

MICHIGAN STATE

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09/13: 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 2022



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

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U N I V E R S I T Y

Status Report Presentation

Ally Kudos

The Capstone Experience

Team Ally

Phillip Yu

Abby Peterson

Harrison McComb

Gatesana Vongphachanh

(Poach) Phumapiwat Chanyutthagorn

Department of Computer Science and Engineering

Michigan State University

Fall 2022



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Team Ally

Status Report

[1 of 4]

Ally Kudos

- Project Overview
 - Building an employee recognition web-app for Ally
 - Have a rough draft of UI/UX from client
 - Have been able to ask questions/run ideas with the client
 - Expectations and work dynamic have been established
- Project Plan Document
 - Have created and distributed to all team members
 - Haven't decided table of contents
 - Plan to look over examples from prior years
 - ~2% complete...



Team Ally

Status Report

[2 of 4]

Ally Kudos

- Server Systems / Software
 - Have established remote access on multiple machines
 - Have updated machine login information as instructed
 - Not too familiar working with servers, expect the need for servers for the database and the web-app itself to manage client information
- Development Systems / Software
 - Have a good grasp of the languages we will be using
 - Frontend: HTML, CSS, React – 3 team members confident
 - Middleware: Machine Learning, APIs – lacks experience
 - Backend: database work, SQL – 2 team members confident



Team Ally

Status Report

[3 of 4]

Ally Kudos

- Client Contact
 - Contacted client on Sept. 2nd, had first meeting on Sept 7th
 - Scheduled weekly standup meetings every Friday on Zoom
- Team Meetings
 - Scheduled in-person meetings every Monday
 - Have met with each other 5 times(2x virtual, 3x in-person)
- Team Organization
 - Established collaboration, work-ethic, strengths/weaknesses
 - Members has claimed/started working on their areas
 - One member has had Covid and will catch up shortly



Team Ally

Status Report

[4 of 4]

Ally Kudos

Risks

- Risk 1
 - Establishing a proper server for our website to use
 - Started researching on 9/10, may ask James or Luke for help setting up server, or even client for preference/insight or possibility of business server
- Risk 2
 - Creating/establishing a server for our database
 - Familiar with databases but only locally, will research and make prototype/test
- Risk 3
 - Implementing machine learning to help users create accurate/quick messages
 - Team members have been delegated to start researching as soon as 9/10 and create test programs/prototype systems
- Risk 4
 - Realtime interaction between users, live messaging/notifications
 - Review old class material, research other practices, create prototype ASAP



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U N I V E R S I T Y

Status Report Presentation

Amazon Review Confidence Tool

The Capstone Experience

Team Amazon

Collin Cole

Nikita Gupta

Cameron Hurley

Ashu Kher

Dylan Mccarroll

Ethan Strain

Department of Computer Science and Engineering
Michigan State University

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Team Amazon

Status Report

[1 of 4]

Amazon Review Confidence Tool

- Project Overview
 - Visual Summary of Review-Authenticity Metrics
 - Page Should Show a Confidence Score for Each Review
 - Used to Predict if a Review is Genuine or Not for Sellers/Clients/Customers
- Project Plan Document
 - 10% Complete, Moving Fast
 - Started AWS Architecture Diagram
 - Started Screen Mock Ups
 - Researching PR/FAQ Format



Team Amazon

Status Report

[2 of 4]

Amazon Review Confidence Tool

- Server Systems / Software
 - NoSQL (DynamoDB)
 - Lambda + API Gateway for App Layer
 - Machine Learning via SageMaker
 - Amazon Comprehend for Natural Language Processing
 - Backend Calculates Confidence Scores
- Development Systems / Software
 - Web App vs Browser Extension
 - Amplify + React



Team Amazon

Status Report

[3 of 4]

Amazon Review Confidence Tool

- Client Contact
 - 1 Meeting so Far
 - 1 Call on Tuesdays from 9:00-10:00am
- Team Meetings
 - 4 Meetings so Far
 - 2 Times In-Person – Tuesday/Thursday
- Team Organization
 - Pair Programming
 - Front End/Back End/Machine Learning



Team Amazon

Status Report

[4 of 4]

Amazon Review Confidence Tool

Risks

- Risk 1
 - Responsive Browser Extension
 - Redirect to Web Page if Browser Extension is too Slow
- Risk 2
 - Acquiring Labeled Review Data for Machine Learning
 - Ask Client
 - Amazon Comprehend
 - Generate New Data for Training



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U N I V E R S I T Y

Status Report Presentation
Public Opinions on Nuclear Energy from
Social Media
The Capstone Experience

Team Anthropocene Institute

Akshit Bansal

Grant Carey

Shrey Jindal

Doyeon Kim

Aidan Lane

Katherine White

Department of Computer Science and Engineering
Michigan State University

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From Students...
...to Professionals

Team Anthropocene Institute

Status Report

[1 of 4]

Public Opinions on Nuclear Energy from Social Media

- Project Overview
 - Met with client and worked on scoping out the project
 - Created UI mockup for client reviews and changes
 - Assigned general team roles and set up weekly schedule
 - Setup project repository
- Project Plan Document
 - Table of contents draft completed
 - Started Project Plan Presentation, will use as outline
 - <2% completed
 - Main topic for next group meeting



Team Anthropocene Institute

Status Report

[2 of 4]

Public Opinions on Nuclear Energy from Social Media

- Server Systems / Software
 - GitLab for Version Control and development
 - AWS RDS/S3 buckets for data storage
 - AWS Lambda for data processing
- Development Systems / Software
 - Social Listening Tools: priority excel sheet
 - Python to implement social listening APIs, completed testing
 - Visual Studio Code for development
 - React/JS for front end web application



Team Anthropocene Institute

Status Report

[3 of 4]

Public Opinions on Nuclear Energy from Social Media

- Client Contact
 - Met with main client contact and Carl Paige
 - Established meetings with client at 8 pm Tues/Thurs
- Team Meetings
 - Group has met 5 times now
 - Established twice weekly meetings (in-person and virtual)
- Team Organization
 - Distributed primary roles
 - Front-end, Back-end, Modeling, Management delegated



Team Anthropocene Institute

Status Report

[4 of 4]

Public Opinions on Nuclear Energy from Social Media Risks

- Properly understanding client requirements
 - Project seems to be very open-ended as of right now
 - Draw up multiple mock-ups of UI until client is satisfied
- Correct decision making on storage solutions
 - Social Media data is expansive and proper storage solution is essential
 - Compare different options based on final UI decisions and decide accordingly
- Display latency and processing speeds
 - Real time modeling of data can be extremely slow and inaccurate
 - Carefully examine client needs and focus exclusively on important metrics



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U N I V E R S I T Y

Status Report Presentation

Custom Data Visualization Dashboard

The Capstone Experience

Team Atomic Object

Chandan Aralikatti

Abigail Murray

Frank Nylander

Neil Warraich

Wenrui Li

Department of Computer Science and Engineering

Michigan State University

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Team Atomic Object

Status Report

[1 of 4]

Custom Data Visualization Dashboard

- Project Overview
 - Atomic Object is a software consulting company that specializes in custom software design and development
 - Project goal: Create a custom dashboard to be used in different Atomic Object offices that displays a variety of information such as company, office, and employee-specific metrics (such as billable hours), upcoming events, image slideshows, etc.
 - The dashboard needs to draw from different data sources and APIs, and it must be customizable, scalable, and easy to read
- Project Plan Document
 - 15% complete
 - Sections completed: executive summary, draft user interface design, basic description of risks



Team Atomic Object

Status Report

[2 of 4]

Custom Data Visualization Dashboard

- Server Systems/Software
 - Currently not using any server systems/software
- Development Systems/Software
 - GitHub repository provided by the client, and everyone submitted their GitHub accounts to the client to be added to the repository
 - Everyone has Visual Studio/Visual Studio Code installed on their systems
 - Back-end: NodeJS
 - ❖ We will use NodeJS to pull data from sources
 - ❖ We have a NodeJS server that is serving our React app
 - Front-end: Jinja, HTML/CSS, JS, React
 - ❖ We have a Hello World program in React
 - Data visualization libraries: Chart.js



Team Atomic Object

Status Report

[3 of 4]

Custom Data Visualization Dashboard

- Client Contact
 - Had Initial Project Meeting with client on 9/7 to discuss project overview, goals, and what constitutes a minimum viable product
 - Scheduled weekly conference calls with client on Thursdays from 9:00-10:00am
 - Met with managing partners from two Atomic Object offices (Ann Arbor and Chicago) on 9/12 to discuss dashboard preferences/changes to be made to new dashboard
- Team Meetings
 - Mandatory weekly team meeting time: Thursdays at 5:00pm
 - Team also met on 9/9, 9/11, and 9/12 to discuss material for Status Report Presentation/Project Plan document
- Team Organization
 - Main Client Contact: Abigail
 - Front-End: Neil, Abigail, Wenrui
 - API/Backend: Chandan, Frank



Team Atomic Object

Status Report

[4 of 4]

Custom Data Visualization Dashboard

Risks

- **Setting up Fake Data/Future Integration**
 - Our dashboard will be developed with fake (placeholder) data, but real data must be easily integrated
 - Mitigation: Contacted Micah Alles for a meeting to learn where the real data is stored/what APIs are used for the current dashboard so that we may set up access to the fake data in a similar way for the new dashboard
- **Hosting**
 - The dashboard needs to be hosted through Atomic Object's domain
 - Mitigation: Discuss with Micah Alles this week to learn more about how this process of hosting on their domain will work
- **Privacy**
 - Employee information must be kept private (Inspect Element), also there are worries about clients walking in and viewing private company metrics
 - Mitigation: Figure out how to keep private information in the back-end so it cannot be shown anywhere in the front-end, may need to create two versions of the dashboard for office use and for personal employee use
- **User Preference**
 - Office managers have different views on what to put on the dashboard. Throughout the offices there are varying opinions of how "fun" vs. "practical" the dashboard should be (such as using a social events pictures slideshow vs. focusing on metrics)
 - Mitigation: Make the dashboard customizable so offices can choose what to display, make features such as charts or image slideshows easy to add or remove



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U N I V E R S I T Y

Status Report Presentation

A-O Merch Search

The Capstone Experience

Team Auto Owners

Caroline Gormely

Tyler Gyulveszi

John Lin

David Sugai

Samuel Ward

Yuzhen Zhou

Department of Computer Science and Engineering

Michigan State University

Fall 2022



*From Students...
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Team Auto Owners

Status Report

[1 of 4]

A-O Merch Search

- Project Overview
 - Develop a website to allow Auto Owners associate to purchase products
 - Include a login page with single layer authentication
 - Build a virtual store that mimics a typical online shopping experience
 - Administrative dashboard that allows answering of analytical questions
- Project Plan Document
 - Document roughly 50% completed
 - Assigned roles for each section
 - Started making mockups to be included in document



Team Auto Owners

Status Report

[2 of 4]

A-O Merch Search

- Server Systems / Software
 - Microsoft SQL server on Ubuntu server up and running
 - Database with all merchandise items created
 - SQL server is accessible by local and remote device
- Development Systems / Software
 - React Frontend – Mock Website deployable on local systems
 - Java Spring Boot REST API – Connected React and Springboot
 - Github repository created



Team Auto Owners

Status Report

[3 of 4]

A-O Merch Search

- Client Contact
 - Weekly conference call with client: Thursdays at 9:30 am
 - Currently have met twice
- Team Meetings
 - Weekly triage meeting with Tommy:
 - Mondays at 5 pm
 - Weekly team meeting:
 - Tuesdays at 6 pm
 - Currently have met three times
- Team Organization
 - Front-end: Tyler, Ian, and John
 - Back-end: David, Sam, and Caroline



Team Auto Owners

Status Report

[4 of 4]

A-O Merch Search

Risks

- Saving payment information
 - Users will check out and purchase the items in their shopping cart. We need to do this without obtaining any sensitive information.
 - Our application will completely mock the payment portion and will not ask users to put in any sort of payment information (credit card number, etc.)
- Connecting the database to the frontend
 - All of the merchandise items that users can purchase are stored in a database. In order for users to view these items on the website, we need to find a way for the front-end to communicate with the database.
 - To mitigate this risk, our project will use Spring Boot which will communicate with both the front-end and the back-end. Using Spring Boot, the items stored in the database will be sent to the front-end so they can be displayed for users to see.
- Protecting our own information
 - Testing our application will involve us acting as users, adding items to our cart and checking out to purchase those items. When testing, we must be sure to not include our own information such as our shipping address in the application.
 - To protect our own sensitive information, we will be using mock data for testing purposes.



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U N I V E R S I T Y

Status Report Presentation

Synthetic Image Generation via Random Noise

The Capstone Experience

Team CSAA Insurance

William Long
Matthew Baxter
AJ Bensman
Zongyuan Li
John Park
Joe Romain

Department of Computer Science and Engineering
Michigan State University

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Team CSAA Insurance

Status Report

[1 of 4]

Synthetic Image Generation via Random Noise

- Project Overview
 - Flask app created
 - Model is being tested
 - Database solutions and compute resources being researched
 - Waiting on AWS account information
- Project Plan Document
 - Template created
 - Sections have been assigned
 - Nothing written



Team CSAA Insurance

Status Report

[2 of 4]

Synthetic Image Generation via Random Noise

- Server Systems / Software
 - AWS Elastic Beanstalk / Not hosted waiting on sponsor
 - AWS EC2 / Not created waiting on sponsor
 - Database storage / Not in use, researching solutions
- Development Systems / Software
 - Docker Container / Running and tested
 - Gitlab / created with everyone added to it



Team CSAA Insurance

Status Report

[3 of 4]

Synthetic Image Generation via Random Noise

- Client Contact
 - Contacted the client September 30
 - Set up a weekly meeting time of Mondays at 5:00 pm
- Team Meetings
 - The team has met 3 times so far over Microsoft Teams
 - Our weekly scheduled meeting is Wednesdays at 8am
- Team Organization
 - Segmented team into front end, back end, and model development
 - Currently 2 people are assigned to each group, but people can move as needed



Team CSAA Insurance

Status Report

[4 of 4]

Synthetic Image Generation via Random Noise Risks

- Risk 1
 - Lack of data to fine tune the model
 - Web scraping or textual inversion
- Risk 2
 - The Model being too slow for practical use
 - Talking to sponsor about increasing GPUs at our disposal
- Risk 3
 - Get AWS EC2 instance with the power to support the model affordably
 - Meadowrun or find a way to shut down model when not in use
- Risk 4
 - How to trigger the EC2 instance to run the model from the website
 - Meadowrun or using AWS lambda



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Status Report Presentation
Augmented Reality Utilizing IoT
Technology
The Capstone Experience

Team GM

Sarah Palmer
Anthony Salem
Connor Pangle
Ningshu Li
Ian Hay
Kaezar Leonard

Department of Computer Science and Engineering
Michigan State University

Fall 2022



From Students...
...to Professionals

Team GM

Status Report

[1 of 4]

Augmented Reality Utilizing IoT Technology

- Project Overview
 - Create an application that runs on Microsoft HoloLens 2
 - Utilize the HoloLens as an extra layer of security
 - Communicate between HoloLens and Raspberry Pi
 - Utilize the HoloLens to activate a magnetic lock to reveal a QR code in Augmented Reality space
- Project Plan Document
 - We have started gathering more in-depth information
 - We have a rough draft of specific milestones
 - We are about 10% done



Team GM

Status Report

[2 of 4]

Augmented Reality Utilizing IoT Technology

- Server Systems / Software
 - VMWARE – Not setup or tested
 - Raspberry Pi – Received and not tested
 - GitHub – Setup and tested
- Development Systems / Software
 - Unreal Engine – Downloaded and tested
 - HoloLens – Received and not tested



Team GM

Status Report

[3 of 4]

Augmented Reality Utilizing IoT Technology

- Client Contact
 - Met with our client once via Teams
 - Setup a weekly meeting
 - Received hardware and software
- Team Meetings
 - Two meetings per week in Capstone Labs
 - Daily communication through group chat
 - File sharing and resource tracking via private Teams channel
- Team Organization
 - Client Contact – Sarah
 - HoloLens / Unreal – Kaezar, Connor, Ian, Sarah
 - Raspberry Pi / Server – Anthony, Ningshu



Team GM

Status Report

[4 of 4]

Augmented Reality Utilizing IoT Technology Risks

- Raspberry Pi Communication
 - Potential issue with implementing a secure connection from HoloLens to Raspberry Pi to the magnetic lock.
 - Testing the connection between each item separately
- Push the Unreal environment to HoloLens
 - Seeing the Augmented Reality space from unreal on the actual HoloLens device
 - Downloading tutorials on the integration between both
- Determine the security check being used
 - What form of authentication will be used to access the lock
 - We need to ask GM specifically what they are looking for / Test HoloLens to see what is possible.



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U N I V E R S I T Y

Status Report Presentation

Android Exploit Fuzzing Analysis

The Capstone Experience

Team Google

Anurag Kompalli
Shubham Chandna
Karan Singh
Catherine Xu
Michael Umanskiy
Romario Rranza

Department of Computer Science and Engineering
Michigan State University

Fall 2022



*From Students...
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Team Google

Status Report

[1 of 4]

Android Exploit Fuzzing Analysis

- Project Overview
 - Write fuzzer descriptions to search for bugs in the Linux Kernel
 - Analyze exploits to create generalized fuzzer descriptions
 - Aggregate fuzzer metrics into a common data store
 - Visualize metrics on a website
- Project Plan Document
 - Started the Project Plan Document
 - Finished the Executive Summary
 - Currently Working on the Functional Specifications



Team Google

Status Report

[2 of 4]

Android Exploit Fuzzing Analysis

- Server Systems / Software
 - Rack mounted server set up with Fuzzing Framework, Node.JS, Angular and MySQL Server
 - Tested all software
- Development Systems / Software
 - VMware Fusion installed with Windows and Ubuntu VMs
 - Ubuntu VM has MySQL Server, Node.JS and Angular installed
 - Need to set up fuzzing framework
 - GitHub created for Project



Team Google

Status Report

[3 of 4]

Android Exploit Fuzzing Analysis

- Client Contact
 - Talked with all sponsors
 - Received a high-level overview of project requirements
 - Scheduled weekly touch-base conference call
 - Wednesday Evenings
- Team Meetings
 - Team has met roughly 5 times
 - Weekly team meetings have been scheduled for Tuesday 4:30 PM EST.
- Team Organization
 - Fuzzer/Kernel Work (Syzkaller, Linux Kernel)
 - Romario, Michael and Karan working heavily on backend
 - Frontend Work (Angular, MySQL, GKE)
 - Anurag, Shubham and Catherine splitting time between frontend and backend.



Team Google

Status Report

[4 of 4]

Android Exploit Fuzzing Analysis

Risks

- Priority of Fuzzing Datapoints
 - Need to select datapoints that deliver meaningful insight
 - Gain experience with fuzzing and analyze commonalities/differences between Syzkaller crash reports to figure out which datapoints are relevant and useful
- Representing the Data on the Dashboard
 - Need to visualize data in a creative and meaningful way
 - Leverage our gained experience writing fuzzers, along with the experience of the project sponsors to iterate over different types of designs
- Scalability
 - As we write more fuzzing descriptions, one concern is how to scale the dashboard metrics and the syzkaller instances.
 - Leverage tools that help with scalability such as Docker and Kubernetes to make sure that the system can perform under load.



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Status Report Presentation
Templatize R Development via
Design Thinking
The Capstone Experience

Team Kellogg's

Savvy Barnes
Tolu Fashina
Jonathan Shomali
Matt DiRisio
Devin Masiak

Department of Computer Science and Engineering
Michigan State University

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*From Students...
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Team Kellogg's

Status Report

[1 of 4]

Templatize R Development via Design Thinking

- Project Overview
 - Kellogg's uses Global Business Services to interact with customers
 - These apps are created in R/Shiny
 - As developers have added tools, the look of the apps have diminished
 - We need to create ADA compliant and reusable R templates that match the image of Kellogg's so that the apps are cohesive
- Project Plan Document
 - The outline is complete
 - The executive summary is complete
 - Technical specifications and summary have been started
 - 33% total is completed



Team Kellogg's

Status Report

[2 of 4]

Templatize R Development via Design Thinking

- Server Systems / Software
 - No servers necessary
- Development Systems / Software
 - R Studio/Shiny and several packages have been installed.
 - “Hello World” was successfully run-on R
 - Tableau has been installed and tested.



Team Kellogg's

Status Report

[3 of 4]

Templatize R Development via Design Thinking

- Client Contact
 - We have met with our client for a 30-minute meeting on Thursday, 9/8.
 - Our weekly conference call with our client is scheduled for Tuesday's 9 – 10 AM
- Team Meetings
 - Scheduled weekly in-person meetings for Thursday's 9:20 -10 AM+
 - We have met 3 times as a team
- Team Organization
 - Savvy is the client contact
 - Jonathan is the note-taker
 - We have two who are best at backend, two at frontend, and one drifter.



Team Kellogg's

Status Report

[4 of 4]

Templatize R Development via Design Thinking

Risks

- Integrating the Application
 - We have never used Kellogg's GBS and won't have access to any populating data, so understanding the application and reintegrating may be challenging
 - We expect to clarify with stakeholders on Thursday and stay in contact with the tech-lead in case this becomes a problem moving forward
- Scheduling Conflicts
 - We all have complete opposite schedules between ourselves and with our sponsor
 - We've worked out early morning that work for us and have agreed that working online and/or without the whole team is less than ideal, but occasionally necessary
- Heavy Design Element
 - Our project focuses heavily on design, and only two of us have experience with that
 - We are going to create several prototypes and present to Kellogg's as often as possible to make sure our design matches the company's image



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U N I V E R S I T Y

Status Report Presentation

Backstage's Back Alright

The Capstone Experience

Team Kohl's

Mike Guan

Gage Hohwart

Joey Meng

Miriam Oginsky

Blake Sabbagh

Department of Computer Science and Engineering

Michigan State University

Fall 2022



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Team Kohl's

Status Report

[1 of 4]

Backstage's Back Alright

- Project Overview
 - Internal developer portal to manage various technologies
 - Portal designed as a single place to onboard, access, test, and deploy products
 - Project goal is to improve efficiency and coding standards by replacing existing API with custom actions
- Project Plan Document
 - Document created and outline made
 - Risk analysis created
 - Executive Summary drafted
 - 20% completed



Team Kohl's Status Report

[2 of 4]

Backstage's Back Alright

- Server Systems / Software
 - Google Cloud Services – Kohl's side, up and running
 - Onboarding API – Up and running for local testing
 - Basic Backstage application – Up and running for local testing
- Development Systems / Software
 - TypeScript, React, Backstage
 - The frontend of the portal will be developed in React and TypeScript
 - The backend of the portal will be handled in TypeScript



Team Kohl's

Status Report

[3 of 4]

Backstage's Back Alright

- Client Contact
 - First meeting with client on 9/8, second meeting 9/12
 - Weekly meetings scheduled for Fridays
- Team Meetings
 - 4 team meetings so far
 - Weekly meetings scheduled for Thursdays after class
- Team Organization
 - Mike, Gage, Joey, Blake - Full Stack, Miriam - Backend
 - Miriam – Client Contact, Gage – Sprint Coordinator



Team Kohl's

Status Report

[4 of 4]

Backstage's Back Alright

Risks

- Risk 1
 - Working with Backstage, a new open-source tool for creating developer portals.
 - Mitigation - Meeting with Kohl's developers to talk about how they use backstage and how the team intends for us to work with the tool.
- Risk 2
 - Ensuring all APIs are properly secured with authentication.
 - Mitigation - Find and utilize libraries in our backend that will allow us to limit access for certain users and will also provide encryption for all sensitive information traveling through the backend pipeline.
- Risk 3
 - Onboarding without a Mac or Linux environment (sponsor does not use Windows).
 - Mitigation – Finding workarounds for installing onboarding dependencies on Windows or remote connecting to iMacs in the engineering building lab.
- Risk 4
 - Testing with different platforms and environments outside of Kohl's internal network may be a challenge.
 - Mitigation – Test locally first and work with Kohl's developers to determine the progress.



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Status Report Presentation
LiDAR and Stereo Image Fusion for
Autonomous Navigation
The Capstone Experience

Team Lockheed Martin Space

Matt Anikiej

Carlo Barths

Michael Dittman

Nate Ferry

Dom Mazza

Department of Computer Science and Engineering
Michigan State University

Fall 2022



From Students...
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Team Lockheed Martin Space

Status Report

[1 of 4]

LiDAR and Stereo Image Fusion for Autonomous Navigation

- Project Overview
 - Fusion of LiDAR and Stereo Image detection methods through state-of-the-art object detection networks
 - Integration of MQTT communication on Lockheed SmartSat platform on Linux and VxWorks
- Project Plan Document
 - Created a full outline of the document
 - Sections split based on development responsibilities
 - General system architecture definition in progress
 - Document 20% complete



Team Lockheed Martin Space

Status Report

[2 of 4]

LiDAR and Stereo Image Fusion for Autonomous Navigation

- **Server Systems / Software**
 - Nvidia Jetson is being flashed with Jetpack 4.6.2
 - Dell server will be set up this week
 - Zync Ultrascale+ will be used for SmartSat development
- **Development Systems / Software**
 - GitLab Repo created for source control
 - Trello board created for sprint tracking
 - Team has done ROS tutorial to understand development systems



Team Lockheed Martin Space

Status Report

[3 of 4]

LiDAR and Stereo Image Fusion for Autonomous Navigation

- Client Contact
 - Initial client meeting last Tuesday
 - Meeting with clients at 5:00 on Thursdays for the rest of the semester
- Team Meetings
 - 3 in-person meetings so far
 - Evening meetings scheduled to work around time constraints
- Team Organization
 - Dom is working on the ROS wrapper.
 - Michael is working on the SmartSat messaging mechanism plugin utilizing an open source MQTT API
 - Nate is working on the Lidar and stereo image Fusion.
 - Matt and Carlo are working on the neural networks that will process the fused point clouds.



Team Lockheed Martin Space

Status Report

[4 of 4]

LiDAR and Stereo Image Fusion for Autonomous Navigation

Risks

- Risk 1
 - Switching over from prerecorded Lidar data to live sensor data
 - ROS provides tools allowing easy reading of sensor data
- Risk 2
 - Development of a new system for fusion of LiDAR and stereo data
 - Will be adapting stereo data to established pointcloud data format
- Risk 3
 - Creation of a neural network to process fused pointclouds
 - Training established network architectures on adapted format
- Risk 4
 - Training of neural networks is very computationally expensive and time consuming
 - If the models are not able to be reasonably trained on our own machines, then cloud computing services like AWS or GCP can be easily used
 - For deployment, Nvidia Jetson will be used



Status Report Presentation

Dashboard for Data Visualization

Team Magna

Nate Bollman

Dylan Burke

Daryn Dratt

Yetian Chai

Brian Greifenberg

Matthew Hofmann

Department of Computer Science and Engineering

Michigan State University

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Dashboard for Data Visualization

- Project Overview
 - Connect QuickSight to a Magna AWS database
 - Make sure Data from AWS database can update in real-time to QuickSight
 - Create a Dashboard to visualize Magna's data on AWS
 - Integrate the Dashboard into Magna's web site
- Project Plan Document
 - Project plan document has been started
 - Basic table of contents, executive summary, schedule
 - Approximately 20% complete



Team Magna

[2 of 4]

Dashboard for Data Visualization

- Server Systems / Software
 - Will soon have access to Magna's AWS platform for data storage
- Development Systems / Software
 - Will use Jira to track project status. We will have access soon
 - Local code editor (such as Visual Studio)
 - AWS Code Commit repository for version control



Dashboard for Data Visualization

Risks

- Risk 1
 - Refreshing data to show near real time results
 - Worst case: a button to refresh, best case: refresh when new data is submitted
- Risk 2
 - Integration/embedding of dashboards into Vue files
 - Match format with currently existing files, discuss problems with Magna contact
- Risk 3
 - Displaying large amounts of data in a way that the user can understand
 - Find the balance between too much information and not enough based on client needs
- Risk 4
 - Integration of visualization software with AWS
 - Use of either Amazon QuickSight or PowerBI depending on which integrates more easily



Team Magna

[3 of 4]

Dashboard for Data Visualization

- Client Contact
 - Met with our client twice, weekly meetings on Monday
 - In the process of signing NDAs and IPAs
- Team Meetings
 - Met as a team four times
 - Weekly meetings on Thursday and Sunday
- Team Organization
 - Contact between Magna and Students: Dylan Burke
 - HTML/JSON Web integration (Dylan/Nate), AWS-SQL integration (Matt/Yetian), QuickSight visuals (Daryn/Brian)



MICHIGAN STATE

UNIVERSITY

Status Report Presentation

Simply Give Automation

The Capstone Experience

Team Meijer

Jacob Pavlawk

Josh Jacob

Ricardo Paz

Matthew Mannausa

Samantha Sebestyen

Mounika Jeti

Department of Computer Science and Engineering

Michigan State University

Fall 2022



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

Team Meijer

Status Report

[1 of 4]

Simply Give Automation

- Project Overview
 - Create web page and mobile app to isolate Simply Give contributions.
 - Allow contributions from anonymous users.
 - Provide a business analytics dashboard of contribution data.
- Project Plan Document
 - Goals written for first sprint.
 - Started writing down functional specifications.
 - Finished first two weeks of schedule.



Team Meijer

Status Report

[2 of 4]

Simply Give Automation

- Server Systems / Software
 - Azure SQL Database – Waiting for access.
 - Azure DevOps – Team dashboard created.
 - Meijer Git Repo – Tested and first clone/push done.
- Development Systems / Software
 - Web App: React.js – Tested and ready.
 - Mobile App: React Native – Tested and ready.



Team Meijer

Status Report

[3 of 4]

Simply Give Automation

- Client Contact
 - Had first meeting with client.
 - Scheduled weekly meeting Thursdays 4:30pm on Teams.
- Team Meetings
 - Scheduled weekly meeting Tuesdays 4:30pm in lab.
 - Have met outside of scheduled meeting 3 times.
- Team Organization
 - Client Contact: Mounika, Project Manager: Jacob
 - Front End: Samantha, Mounika, Josh
 - Back End: Ricardo, Jacob, Matthew



Team Meijer

Status Report

[4 of 4]

Simply Give Automation Risks

- Interacting with Meijer APIs
 - Integrating our software with existing Meijer resources.
 - Meet with Meijer Developer for training with Meijer systems.
- Anonymous Contribution Option
 - Making an experience for an anonymous user the same as someone signed in.
 - Discuss with Meijer the idea of a guest profile.
- Employee Analytics Page
 - Verify employee credentials to allow access to analytics page.
 - Research permission handling.



MICHIGAN STATE

U N I V E R S I T Y

Status Report Presentation

Mobile App for Remote Recording

The Capstone Experience

Team Michigan State University Linguistics

Gengyuan Bai
Sonia Moozhayil
Jennifer Tran
Lucas Wilkerson
Jake Zolkosky

Department of Computer Science and Engineering
Michigan State University

Fall 2022



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

Team Michigan State University Linguistics

Status Report

[1 of 4]

Mobile App for Remote Recording

- Project Overview
 - High quality acoustic recording of sufficient length
 - Redevelop Apps in native language
 - Create non-programmer friendly documentation
 - Modular code to accommodate multiple research projects
- Project Plan Document
 - Created project plan document
 - Started thinking about what to add to the document
 - About 4% done



Team Michigan State University Linguistics

Status Report

[2 of 4]

Mobile App for Remote Recording

- **Server Systems / Software**
 - Backend hosted on MSU Linguistics server
 - Using existing server hosted by MSU Linguistics
 - Using Docker, Node.Js, and FeathersJs
- **Development Systems / Software**
 - Android studio and Kotlin for Android development
 - Minimum API version 31 due to August 2022 requirements
 - XCode and Swift for IOS development
 - Minimum IOS 11 or better
 - Jira Software
 - Our team is using Jira for task management and assignment



Team Michigan State University Linguistics

Status Report

[3 of 4]

Mobile App for Remote Recording

- Client Contact
 - Russ Werner, Betsy Sneller
 - Have met with clients 9/7 and 9/9 to discuss project overview, features, and expectations moving forward
 - Standing meeting every Friday at 11:30am going forwards
- Team Meetings
 - First full meeting on 9/9, standing meeting on Wednesday at 12:30pm
 - Daily Standup reports to ensure everyone is making progress
- Team Organization
 - Client Contact: Jennifer Tran
 - Program Manager: Lucas Wilkerson
 - IOS Developers: Sonia Moozhayil, Jennifer Tran, Lucas Wilkerson
 - Android Developers: Gengyuan Bai, Jake Zolkosky, Lucas Wilkerson



Team Michigan State University Linguistics

Status Report

Mobile App for Remote Recording

Risks

- Risk 1
 - Creating Modular Software: Easily modified by those with little coding experience
 - Heavy documentation and creating a format that both follows app store standards and allows for one variable to change application assets
- Risk 2
 - Migration from Flutter to Swift/Kotlin to retain the app capabilities and design consistency
 - Read documentation on migration from Flutter to Swift/Kotlin



Status Report Presentation

Making STEM Papers Accessible to ASL Users

The Capstone Experience

Team Microsoft

Aditya Ashok

Aidan O'Rourke

Alex Woodring

Jiancong Huang

Ricky Pennepalli

Tommy Kocab

Department of Computer Science and Engineering
Michigan State University

Fall 2022



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

Team Microsoft

Status Report

[1 of 4]

Making STEM Papers Accessible to ASL Users

- Project Overview
 - Create a reading tool that enables the user to select a word or phrase and receive an ASL translation
 - Utilize the functionality of chrome extension to allow user to highlight word/phrase and translate to ASL using a robust backend model
- Project Plan Document
 - Started on the Project Plan Document with Executive Summary and Functional Specifications written down
 - Discussing the Design Specifications and Technical Specifications along with Schedule



Team Microsoft

Status Report

[2 of 4]

Making STEM Papers Accessible to ASL Users

- Server Systems / Software
 - With our current design, Server Systems will not be needed
- Development Systems / Software
 - Set up chrome extension, built simple JavaScript app that reads highlighted text and sends to a backend
 - Successfully read sample data given to us by Microsoft to Python
 - Created a machine learning model and algorithm that can successfully use the sample data



Team Microsoft

Status Report

[3 of 4]

Making STEM Papers Accessible to ASL Users

- Client Contact
 - First Weekly Meeting on Friday 3:00pm
 - Offered office hours for us if we have questions (TBD)
- Team Meetings
 - Weekly Team Meeting after Weekly Triage
- Team Organization
 - 4 Members work on backend development (python)
 - 2 Members work on frontend development (chrome extension)



Team Microsoft

Status Report

[4 of 4]

Making STEM Papers Accessible to ASL Users

Risks

- Risk 1
 - Uncertain on how to build a robust model using Cross-Lingual entity linking
 - Client provided resources and researches on the specific model
- Risk 2
 - None of our members have any experience with ASL
 - Learn basic ASL and Microsoft promised to provide external helps
- Risk 3
 - Schedule confliction – limited time on when to meet
 - Meet early or late night / virtually
- Risk 4
 - Unfamiliar with front-end development
 - Research on UX/UI design and talk to product users



MICHIGAN STATE

U N I V E R S I T Y

Status Report Presentation

Digital Transformation of Member Data

The Capstone Experience

Team MSUFCU

Vishnu Bhupathiraju

Sadeem Boji

Chris Cardimen

Chris Chen

Liam McCune

Jotham Teshome

Department of Computer Science and Engineering

Michigan State University

Fall 2022



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

Team MSUFCU

Status Report

[1 of 4]

Digital Transformation of Member Data

- Project Overview
 - Categorize and recommend local loyalty programs using transaction-based machine learning and artificial intelligence
 - Enhance existing P2P systems within the MSUFCU ecosystem
 - Design Android/iOS prototypes of new features
- Project Plan Document
 - We have not yet started our Project Plan Document
 - Reviewed Project Plan Documents from previous years
 - Discussed how we would layout our Project Plan Document



Team MSUFCU

Status Report

[2 of 4]

Digital Transformation of Member Data

- Server Systems / Software
 - Database server not yet deployed – 0% complete.
 - Waiting on data from MSUFCU to fill database and determine the exact layout of the system – 0% complete.
 - Deciding between SQLite3, MySQL, and Firebase (NoSQL) for data management - 20% complete.
- Development Systems / Software
 - Installed Android Studio and XCode on all iMacs and personal devices – 100% complete.
 - Setup GitLab Repository for Android and IOS project for version control – 100% complete.
 - Tying prototype backend and frontend systems together to illustrate how data will be used and navigated – 30% complete.



Team MSUFCU

Status Report

[3 of 4]

Digital Transformation of Member Data

- Client Contact
 - Client sending transaction data this week
 - Weekly Conference calls have been scheduled for Fridays at 12:30pm via WebEx
- Team Meetings
 - Met twice with full attendance, and multiple times in smaller groups
 - Team meetings have been scheduled for once a week immediately after our 6:00 pm Triage meetings on Tuesdays
- Team Organization
 - Chris Cardimen and Chris Chen developing Android App
 - Vishnu and Jotham developing IOS App
 - Sadeem and Liam setting up database system



Team MSUFCU

Status Report

[4 of 4]

Digital Transformation of Member Data

Risks

- Risk 1
 - What machine learning technique is suitable for our project, if any
 - Research different kinds of machine learning techniques and select one, or more, based on their pros and cons
- Risk 2
 - How NFC readers work and how devices interact with each other using NFC
 - Research what NFC is and how to set it up in our project, as well as how to get devices to communicate using NFC
- Risk 3
 - How to set up database for both iOS and Android applications
 - Design an architecture for how we would use the database on both systems simultaneously without redundancy
- Risk 4
 - Not receiving data by end of week will block progress on spending analysis module
 - Following up with project sponsors throughout week to ensure delivery of data



MICHIGAN STATE

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Status Report Presentation

The Capstone Experience

Team Roosevelt Innovations Data Science

Justin Doan

Carson Honkala

Jeffrey Lo

Tanawan Premisri

Junchi Zhu

Kate Roney

Department of Computer Science and Engineering

Michigan State University

Fall 2022



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

Team Roosevelt Innovations Data Science

Status Report

[1 of 4]

Provider Anomaly Analytics Toolkit

- Project Overview

- Create a website that allows our sponsors to visualize fraud, waste and abuse statistics about their dental providers
- Gather statistics from a synthetic database and aggregate into a risk score
- Should be flexible to use different data sources and be expanded upon in the future
- Implement user-friendly data visualizations that allow comparison of dental providers

- Project Plan Document

- Skeleton created with expected sections
- Table of Contents created
- Preliminary schedule made with important deadlines
- General project plan description added



Team Roosevelt Innovations Data Science

Status Report

[2 of 4]

Provider Anomaly Analytics Toolkit

- Server Systems / Software
 - Simple node.js server with angular has been set up
 - Found out how to connect Snowflake database to node server
 - Still waiting for access to internal Snowflake database
- Development Systems / Software
 - Made simple graphs with angular libraries
 - Installed Webstorm IDE and Vscode
 - Created a Python Streamlit prototype for the server



Team Roosevelt Innovations Data Science

Status Report

[3 of 4]

Provider Anomaly Analytics Toolkit

- Client Contact
 - Had initial meeting to flesh out high-level specifications
 - Scheduled weekly meetings with sponsors, Friday 9-10AM
- Team Meetings
 - Scheduled weekly team meeting, Monday 5:20PM
 - Our team has been able to meet 4 times
- Team Organization
 - Carson has served as primary contact with client
 - General technical roles have been assigned to each team member



Team Roosevelt Innovations Data Science

Status Report

[4 of 4]

Provider Anomaly Analytics Toolkit

Risks

- Determine the correct technologies to use
 - Our sponsors have given us flexibility deciding which technologies to use
 - Decided on using node.js to set up the server
- Ensuring solution is expandable
 - Sponsor wants to be able to use our website for different data visualizations in the future
 - Design with due diligence in planning phase
- Connection of server to database
 - Must determine best way to provide data to web application
 - Research connection methods to see what is possible
- Creating effective data visualizations
 - Must determine the required information and functionality of the data visualizations to be displayed
 - Started on a mock dashboard to show to sponsors to receive feedback



MICHIGAN STATE

U N I V E R S I T Y

Status Report Presentation

DSL IDE Test Harness

The Capstone Experience

Team Roosevelt Innovations Knowledge Science

Chase DeVries

Christian Lulaj

Jason Harris

Kristian Rica

Xinghe Zhang

Department of Computer Science and Engineering

Michigan State University

Fall 2022



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

Team Roosevelt Innovations Knowledge Science

Status Report

[1 of 4]

DSL IDE Test Harness

- Project Overview
 - R.I.K.S uses a DSL known as GRACE(General Rate Calculation Environment) that allows actuaries to compute rate calculations for their clients
 - We must add a testing mechanism to the GRACE IDE created by the previous capstone
 - Develop a UI that allows for inputs for testing and triggering mock calculations
 - Analyze GRACE Programs to specify if the inputs are provided from outside sources
- Project Plan Document
 - The project plan document has been shared with team members
 - Outline for plan is not complete (awaiting access)
 - Project Plan Status: ~2%



Team Roosevelt Innovations Knowledge Science

Status Report

[2 of 4]

DSL IDE Test Harness

- Server Systems / Software
 - Awaiting access from sponsor
- Development Systems / Software
 - GRACE IDE – Awaiting access from sponsor
 - Angular – Working environment has been created and tested
 - Frontend Repository has been created



Team Roosevelt Innovations Knowledge Science

Status Report

[3 of 4]

DSL IDE Test Harness

- Client Contact
 - We have met with our client once
 - We have weekly conference calls on Teams scheduled Tuesdays mornings 9:00am -10:00am
- Team Meetings
 - Virtual Meetings on Teams
 - Sprint Planning/Problem Solving on Mondays
 - Daily Stand-Ups Tuesday-Friday
 - We have met 3 times already
- Team Organization
 - Jason Harris(Front-End/Deliverable Manager)
 - Chase DeVries (Contact, Front-End)
 - Christian Lulaj (Front-End, ANTLR)
 - Kristian Rica (Back-End, IT/SysAdmin)
 - Xinghe Zhang (Back-end/Front-end)



Team Roosevelt Innovations Knowledge Science

Status Report

[4 of 4]

DSL IDE Test Harness

Risks

- Risk 1
 - Description
 - Setting up working client/server and figuring out how technologies tie together to set up working environment we could build off of
 - Mitigation
 - Create a dummy working environment with working code. Assign very specific roles and technologies to team members to ensure no work is being done twice or time is wasted.
- Risk 2
 - Description
 - Utilizing ANTLR grammar to parse the GRACE program to locate and find the session specific items that need to come from outside sources
 - Mitigation
 - Have a walkthrough of how ANTLR is already being implemented to the existing software to get a better understanding of how the grammar tool operates with the system. Build off the existing functionalities to extend them to fit our needs
- Risk 3
 - Description
 - Generate Angular frontend dynamically to accept input for any number of variables specified as data from an outside source in GRACE file
 - Mitigation
 - Create a simple Angular frontend with variable number of listed items displayed and a randomize list length button that re-draws the list of items



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Status Report Presentation
RPM Drive Mobile App Extension and
Enhancements
The Capstone Experience

Team RPM

Andrew Hou

Hanshi Zuo

Archer Liu

Nikit Parakh

Zach Troxell

Department of Computer Science and Engineering
Michigan State University

Fall 2022



From Students...
...to Professionals

Team RPM

Status Report

[1 of 4]

RPM Drive Mobile App Extension and Enhancements

- Project Overview
 - Solidified understanding of proposal after discussions with the client
 - Familiarizing ourselves with development environment and C#
 - Awaiting resources from client such as access to existing app and data base
 - Researching machine learning and mobile app development
- Project Plan Document
 - Created and assigned to team members
 - Working on creating mockups in code

Team RPM

Status Report

[2 of 4]

RPM Drive Mobile App Extension and Enhancements

- Server Systems / Software
 - Azure SQL Database Server – awaiting access
 - TNX Marketplace API – awaiting access
 - App host – awaiting more information from client
- Development Systems / Software
 - Visual Studio 2019
 - XCode
 - Xamarin with iOS and Android Emulators

Set up and run well on iMac in lab. Set up on personal computers too.



Team RPM

Status Report

[3 of 4]

RPM Drive Mobile App Extension and Enhancements

- Client Contact
 - Weekly Wednesday meeting with development team
 - Monthly meeting with CIO
 - Two Meetings
- Team Meetings
 - Four Meetings
 - Weekly Thursdays
- Team Organization
 - Andrew – UI Developer
 - Hanshi – ML Developer
 - Archer – ML Developer
 - Nikit – API Integration and Client Point-of-Contact
 - Zach – UI Developer



Team RPM

Status Report

[4 of 4]

RPM Drive Mobile App Extension and Enhancements Risks

- Effectively retrieving TNX data into RPM app
 - RPM app's bidding system redirects users to TNX site instead of operating natively
 - Look into TNX APIs to retrieve TNX recommendations
- Keeping track of who is eligible to be checked for rewards
 - Drivers can receive rewards for good driving, app needs to have basic functionality to make deposits
 - Assess how the app currently pays drivers and see if that interface is adaptable for this use case
- Selecting appropriate AI algorithms for recommendation
 - Drivers need recommendations for ideal payloads to pick up and deliver
 - Research technologies used in similar recommendation systems
- Implementing results of algorithms from above in RPM app
 - AI development/algorithms are mostly in Python while RPM app is in Xamarin (C#)
 - Research available APIs for porting results in Python to Xamarin



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Status Report Presentation

The Capstone Experience

Team Stryker

Abhiram Penmethsa

Shashwat Bhatia

Jake Perialas

Joseph Klynstra

Owen Evey

Department of Computer Science and Engineering

Michigan State University

Fall 2022



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

Team Stryker

Status Report

[1 of 4]

Technology Driven Inventory Optimization

- **Project Overview**

- Supply-chain/Blockchain tracker
- Android Mobile App (Hospital & Distributor/Representative)
- Power BI Dashboard & Filters
- Hardware Sensors (IoT)

- **Project Plan Document**

- Started initial documentation
- ~15% drafted
- Initial mock layout of mobile app



Team Stryker

Status Report

[2 of 4]

Technology Driven Inventory Optimization

- **Server Systems / Software**

- Server required but not set up yet

- **Development Systems / Software**

- Android Studio – Up and running (created initial mock layout)
- Power BI – Created a mock dashboard
- Blockchain development in Python



Team Stryker

Status Report

[3 of 4]

Technology Driven Inventory Optimization

- **Client Contact**

- David Irwin, IT Business Partner
- Guy Hughes, Sr. Director, IT Business Partner
- Client meeting (Friday 10am)
- Met with client once

- **Team Meetings**

- Team meeting (Sunday 3pm)
- Triage Meeting (Monday 9:30 – 9:50)
- Met with team twice (officially)

- **Team Organization**

- Android Studio – [Abhiram](#), Shashwat, Joe
- Power BI - [Abhiram](#), Joe
- Blockchain – Jake, Owen, Shashwat



Team Stryker

Status Report

[4 of 4]

Technology Driven Inventory Optimization Risks

- **Picking the correct Blockchain Network**
 - **Mitigation:** Meeting with professional contact and fleshing out the utility details
- **Communication between blockchain and Android Studio**
 - **Mitigation:** Testing the capabilities
- **Package tracker/sensor destroyed in sanitization**
 - **Mitigation:** Research into high pressure resistant sensors
- **Onsite Testing**
 - **Mitigation:** Travel to onsite location or communicate with hospital staff



MICHIGAN STATE

U N I V E R S I T Y

Status Report Presentation

Sharing Advice on Academic Harassment

The Capstone Experience

Team Targets' Tip

Melody Buado

Gigi Dauphinee

Lemmy Lin

Jacob Theobald

Logan Wolfe

Department of Computer Science and Engineering

Michigan State University

Fall 2022



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

Team Targets' Tip

Status Report

[1 of 4]

Sharing Advice on Academic Harassment

- Project Overview
 - Online multi-platform subscription service
 - Connects targets of academic harassment with survivors or professionals for advice
 - Chatting feature
 - Data storage and customizable analysis
- Project Plan Document
 - We have started it
 - Information that will go in the document is organized
 - We are beginning to create the mockups
 - 10% complete



Team Targets' Tip

Status Report

[2 of 4]

Sharing Advice on Academic Harassment

- Server Systems / Software
 - MySQL Server – Planned
 - PHP Storm/JavaScript - Downloaded
- Development Systems / Software
 - Android Studio - Downloaded
 - Xcode - Downloaded
 - Flutter (UI/Website) - Downloaded



Team Target's Tip

Status Report

[3 of 4]

Sharing Advice on Academic Harassment

- Client Contact
 - Lemmy is the main client contact
 - Weekly Client Meetings on Tuesdays at 7pm
 - We have met with the client once
- Team Meetings
 - Weekly Team Meetings on Tuesdays & Thursdays at 12:20pm
 - We have met as a team four times
- Team Organization
 - Frontend – Jacob, Lemmy, and Gigi
 - Backend – Logan and Melody



Team Targets' Tip

Status Report

[4 of 4]

Sharing Advice on Academic Harassment Risks

- Risk 1
 - Finding a proper UI/UX design for ease of user experience
 - Mitigation: Prototyping and sharing with the client
- Risk 2
 - Keeping user data safe and secure
 - Mitigation: Encryption
- Risk 3
 - Open-sourced software licensing
 - Mitigation: Acquire appropriate license
- Risk 4
 - Managing development on three platforms
 - Mitigation: Flutter or splitting the work amongst three people



MICHIGAN STATE

U N I V E R S I T Y

Status Report Presentation

TARA TechSmith Asset Recommendation Assistant

The Capstone Experience

Team TechSmith

Aryan Verma

Carson Farrel

Daniyal Dar

Michael Montgomery

Peter Song

Simon Harmata

Department of Computer Science and Engineering
Michigan State University

Fall 2022



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

Team TechSmith

Status Report

[1 of 4]

TARA

- Project Overview
 - Create a website that users can upload videos to
 - TARA gathers and processes audio and visual data
 - TARA generates search terms for the TechSmith Asset store
 - TARA displays content to preview, select, and download
- Project Plan Document
 - Title page complete
 - Table of Contents organized but will need sub-categories
 - Executive Summary is completed
 - Starting to write Functional Specifications page



Team TechSmith

Status Report

[2 of 4]

TARA

- Server Systems / Software
 - Virtual Machine and Microsoft Office set up on one Mac
 - GitHub accounts linked to TechSmith directory
 - Access to TechSmith Azure Sandbox has been set up
- Development Systems / Software
 - Barebones webpage set up using HTML
 - Flask VSC extension set up and connected to webpage
 - Using Azure and Python for machine learning tools



Team TechSmith

Status Report

[3 of 4]

TARA

- Client Contact
 - First meeting took place Friday 9/9
 - Weekly recurring meeting Friday @ 8:30am
- Team Meetings
 - Weekly Triage meeting will take place Friday @ 10:40am
 - Weekly recurring team meeting Tuesday @ 7:30pm
- Team Organization
 - Aryan and Carson are working on setting up a basic webpage
 - Simon, Daniyal, Peter, and Michael are researching and testing speech-to-text tools and ML implementation.
 - Everyone is working on the Project Plan



Team TechSmith

Status Report

[4 of 4]

TARA

Risks

- Utilized Azure to gather and save the data for the machine.
 - We are unfamiliar with using Azure to store the user's uploaded videos and send the information to the Machine.
 - Look around online for Azure videos to create a sample server to test and make sure the server perceives data and saves the data correctly.
- Training and testing data for the machine learning model.
 - We don't have a large data set of videos to use to train and test the machine learning model.
 - Look around online for a database of videos to use. We can also create videos of our own to help test and train.
- Accessing the TechSmith Asset Store
 - Needed so we are able to enhance our models to return better suggestions to be added for videos.
 - Access to the Asset Store would allow us to test various keywords and what suggestions they return.



MICHIGAN STATE

U N I V E R S I T Y

Status Report Presentation

Mobile Train Handling Simulator

The Capstone Experience

Team Union Pacific

Adam Kasumovic

Darien Ford

Kevin Shin

Nhat Vong

Nicholas Shari

Reid Harry

Department of Computer Science and Engineering

Michigan State University

Fall 2022



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

Team Union Pacific

Status Report

[1 of 4]

Mobile Train Handling Simulator

- Project Overview
 - Mobile train simulation game on iOS/Android/WebGL with realistic physics (existing app requires train hardware)
 - Used by on-demand locomotive engineers to train them on distributed power management
 - Built using Unity, a proprietary Physics API, and provided track files which emulate real train tracks on various terrains
 - Simplified, portable 2D version of their existing 3D simulator
- Project Plan Document
 - In-Progress: 33% Completed
 - Functional Specs & Risks/Mitigation completed
 - Technical Specs gathered from Client and written
 - System components done
 - Architecture – Initial Class Diagram and Game Flow Chart Generated, needs polish
 - Mockups – 2 initial UIs for gameplay created in Paint, will redo with Android studio



Team Union Pacific

Status Report

[2 of 4]

Mobile Train Handling Simulator

- Server Systems / Software
 - Testing WebGL build on itch.io
- Development Systems / Software
 - GitLab repository completely set up and everyone has pushed
 - Unity 2020.3.25f with Visual Studio and Xcode installed on our personal machines
 - Union Pacific's proprietary physics engine API to be integrated with our game.



Team Union Pacific

Status Report

[3 of 4]

Mobile Train Handling Simulator

- Client Contact
 - Met with client twice, weekly conference calls on Friday, 4 pm over Zoom
 - Signed NDA and IP agreements
 - Client is MSU and Capstone Alum, works for PS Technology, a Union Pacific subsidiary
- Team Meetings
 - Met with team three times, weekly meetings on Wednesday, 8 pm over Zoom
 - Also do on-demand meetings as needed for miscellaneous tasks
- Team Organization
 - Darien is our client contact and producer, managing our timeline and Trello board
 - Nhat specializes in 2D art for the game
 - Kevin and Reid will specialize in front-end UI
 - Adam and Nicholas will specialize in back-end



Team Union Pacific

Status Report

[4 of 4]

Mobile Train Handling Simulator

Risks

- Build Game to Target Platforms
 - Build Test App to iOS/Android/WebGL accounting for various resolutions and aspect ratios.
 - Build a test game to each platform early on to ensure we can do it later.
- Use Physics Engine API with Unity
 - Use PS Technology's Physics Engine (an external set of DLLs) to calculate forces along railcars in Unity. Compatibility is not guaranteed.
 - Create a 2D test scene that simulates a train and displays physics information.



MICHIGAN STATE
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Status Report Presentation
Injury and Damage Data Quick
Access App
The Capstone Experience

Team United Airlines Airport Operations

Hargun Atwal

Joseph Chen

Elizabeth DeBack

Emmanuel Marudo

Grace Mora

Department of Computer Science and Engineering

Michigan State University

Fall 2022



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

Team United Airlines Airport Operations

Status Report

[1 of 4]

Injury and Damage Data Quick Access App

- Project Overview
 - Contacted Client 9/02, plan to meet on 9/14
 - Identified roles within the team
 - Configured Environment
 - GitHub Repository, React Native, Visual Studio Code
 - Completed 2 iterations of wireframes using Figma
- Project Plan Document
 - Project plan shared with team members
 - Established Table of Contents
 - Significant progress: Executive Summary, Risk Analysis, Project Schedule
 - Approximately 25% completed



Team United Airlines Airport Operations

Status Report

[2 of 4]

Injury and Damage Data Quick Access App

- Server Systems / Software
 - AO Metric Dashboard – Spotfire, no access
 - SQL Server, no access
 - ARB SharePoint Data, no access
- Development Systems / Software
 - GitHub Repository, project framework published
 - React Native, need approval
 - Expo Go
 - Visual Studio Code
 - JavaScript, HTML, CSS



Team United Airlines Airport Operations

Status Report

[3 of 4]

Injury and Damage Data Quick Access App

- Client Contact
 - Emailed Client to schedule initial meeting – 9/14
 - Expected scheduled conference call every Wednesday
- Team Meetings
 - Scheduled sprint end/sprint planned meetings
 - Wednesday, Sunday
 - Team has met 9 times: 3 times in person, 6 times virtual
- Team Organization
 - Trello for project planning
 - Discord for communication and resources
 - Microsoft Teams for deliverables and meetings
 - Backend leaders: Hargun Atwal, Joseph Chen
 - Frontend leaders: Elizabeth DeBack, Emmanuel Marudo, Grace Mora



Team United Airlines Airport Operations

Status Report

[4 of 4]

Injury and Damage Data Quick Access App Risks

- Retrieving Data
 - Connecting application to multiple databases
 - Mitigation: Asking for internal documentation and approval
- Data Visualization
 - Currently using Spotfire for analytics, requirements are not yet clear
 - Mitigation: Communication with Client and demonstrating prototypes
- User Friendly Application
 - Do not know what setting this application will be used in
 - Mitigation: Communication with Client and user interviews
- Account Authentication and Initialization
 - How will accounts be created (especially for testing)
 - Mitigation: Discussing with client how accounts will be created



MICHIGAN STATE

U N I V E R S I T Y

Status Report Presentation

Audit Management System

The Capstone Experience

Team United Airlines Quality Assurance

Sam Hus
Tyler Higashi
Jay Ho
Robert Morton
Michael Schester

Department of Computer Science and Engineering
Michigan State University

Fall 2022



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

Team United Airlines Quality Assurance

Status Report

[1 of 4]

Audit Management System

- Project Overview
 - Create iOS application for United Airlines audits
 - Classify audit issues into usable data
 - Track the quality of vendors for United Airlines
 - Allow for photos of previous audits to be recognizing and read-in, and be able to recognize handwriting with a stylus
- Project Plan Document
 - Document created and shared with the team
 - Looked at previous year's documents and the example Project Plan Documents shared with us
 - Approximately 10% completed



Team United Airlines Quality Assurance

Status Report

[2 of 4]

Audit Management System

- Server Systems / Software
 - Flask
 - Docker
 - AWS MySQL RDS
 - AWS Amplify Studio
 - Google Cloud
- Development Systems / Software
 - Xcode and SwiftUI for Frontend
 - Databases Software (Python/PyMySQL)
 - GraphQL API



Team United Airlines Quality Assurance

Status Report

[3 of 4]

Audit Management System

- Client Contact
 - Main client contact: Michael Schester
 - We talked on Thursday, Sept. 8th for the first time
 - We scheduled a meeting on Tuesday and Thursday every week for half an hour
- Team Meetings
 - We met first on September 1st
 - We plan to meet on Tuesday, Thursday, and Sunday every week to share project's progress and obstacles
- Team Organization
 - Front-end: Jay Ho & Tyler Higashi & Michael Schester
 - Back-end: Robert Morten & Sam Hus & Michael Schester



Team United Airlines Quality Assurance

Status Report

[4 of 4]

Audit Management System

Risks

- Creating our AWS backend and connect to previous team's SwiftUI front-end
 - Develop new AWS backend based on previous team's structure and changed current iOS application backend connection to our backend, so the app can run
 - Analyze previous team's backend structure
- Connecting the iOS App to United's existing database
 - Previous databases of audits will be used to gather historical data, and it must align with the system that we are building
 - Set up SQL database, server software and connect them to database and server related files from previous team
- Getting iOS App to work on a device
 - Getting programs to install on actual devices can be much more difficult for using iOS instead of Android
 - Trying to get the iOS app running on XCode simulator before testing on physical devices
- Understanding United Airlines Audit Process
 - We must understand the way that audits are done in the field
 - Meet with client to understand their goals and current solutions



MICHIGAN STATE

U N I V E R S I T Y

Status Report Presentation

The Capstone Experience

United Airlines Training Team

Neha Challa

Rishika Juloori

Varuntej Kodandapuram

James Demetris

Morgan Stanczuk

Sam Oviasu

Department of Computer Science and Engineering

Michigan State University

Fall 2022



*From Students...
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Team United Airlines Training

Status Report

[1 of 4]

Efficacy Testing within United's Cornerstone LMS

- Project Overview
 - UA Training Program
 - Assess the effectiveness of their training program
 - Analyze the discrepancies in the training questions
- Project Plan Document
 - Created Trello board and repository to track progress
 - Created a document to lay down a tentative plan of action



Team United Airlines Training

Status Report

[2 of 4]

Efficacy Testing within United's Cornerstone LMS

- Server Systems / Software
 - Cornerstone Learning Management System (LMS)
 - Working on getting access to Cornerstone
- Development Systems / Software
 - C#
 - Power BI



Team United Airlines Training

Status Report

[3 of 4]

Efficacy Testing within United's Cornerstone LMS

- Client Contact
 - Met with client
 - Established weekly meetings
- Team Meetings
 - Established once a week in person meetings
- Team Organization
 - Data Collection: Neha & Morgan
 - Data Processing: Samuel & Rishika
 - Front-End Development: James, Varun & Morgan
 - Primary Sponsor Contact: Rishika



Team United Airlines Training

Status Report

[4 of 4]

Efficacy Testing within United's Cornerstone LMS

Risks

- Fairly evaluating instructors
 - Making an algorithm to fairly determine if an instructor is at fault or not
 - Talk with instructors to see how they determine when they feel at fault for students missing questions
- Evaluating poorly worded questions for discrepancies
 - It is difficult to differentiate questions that are poorly worded from questions that have not been taught well
 - See if we can determine that poorly worded questions are answered slightly more accurately than poorly taught ones
- Integration of Power BI
 - We are not sure if there is integration for Power BI in C#
 - We can consider other data visualization tools





MICHIGAN STATE

UNIVERSITY

Status Report Presentation

Dealership Parts and Telematic Insights

The Capstone Experience

Team Urban Science

Michael Sobieski

Jonathon Moore

Noah O'Bryan

Trenton Lach

Jackson Riggle

Department of Computer Science and Engineering

Michigan State University

Fall 2022



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

Team Urban Science

Status Report

[1 of 4]

Dealership Parts and Telematic Insights

- Project Overview
 - Derive insights from the telematics data
 - Visualize telematics data insights on a website
 - Telematics is the technology used to monitor a wide range of information relating to an individual vehicle or an entire fleet
 - Physical server running and has SQL Server installed
- Project Plan Document
 - Template created and filled with placeholder information
 - 10% Complete
 - Delegated project plan document responsibilities



Team Urban Science

Status Report

[2 of 4]

Dealership Parts and Telematic Insights

- Server Systems / Software
 - Ubuntu 18.04 running on the server
 - Running MS SQL Server 2017
 - Telematics & Dealership data provided by Urban Science
- Development Systems / Software
 - Hello World in C# and HTML, Angular frontend
 - Github repository created and accessible to team
 - Visual Studio installed on all team member's computers



Team Urban Science

Status Report

[3 of 4]

Dealership Parts and Telematic Insights

- Client Contact
 - Weekly meetings Wed. at 4pm via MS teams
 - One meeting so far
- Team Meetings
 - Weekly meetings Sun. at 12pm via Discord
 - Five meetings so far
- Team Organization
 - Back-end: Trenton, Noah
 - Front-end: Jonathon, Jackson
 - Business Layer: Michael



Team Urban Science

Status Report

[4 of 4]

Dealership Parts and Telematic Insights

Risks

- Data Visualization
 - What data needs to be displayed and in what format
 - Rank data by importance and meet with point of contact to confirm
- Business Layer Data Processing
 - Creating the architecture to abstract private data away from the front end
 - Open up an in-depth discussion with client
- Exposing Back-End APIs
 - Unknown on how to create the API service for the business layer
 - Explore and discuss options for creating and deploying API services
- SQL Server Setup
 - No experience with setting up & exposing servers
 - Trial and error during team meeting



MICHIGAN STATE

U N I V E R S I T Y

Status Report Presentation

Time Cube

The Capstone Experience

Team Vectorform

Alex Lee

Zack Garrett

Katherine Rochon

Kartik Soni

Josh Ilkka

Minsong Zheng

Department of Computer Science and Engineering
Michigan State University

Fall 2022



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

Team Vectorform

Status Report

[1 of 4]

Time Cube

- Project Overview
 - Aggregate potential task names
 - Interface the device via Bluetooth-Low-Energy to a web app
 - Track task time allocation throughout the day by orientation
 - Automatically generate reports within the web app
- Project Plan Document
 - Created skeleton of project plan
 - Less than 10% completed
 - Assigned sections to team members



Team Vectorform

Status Report

[2 of 4]

Time Cube

- Server Systems / Software
 - iMacs setup to be used as necessary, VMWare initialized
- Development Systems / Software
 - Arduino IDE Installed and required libraries added
 - C++ “Hello World” program functional
 - Node.js / React / VSCode
 - “Hello World” program functional
 - SQLite
 - Jira



Team Vectorform

Status Report

[3 of 4]

Time Cube

- Client Contact
 - Weekly meetings scheduled for 3PM Fridays
 - Three meetings already complete
- Team Meetings
 - Meetings scheduled for immediately after Triage meeting
 - Triage meetings @ 10:20 AM Fridays
- Team Organization
 - Agile based workflow through JIRA Board
 - Front End: Alex & Josh; Back End: Katherine (Client Contact) & Zack; Arduino Development: Kartik & Minsong



Team Vectorform

Status Report

[4 of 4]

Time Cube

Risks

- Bluetooth communication
 - Create communication pattern/protocol between Web App and Physical Device
 - Reading documentation of Bluetooth-Low-Energy
- Tracking accelerometer and Time data
 - Determine most power-efficient and accurate method to track internal readings
 - Test multiple methods to derive data for power efficiency
- Aggregating and Deriving task names from API data
 - Create method to recommend Task names based off existing data in API from common tools within Vectorform
 - Learn how to communicate through an API and derive recommendations



MICHIGAN STATE

U N I V E R S I T Y

Status Report Presentation

VW Car-Net EV Match Based Technology

The Capstone Experience

Team Volkswagen

Chris Belack

Noah Behm

Ryan Doty

Yanjia Zhu

Srijith (Jay) Venkateshwaran

Sean Kelly

Department of Computer Science and Engineering

Michigan State University

Fall 2022



*From Students...
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Team Volkswagen

Status Report

[1 of 4]

VW Car-Net Match Based Technology

- Project Overview
 - Match Drivers with an Electric Vehicle
 - Use Drivers Driving Habits
 - Develop a Best Fit Algorithm
 - Increase Sales of Electric Vehicles for Volkswagen
- Project Plan Document
 - Overall Completion ~30%
 - Table of Contents 100%
 - Executive Summary 99%
 - Technical Summary 99%



Team Volkswagen

Status Report

[2 of 4]

VW Car-Net Match Based Technology

- Server Systems / Software
 - Web Page Host (CSE Servers): Not Running
 - MySQL Python Client Connection: Installed
 - MySQL Database (CSE phpMyAdmin): Installed and Running
- Development Systems / Software
 - React Frontend: Installed With 'Hello World' Program
 - Flask Backend: Installed
 - VS Code for Development: Installed



Team Volkswagen

Status Report

[3 of 4]

VW Car-Net Match Based Technology

- Client Contact
 - One Meeting
 - Weekly Meeting Fridays 3:00 p.m.
- Team Meetings
 - Four Meetings
 - Weekly Scrum Tuesdays 4:30 p.m.
- Team Organization
 - Frontend – Jay, Ryan, Noah
 - Backend - Sean, Yanjia, Chris



Team Volkswagen

Status Report

[4 of 4]

VW Car-Net Match Based Technology

Risks

- Risk 1
 - Interface Database with Frontend
 - Developing Flask API
- Risk 2
 - Setup Web Page Host
 - Looking into CSE Servers (Backup Google Cloud/AWS)
- Risk 3
 - Generating Realistic Data Points
 - Researching Common Driving Habits
- Risk 4
 - Develop Best Match Algorithm
 - Researching Google's Ad Placement Algorithm



MICHIGAN STATE

U N I V E R S I T Y

Status Report Presentation

Guided Recipe Augmentation

The Capstone Experience

Team Whirlpool

Tom Choi
Quinn James
Joseph Kasza
Justin King
Rashon Poole
Jiuhua Wu

Department of Computer Science and Engineering
Michigan State University

Fall 2022



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

Team Whirlpool

Status Report

[1 of 4]

Guided Recipe Augmentation

- Project Overview
 - Create a mobile app that streamlines and simplifies the process of following new recipes
 - Control cooking times and temperatures while providing users an intuitive step-by-step interface
 - Allow for an entirely hands-free recipe experience via real-time voice and gesture recognition
- Project Plan Document
 - Outline created, document in progress; around 5% complete
 - Plan for application layout nearly complete; 5-10% remaining



Team Whirlpool

Status Report

[2 of 4]

Guided Recipe Augmentation

- Server Systems / Software
 - As of current Whirlpool plan, no server systems necessary
- Development Systems / Software
 - Gitlab repository created, synced on all relevant devices
 - Virtual machines set up on both iMacs and personal devices where necessary
 - Flutter and required dependencies for iOS and Android development install on iMacs and personal systems
 - Whirlpool Google Drive folders shared and synced on iMacs



Team Whirlpool

Status Report

[3 of 4]

Guided Recipe Augmentation

- Client Contact
 - One client meeting completed
 - Project overview meeting with Jackie Li
 - Team still needs to meet Collin Stipe for additional project details
 - Weekly meetings with clients scheduled Tuesdays at 12:30pm
- Team Meetings
 - Three team meetings and one triage meeting completed
 - Weekly team meetings Sundays at 4:00pm
 - Weekly triage meetings Thursdays at 1:40pm
- Team Organization
 - Rashon and Quinn on frontend development and user experience
 - Joseph and Jiuhoa on backend development
 - Tom and Justin on machine learning tasks (voice and gesture recognition)



Team Whirlpool

Status Report

[4 of 4]

Guided Recipe Augmentation

Risks

- Accessing native software elements through Flutter
 - We may not be able to access native software elements such as Siri when creating our codebase using Flutter.
 - If this is the case, we will need to seek alternative methods of voice recognition such as Amazon's Alexa.
- Voice and gesture recognition learning curve
 - Voice and gesture recognition are new technologies to our team. We predict an extensive learning curve.
 - Two of our team members (Tom and Justin) plan to become proficient in the technologies as quickly as possible to be able to handle tricky situations in the future. Tom and Justin are trying to use TensorFlow, Mediapipe, and Apple gesture recognition library for the voice and gesture recognition.
- Ability to test our ACT app using a real Whirlpool induction cooktop
 - Our sponsor wishes to send us one induction cooktop to use for testing purposes, but there are currently no options for 240V AC in the engineering lab.
 - We need to work together with the instructional staff and our sponsor to establish a location where we will have the necessary power requirements.
- Apple Development
 - Apple developer IDs are required for deploying to iPhone devices. Whirlpool will not be providing accounts.
 - We plan to work with course staff to obtain a developer key.

