

MICHIGAN STATE

U N I V E R S I T Y

09/15: Team Status Reports

The Capstone Experience

Dr. Wayne Dyksen
James Mariani
Luke Sperling

Department of Computer Science and Engineering
Michigan State University
Fall 2021



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

MICHIGAN STATE

U N I V E R S I T Y

Status Report Presentation
Digital Avatar Assistant
The Capstone Experience

Team Ally

Zach Arnold
Akhil Arora
Nate Wood
Annie Zhou

Department of Computer Science and Engineering
Michigan State University

Fall 2021



From Students...
...to Professionals

Team Ally

Status Report

[1 of 4]

Digital Avatar Assistant

- Project Overview
 - Creating self-learning conversational chatbot to be integrated with Ally's pre existing web application
 - Goal is to solve customer banking problems by providing quick access to relevant account info
 - Working with our contact to develop our MVP
 - Signing IP agreements and NDA
 - Learning Rasa Open Source / Rasa X to develop the chatbot
- Project Plan Document
 - Still in brainstorming process
 - Working with Ally to highlight target group
 - Document not started, researching problem and technologies



Team Ally

Status Report

[2 of 4]

Digital Avatar Assistant

- Server Systems / Software
 - Hosting our application on AWS server
- Development Systems / Software
 - Python3 Rasa Open Source / Rasa X frameworks for conversational bot backend - initialized chatbot with Rasa Open Source
 - Python3 scikit-learn framework for Machine Learning capabilities - installed
 - HTML/CSS User Interface - installed



Team Ally

Status Report

[3 of 4]

Digital Avatar Assistant

- Client Contact
 - We have met with our client twice
 - We have set up our regular weekly meetings at 3:00 pm Mondays
- Team Meetings
 - We have met 3 times already
 - We have set up our regular weekly meetings after class Mondays @ 12:00 pm
- Team Organization
 - User Interface / Application Layer - Zach
 - Machine Learning / Computational Layer - Akhil
 - AI Backend / Rasa Layers - Nate & Annie



Team Ally

Status Report

[4 of 4]

Digital Avatar Assistant

- Integrating our application with preexisting Ally application
 - Chatbot application needs to work on-top of & alongside Ally's desktop web application
 - Test integration throughout to ensure it works at each step & Communicate directly with Ally engineers
- Integrate Machine Learning into chatbot
 - Integrating machine learning so into the chatbot so specific actions will use ML
 - Determine what actions will require ML to be completed and develop that functionality early
- Integrate UI into chatbot
 - Integrate the digital avatar interface with the chatbot/speech-to-text features of the assistant
 - Test how the UI interacts with the users and how the display of the avatar changes with the each use
- Chatbot unable to accomplish preferred tasks
 - Our application may be unable to retrieve user data necessary for the intended use cases
 - Communicate directly with Ally engineers to ensure the bot's functionality is feasible



MICHIGAN STATE

UNIVERSITY

Status Report Presentation

AWSome Availability Zones

The Capstone Experience

Team Amazon

Jake Hood

Jung Chak

Jamison Heiner

Wynton Huang

Iris Kim

Department of Computer Science and Engineering

Michigan State University

Fall 2021



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

Team Amazon

Status Report

[1 of 4]

AWSome Availability Zones

- Project Overview
 - AWS is a cloud platform that provides fast, resilient software services (VMs, databases, etc.) at massive scales
 - AWS accomplishes this by hosting "rentable computers" in Availability Zones (i.e. data centers). To improve service resiliency, AWS customers can choose to use AWS services in *multiple AZs*. Our project aims to help AWS customers choose the best pairs of AZs, allowing them to improve service resiliency without sacrificing speed
 - Step one: gather data about network latency between AWS Availability Zones
 - Step two: visualize this data in a user-friendly way to help AWS customers choose the right Availability Zones
- Project Plan Document
 - Outlined, Summary drafted, Specifications are being gathered
 - We have been discussing the plans with Amazon closely and will be proposing ideas this Friday, as well as showing them the initial UI design



Team Amazon

Status Report

[2 of 4]

AWSome Availability Zones

- Server Systems / Software
 - AWS EC2 (up and running, multiple experiments, definitely going to use)
 - AWS Lambda (possible bonus feature; researched but no experimentation yet)
 - SSH (cryptographic keys generated, security groups created, good to go)
 - Amazon Linux (spun up on an EC2 instance, working correctly)
 - Ping/NIPING (ICMP vs. TCP, research started, no tests yet)
 - Amazon QuickSight (research started, resolving permissions issues before exploring further)
 - AWS RDS/AWS SQS/Dynamo DB (investigating different use cases)
- Development Systems / Software
 - AWS CodeStar (super IDE, research started, resolving permissions issues)
 - Git/GitLab (installed on dev. machines, repository created)



Team Amazon

Status Report

[3 of 4]

AWSome Availability Zones

- Client Contact
 - We've met twice, each time for one hour
 - We are using Slack for communication outside of meetings
 - We scheduled hour-long weekly meetings on Fridays at 10:30am
- Team Meetings
 - We've met twice virtually and once in person
 - Virtual meetings scheduled on Thursday evenings, with impromptu meetings throughout the week as necessary
- Team Organization
 - Jake is our client contact, Wynton is elected leader
 - Back-end (Jung, Jamison) [proof-of-concept in progress]
 - Front-end (Jake, Iris, Wynton) [rough UI mock-up completed]



Team Amazon

Status Report

[4 of 4]

AWSome Availability Zones

Risks

- Front-end visualization
 - Amazon QuickSight is very important for our vision, but we don't have access to it currently and none of us have been able to experiment with it yet
 - Resolve permissions issues + develop PoC ASAP
- Cost
 - Many EC2 instances running simultaneously may rack up bills (covered by Amazon up to a certain amount)
 - Be vigilant about stopping/terminating EC2 instances when not in use
- Security
 - AWS firewalls block all connections from foreign computers
 - Discover our machines' IP addresses and add custom firewall exceptions to allow our machines access to AWS instances (using SSH, ICMP, and TCP)
- Lambda Instances
 - It may be complicated to specify which Availability Zones we want when using Lambda
 - Research more about Lambda, explore public code, and find or engineer a workaround (maybe using short-lived EC2 instances as proxies)



MICHIGAN STATE

UNIVERSITY

Status Report Presentation

Air Pollution Health Outcomes Forecasting Tool

The Capstone Experience

Anthropocene Institute 1

Lindsey Boivin

Tate Bond

Hannah Francisco

Zhendong Liu

Lukas Richters

Department of Computer Science and Engineering

Michigan State University

Fall 2021



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

Team Anthropocene Institute 1

Status Report

[1 of 4]

Air Pollution Health Outcomes Forecasting Tool

- Project Overview
 - Leverage ML framework to predict health and air quality
 - Display data and predictions on a map overlay
- Project Plan Document
 - Started on the presentation
 - 12% complete (3 slides)
 - Creating outlines for paper content
 - Goal: minimum 50% done by September 17th



Team Anthropocene Institute 1

Status Report

[2 of 4]

Air Pollution Health Outcomes Forecasting Tool

- Server Systems / Software
 - VM Fusion installed; running Windows VM
 - Python virtual environment installed
 - Hosting on Capstone iMacs – configuration in progress
- Development Systems / Software
 - Scikit-Learn – installed
 - Flask backend – installed, able to run “hello world” program
 - HTML/CSS frontend – simple UI created



Team Anthropocene Institute 1

Status Report

[3 of 4]

Air Pollution Health Outcomes Forecasting Tool

- Client Contact
 - Weekly meetings (Wed @ 5 pm PST, 8 pm EST)
 - 1 meeting so far
- Team Meetings
 - Weekly meetings (Wed @ 2 pm EST), more as necessary
 - 4 meetings so far
- Team Organization
 - Frontend – Hannah & Zhendong
 - Machine Learning – Lindsey & Tate
 - Backend – Lukas



Team Anthropocene Institute 1

Status Report

[4 of 4]

Air Pollution Health Outcomes Forecasting Tool

Risks

- Minimal experience linking ML to Web application
 - We have experience with both individually, but have never combined them
 - Smaller “hello world” projects to increase confidence
- Data acquisition
 - Unsure as to what data sets we are expected to use, or if the client will supply any
 - Ask the client if they have their own data/database that they want us to use
- Geographical heat map
 - Client would like an interactive heat map overlay for the front end, which could be a large technical challenge
 - Utilize existing APIs (Google Maps API) and creative assistance from our client
- Discrepancy between data and project expectations
 - Client would like to use zip codes, but the databases use counties
 - Communicate with client to change expectations or extrapolate zip code information from county data



MICHIGAN STATE

U N I V E R S I T Y

Status Report Presentation

Electricity Grid Planning Tool

The Capstone Experience

Team Anthropocene Institute 2

Nic Weller
Amanuel Engeda
Tyler Smith
Nafisa Lenseni
Hunter Paul

Department of Computer Science and Engineering
Michigan State University

Fall 2021



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

Team Anthropocene Institute 2

Status Report

[1 of 4]

Electricity Grid Planning Tool

- Project Overview
 - Provide cost/benefit predictions of SMRs to electrical substations in California with a machine learning tool.
 - Model electricity generation, pricing, consumption and weather related data to create an accurate planning tool.
 - Deliver high level web application including all findings in a visual manner.
- Project Plan Document
 - Project plan document is in the beginning stages.
 - Started thinking about main details.
 - Created project plan outline.
 - 5% complete.



Team Anthropocene Institute 2

Status Report

[2 of 4]

Electricity Grid Planning Tool

- Server Systems / Software
 - Windows with VMFusion on iMac.
 - SQLite data base set up with multiple tables and tested.
 - Flask installed and tested with simple API.
- Development Systems / Software
 - Python classes to interface with database.
 - Web development – Using JavaScript and have written Hello World.
 - AI development – Using Tensorflow with Keras.



Team Anthropocene Institute 2

Status Report

[3 of 4]

Electricity Grid Planning Tool

- Client Contact
 - Three Meetings
 - Initial Meeting: Initial Introduction with Anthropocene Project Lead
 - Second Meeting: Initial Introduction to the Anthropocene team
 - Third Meeting: Project description and Expectations
 - Created Weekly meeting on Monday at 4:00 PM
- Team Meetings
 - Two meetings as a team
 - First Meeting: Initial Introduction
 - Second Meeting: Research on Possible Frameworks and Project Infrastructure
 - Weekly Meetings on Friday
 - Sub-group of team members meet as needed
- Team Organization
 - Nic Weller: Database and Backend
 - Amanuel Engeda: Machine learning for Supply and Demand of Energy Predication
 - Tyler Smith: Machine learning for Supply and Demand of Energy Predication
 - Nafisa Lenseni: Frontend and user interface
 - Hunter Paul: Frontend and Backend



Team Anthropocene 2

Status Report

[4 of 4]

Electricity Grid Planning Tool

Risks

- Risk 1
 - How to interface from the backend to the front end.
 - Nic is working on setting up an API to facilitate the communication.
- Risk 2
 - Which specific datasets do we need for the ML tool.
 - Focus on the goal of the project.
- Risk 3
 - What type of ML model will be used.
 - Once we figure out what kind of inputs and outputs the ML tool needs, it will be clear which model is needed.
- Risk 4
 - Displaying an interactive map of substations in CA as well as reactive line graphs.
 - Generating an early prototype.



MICHIGAN STATE

UNIVERSITY

Status Report Presentation

Stroodle: Learning Management System

The Capstone Experience

Team Atomic Object

Jake Bosio
Gabrie Italia
Shachi Joshi
Sean O'Hare

Department of Computer Science and Engineering
Michigan State University

Fall 2021



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

Team Atomic Object

Status Report

[1 of 4]

Stroodle: Learning Management System

- Project Overview
 - Stroodle is a robust web app for educators and educational institutions to easily manage the complexities of curriculum planning.
 - The Stroodle interface allows you to manage people, courses, and course resources.
 - The modern web app works across browsers and mobile, allows offline access and editing, and provides real-time updates.
 - Stroodle allows built-in integrations with popular tools like Google Calendar, Zoom, and Slack.
- Project Plan Document
 - Created a skeleton of the project plan document.
 - Interviewed with students and professors and gotten their feedback on popular learning management systems such as D2L.
 - Began establishing a development environment for our project.
 - Addressed core functionalities of our learning management system.



Team Atomic Object

Status Report

[2 of 4]

Stroodle: Learning Management System

- Server Systems / Software
 - Set up local dev environment on iMac.
 - Heroku, Amazon S3 will be set up after client approval.
- Development Systems / Software
 - Github
 - Trello
 - Both have been set up.



Team Atomic Object

Status Report

[3 of 4]

Stroodle: Learning Management System

- Client Contact
 - Met twice, weekly meeting set up for Wednesdays.
 - In a “R&D” phase.
 - Set up Slack channel with client.
- Team Meetings
 - Met three times, twice in person.
 - One scheduled weekly meeting.
 - Additional meeting when needs (1-2 per week)
- Team Organization
 - Frontend - Gabriele, Shachi
 - Backend – Sean, Jake
 - Roles may shift



Team Atomic Object

Status Report

[4 of 4]

Stroodle: Learning Management System

Risks

- We have not fully decided all technologies to use in this project
 - We have many options for what to use while creating our web application and need to narrow them down.
 - We plan to discuss this with the project sponsor to determine what options are best for the desired result.
- Establishing MVP expectations with the client
 - We need a baseline for the project so we can plan without overpromising.
 - Discussing this with the sponsor will help us understand what features to prioritize.
- Discussions about a mobile app
 - There have been mentions of adapting Stroodle as a mobile app as well. The logistics of this may be time consuming and difficult.
 - We are planning to use React Native, which will allow for easy translation between a web app and a mobile one.



MICHIGAN STATE

U N I V E R S I T Y

Status Report Presentation

Yard Wars: Weathering the Storm

The Capstone Experience

Team Auto Owners

Brandon Byiringiro

Graham Cornish

Carolus Huang

John Reichenbach

Department of Computer Science and Engineering

Michigan State University

Fall 2021



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

Team Auto Owners

Status Report

[1 of 4]

Yard Wars: Weathering the Storm

- Project Overview
 - VR application to place trees to protect homes from weather damage
 - Simulate storms and gather weather and damage data, tracking tree protection and falls
 - Upload data to separate website or application with database for viewing
- Project Plan Document
 - Not started yet – Will begin working on it during team meeting this week
 - Design has been started – We have design points made but not written in the document yet
 - We know the format/template we want to use



Team Auto Owners

Status Report

[2 of 4]

Yard Wars: Weathering the Storm

- Server Systems / Software
 - Rack server in lab - Not set up yet, awaiting assignment
 - Host website and database
 - Virtual Machine (Linux Ubuntu) - Up and running
 - Alternative host option
- Development Systems / Software
 - Unity and C# (simulation) - Project up and running
 - MySQL/SQLite (database) - Local instance up and running (MySQL)
 - HTML/CSS/JavaScript/PHP (using PHP Storm) (website) - Local instance up and running



Team Auto Owners

Status Report

[3 of 4]

Yard Wars: Weathering the Storm

- Client Contact
 - First meeting with client Sep. 3rd at 9:30 am
 - Team contact met in person to receive hardware Sep. 3rd at 4:30 pm
 - Weekly conference call every Friday at 9 am (met with client twice)
- Team Meetings
 - Scheduled online meeting every Thursday at 7 pm
 - Currently met 4 times
- Team Organization
 - Unity/VR Simulation (John and Graham) – Project up and running, several tasks in progress
 - Website/Database (Brandon and Carolus) – Local instances of both up and running, not connected to simulation yet



Team Auto Owners

Status Report

[4 of 4]

Yard Wars: Weathering the Storm Risks

- Database Connection
 - How to gather data in Unity and upload it to database
 - Research existing methods for connecting a Unity project to a database server
- VR Development
 - VR development is relatively new, has limited development tools and resources, and the team has limited knowledge and experience
 - Use currently in-development tools and research relevant methods for VR development



MICHIGAN STATE

U N I V E R S I T Y

Status Report Presentation

Hardware in the Loop (HIL) Vehicle Simulator

The Capstone Experience

Team Bosch

Luke Monroe

Alan Wagner

Justin Armstrong

Christian Zawisza

Aditya Raj

Department of Computer Science and Engineering

Michigan State University

Fall 2021



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

Team Bosch

Status Report

[1 of 4]

Hardware in the Loop (HIL) Vehicle Simulator

- Project Overview
 - Interact with the hardware we were given to create a functioning NCC and ACC.
 - Create a user-friendly GUI that simulates a functional vehicle interior and the car driving.
 - Create a parser that can interpret DBC (Database-Communicator) files. These files contain the rules used for decoding CAN signals.
 - Ensure that the Vehicle Simulator is configurable for all kinds of vehicles.
- Project Plan Document
 - 5% done with Project Plan
 - Plan to work on a Project Design on Thursday in the lab
 - Have begun investigating how technologies will work together to produce Architecture Diagram



Team Bosch

Status Report

[2 of 4]

Hardware in the Loop (HIL) Vehicle Simulator

- Server Systems / Software
 - Python
 - Currently researching GUI toolkits that would be compatible with Python, and best suited for our application's requirements.
 - There is an API that we will also be using for the project that we are unable to disclose.
- Development Systems / Software
 - Windows machine is running and functioning properly.
 - The hardware is hooked up to the machine and is functioning properly.
 - Appropriate drivers for the hardware are installed and running.



Team Bosch

Status Report

[3 of 4]

Hardware in the Loop (HIL) Vehicle Simulator

- Client Contact
 - Met 3 times and scheduled weekly meetings with client on Fridays at 10:30 am.
 - Received important hardware and hardware documentation from client.
- Team Meetings
 - Met 8 times and scheduled weekly meetings Mondays at 5:00 pm.
 - Met 2 times and scheduled weekly lab meetings on Tuesdays and/or Thursdays.
- Team Organization
 - Luke Monroe is team communicator.
 - We plan to work together until a project design is created so we have a better idea of how to break up tasks.



Team Bosch

Status Report

[4 of 4]

Hardware in the Loop (HIL) Vehicle Simulator

Risks

- Risk 1
 - Unable to communicate programmatically with the hardware.
 - Make a “Hello, world!” program ASAP to ensure we can communicate with the hardware.
- Risk 2
 - The hardware breaks completely and becomes unusable.
 - Treat the hardware carefully and delicately when using it.
- Risk 3
 - The hardware may not be fast enough to work reliably.
 - Create a test to try and overload the hardware components.
- Risk 4
 - Creating a refined GUI that is easy to use in real time.
 - Start and show the client early, continue refining the GUI from the client’s feedback and our own testing.



MICHIGAN STATE

UNIVERSITY

Status Report Presentation

Smart Benefit Plan Recommender Engine

The Capstone Experience

Team Delta Dental Data Science

Nicole Keller

Arden Knoll

Nick Lenaghan

Derek Nguyen

Department of Computer Science and Engineering
Michigan State University

Fall 2021



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

Team Delta Dental Data Science

Status Report

[1 of 4]

Smart Benefit Plan Recommender Engine

- Project Overview
 - Automate process of recommending ideal benefit plans.
 - Use clustering algorithms to map potential customers to plans.
 - Front-end for use to input information and call trained models in real-time for recommended plans.
- Project Plan Document
 - System architecture draft has been created.
 - Team has reviewed previous examples and will be assigning sections to begin work this week.



Team Delta Dental Data Science

Status Report

[2 of 4]

Smart Benefit Plan Recommender Engine

- Server Systems / Software
 - Ran clustering algorithms on made-up data.
 - Explored documentation of Snowflake and how it connects with Jupyter Notebooks.
 - Will establish a Snowflake connection this week after NDAs are approved.
- Development Systems / Software
 - Explored the functionalities of similar applications.
 - Developed a skeleton for the front-end site.



Team Delta Dental Data Science

Status Report

[3 of 4]

Smart Benefit Plan Recommender Engine

- Client Contact
 - Met twice so far.
 - Weekly conference calls Tuesdays at 9:30am.
- Team Meetings
 - Met four times so far.
 - 2 meeting each week: Mondays and Wednesdays at 8:30am.
- Team Organization
 - Nicole: Database / Machine Learning
 - Arden: Clustering
 - Nick: Team Lead / Databases
 - Derek: Front-end



Team Delta Dental Data Science

Status Report

[4 of 4]

Smart Benefit Plan Recommender Engine

Risks

- Risk 1
 - Connecting front end with database.
 - Connect bare-bones first.
- Risk 2
 - Connection/access to the Delta Dental database.
 - Follow up with Delta Dental as needed.
- Risk 3
 - Poorly defined cluster of data points.
 - Extensive data cleaning and testing with varying numbers of clusters.
- Risk 4
 - Data security.
 - Design architecture to minimize this risk and check input for SQL injections.



MICHIGAN STATE

U N I V E R S I T Y

Status Report Presentation

Microsoft Excel Data Extractor/Modeler

The Capstone Experience

Team Delta Dental Knowledge Science

Ethan Bransdorfer

Morgan Mundell

Peter Ro

Xochitl Weiss

Department of Computer Science and Engineering

Michigan State University

Fall 2021



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

Team Delta Dental Knowledge Science

Status Report

[1 of 4]

Microsoft Excel Data Extractor/Modeler

- Project Overview
 - Improve Efficiency of Delta Dental Employees
 - Modeling and Extracting Excel Data Autonomously
 - Web Application with Persistent Database
 - Remove Reliance on One-Time Use Programs
- Project Plan Document
 - Completed Project Overview
 - Design and Technical Slides in progress
 - System Architecture in progress
 - 25% Completion



Team Delta Dental Knowledge Science

Status Report

[2 of 4]

Microsoft Excel Data Extractor/Modeler

- Server Systems / Software
 - MongoDB Cluster: Running, Integrated, Tested
 - Node + Express: Integrated, Tested
- Development Systems / Software
 - Angular: Integrated, Tested
 - ExcelJS: Researched
 - Xspreadsheet: Researched



Team Delta Dental Knowledge Science

Status Report

[3 of 4]

Microsoft Excel Data Extractor/Modeler

- Client Contact
 - Two Client Meetings
 - Weekly Tuesday Meetings
- Team Meetings
 - Four Team Meetings
 - Twice Weekly
 - Trello Board
- Team Organization
 - Front-End: Ethan, Morgan
 - Back-End: Peter, Xochitl



Team Delta Dental Knowledge Science

Status Report

[4 of 4]

Microsoft Excel Data Extractor/Modeler

Risks

- UI Constraints
 - Problem: Massive amounts of excel data renders highlighting cells infeasible
 - Solution: Domain Specific Language or Predictive Modeling
- No Formalized Output
 - Problem: Client has honestly disclosed that they aren't sure what they want as their output
 - Solution: Fast AGILE development cycle with strong DevOps, Efficient Customer Discovery
- X-Spreadsheet Integration
 - Problem: Impossible to integrate features with project?
 - Solution: Development cycle to test functionality, Potentially refactor.
- Loading Data
 - Retrieval, display, and modification of previously stored data
 - Unique spreadsheet names, modify data loading/saving functions.



MICHIGAN STATE

U N I V E R S I T Y

Status Report Presentation

Virtual Computer Service Enhancements

The Capstone Experience

Team Dow

Arvid Brunsell

Patrick Doyle

Junnan Fu

Mark Kistler



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

Department of Computer Science and Engineering
Michigan State University

Fall 2021

Team Dow

Status Report

[1 of 4]

Virtual Computer Service Enhancements

- Project Overview
 - Minimizing Computation Costs on Microsoft Azure
 - Working with Dow Virtual Computers
 - Transition from Persistent to Non-Persistent
 - Track Dow VM Users Location / Operations
- Project Plan Document
 - Table of Contents
 - Cover Page (Title Page)
 - Basic Layout



Team Dow

Status Report

[2 of 4]

Virtual Computer Service Enhancements

- Server Systems / Software
 - Microsoft Azure (Cloud)
 - Azure Automation Accounts
 - Azure Virtual Desktop
- Development Systems / Software
 - Personal Powershell/Python IDE's
 - Local Azure environment



Team Dow

Status Report

[3 of 4]

Virtual Computer Service Enhancements

- Client Contact
 - Weekly scheduled meeting (Tuesday 3pm)
 - Met 2 times up to this point
- Team Meetings
 - Weekly scheduled meeting (Monday 4:30pm)
 - Met 3 times up to this point
- Team Organization
 - Split into two sub-teams to divide and conquer the different tasks



Team Dow

Status Report

[4 of 4]

Virtual Computer Service Enhancements Risks

- Risk 1
 - Understanding the Azure Cloud Architecture
 - Constant Communication / Feedback from Sponsor
- Risk 2
 - Avoiding Unwanted Changes to Preexisting VM state
 - Development Resource Group for Testing / Local Testing



MICHIGAN STATE

U N I V E R S I T Y

Status Report Presentation

ERP Kids: Wildlife Conservation

The Capstone Experience

Team Evolutio

Jonathan Skidmore

Joey Daprai

Lindsey Murrell

Gabe Sanborn

Jennifer Sageman

Department of Computer Science and Engineering
Michigan State University

Fall 2021



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

Team Evolutio

Status Report

[1 of 4]

ERP Kids: Wildlife Conservation

- Project Overview
 - We are making a 2D top-down third person ranger simulation game/RPG
 - Project has been set up and we have begun prototyping
 - We have been solidifying our design specifications and core game pillars
 - Character art has been developed
 - The overall art style has been established
- Project Plan Document
 - Begun constructing a Design Document with key game elements
 - Begun planning and sketching our screen mockups



Team Evolutio

Status Report

[2 of 4]

ERP Kids: Wildlife Conservation

- Server Systems / Software
 - We do not have any server systems/software
- Development Systems / Software
 - Unity Collab is set up and configured so all team members can work on the same project simultaneously
 - Our Unity project is configured to work in 2D, and we have a few basic scenes and some basic code implemented
 - We have an A* pathfinding algorithm package imported into Unity to be used for our AI and player movement



Team Evolutio

Status Report

[3 of 4]

ERP Kids: Wildlife Conservation

- Client Contact
 - We have met with our client and set up a contact point with a ranger
 - We have weekly meetings every Friday at 2:30 pm
- Team Meetings
 - We have set up two weekly meetings aside from class time on Tuesdays and Thursdays at 5pm and 8pm, respectively
 - We have met six times so far as a group, as well as meeting with an external designer
- Team Organization
 - We have a Trello board set up with tasks assigned to each member
 - Jonathan is the movement designer/VFX artist, Joe is the inventory system/task system programmer, Gabe is the currency and time cycle programmer, Jennifer is programming the tile mapping and in-game donation system, and Lindsey will be programming minigames as well as doing 2D character/environment art



Team Evolutio

Status Report

[4 of 4]

ERP Kids: Wildlife Conservation

Risks

- Risk 1
 - Lack of knowledge about the lives of rangers
 - Having a point of contact with an actively working ranger
- Risk 2
 - Smoothly implement real-life drone footage in a way that makes sense in the context of the game
 - Communicating with the client to discuss the importance of the footage being included in relation to other features they emphasized
- Risk 3
 - Potentially going over scope (or, on the reverse side, missing key components due to time constraints)
 - Setting up a priority system for features (green light, yellow light, and red light)
- Risk 4
 - Our client contact is going to be away for 1.5-2 weeks
 - Planning ahead to account for changes in meeting availability, as well as having some deliverables sent to the clients before they leave



MICHIGAN STATE

U N I V E R S I T Y

Status Report Presentation

Crowd-Sourced EV Emergency Recharge

The Capstone Experience

Team Ford

Alec Rotter
Bridget Bussey
Shiyu Li
Chris Beeman

Department of Computer Science and Engineering
Michigan State University

Fall 2021



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

Team Ford

Status Report

[1 of 4]

Crowd-Sourced EV Emergency Recharge

- Project Overview

- An app for Ford customers who own an electric vehicle
- If a drivers vehicle ever runs out of charge while driving, they will be able to contact other Ford EV owners to help them
- The two parties can then agree on a transaction amount and charge the vehicle enough to reach a nearby charging station

- Project Plan Document

- Created diagrams for UX flow
- UI design is in progress
- System architecture mostly agreed upon, but subject to change



Team Ford

Status Report

[2 of 4]

Crowd-Sourced EV Emergency Recharge

- Server Systems / Software
 - Firebase Database
 - Firebase Cloud Messaging and notifications
 - Firebase Authentication services
 - Database is setup, the rest is dependent on a working backend, which is not yet implemented
- Development Systems / Software
 - React Native Front end
 - Swift/Kotlin backend
 - Local development environments have been set up for all members



Team Ford

Status Report

[3 of 4]

Crowd-Sourced EV Emergency Recharge

- Client Contact
 - 1 Meeting with Ford Client so far
 - Weekly meeting with Ford 10:30 Friday
- Team Meetings
 - 4 team meetings so far
 - Post-Triage meetings on Tuesdays at 5pm.
 - After Meeting with Ford Client on Fridays at 10:30am.
- Team Organization
 - Bridget is our point of contact with Ford
 - All Team members share front-end tasks: app screens are currently in development
 - Bridget and Chris will be developing back-end for Android
 - Shiyu and Alec will be developing back-end for iOS



Team Ford

Status Report

[4 of 4]

Crowd-Sourced EV Emergency Recharge

Risks

- Uber Maps
 - Risk: Maps screen similar to Uber
 - Mitigation: react-native-maps-directions module powered by the Google Maps API
- Push Notifications
 - Risk: Timely push notifications
 - Mitigation: Google Firebase Cloud Messaging
- Transactions
 - Risk: Ensuring transactions go through and everything is correct
 - Mitigation: Ford has its own way handling transactions; We will not reinvent the wheel
- Maintaining Consistency Across Devices
 - Risk: We need to ensure that our front-end will look and work consistent regardless of device
 - Mitigation: We are using React Native in order to build a platform-agnostic front-end, and we will test our application on emulators for multiple devices, as well as physical iPhones and Android tablets



MICHIGAN STATE

U N I V E R S I T Y

Status Report Presentation

Enhanced MISP User Interface

The Capstone Experience

Team GM

Noah Anderson
Marven Nadhum
Alex Richards
Jake Rizkallah
Jordyn Rosario

Department of Computer Science and Engineering
Michigan State University

Fall 2021



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

Team GM

Status Report

[1 of 4]

Enhanced MISP User Interface

- Project Overview
 - Provide Analysts with streamlined access
 - Improved search functionality
 - Implement Many QOL improvements
- Project Plan Document
 - Started
 - Created basic outlines for paper
 - Around 8% completed



Team GM

Status Report

[2 of 4]

Enhanced MISP User Interface

- Server Systems / Software
 - Linux VM up and running MISP
 - iMacs set up
- Development Systems / Software
 - Bootstrap frontend, Created Hello World!
 - Python Backend, IDE's established
 - Github repo established



Team GM

Status Report

[3 of 4]

Enhanced MISP User Interface

- Client Contact
 - Weekly meetings Tuesday at 4:30 pm
 - Met twice
- Team Meetings
 - Weekly meetings Monday after class and Tuesday after client meeting
 - Met 5 times
- Team Organization
 - Backend: Marven, Alex, Jake
 - Frontend: Jordyn, Noah



Team GM

Status Report

[4 of 4]

Enhanced MISP User Interface

Risks

- Risk 1
 - Understanding the MISP framework
 - Group meetings going over documentation and doing hands on research of how it all fits together while also searching through source code
- Risk 2
 - Getting the UI to look how the client wants it
 - Regular contact with client with step by step updates of what it looks like right now and if they like/dislike it and how things can be improved
- Risk 3
 - Refining the search functionality to allow for complex searches to be saved
 - Dive deep into the current search functionality to see if it if it should be scrapped or expanded upon
- Risk 4
 - Integrating our code into the already existing framework
 - Having a deep understanding of the framework and rigorous testing to make sure nothing gets broken



MICHIGAN STATE

U N I V E R S I T Y

Status Report Presentation

Live Platform CAD Ingestion

The Capstone Experience

Team Herman Miller

Connor Lang

Tony Mei

Meigan Starr

Greg Szczerba

Department of Computer Science and Engineering

Michigan State University

Fall 2021



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

Team Herman Miller

Status Report

[1 of 4]

Live Platform CAD Ingestion

- Project Overview
 - Working on service that helps visualize office space usage
 - Currently floorplans are imported as images
 - Additional data like dimensions is being lost when only an image is provided
 - Automate import of CAD files directly into the mapping tool
- Project Plan Document
 - System Architecture: 75% - Might be rearranged as time goes on
 - System Components: 50% - Compiling list of all technologies that will be used as research continues
 - Functional Specification: 25% - Compiled information to be used in this section but needs to be written
 - Risks: 25% - Compiled all known risks but new risks likely to appear



Team Herman Miller

Status Report

[2 of 4]

Live Platform CAD Ingestion

- Server Systems / Software
 - AWS – App currently hosted on AWS. We have Herman Miller logins, but they're not set up with their AWS server yet.
- Development Systems / Software
 - AutoCAD – Installed and opened sample floorplans
 - Mapbox – Researched how to use the API
 - GDAL – Researched library capabilities and determined functionality that is useful for this application
 - Relevant File Specifications – DWG, DXF, GeoJSON



Team Herman Miller

Status Report

[3 of 4]

Live Platform CAD Ingestion

- Client Contact
 - Weekly 30 min stand-up meetings
 - Mon/Wed - 9:00-9:30, Fri – 11:00-11:30
 - Met 4 times so far
- Team Meetings
 - Weekly meeting
 - Mondays 9:30-10:20
 - Met 4 times so far (including meetings in addition to official time)
- Team Organization
 - Greg, Meigan – Backend
 - Connor, Xingzhi - Frontend



Team Herman Miller

Status Report

[4 of 4]

Live Platform CAD Ingestion

Risks

- Implementation uses shell execution.
 - Current design uses shell execution in the code requires it be on a server with the command line tools installed. Might not be able to be a serverless AWS lambda function.
 - To mitigate, we will have to use different method for that portion of the implementation or set up a deployment that allows for command line execution.
- Reading layers in DWG/DXF files
 - CAD files with furniture data may be too large to convert into GeoJSON with current solution. Team will likely need to extract layers individually instead of all at once, but these layer names are not standardized.
 - To mitigate, we will have to talk with CAD designers about layer name standardization and determine a way to determine which layers to use.



MICHIGAN STATE
UNIVERSITY

Status Report Presentation

SmartSat Satellite App Store

The Capstone Experience

Team Lockheed Martin Space

Valentino Dore

Aidan Delfuoco

Matt Heilman

Colin Williams

Will Teasley

Department of Computer Science and Engineering

Michigan State University

Fall 2021



From Students...
...to Professionals

Team Lockheed Martin Space

Status Report

[1 of 4]

SmartSat Satellite App Store

- Project Overview
 - App store similar to Android for delivering software.
 - Create testing functionality to ensure SmartSat apps are compatible with different versions of hardware and software.
 - Extend current testing capabilities to support black box hardware testing.
 - (Stretch Goal) Create a RESTful API to support automation of App Store functionality.
- Project Plan Document
 - Currently dividing up work based on individual strengths.
 - The project plan has been started and is currently being written.
 - Approximately ten percent complete.



Team Lockheed Martin Space

Status Report

[2 of 4]

SmartSat Satellite App Store

- Server Systems / Software
 - Set up an Ubuntu Linux server on the server rack.
 - Checked in hardware from Lockheed Martin.
- Development Systems / Software
 - Set up secure file sharing with Lockheed Martin to transfer the code base.
 - Downloaded VMWare Fusion on lab Mac.



Team Lockheed Martin Space

Status Report

[3 of 4]

SmartSat Satellite App Store

- Client Contact
 - Currently in discussion with our clients. Meeting once a week every Wednesday afternoon.
 - We have met once with them so far, and planning to get the hardware setup this week with their guidance.
- Team Meetings
 - We have met multiple times and are figuring out a good structure for team meetings and responsibilities.
 - Everyone communicates well and shows up to meetings.
- Team Organization
 - Teams head contact point with client is Will.
 - Team lead is Matt to make sure everyone is pulling their weight.



Team Lockheed Martin Space

Status Report

[4 of 4]

SmartSat Satellite App Store

Risks

- Hardware
 - Single board computers from Lockheed Martin Space
 - Setting up meetings with our contacts to answer some questions we have about hardware setup.
- Frameworks
 - Angular, React, Flask
 - Working with teammates who know the frameworks and reading through online resources to familiarize ourselves.



MICHIGAN STATE

U N I V E R S I T Y

Status Report Presentation

Review Aggregator for Educational Programs

The Capstone Experience

Team Malleable Minds

Jack Belding
Matthew Ladouceur
Neil Potdukhe
Shanrui Zhang

Department of Computer Science and Engineering
Michigan State University

Fall 2021



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

Team Malleable Minds

Status Report

[1 of 4]

Review Aggregator for Educational Programs

- Project Overview
 - Downloaded all software and setup environment locally
 - Setup frontend and backend for the applications
 - Have tested and been able to push visible changes to the application
 - Setting up current database with new dashboard by the end of next week
 - Finalizing work timeline with client by end of week
- Project Plan Document
 - Created project plan document
 - Shelled out table of contents and work plan



Team Malleable Minds

Status Report

[2 of 4]

Review Aggregator for Educational Programs

- Server Systems / Software
 - Flask backend server is setup and able to make changes
 - React frontend is setup and able to make changes
 - Web application is deployed using AWS
- Development Systems / Software
 - We are using Pycharm for backend development
 - We are using Visual Studio Code for frontend development



Team Malleable Minds

Status Report

[3 of 4]

Review Aggregator for Educational Programs

- Client Contact
 - Semi-Weekly conference calls
 - Monday 7pm – Meeting with CEO, CTO, and Technical Advisor
 - Wednesday 7pm – Meeting with CTO; Scrum/Sprint style
 - Slack group direct messaging
- Team Meetings
 - Weekly 9pm Sunday night conference call
 - Meet during the week as needed, in person or virtually
- Team Organization
 - Jack – Point of contact
 - Matt – Presentation and document organizer
 - Neil – Timeline manager
 - Shanrui – Code manager



Team Malleable Minds

Status Report

[4 of 4]

Review Aggregator for Educational Programs

Risks

- Porting over dashboard
 - Maintaining the same dashboard functionality and aesthetics with new software
 - Create test applications to ensure we can replicate functionality in new software
- Data collection
 - We need enough relevant data in order to create the recommendation engine
 - Collect sample datasets to determine what information is most relevant for our recommendation engine
- Skill System
 - Determining a representative method of tracking progress for a child in a particular skill
 - Implement an Achievement/Milestone tracking style system to determine different levels of mastery; The specific achievements can be discussed with the clients



MICHIGAN STATE

U N I V E R S I T Y

Status Report Presentation

mHealthy: Healthy Eating Application

The Capstone Experience

Team Meijer

Julius Eillya
Amy Puidokas
Yiteng Zhang
Filip Matovski

Department of Computer Science and Engineering
Michigan State University

Fall 2021



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

Team Meijer

Status Report

[1 of 4]

mHealthy: Healthy Eating Application

- Project Overview
 - Help customers make healthy choices by providing easy-to-understand information with a mobile application
 - Integrate with Meijer website and app
 - Create categories such as Gluten-Free, Keto, etc.
 - Provide suggestions for healthy eating
- Project Plan Document
 - Excel PP Started
 - Major milestones laid out
 - Living document – About 10-15%



Team Meijer

Status Report

[2 of 4]

mHealthy: Healthy Eating Application

- Server Systems / Software
 - Microsoft Azure Portal up/running and tested
- Development Systems / Software
 - Android Studio up/running and tested
 - Microsoft Azure DevOps up/running and tested
 - PhpStorm up/running and tested



Team Meijer

Status Report

[3 of 4]

mHealthy: Healthy Eating Application

- Client Contact
 - Met with client three times
 - Weekly meetings scheduled every Friday 10:30 AM
- Team Meetings
 - Met >5 times
 - Biweekly meetings 9 AM before class
- Team Organization
 - Project Manager/Client Contact: Julius Eillya
 - Android Development: Yiteng Zhang, Julius Eillya
 - Web Development: Amy Puidokas, Filip Matovski



Team Meijer

Status Report

[4 of 4]

mHealthy: Healthy Eating Application

Risks

- Meijer Website API
 - We are unsure if it contains the tools we want
 - Constant contact with Meijer employees to have questions answered and quick access to documentation
- Lack of Android Devices
 - The android device emulators in Android Studio have minute differences between the actual devices which could cause discrepancies and bugs
 - We can rent out Android devices from MSU and minimize utilizing features that can't be tested on the emulator
- Meijer Website May Not Have Expected Data
 - The Meijer website may not have as much robust nutritional information as we'd like to use when implementing the features we want
 - Get access to the Meijer site as fast as possible to determine what information we can expect to have and discuss with Meijer what limitations that might set
- Unsure How to Scale Health of Products
 - We must determine how we will calculate how healthy a grocery choice is, possibly both with regards to the users' unique dietary restrictions and/or the context of their grocery list
 - We should contact Meijer to gain their feedback on what they consider essential and determine a baseline minimum viable product that we can work towards



MICHIGAN STATE

UNIVERSITY

Status Report Presentation

Feedback Prompt for Ratings in Google Play Store

The Capstone Experience

Team Microsoft

Justin Hollinshead

Jordan Hybki

Karn Jongnarangsin

Moez Khan

Department of Computer Science and Engineering

Michigan State University

Fall 2021



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

Team Microsoft

Status Report

[1 of 4]

Feedback Prompt for Ratings in Google Play Store

Project Overview

- Implement In-app rating prompt inside the Microsoft Intune Android application. Users and Microsoft will have the ability to enable and disable the feedback feature.
- Automate and streamline feedback collection in order to determine most requested features and prominent issues via a Recommendation System.
- Microsoft Teams bot to be utilized by Microsoft Intune developers to assess app performance in the market.
- Project Plan Document
 - Clarifying project details/specs with Microsoft in order to better address goals systematically
 - Several pages of written notes to establish a general outline regarding technical specifications and desired functionality
 - Roughly 5% complete
 - Still in early stages



Team Microsoft

Status Report

[2 of 4]

Feedback Prompt for Ratings in Google Play Store

- Server Systems / Software
 - MySQL Relational Database on Microsoft Azure, not yet initialized
- Development Systems / Software
 - Android and Kotlin Developer Environment
 - All members have IDEs installed and have made a sample app
 - Currently waiting on access to codebase from Microsoft after background checks approved
 - JavaScript and Node.js environment
 - Python development environment with TensorFlow and Keras Libraries.



Team Microsoft

Status Report

[3 of 4]

Feedback Prompt for Ratings in Google Play Store

- Client Contact
 - Client Conference Call on Monday 4pm and Friday 11:00 am
 - Had two client conference calls so far.
- Team Meetings
 - Weekly Team Meeting Friday 12:00 pm
 - Had four team meetings so far.
- Team Organization
 - App Interface Manager - Justin Hollinshead
 - Data and Machine Learning Manager – Jordan Hybki
 - Database server administrator and Customer Liaison - Karn Jongnarangsin
 - Bot and UI Manager - Moeez Khan



Team Microsoft

Status Report

[4 of 4]

Feedback Prompt for Ratings in Google Play Store

Risks

- Organization of Review Data into a Database
 - What the review data encompasses and contains is unknown, schema that can accommodate can't be fully determined
 - Consult additional resources and information regarding the Google Play Store review API, hands-on exploration of review data following access to the codebase
- Microsoft Teams Bot
 - Creating a bot that processes data and creates visualizations from that data is a new technology to us
 - Seek out additional Teams bot creation documentation, research different packages and APIs that can be utilized for bot functionality, determine best programming language(s) to utilize (C#, Python, Javascript, etc.)
- Microsoft's Development workflow
 - Unfamiliarity with Microsoft's development protocols and the processes required for modifying code
 - Initially consult the engineers as we develop in order to ensure we're going through the proper channels and performing the proper procedures



MICHIGAN STATE

U N I V E R S I T Y

Status Report Presentation

Improve High Contrast Mode for Firefox

The Capstone Experience

Team Mozilla

Shaoting Huang

Danielle Lamoureux

Avi Pasula

Noah Pesta

Jack Ying

Department of Computer Science and Engineering

Michigan State University

Fall 2021



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

Team Mozilla

Status Report

[1 of 4]

Improve High Contrast Mode for Firefox

- Project Overview
 - Currently Firefox's high contrast mode (HCM) has many bugs that need to be fixed. High contrast mode is a very important part of making Firefox accessible to as many people as possible
 - High contrast mode makes Firefox's UI easier to read by using more distinct color for the UI elements.
 - Each team member will be assigned various bugs to work on in order to improve HCM
- Project Plan Document
 - Currently planning for writing the project plan document
 - Project plan document has not been started yet



Team Mozilla

Status Report

[2 of 4]

Improve High Contrast Mode for Firefox

- Mercurial
 - We are using Mercurial as our version control software (VCS). This was chosen based on the experience of our client.
 - Mercurial is very similar to git
- Moz-phab
 - Moz-phab is utilized to push code to the remote Firefox repository
 - Moz-phab is a in house tool build by Mozilla to make Firefox development easier
- Mozilla shell
 - The Mozilla shell is used to run all commands related to Firefox development including Mercurial commands and building and running Firefox
- Local Dev Environments
 - Each member has successfully bootstrapped and built their own local copy of Firefox and installed all of the necessary tools to begin development



Team Mozilla

Status Report

[3 of 4]

Improve High Contrast Mode for Firefox

- Client Contact
 - We have met with our client for a total of 12 hours. 6 on the last Saturday and 6 on the last Sunday
 - We have set up a weekly meeting Monday's from 2:00PM-3:00PM
- Team Meetings
 - Our team has met 3 times so far, and our weekly meeting time is Wednesday's from 12:30PM-1:30PM
 - We have set up a team Discord server to be used for communication
- Team Organization
 - Each team member is working on their individual bugs as assigned by the client. All of the bugs are front-end related



Team Mozilla

Status Report

[4 of 4]

Improve High Contrast Mode for Firefox

Risks

- Learning the Firefox codebase
 - The Firefox codebase is massive and learning the structure and organization of the code will be something we have to work on the whole semester
 - To mitigate this risk, we plan on making sure to reach out to the client when we have questions since they have more experience with the code base
- Being part of a large team
 - The process of adding code to the Firefox code base is difficult to understand. There are a significant number of processes that must be followed in order to ensure code gets added correctly
 - We are making sure to reference the extensive Firefox documentation whenever we have any questions regarding development
- Time management
 - There is a lot of work that must be completed to finish this project. It will be easy to lose track of focus and fall behind.
 - As a team we plan to be strict with self set deadlines and make sure to plan out our project appropriately



MICHIGAN STATE
UNIVERSITY

Status Report Presentation

“Saving”: Giving based on Spending Habits

The Capstone Experience

Team MSUFCU

Nicholas Aaltonen

Ethan Colbert

Ning Wang

Jonathon Harkness

Department of Computer Science and Engineering
Michigan State University

Fall 2021



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

Team MSUFCU

Status Report

[1 of 4]

“Spaving”: Giving based on Spending Habits

- Project Overview
 - Analyze transactional spending data within the Spave[®] app
 - Add features to the spending analysis module
 - Looking inside the overall dataset to identify patterns of similar users and make suggestions
 - Utilizing machine learning and artificial intelligence methods
- Project Plan Document
 - Completed Template
 - Cover, Table of Contents, Functional Specifications
 - 10% Complete



Team MSUFCU

Status Report

[2 of 4]

“Spaving”: Giving based on Spending Habits

- Server Systems / Software
 - iMacs set up to be used if necessary; VMware installed
- Development Systems / Software
 - Node.js downloaded on Systems
 - VSCode downloaded on Systems for React development
 - Plaid accounts created to access API keys
 - MongoDB Atlas access to be provided if needed
 - Github repository access to be granted



Team MSUFCU

Status Report

[3 of 4]

“Spaving”: Giving based on Spending Habits

- Client Contact
 - Met with Clients to discuss first steps; waiting on repository access
 - Established Weekly Meetings Friday @ 4:00 PM
- Team Meetings
 - Four meetings so far
 - Established Weekly Meetings Monday @ 7:00 PM
- Team Organization
 - Jonathon (Client Contact/Backend), Nick (ML/ FrontEnd)
 - Ethan (Backend/ML), Ning (React/FrontEnd)



Team MSUFCU

Status Report

[4 of 4]

“Spaving”: Giving based on Spending Habits

Risks

- Not Having Access to the Proper Information and Technology
 - Not being able to continue progress on the app due to not having proper access to essential documentation (i.e. repository access)
 - Develop action plan and maintain close dialogue with Client for when we can receive access
- Proper Execution of Plaid APIs
 - Being able to pull information from Plaid APIs and utilize it within Spave®
 - Research Plaid and how its APIs function by referring to the Plaid API docs and doing walkthrough tutorial/setup
- Utilizing App Architecture
 - How do these technologies exist within the current app, and how our project will utilize them?
 - Engaging in Dialogue with Spave® Software Engineers to better understand implementations
- Engagement with real users
 - How to engage with real users through app beta testing and utilize their feedback in a meaningful way
 - Discussing with Clients when beta testing will occur and how we'll receive feedback



MICHIGAN STATE

UNIVERSITY

Status Report Presentation

Collaboration Bot for Microsoft Teams

The Capstone Experience

Team PwC

Zach Fincher

Sean Nguyen

Xinyue Shu

Ankit Hegde

Department of Computer Science and Engineering

Michigan State University

Fall 2021



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

Team PwC

Status Report

[1 of 4]

Collaboration Bot for Microsoft Teams

- Project Overview
 - Reduces admin need for intervention into adding guest users from outside companies to PwC Team channels for collaboration
 - Gives power to PwC Employees for adding and removing guest access to internal OneDrive and SharePoint sites
 - Alerts Global Relationship Partner for approval of access to collaboration resources
- Project Plan Document
 - Template has been designed and executive summary has been drafted
 - UI mockups are in development
 - Design specifications currently being drafted



Team PwC

Status Report

[2 of 4]

Collaboration Bot for Microsoft Teams

- Server Systems / Software
 - Microsoft Azure, each student has or is creating personal account for usage
 - Microsoft 365 tenants, each student has created for testing process
 - Server systems are set up on a trial basis
- Development Systems / Software
 - React App Development
 - Power Automate (Trial Basis)
 - Visual Studio Code
 - Development Systems are set up and discovery is in progress



Team PwC

Status Report

[3 of 4]

Collaboration Bot for Microsoft Teams

- Client Contact
 - Started touchpoints with client on 9/2
 - Set up weekly touchpoints on Wednesdays with the client
- Team Meetings
 - Set up bi-weekly team meetings on Wednesday and Saturday
 - Provisions for frequent collaboration via Teams chat
- Team Organization
 - Zach Fincher (Team Leader/Back End), Sean Nguyen (Client Contact/ Front End)
 - Ankit Hegde (Front End), Xinyue Shu (Back End)



Team PwC

Status Report

[4 of 4]

Collaboration Bot for Microsoft Teams

Risks

- Risk 1
 - Description: Graph API is currently in Beta and has a sufficient number of bugs which are recorded on API documentation
 - Mitigation: Documentation has listed “work arounds” for known bugs and issues. These methods will be used for bug mitigation with final product
- Risk 2
 - Description: Unable to attain access to internal PwC M365 tenant for data collection and development
 - Mitigation: Will attempt development on private M365 tenants with the intent that deployment to the PwC tenant will be possible through personal tenants
- Risk 3
 - Description: Current development tools are not setup in same manner as PwC admin accounts
 - Mitigation: Students will work with PwC resources to configure accounts to reflect internal permissions so that they can effectively simulate the end user experience



MICHIGAN STATE

U N I V E R S I T Y

Status Report Presentation

ROCKY Team Challenge Application

The Capstone Experience

Team Rocket Mortgage

Kyle Terryn
Thomas Bos
Huanduo Yang
Justin Kappler

Department of Computer Science and Engineering
Michigan State University

Fall 2021



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

Team Rocket Mortgage

Status Report

[1 of 4]

ROCKY Team Challenge Application

- Project Overview
 - Web application for tracking employee competitions
 - Internal tool accessed by various employees
 - Support for team and individual scores
 - Tracks and displays information on leaderboard
- Project Plan Document
 - Rough outline started
 - Had a business requirements meeting to clarify project specifications
 - Approximately 5% done



Team Rocket Mortgage

Status Report

[2 of 4]

ROCKY Team Challenge Application

- Server Systems / Software
 - AWS RDS (Aurora) test database created
 - Basic database plan created

- Development Systems / Software
 - Angular 9 test app created
 - .NET core 3.1 Web API installed
 - Visual Studio Code installed



Team Rocket Mortgage

Status Report

[3 of 4]

ROCKY Team Challenge Application

- Client Contact
 - Met with client 3 times, will meet in-person week of October 4
 - Weekly meetings scheduled every Friday 1:00 PM
- Team Meetings
 - Met 4 times
 - Meetings at 5PM on Tuesdays/Thursdays
- Team Organization
 - Client Contact: Thomas Bos
 - Back-end Development: Kyle Terryn, Thomas Bos
 - Front-end Development: Huanduo Yang, Justin Kappler



Team Rocket Mortgage

Status Report

[4 of 4]

ROCKY Team Challenge Application

Risks

- Connecting front-end to back-end
 - We do not know how to combine AWS with our front-end software
 - Reach out to technical contacts with client
- Admin vs. Non-admin system
 - How to keep certain users from accessing certain parts of the site
 - Research Angular user privilege control methods
- Multi-level admin permissions
 - Different admins need different levels of privilege
 - Further contact with client to determine the distinction between levels of admins
- SSO
 - We do not know how to replicate SSO like Rocket Mortgage's yet
 - Ask client how their SSO works and what our placeholder SSO needs to do



MICHIGAN STATE

U N I V E R S I T Y

Status Report Presentation

Interactive Digital Assistant

The Capstone Experience

Team Stellantis

Seoungwoo Hong

Abhi Thirupathi

Jinrong Liang

Shaheer Hasan

Department of Computer Science and Engineering
Michigan State University

Fall 2021



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

Team Stellantis

Status Report

[1 of 4]

Interactive Digital Assistant

- Project Overview
 - Voice Recognition to identify and authenticate user
 - Answer a variety of questions
 - Device/app configurable to restrict (or specialize) for certain functions
 - Log activity
- Project Plan Document
 - Use of Amazon Lex as a central base for the digital assistant
 - Must wait for sponsor to create Stellantis IDs for accessing databases
 - About 5% has been completed (proposal, starting components, etc.)



Team Stellantis

Status Report

[2 of 4]

Interactive Digital Assistant

- Server Systems / Software
 - Amazon Lex: Tested Intents
 - Amazon Lambda: Tested functions
- Development Systems / Software
 - PHPStorm: Experienced for years



Team Stellantis

Status Report

[3 of 4]

Interactive Digital Assistant

- Client Contact
 - Meeting occurred with sponsor twice
 - Weekly meetings on Friday at 9 am
- Team Meetings
 - Team meetings occurred 4 times already
 - Scheduled meetings after client meeting
 - Weekly meetings on Sunday at 9 am
- Team Organization
 - Seungwoo Hong: Web UI/Amazon Lex
 - Abhi Thirupathi: Amazon Lex/Data Analysis
 - Jinrong Liang: Amazon Lambda/Data Analysis
 - Shaheer Hasan: Amazon Lex/Data Analysis



Team Stellantis

Status Report

[4 of 4]

Interactive Digital Assistant

Risks

- Personalization of the assistant through user login
 - Personalized assistant for the user by logging into corporate user directory
 - Leverage access control to retrieve the appropriate data
- Secure connection to internal databases
 - Amazon Lex will securely connect to access information from databases
 - Access to a large csv file which contains relatively the same data as Stellantis' database
- Deployment of the digital assistant to various platforms/devices
 - Ability to use IDA on various platforms/devices (iOS, Windows, etc.)
 - Deploying as web application designed for desktop and mobile
- Different positions have correctly access to different data
 - Verify authorization for access to team drives and other information
 - Project sponsor will confirm which data will be allowed for utilizing in project



MICHIGAN STATE

UNIVERSITY

Status Report Presentation Snagit Template Creator

The Capstone Experience

Team TechSmith

Yash Anandakumar

Akansha Dey

Dalton Lauerman

Heather Noonan

Miaoyu Yang

Department of Computer Science and Engineering
Michigan State University

Fall 2021



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

Team TechSmith

Status Report

[1 of 4]

Snagit Template Creator

- Project Overview
 - At the moment, TechSmith has created a feature in Snagit called templates to bootstrap their customer's creation process.
 - A customer can easily browse through a set of professional looking templates to get started creating their instruction sheets, job aids, documentation imagery, or slide graphics.
 - **PROBLEM:** TechSmith can create templates with internal tools, but this makes it a challenge for partners/savvy-customer to create their own templates.
 - **SOLUTION:** We have been tasked with helping TechSmith with empowering their clients' creative side by developing a web application to allow TechSmith's customers and partners to create their own templates and share them with their colleagues.
- Project Plan Document
 - Project Plan Document Outline Created:
 - Table of Contents (100% Complete)
 - Executive Summary (100% Complete)
 - Functional specifications (15% Complete)
 - Project Plan Presentation is 40% complete.



Team TechSmith

Status Report

[2 of 4]

Snagit Template Creator

- Microsoft Azure
 - Azure is a cloud computing platform where we'll be hosting our databases.
 - We've received access to azure as of Friday(9/10) and are currently familiarizing ourself with the services.
- Visual Studio
 - This is where our backend development in C# will take place.
 - We have had access to this technology and have created "Hello World" programs in C# to make sure everyone has the right configurations and access.
- React
 - We'll be using react for front end development.
 - We've received a tutorial as of Wednesday(9/08) for us to get familiarized with the technology and have configured Visual Studio to support our development.
- Trello
 - Trello is a platform used for organizing/planning project development.
 - We have set up a Trello page for our team to support our Agile Software Development.
- GitHub
 - GitHub is a platform used for version control and helps keep our code centralized.
 - We've received access to it as of Friday(9/10) and have all pulled the current repository and are handling any configuration issues that pop up.



Team TechSmith

Status Report

[3 of 4]

Snagit Template Creator

- Client Contact
 - We've established contact and have scheduled weekly meetings on Fridays @ 9:30 AM
 - We have met twice with the client as of 9/15
- Team Meetings
 - We've scheduled weekly meetings on Wednesdays @ 8 PM.
 - Our team's files channel has been organized and a Trello board has been set up to aid in project organization.
- Team Organization
 - Dalton is assigned as Client Liaison and is handling frontend development.
 - Yash is handling frontend development.
 - Akansha is handling frontend development.
 - Heather is handling backend development.
 - Miaoyu is handling backend development.



Team TechSmith

Status Report

[4 of 4]

Snagit Template Creator

Risks

- Custom File Type Integration
 - Snagit Templates use a custom file type that we're not familiar with.
 - Might require extra configuration
- User Login System
 - The customer is undecided as to whether we will end up integrating a user login system into our application.
 - To mitigate, we are ensuring that our design does not impede this possibility.
- Security Concern regarding access control.
 - How to handle who can access/create/share the shared templates.
 - Integrate safety checks within our editor, so users' have proper permissions and credentials.
- We are TechSmith's "Guinea Pigs"
 - TechSmith is still polishing out the project setup/pipeline. Our permissions are still being defined as we progress through development.
 - We are maintaining constant contact with our client to ensure these access issues are resolved as quickly as possible. Additionally, we are looking ahead to next steps in an attempt to anticipate further access needs before they arise.



MICHIGAN STATE

U N I V E R S I T Y

Status Report Presentation

Gate Hazard Geo-Mapping

The Capstone Experience

Team United Airlines Airport Operations

Alexander Brandt

Zachary Yarost

Gitika Kumar

Mihir Bhadange

Department of Computer Science and Engineering

Michigan State University

Fall 2021



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

Team United Airlines Airport Operations

Status Report

[1 of 4]

Gate Hazard Geo-Mapping

- Project Overview
 - Create device-agnostic mobile app to display and map hazards at airport gates
 - Display map in 2D and AR (optional) view
 - Target audience is UA Ground Operations Staff
- Project Plan Document
 - Have not yet started, 0% complete
 - Have read over requirements
 - Meeting on 9/15 to begin filling out info and dividing remaining tasks up



Team United Airlines Airport Operations

Status Report

[2 of 4]

Gate Hazard Geo-Mapping

- Server Systems / Software
 - Created a Hello World application to confirm basic Xamarin functionality
 - Gained access to phpMyAdmin
- Development Systems / Software
 - Downloaded and setup Visual Studio to develop a Xamarin app for iOS and Android
 - Created a GitLab repository
 - Established remote connection to iMacs



Team United Airlines Airport Operations

Status Report

[3 of 4]

Gate Hazard Geo-Mapping

- Client Contact
 - Met with client once already on 9/7 at 12:30 PM EST
 - Next meeting scheduled for Friday 9/17 at 12 PM EST
 - Plan to schedule weekly meetings week-to-week on Teams
- Team Meetings
 - Decided to meet twice weekly with a set schedule with time to meet impromptu built in, if necessary
 - Meetings are held over Teams
 - Have met 5 times as of 9/12
- Team Organization
 - Front-End: Zachary, Mihir
 - Back-End: Alexander, Gitika



Team United Airlines Airport Operations

Status Report

[4 of 4]

Gate Hazard Geo-Mapping

Risks

- Risk 1
 - Ensuring our UI is intuitive and user friendly
 - Work with UA employees to polish design
- Risk 2
 - Unable to get same map software on iOS and Android using Xamarin efficiently
 - Using Xamarin's ability to share functionality across both platforms
- Risk 3
 - Possibility for different functionality across platforms since the required Android version is older than iOS version
 - Pointedly developing for both platforms at the oldest OS versions
- Risk 4
 - Hazard data is non-uniform and must be entered manually
 - Must be quick and easy to add, edit, and delete hazards





MICHIGAN STATE
UNIVERSITY

Status Report Presentation

QA Audit Center

The Capstone Experience

Team United Airlines Quality Assurance

Anika Patel

Elizabeth Stevens

Adeboye Adegbenro Jr.

Xuefeng Sun

Department of Computer Science and Engineering

Michigan State University

Fall 2021



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

Team United Airlines Quality Assurance

Status Report

[1 of 4]

QA Audit Center

- Project Overview
 - Provide an Android mobile application for auditors to collect real time data while conducting on-site visits.
 - Generate PDFs and save it into the database.
 - Scrape FAA (Federal Aviation Administration) government websites.
- Project Plan Document
 - 100% of general outline for project plan is complete.
 - 60% of the overview of design specifications is complete.
 - 50% of risk analysis has been discussed.
 - 60% of the technical specifications will be complete by the end of this week.



Team United Airlines Quality Assurance

Status Report

[2 of 4]

QA Audit Center

- Server Systems / Software
 - Decided to use MSU servers but we do expect UA to integrate into their servers at some point.
 - Server is currently not up and running.
 - Assessing our server status as a risk at this point.
- Development Systems / Software
 - Android Studio and PHP Storm are accessible by all team members. Currently deciding on DBMS framework.
 - Project repository is set up and we are ready to deploy the project directories from both applications
 - We tested an initial "Hello World" activity with an Android Studio Project. Still waiting on a running server to be able to test connectivity with PHP.



Team United Airlines Quality Assurance

Status Report

[3 of 4]

QA Audit Center

- Client Contact
 - Our team met with our client and scheduled weekly meetings for Mondays at 5 PM.
 - So far, we have met with our client twice.
- Team Meetings
 - Our team has met 3 times so far
 - We meet once a week on Sundays at 4 PM
- Team Organization
 - Anika will work on the front-end user interface. Elizabeth will work on front end scripts that collects data for observation sheets and tables as well as generate a pdf.
 - Stan will work on integrating the front and back end. Adeboye will work on the server-side functionality and MySQL queries.



Team United Airlines Quality Assurance

Status Report

[4 of 4]

QA Audit Center

Risks

- Server Set-Up
 - Our team needs to have PhpStorm and MySQL hosted on the MSU servers
 - This can be solved by finding resource online on how to set up a SQL database on a rack server
- Web Scraping
 - Our application needs to regularly scrape government sites such as FAA. We need to create a web crawler to accomplish this.
 - We can make use of Java libraries to accomplish this if our sponsor green-lights it.
- Generating PDF
 - Another requirement is to take the audit data from our application and convert it into a pdf formatted according to our sponsor's specs.
 - We can make use of APIs and reference source code online.
- Decipher Text from Images
 - One of our additional features is to have our app pull text data from images taken from the app.
 - We can use the Java library Tess4J along with our sponsor's approval. It abstracts the process of optical character recognition.



MICHIGAN STATE

UNIVERSITY

Status Report Presentation

Independent Repair Facility Insights

The Capstone Experience

Team Urban Science

Gyungrok Lee

Juston Ko

Victoria Cao

Zhi Li

Department of Computer Science and Engineering
Michigan State University

Fall 2021



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



URBAN SCIENCE

Team Urban Science

Status Report

[1 of 4]

Independent Repair Facility (IRFs) Insights

- Project Overview:
 - Develop a software solution to provide dealerships with information about their aftersales department
 - Identify the IRFs
 - Develop an automatic process
 - Develop an online reporting solution
- Project Plan Document
 - Currently waiting for the telematics data
 - Downloaded the software
 - Currently developing the website
 - Set up backend services
 - 5% completion of the entire project



Team Urban Science

Status Report

[2 of 4]

Independent Repair Facilities Insights

- Server Systems / Software
 - Azure App Service (Controller) **STATUS:** API uploaded
 - Azure SQL Server (Database) **STATUS:** Set up/Connected
 - Azure Functions (Front-end) **STATUS:** Set up test site
- Development Systems / Software
 - .Net Framework and C# **STATUS:** Tested
 - ASP.NET CORE APIs **STATUS:** Tested
 - Angular Client **STATUS:** Setting Up



Team Urban Science

Status Report

[3 of 4]

Independent Repair Facilities Insights

- Client Contact
 - Pre-Kick-Off and Kick-off meeting with client
 - Scheduled meetings every Friday 11:30am - 12:30pm ET on Teams
- Team Meetings
 - Five team meetings so far
 - Scheduled meetings every Monday and Wednesday 9:40 am - 10:10 am ET on Teams
- Team Organization
 - Front-end: Juston and Larry
 - Back-end: Gyungrok and Victoria



Team Urban Science

Status Report

[4 of 4]

Independent Repair Facilities Insights

Risks

- Data Format
 - The unsure data format may increase uncertainty
 - Asking client for sample data
- Complex UI interface
 - Client demo showed complex UI with lots unsure details
 - Asking client for more demo detail or screenshots can be helped
- IRFs information Map
 - Client needs program to visualize the IRFs information on the map may be a challenge
 - Using available APIs
- Scraping from sites with varied layouts
 - IRFs will have variable website layouts, so developing a generic scraper will be difficult
 - Analyze common trend for formats or use NLP on block text



MICHIGAN STATE

U N I V E R S I T Y

Status Report Presentation

Smart Auto-Time Logging

The Capstone Experience

Team Vectorform

Everett Case

Sherwin Soroushian

Jake Mitchell

Jianyu Deng

Department of Computer Science and Engineering

Michigan State University

Fall 2021



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

Team Vectorform

Status Report

[1 of 4]

Smart Auto-Time Logging

- Project Overview
 - Assigning roles amongst group members
 - Picking the software packages to implement
 - Began writing small programs in C#, NodeJS, and ReactJS
 - Discovering API calls for Microsoft Teams for time of meeting
 - Mock-up web application for UI
- Project Plan Document
 - Started on the presentation slides
 - Functional and design specifications in process
 - Creating screen mockups and system architecture diagrams
 - Goal: Complete by September 23rd to begin practicing presentation



Team Vectorform

Status Report

[2 of 4]

Smart Auto-Time Logging

- Server Systems / Software
 - SQLite
 - Writing schema for database and instantiating tables
 - Stores data locally, interfaces with mother server at request of user
- Development Systems / Software
 - React JS
 - Used for UI front end for database, mock up UI in the works
 - C#
 - Used to interface with the teams API
 - Node JS
 - Used to interface between the UI and the database
 - Microsoft Teams
 - Used for meetings and tracking times with clients of the company



Team Vectorform

Status Report

[3 of 4]

Smart Auto-Time Logging

- Client Contact
 - Weekly meetings (Wed @ 9:30 Am EST)
 - 2 meeting so far
- Team Meetings
 - Weekly meetings (Thu @ 6 pm), more as necessary
 - 4 meetings so far
- Team Organization
 - Front End: Sherwin
 - Back End: Everett, Jake, Jianyu



Team Vectorform

Status Report

[4 of 4]

Smart Auto-Time Logging

Risks

- Connecting multiple languages and applications together
 - Minimal experience in the connections for multiple languages and programs
 - Making smaller programs to practice connecting the languages and tools that we intend to use, testing to make sure data is coming through as intended.
- Tracking active work time
 - Need to create a solution to track active development time using multiple software tools and applications
 - Utilizing OS api's and IDE plugins to integrate system focus and track times for programs, assigning focus time from programs to project work hours
- Designing and creating a UI
 - Needs to not only be able to query and display information from the database, but also be able to overwrite previous information in a sensible manner.
 - Using React JS and Node JS to interact with the database in a user friendly fashion and securely pulling and pushing new information



MICHIGAN STATE
UNIVERSITY

Status Report Presentation
VW Car-Net DriveView Social
Competition App
The Capstone Experience

Team Volkswagen

Blake Miller
Tianyu Wang
Riley Wagner
Evan Yokie

Department of Computer Science and Engineering
Michigan State University

Fall 2021



From Students...
...to Professionals

Team Volkswagen

Status Report

[1 of 4]

VW Car-Net DriveView Social Competition App

- Project Overview
 - Social competition app to encourage better driving
 - Offers leaderboards, achievements and levels
 - Linked to your personal Volkswagen car
- Project Plan Document
 - Taken a look, gathered materials (diagrams, Screen Mockups)
 - Have not started writing
 - 5%
 - Starting immediately



Team Volkswagen

Status Report

[2 of 4]

VW Car-Net DriveView Social Competition App

- Server Systems / Software
 - Repository for Server set up, Server development underway
 - Firebase (authentication) – running and authenticating
 - Connection to database TBD
 - Waiting on data as well as database
 - Using AWS and RDS
 - Swagger API documentation started
- Development Systems / Software
 - Android Studio – project setup and running, starting authentication
 - Flask – project setup, ready for database



Team Volkswagen

Status Report

[3 of 4]

VW Car-Net DriveView Social Competition App

- Client Contact
 - Have talked and gotten a set of goals for the first part of the project
 - Meetings on Tuesdays, No in person meeting yet
- Team Meetings
 - Have met for two official meeting, 5+ times unofficially
 - Team meeting once a week, sub teams meet when needed
- Team Organization
 - Frontend (Blake and Evan) – Initial project setup, Authentication page setup
 - Backend (Tianyu and Riley) – initial project setup, schema and database initialization being worked on



Team Volkswagen

Status Report

[4 of 4]

VW Car-Net DriveView Social Competition App

Risks

- New technologies
 - New software to use, such as Swagger, Postman, Firebase, Jetpack Compose
 - Research and experience with documentation / tutorials, checkout a branch and experiment
- Connections from client side to server side
 - Creating communication from Android studio to Flask (frontend to backend)
 - Internet, look at example projects
- Getting feedback from real users
 - Finding Volkswagen users to give constructive criticism on the app
 - Talk with project managers, find VW owners near us
- How to effectively format our database
 - How to format our server architecture to effectively store data
 - Look at other similarly formatted database, communicate with project sponsors



MICHIGAN STATE

U N I V E R S I T Y

Status Report Presentation

AI Recipe Converter

The Capstone Experience

Team Whirlpool

Ryan McLean
Samuel Chen
Cameron Lang
Ruitong Xu(Eric)

Department of Computer Science and Engineering
Michigan State University

Fall 2021



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

Team Whirlpool

Status Report

[1 of 4]

AI Recipe Converter

- Project Overview
 - Scrape cooking websites for recipes
 - Convert recipes to a machine-understandable format
 - Store converted recipes in a non-relational database
 - Create a web app interface for viewing and editing recipes
- Project Plan Document
 - Created outline of project plan
 - Filled out software platforms and technologies
 - Discussed architecture and risks



Team Whirlpool

Status Report

[2 of 4]

AI Recipe Converter

- Server Systems / Software
 - Prototype local MongoDB can communicate with python
 - AWS account has been initialized
 - Prototype web scraper can request and parse html
- Development Systems / Software
 - Github repository has been created for version control
 - Trello has been created to track tasks
 - Python libraries for web scraping, NLP, and database communication has been installed



Team Whirlpool

Status Report

[3 of 4]

AI Recipe Converter

- Client Contact
 - Met with client twice over Microsoft Teams
 - Scheduled weekly meetings on Wednesdays 3:00pm
- Team Meetings
 - Scheduled weekly meetings on Friday 1:30 pm
 - Set up meetings between members as needed
- Team Organization
 - Cameron: Web-Scraping
 - Ryan: POC, database manager
 - Eric: NLP
 - Samuel: NLP



Team Whirlpool

Status Report

[4 of 4]

AI Recipe Converter

Risks

- Natural Language Processing
 - The theory of natural language processing is complex
 - Investing research done by Stanford on natural language processing of recipes to understand and guide our approach
- Web Scraping
 - Non-uniform html locations on linked websites
 - Look into using regular expressions to find similar storage locations
- Testing Software
 - We do not have access to the hardware
 - Possible hardware access or remote trials in discussion with Whirlpool
- Lack of Training Data
 - Natural language processing requires a large amount of training data
 - Discuss with appropriate faculty and reference Stanford study source on NLP

