]

### Application Lifecycle Framework 2.0

- Sponsor Overview
  - One of the largest automobile manufacturers
  - Produces a wide range of vehicles [compact cars to full-size trucks]
  - Electric and autonomous vehicle development
  - Shift to a more software-focused company
- Project Overview
  - Workflow Management System (streamlines software distribution)
  - Make application applicable for larger variation of teams
  - Database cardinality (request sent to multiple EWT)
  - Incorporate deployment platforms
  - Expand system applicability



# Team GM

## Status Report

[2 of 4]

### Application Lifecycle Framework 2.0

- Server Systems / Software
  - Server rack – Assigned but not started
  - Tomcat Java server – Not started
- Development Systems / Software
  - Java Spring Boot – Last project's group instance running
  - JavaScript Angular – Last project's group instance running and tested features
  - MariaDB – Installed but not configured locally
- Project Plan Document
  - Parts of document and presentation workload assigned
  - Further coordination with GM contact required
  - 10% Complete



# Team GM

## Status Report

[3 of 4]

### Application Lifecycle Framework 2.0

- Client Contact
  - Met twice with the project client
  - Setup weekly meeting every Thursday
- Team Meetings
  - Meet two times a week after class
  - Daily standups via Slack
  - Weekly triage meeting with TM
- Team Organization
  - Backend/database systems – David, Elio, Anthony
  - Frontend development – Conner, Harika
  - Lead Contact - Harika





# Team GM

## Status Report

[4 of 4]

### Application Lifecycle Framework 2.0

#### Risks

- Risk 1
  - Database cardinality – currently 1 to 1, needs to be 1 to many
  - Mitigation: Explore different schema diagrams to determine the best course of action
- Risk 2
  - Managing differing expectations between GM and TM
  - Mitigation: Establish clear communication to GM on recommendations from our TM
- Risk 3
  - Deploy application to a web server
  - Mitigation: Look into Gcloud documentation and deploy a dummy application to a web server
- Risk 4
  - Integrating our code into an existing code base
  - Mitigation: Study the previous team's codebase and documentation



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# Status Report Presentation

## Leveraging OpenAI for Business Analytics

### The Capstone Experience

Team HAP

Evan Bean

Lily Hami

Ziqi Liu

Brendan Murphy

Sukruth Rao

Department of Computer Science and Engineering

Michigan State University

Fall 2023



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# Team HAP

## Status Report

[1 of 4]

### Leveraging OpenAI for Business Analytics

- Sponsor Overview
  - Michigan-based nonprofit health insurance company.
  - Offer numerous health and wellness programs in addition to health insurance plans.
  - Mission: To enhance the health and well being of the lives we touch.
- Project Overview
  - Use ChatGPT to build a call summarization tool to better understand why people are calling HAP.
  - Build a chat function where members can get directed to where they need to go on hap.org and to help potential members pick the best plan for them.
  - Improve site conversion and personalization.
  - Customers and employees benefit.



# Team HAP

## Status Report

[2 of 4]

### Leveraging OpenAI for Business Analytics

- Server Systems / Software
  - Confirm with client if they have a server we need to access.
- Development Systems / Software
  - OpenAI
  - Tested two simple API's utilizing OpenAI
  - GitLab setup, tested, and connected with everyone.
- Project Plan Document
  - Cover Functional Specifications
  - Screen Mockup
  - 25% Complete



# Team HAP

## Status Report

[3 of 4]

### Leveraging OpenAI for Business Analytics

- Client Contact
  - The initial meeting was completed on 9/1.
  - Weekly calls will take place at 10 a.m. on Fridays.
- Team Meetings
  - The initial meeting was completed on 8/30.
  - Weekly team meetings will take place at 4:30 p.m. on Thursdays.
- Team Organization
  - Front end: Lily, Brendan, Ziqi
  - Back end: Sukruth, Evan
  - Point of Contact: Lily



# Team HAP

## Status Report

[4 of 4]

### Leveraging OpenAI for Business Analytics

#### Risks

- Risk 1
  - AI outputs incorrect result.
  - Fine-tune the model and thoroughly test different input cases into OpenAI.
- Risk 2
  - Maintaining Protected Health Information (PHI) compliance since a feature we are implementing will process call transcripts.
  - Communicate with client on the best way to navigate this. Potentially use AI-generated call transcripts for testing to protect patient privacy.
- Risk 3
  - Financial constraints with using OpenAI's API since it requires the user to purchase tokens to be able to integrate the API into our web application.
  - Discuss with client to understand what they are willing to invest.
- Risk 4
  - Reliance on a third-party API for the main functionality of the web application we are building.
  - When building our application, we'll provide a default response or redirect the user to an alternative resource in the case that OpenAI's services are unavailable.



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**U N I V E R S I T Y**

# Status Report Presentation

## Global Business Services Process Intelligence

### The Capstone Experience

#### Team Kellogg's

Agust Brandinger

Kimberly Jackson

Claire LaValley

Jingqiao Li

Luke Montgomery

Department of Computer Science and Engineering

Michigan State University

Fall 2023



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# Team Kellogg's

## Status Report

[1 of 4]

### Global Business Services Process Intelligence

- Sponsor Overview
  - Large scale food manufacturing company headquartered in Battle Creek, MI
  - Kellogg's owns various name brand products such as: Pringles, Cheez-It, and Pop-tart's
  - Company vision: A good and just world where people are not just fed but fulfilled
- Project Overview
  - Create a streamlined process that standardizes and automates the OSD (overages, shortages, and damages) return process
  - Serve both employees and customers through an internal application to ensure a user-friendly experience
  - Reduce manual data entry for customers, improve accuracy and efficiency, and increase visibility on the status of returns
  - Users will be able to submit return forms, review claims statuses, notify proper administrators for approvals, approve claims within the system, and utilize filters for claim prioritization





# Team Kellogg's

## Status Report

[3 of 4]

### Global Business Services Process Intelligence

- Client Contact
  - 2 client meetings (9/1 & 9/8)
  - Signed NDAs & IPAs
  - Weekly Meeting: Friday 11:45AM EST
- Team Meetings
  - 5 team meetings to date
  - Thursday after class in EGR LAB
  - Tuesday at 7:30 PM in STEM
  - After Client Meetings
  - Set up iMacs
- Team Organization
  - Kimberly – Company Contact / Front End , Jingqiao – Back End
  - Agust - Back End, Luke – Database Manager, Claire - Front End



# Team Kellogg's

## Status Report

[2 of 4]

### Global Business Services Process Intelligence

- Server Systems / Software
  - AWS Server - waiting for permission
  - SQL – anticipated database
  - GitLab repo created – waiting on starter code
- Development Systems / Software
  - Microsoft Office 365 - installed
  - Microsoft Power Apps – basic app created
  - Microsoft Power BI - installed
  - Microsoft Power Automate - installed
- Project Plan Document
  - Skeleton created
  - Wireframes in progress
  - 10% Complete



# Team Kellogg's

## Status Report

[4 of 4]

### Global Business Services Process Intelligence Risks

- Integrating data into Kellogg's AWS Server
  - Ensure that user input data matches internal systems/databases
  - Extract the correct data from the database to feed it into proper input fields within Forms
- Displaying relevant and accurate data in PowerBI
  - Display analytics and pertinent information about each return
  - Integrate PowerApps/Power Automate with PowerBI
- Developing different views for various users
  - Show the appropriate view for customers, managers, and processors
  - Define specific permissions for the different roles and approval processes



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**U N I V E R S I T Y**

# Status Report Presentation

## Infinity Gauntlet

### The Capstone Experience

Team Kohl's

Andrew Gardner

Gary M. Service

John Foss

Kaiwen Jiang

Srikar Kante

Department of Computer Science and Engineering  
Michigan State University

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# Team Kohl's

## Status Report

[1 of 4]

### Infinity Gauntlet

- Sponsor Overview
  - Kohl's is the largest department store chain in the United States, with 1,165 locations
  - Kohl's also has a large e-commerce presence, where they are expanding their online capabilities more
- Project Overview
  - Our project, entitled the "Infinity Gauntlet" is a new capability for Kohl's. Instead of bringing together the infinity stones, it will bring together multiple cloud providers into one framework
  - This project will solve the issue of having many different cloud providers that are slightly different, and allow the users to more easily create a platform to have them all work together
  - Our users will be internal developers at Kohl's, who use our system as a part of their own developments



# Team Kohl's Status Report

[2 of 4]

## Infinity Gauntlet

- Server Systems / Software
  - Google Cloud Platform – Set-up complete, all team members joined
  - Amazon Web Services – Set-up complete, basic connection to Terraform made
  - Other cloud service providers, such as Microsoft Azure will be worked on once basic implementation of others are complete
- Development Systems / Software
  - Backstage – Installed, initial set-up complete, testing project launched
  - Terraform – Installed, initial set-up complete, testing project launched
  - Docker – Installed, basic project launched through Terraform
  - GitLab – Set-up complete, all team members joined
- Project Plan Document
  - Basics of slides started
  - Document has been started, executive summary complete, skeleton written for rest
  - 10% Complete



# Team Kohl's

## Status Report

[3 of 4]

### Infinity Gauntlet

- Client Contact
  - We have met with our clients, and discussed basics of project and what potential risks or challenges we may encounter
  - We have also established future weekly meetings with clients
  - Our clients are in Wisconsin, so all meetings for the time being will be online
- Team Meetings
  - Our team has met a total of 6 times now, three times online and three times in person
  - We have weekly meetings, Triage meetings, and the client meetings all scheduled
- Team Organization
  - Andrew – Client Contact
  - Gary – Project Manager
  - John – Backstage Developer
  - Kaiwen – Terraform Developer
  - Srikar – System Administrator



# Team Kohl's

## Status Report

[4 of 4]

### Infinity Gauntlet

#### Risks

- Risk 1
  - Terraform may not be able to integrate all cloud platform providers that Kohl's may use
  - Find alternatives to Terraform, or how other platforms may be able to be integrated into our application
- Risk 2
  - Terraform and Backstage may not perfectly integrate with one another
  - Develop our own layer to go between the two, and can communicate between both platforms
- Risk 3
  - Will we be able to ship our solution to the teams at Kohl's for use if most of what we make is configurations and setup files
  - Creating some kind of system for us to test and develop our code on our own, shipping across our machines





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**U N I V E R S I T Y**

# Status Report Presentation

SmartSat™ Heterogeneous Computing in Space

The Capstone Experience

Team Lockheed Martin Space

Gorman, Thomas

Kurkowski, Jacob

Langer, Nolan

Mondol, Shawn

Pargan, Bilal

Department of Computer Science and Engineering

Michigan State University

Fall 2023



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

# Team Lockheed Martin Space

## Status Report

[1 of 4]

### SmartSat™ Heterogeneous Computing in Space

- Sponsor Overview

- The world's largest military contractor
- Headquarters in Bethesda, Maryland
- Designing, building and testing space exploration capabilities



- Project Overview

- Allow many applications to run on various satellites
- Develop hardware accelerators to enable device access
- Create a unified execution platform



# Team Lockheed Martin Space

## Status Report

[2 of 4]

### SmartSat™ Heterogeneous Computing in Space

- Server Systems / Software
  - ZCU102 Xilinx board, up and running
  - Linux server, in progress
  - Udo Bolt, up and running
- Development Systems / Software
  - PetaLinux installed
  - VITIS installed
  - SYCL
- Project Plan Document
  - 14% Complete



# Team Lockheed Martin Space

## Status Report

[3 of 4]

### SmartSat™ Heterogeneous Computing in Space

- Client Contact
  - Only 1 meeting so far
  - Weekly meetings on Tuesdays
- Team Meetings
  - 6 team meetings
  - Regular meetings after class
- Team Organization
  - Accelerator Manager(Bilal and Thomas)-1%-pending source code
  - Accelerators(Jacob and Nolan)-1%-pending client specification
  - Xilinx Runtime Loader Library(Shawn)-1%



# Team Lockheed Martin Space

## Status Report

[4 of 4]

### SmartSat™ Heterogeneous Computing in Space

#### Risks

- Embedded System Development
  - No team members have ever developed software for a hardware system
  - Read XILINX (board) documentation, YouTube, sponsor resources
- Hardware Accelerator
  - Lack of experience with heterogeneous systems
  - Read VITIS and SYCL documentation, accelerator algorithm research
- Testing
  - No effective testing methods currently known
  - Plan alternative means of testing embedded systems using the py.test framework
- NDA
  - Blocks access to getting help from sponsor sources
  - Maintain communication with our sponsor



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**UNIVERSITY**

# Status Report: Composable 3D Model for a Manufacturing Plant

## The Capstone Experience

Team Magna

Alex Grundy

Ben Zuke

Josiah Klann

Sid Amarnath

Viktor Filipovich

Department of Computer Science and Engineering  
Michigan State University

Fall 2023



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...to Professionals*

# Team Magna

## Status Report

[1 of 4]

### Composable 3D Model of Manufacturing Plant

- Sponsor Overview
  - Magna is a automotive supplier.
  - Based out of Ontario, Canada.
  - Our sponsors are a part of the New Mobility Division in Magna.
  - Has over 350 factories internationally.
- Project Overview
  - Magna wants a digital twin to model their factory.
  - Magna is going to rearrange their factories so need the ability to change the digital twin when needed.
  - They will use it to help a new robot move about the factory floor and determine where the objects are it needs.



# Team Magna

## Status Report

[2 of 4]

### Composable 3D Model of Manufacturing Plant

- Server Systems / Software
  - Magna is hosting the project on an Amazon EKS Cluster
  - Our sponsor has told us not to worry about hosting and just get visualization for now
  - For start of development we'll run it locally
- Development Systems / Software
  - Will be utilizing Cesium for 3D rendering.
  - Will be using GeoJson or CZML for object locations.
  - Gestaltor and blender will be used to create and edit objects.
- Project Plan Document
  - Still Researching our tools required, starting a rough outline
  - Magna has rough idea of what they want luckily
  - 5% Complete (We need to meet with Magna for further specifications)





# Team Magna

## Status Report

[3 of 4]

### Composable 3D Model of Manufacturing Plant

- Client Contact
  - We have had our introductory meeting with Magna and met our main contacts – weekly meetings on Friday mornings
  - Identified our first task to be focused primarily on designing and displaying the factory space
- Team Meetings
  - Laid the foundation for what potential steps we will need to complete for our first task
  - We've met 6 times so far – planned to meet regularly on Tuesdays and Thursdays
- Team Organization
  - Decided for each of us to tackle an individual attempt at designing and displaying in 3D using the resources we're working with.
  - Viktor is the primary client contact



# Team Magna

## Status Report

[4 of 4]

### Composable 3D Model of Manufacturing Plant Risks

- Using 3D Objects
  - The team has a lack of experience using 3D objects in designing and implementing them within our code
  - Anyone involved with the objects will begin researching now to prevent future pain, this includes using Bevy engine, Blender, and Cesium
- Converting JSON to 3D Models
  - Magna wants the data of the factory to be represented as a large JSON structure
  - Currently we don't know how to do that, will require research
- Scope Creep of the visualization
  - Magna hasn't been clear if they just want a visualization of the factory or more
  - Solidifying our project requirements with stakeholders at Magna



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**U N I V E R S I T Y**

# Status Report Presentation

## Enhanced Shopping Experience Using AI

### The Capstone Experience

Team Meijer

Matthew Crandall

Zachary Gage

Chirag Rudrangi

Cameron Schwartz

Tatiana Voegerl

Department of Computer Science and Engineering  
Michigan State University

Fall 2023



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# Team Meijer

## Status Report

[1 of 4]

### Enhanced Shopping Experience Using AI

- Sponsor Overview
  - General merchandise supercenter chain
  - Founded in 1934 in Greenville, MI
  - Credited with pioneering the modern supercenter
- Project Overview
  - Recipe recommendations for Meijer.com customers
  - Customers choose a recipe and ingredients are automatically added to their order
  - Customers will spend less time shopping
  - Meijer will gain additional information about customers' preferences



# Team Meijer

## Status Report

[2 of 4]

### Enhanced Shopping Experience Using AI

- Server Systems / Software
  - Currently setting up a Microsoft Azure SQL database
  - Requires a payment method for computation/storage
  - Awaiting approval from our contact at Meijer
- Development Systems / Software
  - Web Framework – Microsoft Blazor or NextJS
  - Data Visualization – Microsoft Power BI (Untested)
- Project Plan Document
  - Outline
  - ~5% Complete



# Team Meijer

## Status Report

[3 of 4]

### Enhanced Shopping Experience Using AI

- Client Contact
  - Regular contact via email
  - Weekly conference calls on Fridays at 2:00 PM
  - 2 meetings so far
- Team Meetings
  - Regular contact via text, Teams, & Trello (project management)
  - Weekly meetings after Triage (Mondays at ~5:10 PM)
  - 2 official meetings so far
- Team Organization
  - Frontend: Cameron
    - 3 working basic front-end applications
  - Backend: Matthew, Zachary
    - Setting up Azure SQL database
  - Both/Misc.: Chirag, Tatiana



# Team Meijer

## Status Report

[4 of 4]

### Enhanced Shopping Experience Using AI Risks

- Customer recipe recommendations
  - Identify which recipes we think the customer would like
  - Test different AI models with prompts and responses
- Limited experience with AI
  - Limited knowledge of AI could limit potential options
  - Demo a model using sample data from database online, etc.
- Blazor vs Next
  - Each option provides its own benefits and restrictions
  - Develop demo applications to familiarize with restrictions (ex: Power BI)
- Database management
  - Integrating Azure SQL database into system architecture
  - Create a demo to read, write, and store data



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**UNIVERSITY**

# Status Report Presentation

## A Browser-Based UML Editor

The Capstone Experience

Team Michigan State University CSE

Blake Bement

Ryan Chang

Bella Ciagne

Jacob Rutkowski

Will Wilson

Department of Computer Science and Engineering

Michigan State University

Fall 2023



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# Team Michigan State University CSE

## Status Report

[1 of 4]

### clUML: A Browser-Based UML Editor

- Sponsor Overview
  - CSE program here at MSU
  - Designs custom interactive lessons/programs to facilitate student learning
  - Program ranked 79th nationally by [Niche.com](https://niche.com)
- Project Overview
  - An easy-to-use web-based UML editor
  - To be used by MSU computer science students
  - Embedded in CourseLib - based websites
  - Used in quizzes, assignments, and diagram examples



# Team Michigan State University CSE

## Status Report

[2 of 4]

### clUML: A Browser-Based UML Editor

- Server Systems / Software
  - Utilized IDE to automatically deploy local server for testing
- Development Systems / Software
  - Installed and tested IDE for use in project
  - Installed and tested package manager for use in project
  - Tested ability to build and deploy project on each team member's machines
  - Imported existing code from CirSim, a related project
  - Basic UI and UI functionality implemented
- Project Plan Document
  - Discussed general project plan layout
  - Started working on screen mockups
  - Template for the document
  - 15.418% Complete



# Team Michigan State University CSE

## Status Report

[3 of 4]

### clUML: A Browser-Based UML Editor

- Client Contact
  - Set up weekly in-person meeting with client on Thursdays
  - Met with client two times
- Team Meetings
  - Set up team meeting on Tuesdays, right before the Triage
  - Set up additional meeting time on Sunday
- Team Organization
  - Designated Will as client contact
  - Designated Jacob as team leader to organize meetings and keep everyone on task
  - Everybody on the team contributes technically to the project as a developer



# Team Michigan State University CSE

## Status Report

[4 of 4]

### clUML: A Browser-Based UML Editor

#### Risks

- Undo Button
  - What information needs to be cached to enable the undo feature?
  - Investigate CirSim code to determine how undo was implemented
- Touch Screen Support
  - How to enable support for touch screen devices?
  - Read JavaScript documentation on how to handle different touch events
- Association Implementation
  - How to implement Associations between Classes?
  - Brainstorm different implementations of Associations and present to client
- Sanity Check
  - What common mistakes do users make when creating UML?
  - Consult our client about common user errors in writing UML



**MICHIGAN STATE**  

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**U N I V E R S I T Y**

# Status Report Presentation

## Small Object Detection Using CCTV Cameras

### The Capstone Experience

Team Moii

Nathan Srivastava

Angela Majestic

Hong Zhuang

Khushi Vora

Ian Valdovinos

Department of Computer Science and Engineering  
Michigan State University

Fall 2023



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...to Professionals*

# Team Moii

## Status Report

[1 of 4]

### Small Object Detection Using CCTV Cameras

- Sponsor Overview
  - International Software Company
  - Uses CCTV with AI/ML to track customer behavior
  - Real time analytics to inform business decisions
- Project Overview
  - Gun Detection Software using small object detection
  - Notify stakeholders in real time if the threat detected
  - Make the world a safer place
  - Warehouse, business, condos, etc.
    - Increase security
    - Alert business owners, employees, and residents to threats



# Team Moii

## Status Report

[2 of 4]

### Small Object Detection Using CCTV Cameras

- Server Systems / Software
  - Google Cloud Platform - Pending
  - Docker - Pending
  - Lambda Cloud - Pending
- Development Systems / Software
  - PyTorch (ML)
  - Sahi & YOLOv8
  - VS Code
- Project Plan Document
  - Specs & System Architecture – Complete
  - Front-end Component - Pending
  - 10-15% Complete



# Team Moii

## Status Report

[3 of 4]

### Small Object Detection Using CCTV Cameras

- Client Contact
  - 2 Zoom Meetings (Client in Germany & India)
  - Signed NDAs/IPAs
  - Weekly Conference Call – Thursdays at 8 AM
- Team Meetings
  - 6 Meetings
  - Weekly Sprint Planning – Tuesdays 4:30 PM
- Team Organization
  - Ian & Hong - ML
  - Nathan & Khushi – Backend
  - Angela - Frontend





# Team Moii

## Status Report

[4 of 4]

### Small Object Detection Using CCTV Cameras

#### Risks

- Small Object Detection
  - Operability: Hard to detect smaller objects
  - Mitigation: Sahi – designed for small object detection
- Scarce Training Data
  - Operability: Gun Footage is rare
  - Mitigation: Looking for open-source data for training/testing
- Long ML Training Time
  - Scalability: ML Training requires compute resources
  - Mitigation: Using lambda Cloud (Vertex AI) to increase efficiency
- Model Accuracy and Speed
  - Scalability: Balance between model accuracy and efficiency
  - Mitigation: Sahi and YOLOv8



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**U N I V E R S I T Y**

# Status Report Presentation

## Digital Banking Car App

### The Capstone Experience

Team MSUFCU

Makayla Allen

Danny Buglak

Senan Haque

Gavin Mraz

Lucas Nogueira Pires

Department of Computer Science and Engineering

Michigan State University

Fall 2023



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# Team MSUFCU

## Status Report

[1 of 4]

### Digital Banking Car App

- Sponsor Overview
  - American credit union
  - Headquarters in East Lansing, MI
  - Over \$7.28 billion in assets and over 330,000 members
- Project Overview
  - Develop a proof of concept for a digital banking app
  - Use voice controls for banking operations
  - Explore voice-enabled features
  - Investigate integration of a large language model
  - Developing for MSUFCU customer use inside vehicles



# Team MSUFCU

## Status Report

[2 of 4]

### Digital Banking Car App

- Server Systems / Software
  - Installed VMWare Fusion
  - Creating mock data for customer information
  - Familiarizing with CarPlay and Android Auto emulators
  - Creating a simple php database to serve as a backend
- Development Systems / Software
  - Familiarizing with necessary programming languages and IDEs
  - Set up Gitlab and requested access for sponsors
  - Gaining access to MSUFCU's sandbox chatbot environment
- Project Plan Document
  - Creating a rough high-level document
  - Rough draft of executive summary created
  - 15% Complete



# Team MSUFCU

## Status Report

[3 of 4]

### Digital Banking Car App

- Client Contact
  - Weekly Teams meeting on Fridays at 2 PM
  - Gaining access to each other's systems
- Team Meetings
  - Weekly in person team meetings on Wednesdays at 7 PM
  - Go over Jira board cards
- Team Organization
  - Set up a Jira board to track progress
  - Communicating through Discord and Teams



# Team MSUFCU

## Status Report

[4 of 4]

### Digital Banking Car App

#### Risks

- Security
  - Ensure secure and simple access to the application for users inside of vehicles
  - Working with MSUFCU for a solution and plan to test different ideas
- Database Logistics
  - Backend database for customer information set-up
  - Researching database systems and implementing within IDE
- MSUFCU APIs
  - Restricted access to currently used APIs within MSUFCU mobile application
  - Communicating with MSUFCU to gain access
- User Safety
  - Ensuring simplicity of application for safe use within a vehicle
  - Researching current CarPlay/Android Auto applications for ideas and inspiration
- Emulators
  - Unable to utilize CarPlay emulator without requesting access through Apple Developer Account
  - Communicating with MSUFCU to find a way to do it without the emulator, either through Android Auto or hardcoding the dimensions of a generic CarPlay screen
- Voice Commands
  - No experience implementing code that uses voice commands
  - Research topics for how to implement in the respective languages as well as utilize MSUFCU's boost.ai to assist



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**U N I V E R S I T Y**

# Status Report Presentation

## Predictive Claims Scoring

### The Capstone Experience

Team Roosevelt Innovations Data Science

Anna Catenacci

Ayeza Imtiaz

Nicole Kuang

Jp Walsh

Yilong Xie

Department of Computer Science and Engineering

Michigan State University

Spring 2023



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...to Professionals*

# Team Roosevelt Innovations Data Science

## Status Report

[1 of 4]

### Predictive Claims Scoring

- Sponsor Overview
  - Headquartered in Okemos, MI
  - Subsidiary of Delta Dental
  - Develop software to streamline insurance operations
- Project Overview
  - Create machine learning model
  - Predict when claims should be investigated
  - Simulate ML model results with sample input data
  - Design a dashboard with real-time views of model effectiveness
  - Develop web app to display dashboard





# Team Roosevelt Innovations Data Science

## Status Report

[2 of 4]

### Predictive Claims Scoring

- Server Systems / Software
  - Fast API is installed
  - Snowflake is set up
- Development Systems / Software
  - GitLab is set up
  - Tableau is runnable with sample Kaggle data
  - Pytorch and Scikit-learn are usable in GitLab
- Project Plan Document
  - Skeleton started
  - 5% Complete



# Team Roosevelt Innovations Data Science

## Status Report

[3 of 4]

### Predictive Claims Scoring

- Client Contact
  - Met with all clients and data scientists
  - Weekly client meetings 9:30 to 10:30 AM on Fridays
- Team Meetings
  - Triage meetings at 5:40 PM on Tuesday
  - Team meetings at 4:30 PM on Tuesday, Thursday
- Team Organization
  - Data visualization: Jp Walsh, Ayeza Imtiaz
  - Python Machine Learning: Yilong Xie, Nicole Kuang, Anna Catenacci



# Team Roosevelt Innovations Data Science

## Status Report

[4 of 4]

### Predictive Claims Scoring

#### Risks

- Machine Learning
  - Sponsor wants classification ML model
  - Regression models may be more fitting
  - Mitigation: Communicate with sponsor, try both models
- Tableau
  - No Tableau experience
  - Mitigation: Research, create visualizations with sample data
- Dashboard integration into web app
  - Show and run the dashboard on the final web app
  - Mitigation: Tableau has web app integration
- FastAPI
  - Which APIs should we use? Do we need an SDK?
  - Mitigation: Ask client in weekly meetings once they have data available for us



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**U N I V E R S I T Y**

# Status Report Presentation

## Universal Guided Web Editor

### The Capstone Experience

Team Roosevelt Innovations Knowledge Science

Ryan Dukovich

Joseph Finnegan

Eunhye Park

Michael Schmauderer

Joey Vesche

Department of Computer Science and Engineering

Michigan State University

Fall 2023



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

# Team Roosevelt Innovations Knowledge Science

## Status Report

[1 of 4]

### Universal Guided Web Editor

- Sponsor Overview
  - Subsidiary of Delta Dental
  - Deliver simple, smart automation for businesses
  - Allows businesses to focus on growth and its customers
- Project Overview
  - Business Rule Management System (BRMS)
  - Create intuitive, non-technical online rule editor
  - Develop, test, deploy, and maintain business logic



# Team Roosevelt Innovations Knowledge Science

## Status Report

[2 of 4]

### Universal Guided Web Editor

- Server Systems / Software
  - GitLab
- Development Systems / Software
  - ANTLR
  - Angular
  - Bootstrap 4
- Project Plan Document
  - Project specifications
  - 20% Complete



# Team Roosevelt Innovations Knowledge Science

## Status Report

[3 of 4]

### Universal Guided Web Editor

- Client Contact
  - Weekly conference call @ Thursday, 1pm
  - Updates via email
- Team Meetings
  - Weekly team meeting @ Monday, 5pm
  - Communications via Slack, iMessage
- Team Organization
  - Client Contact Point : Ryan Dukovich
  - Program Manager : Eunhye Park
  - Front End Developer : Michael Schmauderer, Joey Vesche, Eunhye Park
  - Back End Developer : Joseph Finnegan, Ryan Dukovich
  - Tester : Joey Vesche



### Universal Guided Web Editor

#### Risks

- Going from language processing to displayable format
  - Not a standard translation of a programming language from one source language to one target language.
  - The data structure might get very messy, needing to be able to handle various sub-rules. Correct translation from Java to JS will be needed.
- Adjustment to different input format
  - The website should be able to support any potential language specification that may come into the framework, where syntax/structure may look different depending on the business rule.
  - Work with client to gather information on blueprint of input and investigate different types of input and how each gets displayed on the authoring page.
- Integration to existing Roosevelt web
  - The end product needs to be developed and integrated into an already existing website for smooth user experience.
  - Work with client to have solid understanding of how desktop application will be integrated into the final project.





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**U N I V E R S I T Y**

# Status Report Presentation

## RPM AI-Based Chat Service

### The Capstone Experience

Team RPM

Ishak Ahmed

Leeann Alsaeed

Roshan Atluri

Andrew Dagostino

Ulas Kaygisiz

Department of Computer Science and Engineering  
Michigan State University

Fall 2023



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# Team RPM

## Status Report

[1 of 4]

### AI-Based Chat Service

- Sponsor Overview
  - RPM is an international logistics and supply chain solutions company
  - Routes and schedules drivers
  - They don't own or operate drivers or packages, they act as the "middle man"
- Project Overview
  - Create a multi-platform chatbot that can respond to plain English questions without need of a 24/7 package representative.
  - Be able to seamlessly transition drivers from chatbot to representative.
  - Be able to be flexible enough to answer driver prompts no matter how the driver asks the question.
    - ("What is the package number?" Vs "p#?")



# Team RPM

## Status Report

[2 of 4]

### AI-Based Chat Service

- Server Systems / Software
  - Gained access to RPM GitHub Repository.
  - Gained access to RPM's third-party database: Turvo
  - Call rep contact (pending)
  - Call transcripts (pending)
- Development Systems / Software
  - RPM utilizes Microsoft backend, .NET
  - ChatGPT
  - myRPM
  - Turvo
- Project Plan Document
  - Start utilizing RPM backend database
  - Incorporate GPT API
  - Created a skeleton document
  - 5% Complete



# Team RPM

## Status Report

[3 of 4]

### AI-Based Chat Service

- Client Contact
  - Had initial meeting, decided our regular meeting times with the Director Product Manager and Senior Software Engineer
  - Got a list of initial functionality requirements
  - Established meeting schedule: Every Tuesday and Thursday at 5 PM through Microsoft Teams
- Team Organization
  - Project-Lead, Scribe, Client Contact, Project Coordinator, Technical Lead
  - Pre-Meeting Questions
  - Quick recap of what we have done since last meeting



# Team RPM

## Status Report

[4 of 4]

### AI-Based Chat Service

#### Risks

- Learn .NET C# and deploy a local .NET API
  - A local .NET API framework will be used to test and design our service and it should be accessible between multiple people
  - Follow Microsoft's "Learn .NET" course and deploy test Web and Phone apps
- Incorporating GPT API and keeping the chat focused
  - Open AI API will be the main tool to support the app and it should not respond to irrelevant questions
  - Read OpenAI's fine-tuning documentation, example chatbots, and other resources offered
- Translating English to database query
  - Look into open-source tools and research "Text-To-SQL" methods
- Making a multi-platform service
  - RPM wants a service that could be ported into a phone or web app
  - Create a front-end that could be easily adapted to a phone or a computer



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**U N I V E R S I T Y**

# Status Report Presentation

## Electronic Data Interchange (EDI) Monitoring

### The Capstone Experience

Team Stryker

Ben Gibbons

Ravi Grewal

Nathan Kowalski

Tyson Lance

Charles Talaga

Department of Computer Science and Engineering  
Michigan State University

Fall 2023



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...to Professionals*

# Team Stryker

## Status Report

[1 of 4]

### Electronic Data Interchange (EDI) Monitoring

- Sponsor Overview
  - Stryker Corporation supplies implants, surgical equipment, and innovative medical products directly to doctors, hospitals, and other healthcare facilities
  - Quickly growing and expanding – a serial acquisitions company
  - Products sold in over 100 countries through subsidiaries and third-party partners
- Project Overview
  - Capture (with help from sponsor) and model sample EDI transaction data from source to destination systems
  - Focus on displaying unexpected changes in EDI transaction status
  - Develop a periodic, customizable reporting mechanism to send data to stakeholders
  - Create a web interface to visualize results and transaction payloads



# Team Stryker

## Status Report

[2 of 4]

### Electronic Data Interchange (EDI) Monitoring

- Server Systems / Software
  - Windows VM up and running
  - Stryker provided us set of Windows credentials and access to an Azure SQL Server instance
- Development Systems / Software
  - Azure data solutions currently being configured
  - Introduced to Azure DevOps for project management by sponsor
  - GitLab for versioning/collaboration has been tested & configured
- Project Plan Document
  - Document template is created
  - We have outlined functional specifications, gathered a large portion of our technical requirements, and started mocking a UI prototype
  - 40% Complete





# Team Stryker

## Status Report

[3 of 4]

### Electronic Data Interchange (EDI) Monitoring

- Client Contact
  - Meetings to date: Friday (9/1), Tuesday (9/5), Friday (9/8), Monday (9/11)
  - Meeting both Mondays and Thursdays for requirement gathering
    - Re-occurring meetings scheduled for Fridays at 10am EST to ask general questions and check-in on progress with client
- Team Meetings
  - Meetings scheduled for Tuesdays and Thursdays after class
  - Team meetings to date: Wednesday (8/30), Tuesday (9/5), Thursday (9/7), Friday (9/8), Monday (9/11)
- Team Organization
  - Overall, even skillset amongst team members
  - Ben – client-communicator
  - Nathan and Tyson – front-end focused
  - Ravi, Charles, and Ben – back-end focused



# Team Stryker

## Status Report

[4 of 4]

### Electronic Data Interchange (EDI) Monitoring

#### Risks

- Designing UI elements for tables and graphs
  - Client wants the user to be able to view transaction data in table form, graph form, and summarize the data using various visualizations
  - Mitigation: Utilize dynamic data visualization framework. First, try embedding PowerBI and pulling data from SQL server. Otherwise, look for open-source solutions.
- Database schema for storing EDI data
  - We must create a robust schema to effectively store the EDI data. This schema must be scalable to other types of transactions in the future.
  - Mitigation: Explore and analyze sample data given by sponsor to extrapolate an appropriate schema
- Optimizing searching, filtering, and displaying large amounts of data
  - Client requires a lightweight and fast implementation for traversing the database. For a large database, this may take specific algorithms to provide required latency.
  - Mitigation: Experiment with different algorithms (e.g. distributed computing frameworks) and hardware specifications (e.g. server compute power). Additionally, we can optimize data retrieval queries (SQL).
- Generate & send periodic analytic reports
  - Client requests that users have the ability to define reports and periodically send them via email
  - Mitigation: Provide the analyst a mechanism to create saved SQL queries which generate reports at set intervals



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# Status Report Presentation

## ACE: Automated Content Editor

### The Capstone Experience

Team TechSmith

Joe Baran  
Emily Feuer  
Justin Masters  
Gabriel Sotelo  
Riley Tucker

Department of Computer Science and Engineering  
Michigan State University

Fall 2023



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

# Team TechSmith

## Status Report

[1 of 4]

### ACE: Automated Content Editor

- Sponsor Overview
  - TechSmith is an East Lansing based software company
  - The creators of Camtasia, a screen recorder + video editor
  - The creators of Snagit, a better version of the snipping tool
- Project Overview
  - Uses AI to edit user-provided content into cohesive videos
  - Users provide text-based description of desired outcome
  - Enables easy and fast editing of video content
  - Those without content creation experience can create engaging videos from raw media



# Team TechSmith

## Status Report

[2 of 4]

### ACE: Automated Content Editor

- Server Systems / Software
  - Azure Web Services (app hosting) – *Added to Azure subscription, some permissions still need to be granted*
  - Azure Blob Storage (storage solution)
  - Flask (Python): API framework – *Simple endpoint to talk with frontend set up*
- Development Systems / Software
  - React (Typescript): frontend framework and language – *Starter project set up*
  - FFmpeg: video editing and processing - *Exploration*
  - OpenAI API: NLP tasks - *Exploration*
  - Docker: containerization – *Docker container for our frontend + backend set up*
- Project Plan Document
  - Built document skeleton and roles assigned
  - Began working on our respective sections
  - 15% complete



# Team TechSmith

## Status Report

[3 of 4]

### ACE: Automated Content Editor

- Client Contact
  - Weekly Meetings with 2 TechSmith Software Engineers Thursdays @ 1pm
  - 3rd meeting on 9/14.
  - Discussions have included some functional specifications as well as technical constraints (Azure/AI API key).
- Team Meetings
  - Weekly In-person meetings at Capstone Lab following client meetings
- Team Organization
  - Gabriel – Back end (database/AI), Team Manager
  - Justin – Back end (video editing), Client Contact
  - Joe – Front End (API endpoints)
  - Emily – Front End
  - Riley – Environment (temp.), attempting to streamline development



# Team TechSmith

## Status Report

[4 of 4]

### ACE: Automated Content Editor

#### Risks

- Risk 1
  - ChatGPT might be inferior to other chatbots when used to edit videos
  - Test alternative natural language processors with our editor
- Risk 2
  - Editing the video on the backend is too costly on the server
  - Monitor server resource usage and avoid excessive batch jobs
- Risk 3
  - Python FFmpeg libraries may have limitations on transitions
  - Manually implement functions
- Risk 4
  - Delay between production and deployment causes disparity among branches
  - Weekly deployment cycle



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**U N I V E R S I T Y**

# Status Report Presentation

## Railroad Switch Alignment Training

### The Capstone Experience

Team Union Pacific

Eli McArdle

Farhan Parekh

Joe Potila

Ethan Potvin

Elia Spyrtos

Department of Computer Science and Engineering  
Michigan State University

Fall 2023



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# Team Union Pacific

## Status Report

[1 of 4]

### Railroad Switch Alignment Training

- Sponsor Overview
  - The Union Pacific Railroad system is the biggest in the United States.
  - Over 32,100 route-miles in 23 U.S. states west of Chicago.
  - As of 2022, Union Pacific Railroad recorded a \$147.23B U.S dollars market evaluation
- Project Overview
  - Web learning app designed to aid in identifying railroad switches in a real-time setting
  - Unity WebGL project exported as a SCORM package to be used in a learning management system
  - Designed to be used by train conductors
  - Records and reports training progress



# Team Union Pacific

## Status Report

[2 of 4]

### Railroad Switch Alignment Training

- Server Systems / Software
  - Will be interfaced in Union Pacific's in-house LMS
- Development Systems / Software
  - Unity 3D
  - SCORM
  - WebGL
- Project Plan Document
  - Skeleton of document done
  - Drafts of overviews done
  - 15% Complete



# Team Union Pacific

## Status Report

[3 of 4]

### Railroad Switch Alignment Training

- Client Contact
  - Met twice with client
  - Weekly meetings planned Fridays at 1pm
- Team Meetings
  - Met four times with team
  - Weekly meetings planned Fridays at 12pm
- Team Organization
  - SCORM interaction – Joe, Ethan
  - Unity 3D – Eli, Farhan, Elia



# Team Union Pacific

## Status Report

[4 of 4]

### Railroad Switch Alignment Training Risks

- Risk 1
  - Interaction between Unity and SCORM
  - Work with client's github repository
- Risk 2
  - Video embedding in Unity
  - Initial stock video to make sure it works
- Risk 3
  - Import/export videos modularity
  - Tool to make prefab to take videos



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**U N I V E R S I T Y**

# Status Report Presentation

## Audit Automation Tool

### The Capstone Experience

#### Team United Airlines Quality Assurance

Shafkat Kabir

Adam Collier

Emily Goldwater

Tejas Singhal

Haoyun Wu

Department of Computer Science and Engineering

Michigan State University

Fall 2023



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# Team United Airlines Quality Assurance

## Status Report

[1 of 4]

### Audit Automation Tool

- United Airlines Overview

- United Airlines has the most comprehensive route network and most fuel-efficient fleet among North American carriers
- They fly to hundreds of destinations across the world, with thousands of daily departures
- They employ over 70,000 people

- Project Overview

- Automate auditing process for United Airlines
- By creating a machine learning model to compare FAA and United Airlines regulations to vendor servicing manuals
- Showcase missing standards not found in the vendor manuals to streamline auditing process
- Hence, reduce manpower required for auditing



# Team United Airlines Quality Assurance Status Report

[2 of 4]

## Audit Automation Tool

- Server Systems / Software
  - AWS
  - AWS SageMaker
- Development Systems / Software
  - Python
    - Pandas
    - pyTorch
    - NLTK for pre-processing
    - Flask
  - React
- Project Plan Document
  - Table of content page started and clickable
  - Executive summary, functional/design/technological specifications mainly complete
  - 5% Complete



# Team United Airlines Quality Assurance

## Status Report

[3 of 4]

### Audit Automation Tool

- Client Contact
  - They are a part of the maintenance group which conduct audits to make sure that repairs are done correctly
  - For the first few weeks, we will be meeting biweekly
    - **Monday 4:45pm** – *permanent meeting time*
    - Friday 10:30am
- Team Meetings
  - Monday 5:00pm
  - Friday 11:00am
  - Status update meetings after classes
- Team Organization
  - Frontend – Haoyun, Adam, Tejas
  - Backend – Shafkat, Emily, Tejas





# Team United Airlines Quality Assurance

## Status Report

[4 of 4]

### Audit Automation Tool

#### Risks

- Risk 1
  - Creating an efficient backend as the application uses big data
  - Effectively preprocess the data, eliminating irrelevant data from the training set to decrease processing time and space
    - E.g., Addresses, names, titles, etc.
- Risk 2
  - Understanding what noise to filter out from the data so that the important datapoints remain
  - Communicate with sponsors to understand what portions of the documentation are necessary for evaluation
- Risk 3
  - Creating a highly accurate model strictly using the data provided to us
  - Create synthetic data using the provided data
- Risk 4
  - Restructuring pdf/text manuals as a structured training set for the machine learning model
  - Communicate with sponsors to understand the auditing process in order to learn how to preserve and properly structure the required data for the model



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# Status Report Presentation

## Synthetic Media

### The Capstone Experience

Team Urban Science

Suhan Park  
Misha Lemper  
Evan Marks  
Isabella Engelman  
Neil Khedekar

Department of Computer Science and Engineering  
Michigan State University

Fall 2023



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# Team Urban Science

## Status Report

[1 of 4]

### Synthetic Media

- Sponsor Overview
  - Data analysis & consulting services for the automotive sales
  - Modern network planning to the automotive industry
- Project Overview
  - Generating traditional videos by firms are costly, timely, complicated and inefficient.
  - Generating virtual avatar to instruct users saves cost and time from traditional methods.
  - This solution will be used by automotive clients such as corporate(OEM) users, field staff and dealership employees.



# Team Urban Science

## Status Report

[2 of 4]

### Synthetic Media

- Database Server / API
  - Azure SQL DB & Server is configured
  - DB management FastAPI endpoints are created
- Frontend
  - Foundation structure setup
- Others
  - GitHub setup
  - Synthesis API survey research in progress
- Project Plan Document
  - Table of Contents
  - Project Overview



# Team Urban Science

## Status Report

[3 of 4]

### Synthetic Media

- Client Contact
  - 09/01: General & High-level
  - 09/05: Technical
- Team Meetings
  - 08/29: Primary Planning & Scheduling
  - 09/05: Technical Planning
  - 09/07: Primary Setups
- Team Organization
  - PM: Suhan Park
  - Main Contact: Misha Lemper
  - Frontend: Misha Lemper, Evan Marks
  - DB & Server: Isabella Engelman
  - API's: Neil Khedekar, Suhan Park
  - Data Analysis & ML: Suhan Park



# Team Urban Science

## Status Report

[4 of 4]

### Synthetic Media

#### Risks

- Risk 1
  - Incoherence in data & absence of data
  - Mock-up data
- Risk 2
  - LLM API & Azure Server Limitations
  - Further research and discussions (cost, compatibility, etc.)
  - Migration to different services (e.g., Firebase)
- Risk 3
  - Generative Models Limitations (GPU cost, performance, etc.)
  - Synthesis Module API



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**U N I V E R S I T Y**

# Status Report Presentation

## Change Insights Datamart and Risk Assessment

### The Capstone Experience

#### Team UWM

Hunter Wittke

Jack Wood

Jacob Hughes

Will Alff

Department of Computer Science and Engineering

Michigan State University

Fall 2023



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# Team UWM

## Status Report

[1 of 4]

### Change Insights Datamart and Risk Assessment

- United Wholesale Mortgage
  - #1 wholesale lender and #1 mortgage lender in the country
  - Over 7000 team members on site in Pontiac, MI
  - Provide mortgage products to mortgage brokers
- Project Overview
  - Identify production risks during the development
  - Used by team leaders to moderate their teams performance
  - Aggregate data from multiple sources into one larger datamart
  - Create model that predicts risk of change based on info in the datamart





# Team UWM

## Status Report

[2 of 4]

### Change Insights Datamart and Risk Assessment

- Server Systems / Software
  - Access to Swagger UI
  - Company laptops
  - Currently testing software
- Development Systems / Software
  - Visual Studio 2022
  - Docker
  - Installed UWM Starter Kit
- Project Plan Document
  - Created a shared document
  - Rough architecture diagram
  - 20% Complete



# Team UWM

## Status Report

[3 of 4]

### Change Insights Datamart and Risk Assessment

- Client Contact
  - Recurring checkup meetings on Fridays at 11:00 AM
  - Met with on teams and went on Site 09/11
  - Future on-site visits scheduled
- Team Meetings
  - Thursdays 5:00 PM with TM Wednesday, additional as needed
  - Weekly meeting on Monday evening
- Team Organization
  - Client contact: Jacob
  - Program manager: Hunter
  - Developers: Will, Jack, Jacob



# Team UWM

## Status Report

[4 of 4]

### Change Insights Datamart and Risk Assessment

#### Risks

- DataMart
  - Data is spread across multiple different systems
  - Mitigation: Create a centralized DataMart
- Azure Machine Learning
  - Unfamiliar with the Azure Cloud, Machine Learning Services
  - Mitigation: Contact UWM support team, use resources provided
- API Logistics (Swagger UI)
  - Lack of experience with Swagger UI
  - Mitigation: Understand potential cost/structures of APIs
- Pending Access/Permissions
  - Received laptops, do not have proper access to all necessary resources
  - Mitigation: Contact client



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**U N I V E R S I T Y**

# Status Report Presentation

## Command and Control Simulator

### The Capstone Experience

Team Vectra

Trevor Davis

Ben Hayes

Nixon Holley

Ben Tuckey

Andrew Vandercar

Department of Computer Science and Engineering  
Michigan State University

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# Command and Control Simulator

[1 of 4]

## Status Report

- Sponsor Overview
  - Threat detection and response
  - Real time detection across variety of networks
  - AI models to detect and prioritize attacks
- Project Overview
  - C2 channels used by attackers to control devices
  - Application to simulate C2 channels
  - Configurable parameters and protocols
  - Used as training data for AI model



### Command and Control Simulator

- Server Systems / Software
  - Application set requires server/client separate devices to test network traffic over internet
  - Test on local host in the meantime
  - Eventually migrate to hosting on AWS
- Development Systems / Software
  - Server/Client Channel
  - Packet Capture & Log Output
  - Rest API
- Project Plan Document
  - Word Document
  - Rough System Architecture
  - 10% Complete



### Command and Control Simulator

- Client Contact
  - Have met with client three times
  - Scheduled weekly teams meeting
- Team Meeting:
  - Regular meeting scheduled
  - Necessity based meeting (4 times)
- Team Organization
  - 2 Server
  - 2 Client
  - 1 API



### Command and Control Simulator

#### Risks

- Establishing Remote Connection to Mac
  - Need a way to talk to Mac from outside EGR network to establish C2 tunnel
  - Use MSU VPN to externally access Vm on Mac
- Configure AWS
  - Unfamiliar with AWS environment and how it will interact with client
  - Using rack server before we try to implement in AWS
- Establishing Initial Client Connection
  - Unsure of exact process when initially launching application set
  - Speak with project sponsor to clarify desired behavior
- Hosting the API
  - Need to ensure that the API can be accessed and can edit the C2 tunnel
  - Start by hosting the API locally on the server and calling its functions locally





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**U N I V E R S I T Y**

# Status Report Presentation

## Volkswagen Shopping App with Augmented Reality

### The Capstone Experience

#### Team Volkswagen

Bryce Cooperkawa

Nahom Ghebredngl

Rikito Takai

Swathi Thippireddy

Richard Zhou

Department of Computer Science and Engineering

Michigan State University

Fall 2023



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# Team Volkswagen

## Status Report

[1 of 4]

### Volkswagen Shopping App with Augmented Reality

- Volkswagen Group of America, Inc.
  - US subsidiary of Volkswagen Group, one of the world's top automakers and Europe's largest
  - Driven by innovation across various automotive technologies
  - Pioneering sustainable solutions, including electric mobility
- Project Overview
  - **Augmented Reality iOS App:** Developing an AR app for viewing and customizing Volkswagen vehicles
  - **Improving Shopping Experience:** Empower users to make informed purchasing decisions
  - **Enhancing Car Selection:** Helping customers choose their ideal car by visualizing Volkswagen models in various real-world settings



# Team Volkswagen

## Status Report

[2 of 4]

### Volkswagen Shopping App with Augmented Reality

- Development Systems / Software
  - Xcode 14, Swift, iOS
  - ARKit
  - RealityKit
- Project Plan Document
  - Setting up document
  - Creating Mockups and sharing with client
  - 5% Complete



# Team Volkswagen

## Status Report

[3 of 4]

### Volkswagen Shopping App with Augmented Reality

- Client Contact
  - Met with client once on Sep. 7
  - Weekly meeting every Thursday morning
- Team Meetings
  - Have met 7 times
  - Two meetings prepared each week
- Team Organization
  - Studying coding environment and dependencies
  - 2 team members working on mock-ups and UI, 3 working on prototypes



# Team Volkswagen

## Status Report

[4 of 4]

### Volkswagen Shopping App with Augmented Reality

#### Risks

- 3D Car Model
  - Uncertainty regarding compatible file availability
  - Mitigation: Using placeholder models, creating custom models, and researching opensource Photogrammetry software
- Project Scope
  - Initial project expectations are broad, with an unclear MVP
  - Mitigation: Increasing client collaboration through frequent meetings to define specific goals
- Object Projection
  - Determining camera focus and object fitting within a space
  - Mitigation: Researching established examples, build prototype to test understanding
- Car Audio Based on Location
  - Adjusting horn/engine volume based on vehicle size, distance, and direction
  - Mitigation: Utilizing RealityKit & Spatial Audio for implementation



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**U N I V E R S I T Y**

# Status Report Presentation

## Global Business Services Process Intelligence

### The Capstone Experience

Team WK Kellogg Co

Adrian Adiwidjaja

Shuwei Chen

Jacob Loudon

Elio Moussa

Darshil Patel

Department of Computer Science and Engineering

Michigan State University

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# Team WK Kellogg Co

## Status Report

[1 of 4]

### Global Business Services Process Intelligence

- Sponsor Overview
  - WK Kellogg is a multinational food manufacturing company in Battle Creek, Michigan
  - It is the number one cereal brand in the USA
  - It was founded in 1906 by Will Keith Kellogg
- Project Overview
  - Aims to improve the manufacturing data process
  - Able to present trends, errors, and other data
  - Replace the, soon to be discontinued, MII system
  - WK Kellogg Co Employees will be utilizing it



# Team WK Kellogg Co

## Status Report

[2 of 4]

### Global Business Services Process Intelligence

- Server Systems / Software
  - OSI PI – Created an account and are reading and watching demo videos
  - Oracle Database – Discussing with the clientele team to understand the database fully
  - KPLAS – Discussing with the SME team at WK Kellogg to know how they utilize this system
- Development Systems / Software
  - Power BI – Downloaded and began are watching and reading guided videos
  - Power Apps - Downloaded
  - Python and XML – Experience from previous classes and refreshing ourselves on XML
- Project Plan Document
  - We started the skeleton
  - Written the introduction
  - 4% Complete





# Team WK Kellogg Co

## Status Report

[3 of 4]

### Global Business Services Process Intelligence

- Client Contact
  - Client contact has been conducted along with the creation of active chats
  - Plans to meet every week on Thursdays
- Team Meetings
  - We have met 5 times so far
  - We plan to meet at least 3 times a week
- Team Organization
  - Back-end : Shuwei
  - Front-End : Adrian, Darshil
  - Python : Jacob
  - XML : Elio



# Team WK Kellogg Co

## Status Report

[4 of 4]

### Global Business Services Process Intelligence Risks

- Risk 1
  - Not knowing the extent and capabilities of OSI PI
  - Reading and learning from the guided videos on the OSI PI Website and other sources
- Risk 2
  - Connecting to the back-end data
  - Visit the plant to learn how/where the data is collected and meeting with the SME's to learn about the data collection process
- Risk 3
  - User/Client acceptance
  - Come up with a plan to meet the expectations for the design



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**U N I V E R S I T Y**

# Status Report Presentation

Deep Oven: Volume and Quantity Estimation in Cooking

## The Capstone Experience

Team Whirlpool

Luke Kelly

Ryan Le

Heng (Andy) Liang

Karl Ma

Emily Rose

Department of Computer Science and Engineering

Michigan State University

Fall 2023



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# Team Whirlpool

## Status Report

[1 of 4]

### Deep Oven: Volume and Quantity Estimation in Cooking

- Sponsor Overview

- Whirlpool is a home appliance company
- Based in Benton Harbor, MI
- Collin – Electrical Engineer
- Gian - Electrical Engineer
- Jackie – Software Engineer

- Project Overview

- Estimate volume and quantity of food type in an oven
- Detect what rack the food is on
- Estimate the overall time needed for the food to cook in an oven
- Build an Intuitive User Interface to visualize data



# Team Whirlpool

## Status Report

[2 of 4]

### Deep Oven: Volume and Quantity Estimation in Cooking

- Server Systems / Software
  - Nodejs
    - Python for Back-end
    - JavaScript & React for Front-end
    - Tensorflow for machine learning
- Development Systems / Software
  - "Doneness Detection" Development – Provided
  - Visual Model Validation – Provided
  - Food Burning Detection – Provided
  - Object Detection Segmentation – Needs to be implemented
  - Rack Level Detector – Needs to implemented
  - Volume Estimation – Needs to implemented
- Project Plan Document
  - Has been started
  - Written 5 pages
  - 30% Complete



# Team Whirlpool

## Status Report

[3 of 4]

### Deep Oven: Volume and Quantity Estimation in Cooking

- Client Contact
  - Weekly Meetings on Wednesdays 8:30am – 9:30am via Zoom
  - Contact by Email, Mon-Fri 8:00am-5:00pm
- Team Meetings
  - Tuesdays 9:00pm – 10:00pm on Teams
  - Thursdays 4:30pm – 6:30pm in 3340 EB
  - Sundays 11:00am – 1:00pm 3340 EB
  - Currently 3 meetings a week
- Team Organization
  - Luke - Front-End
  - Emily - Managing Machine Learning Data
  - Ryan - Full Stack
  - Karl - Back-End
  - Heng (Andy) - Back-End



# Team Whirlpool

## Status Report

[4 of 4]

### Deep Oven: Volume and Quantity Estimation in Cooking Risks

- How do we determine how long something needs to be cooked?
  - Given the type of food, quantity, the rack placement, doneness, and volume, estimate the time needed.
  - Possible solution: Find a mathematical formula in relation to volume and time needed to cook something.
- How can we perform the Machine Learning?
  - Given the detections, teach the Machine to detect what is in the oven and how much of it exists.
  - Possible solution: Cameras and UV can be used to determine the quantity and location of foods.
- What kind of user interface should be implemented?
  - Display the information found regarding the volume, time needed, quantity of food, and rack level.
  - Possible solution: Possibly use Nodejs or some other design to display information.
- How do we detect food that is hidden from the camera?
  - It will detect obscured foods that can't be seen such that it can be included within the computation.
  - Possible solution: Determine a universal calculation of weight and mass given volume.

