MICHIGAN STATE UNIVERSITY

09/10: Team Status Reports

The Capstone Experience

Dr. Wayne Dyksen
James Mariani
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Department of Computer Science and Engineering
Michigan State University
Fall 2024

From Students…
…to Professionals

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Status Report Presentation

Image Analysis Tool for Biphasic Solutions

The Capstone Experience

Team AbbVie

Hank Murdock
Colton Leslie
Chirag Solanki
Noel Vazquez
Joseph Cook
Alex Chirillo

Department of Computer Science and Engineering
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Fall 2024

From Students…
…to Professionals

Team AbbVie

Status Report

[1 of 4]

Image Analysis Tool for Biphasic Solutions

- Sponsor Overview
  - AbbVie is a biopharmaceutical company headquartered in North Chicago, IL.
  - Develops advanced treatments in areas like immunology, oncology, and neuroscience
  - Products: Humira, Imbruvica, Botox, Lexapro…
- Project Overview
  - Developing an automated lab analysis tool
  - Goal is to automate this analysis process for chemists
  - Analysis of biphasic solutions, liquids that divide into two parts

Team AbbVie

Status Report

[2 of 4]

Image Analysis Tool for Biphasic Solutions

- Server Systems / Software
  - Accounts for MSU HPCC cluster setup – tested.
- Development Systems / Software
  - VMWare Fusion Setup – tested.
  - Acquired collimated light and camera setup along with vials – tested setup.
- Project Plan Document
  - Project Plan Started
  - Executive Summary, Use Cases, and Objectives done
  - 15% Complete

Team AbbVie

Status Report

[3 of 4]

Image Analysis Tool for Biphasic Solutions

- Client Contact
  - Weekly online meetings setup
  - In person client contact on a regular basis not feasible
- Team Meetings
  - Team meetings occurring 2-3 times per week on ad hoc basis
  - Met roughly 7-9 times so far
- Team Organization
  - Model Development – Hank, Colton
  - Backend – Noel, Joe
  - Frontend – Chirag, Alex
  - Project Manager – Hank
  - Primary Client Contact – Colton

Team AbbVie

Status Report

[4 of 4]

Image Analysis Tool for Biphasic Solutions

Risks

- **Dataset Acquisition**
  - No existing datasets, need to recreate biphasic solutions without access to the actual chemicals used in practice.
  - Use oil and water and other possible substitutes, working closely with AbbVie chemist to ensure a representative variety of mock solutions.
- **Non-Trivial Image Processing Problem**
  - Complex image processing problem that may require more expertise in the field of image processing than we can hope to accrue over the course of 3 months.
  - Two or so group members have exposure to image processing, we will read papers and will discuss with MSU professors if necessary.
- **Backend Model Retraining**
  - Model training can take a long time, we need to figure out how users can efficiently retrain the model without stopping the automated system so the model can be used on a wider variety of biphasic solutions.
  - We could export the model to a temporary path so when we need to retrain the model, we can start an asynchronous task to retrain the model while still able to use the model at the temporary path.

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Status Report Presentation

Agentic Collaborator

The Capstone Experience

Team Ally

Abdullah Baqai

Pranta Nir Barua

Andrew Chen

Areeb Islam

Stefan Lemke

Alison Schlacht

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Michigan State University

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From Students…

…to Professionals

Team Ally

Status Report

[1 of 4]

Agentic Collaborator

- Sponsor Overview
  - Online banking, investment services
  - Auto financing leader
  - Headquartered in Detroit, Michigan
- Project Overview
  - AI Dashboard
  - Internal tool, reduces time spent in email
  - Email chain tracking, summarization, consensus building
  - Email processing and next step suggestions

Team Ally

Status Report

[2 of 4]

Agentic Collaborator

- Server Systems / Software
  - Postgres DB set up & connected with backend
  - Langchain “hello world” agent active
- Development Systems / Software
  - Vite/React webapp actively running
  - Gitlab created, cloned to personal machines with branch permissions
  - Jira board created for sprints
- Project Plan Document
  - Document architecture is established
  - Mockups are in development, up to date schedule
  - Specifications and summaries started
  - 20% Complete

Team Ally

Status Report

[3 of 4]

Agentic Collaborator

- Client Contact
  - 2 client meetings
  - Friday 11:30 weekly meeting
- Team Meetings
  - 3 scheduled team meetings
  - Regular Tuesday 4:30 meetings, impromptu as needed
- Team Organization
  - Abdullah: AI specialist, Langchain
  - Pranta: Integration, backend
  - Andrew: SCRUM master, DB
  - Areeb: Team Lead, Langchain
  - Stefan: Mockup designer, frontend
  - Alison: Scribe, frontend

Team Ally

Status Report

[4 of 4]

Agentic Collaborator

Risks

- Postgres remote database access
  - How can we provide secure access to specific users?
  - Attempt role-based access using CI/CD pipeline, alternatively DB clones
- Outlook frontend integration
  - Can AI insights be displayed in outlook directly or will a webapp be needed?
  - Experimental widget with dummy data
- AI Model Training
  - How can we ensure effective training & fine tuning?
  - Trail runs with various LLMs and evaluating efficacy
- Email parsing
  - Consistently and accurately extract text from the email body and subject
  - Trail with static parsing and model-based parsing
- API security
  - How can we ensure safety of our backend?
  - Token based authentication using python libraries

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Status Report Presentation

Remediating AWS Security Gaps Using Generative AI

The Capstone Experience

Team Amazon

Jaden Cabanasag
Ndiaga Diouf
Ilyas Abdulrahman
Sardar Mehtab Bin Murtaza
Valdine Pegy Tchinda Pegou
Nate Mikkola

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From Students…
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Team Amazon

Status Report

[1 of 4]

Remediating AWS Security Gaps Using Generative AI

- Sponsor Overview
  - Largest online storefront service
  - AWS: Amazon's cloud computing platfrom, offers a wide range of services. (e.g. storage, databases, computing power)
  - AWS is a leader in the cloud industry, and serves millions of customers worldwide.
- Project Overview
  - AWS security analysis is currently difficult to understand as is
  - Aims to better classify AWS security risks and remediation
  - Intended users are non-tech-savvy AWS clients
  - Users will be able to submit their analyses and gain a better understanding of what are the risks, their priorities, and steps to remediation

Team Amazon

Status Report

[2 of 4]

Remediating AWS Security Gaps Using Generative AI

- Server Systems / Software
  - Received and configuring AWS accounts
  - Generative AI API configured
  - Running Security Self Assessment Tools
- Development Systems / Software
  - Installed Typescript
  - Installed React
  - Configuring CDK/SDK
- Project Plan Document
  - Designing Wireframe
  - Researching Architecture
  - 5% Complete

Team Amazon

Status Report

[3 of 4]

Remediating AWS Security Gaps Using Generative AI

- Client Contact
  - Client meeting scheduled Fridays at Minskoff
  - Met with client twice as of now
- Team Meetings
  - Triage meetings scheduled Tuesdays after Capstone class
  - Team meetings scheduled Thursdays after Capstone class
  - Team has met four times so far
- Team Organization
  - Project Managers: Ndiaga and Mehtab
  - Backend: Ilyas, Pegy, and Nate
  - Frontend: Jaden

Team Amazon

Status Report

[4 of 4]

Remediating AWS Security Gaps Using Generative AI

Risks

- Only two AWS accounts
  - Possibility of a shortage of test data to train AI/LLM
  - Refer to public database of security findings to generate test data
- Generative AI Hallucination
  - How will we confidently validate the data our AI responds with?
  - A RAG Model (Restrictive) to completely control an AI's knowledge
- Ranking Security Severity
  - How will we rank the security findings given to our AI?
  - Develop a weighing system accounting for budget, time, and skill
- Linking application to AWS accounts
  - App may be unable to integrate or access AWS user accounts
  - Standalone app

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Status Report Presentation

Ocean Carbon Pollution Cleanup

The Capstone Experience

Team Anthropocene Institute

Henry Bock
William Chasteen
Faith Dawson
Cam Koons
Nitin Polavarapu
Blake Potvin

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From Students…
…to Professionals

Team Anthropocene Institute

Status Report

[1 of 4]

Ocean Carbon Pollution Cleanup

- Sponsor Overview
  - An organization with the ultimate goal of making Earth abundant and sustainable for all generations to come
  - Provides funding to upcoming technologies and promotes education about climate breakthroughs
  - Goal by 2030 to solve climate dilemma by knowing the facts and investing in the right science and technology for the future
- Project Overview
  - Simulate ocean iron fertilization to model how Phytoplankton could capture additional carbon dioxide from the atmosphere
  - Anthropocene will use the simulation data to determine if a full-scale experiment in the ocean is viable
  - Create visualizations to convey to a lay audience the effectiveness of this proposed experiment

Team Anthropocene Institute

Status Report

[2 of 4]

Ocean Carbon Pollution Cleanup

- Server Systems / Software
  - Google Cloud Platform
- Development Systems / Software
  - Python
    - Streamlit (Python Data Web Visualizer)
    - Data Science Libraries (Pandas, Numpy,. …)
  - FastAPI
    - Basic Hello World endpoint - Done
  - Docker
    - Dockerized frontend and backend - Done
  - React
    - Basic Hello World web application - Done
- Project Plan Document
  - Written first pass at Functional, Design, and Technical specifications to discuss in our next client meeting.
  - 5% Complete

Team Anthropocene Institute

Status Report

[3 of 4]

Ocean Carbon Pollution Cleanup

- Client Contact
  - Melinda Chow Alankar, Frank Ling, and Carl Page
  - Met with them twice
    - Scheduled weekly meetings for Tuesdays and Thursdays at 4:30 PM with client
- Team Meetings
  - Scheduled weekly meetings on Friday 12:30 PM
    - Our team has met 6 times
    - Meeting as well after our Tues/Thurs client meetings
- Team Organization
  - Nitin is our main point of contact
  - Nitin and Will on backend and website development
  - Everyone else on simulation and visualizations development
    - Roles may change in the future

Team Anthropocene Institute

Status Report [4 of 4]

Ocean Carbon Pollution Cleanup

Risks

- Risk 1
  - We don’t have background knowledge about the scientific processes that we are meant to be simulating
  - Resources from our sponsor, reaching out to MSU oceanography professor, and our own independent research
- Risk 2
  - Simulation Accuracy
  - Reviewing simulation results with Anthropocene Scientists and using the client’s mock data
- Risk 3
  - How interactive can/should the simulation be
  - Research and use other simulators, discuss with client so we prioritize specific features and functionality
- Risk 4
  - Training a ML model to predict the randomness of the ocean
  - Using PyTorch and using NOAA oceanography datapoints

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Status Report Presentation

From the Ground Up VR

The Capstone Experience

Team Auto-Owners

Alan Feng
Emma Lamb
Elijah Medina
Alex Hawkins
Owen Cochell
Connor Blackmer

Department of Computer Science and Engineering
Michigan State University

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From Students…
…to Professionals

Team Auto-Owners

Status Report

[1 of 4]

From the Ground Up VR

- Auto-Owners Insurance provides insurance
  - Home, Auto, and Business
  - Based in Lansing
  - Nationwide Company
  - Fortune 500
- From the Ground Up VR
  - Provide an interactive VR experience
  - Reduce training time for property claims associates
  - Ease of use regardless of experience
  - Explores materials common in home construction

Team Auto-Owners

Status Report

[2 of 4]

From the Ground Up VR

- Server Systems / Software
  - None
- Development Systems / Software
  - Unity running with plugins
  - Meta Quest 3 running demos
  - OpenXR demos have been tested
- Project Plan Document
  - Contains basic information
  - Mockups yet to be complete
  - 60% Complete

Team Auto-Owners

Status Report

[3 of 4]

From the Ground Up VR

- Client Contact
  - Met last Thursday
  - Alternating Thursdays and Fridays
  - Meet on Teams call (MSU team in one room)
- Team Meetings
  - Meet every Sunday
  - Have met up to 5 times
- Team Organization
  - 4 people each building a room
  - One person building main menu

Team Auto-Owners

Status Report

[4 of 4]

From the Ground Up VR

Risks

- Menus Design
  - Make sure we can design intuitive menus
  - Follow a course for interactive UX design
- Finding/Creating Assets
  - Games require assets, difficult to obtain
  - Utilize the Unity store to get components
  - Learning Blender
- Optimization
  - Making sure the software runs at a consistent frame rate
  - Optimization of scripts along with configuring graphical settings
- Style Consistency
  - Game, environment, and menus need to adhere to guidelines
  - Continuously communicate with Auto-Owners about design

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Status Report Presentation

DRIVEN-4 Connect Application

The Capstone Experience

Team DRIVEN-4

A.J. Brummel
Aiden Foley
Mufeez Mulbagal
Tess Murphy
Siddarth Satish
Quin Strausbaugh

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From Students…
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Team DRIVEN-4

Status Report

[1 of 4]

DRIVEN-4 Connect Application

- Sponsor Overview
  - DRIVEN-4 is an IT consulting firm
  - The firm specializes in PLM, IoT, and IIoT
  - Develop connectivity strategy, products, services, and tech
- Project Overview
  - Collect data via hardware products
  - Manage connected devices and associated API endpoints
  - Enable data processing, transformation, and manipulation
  - Adapt existing web app to accept subscriber payments

Team DRIVEN-4

Status Report

[2 of 4]

DRIVEN-4 Connect Application

- Server Systems / Software
  - AWS EC2 instance is running and accessible
  - MYSQL database server is live and accessible
  - Hardware/product requested and shipped by client
- Development Systems / Software
  - Installed software suite and can run the web app on local
  - Stripe python package installed
  - MYSQL Workbench installed and connected to DB instance
- Project Plan Document
  - Responsibilities/sections delegated
  - Outline created and to be presented to the client for feedback
  - 10% Complete

Team DRIVEN-4

Status Report

[3 of 4]

DRIVEN-4 Connect Application

- Client Contact
  - First met the point of contact, Ryan, on August 30th
  - Recurring meetings scheduled for Wednesdays
- Team Meetings
  - Weekly sprint planning meetings on Saturdays
  - Twice weekly stand-ups on Tuesday/Thursday
- Team Organization
  - Client Relationship Manager - Quin
  - **APIs** – Quin, Mufeez, Aidan, Tess; **DB** – Quin, Tess, A.J.; **Dashboard** – Aiden, Mufeez, Sid; **Stripe**: A.J. Aiden; **HW** - Sid

Team DRIVEN-4

Status Report

[4 of 4]

DRIVEN-4 Connect Application

Risks

- Hardware Library Creation
  - Hardware libraries should provide flexibility and ease of use
  - Test hardware with provided equipment and C hardware functions
- Python Interpreter
  - Web app should consume Python instructions to create executable
  - Create a prototype that ingests Python commands and executes
- Interpreter Security
  - Client-entered data manipulation scripts cannot endanger the system
  - Identify common threat actor tactics and provide coverage
- Stripe Invoicing
  - Stripe needs to be integrated with the database to track account status
  - Use Stripe account and test environment to mock invoices over time

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Status Report Presentation

Recycling Identification Scanner

The Capstone Experience

Team GM-RIS

Matt Miller
Jerry Hoskins
Safiya Fareed
Andres Tamayo
Keerthi Ramesh
Pedro De Oliveira Mitkiewicz

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From Students…
…to Professionals

Team GM-RIS

Status Report

[1 of 4]

Recycling Identification Scanner

- Sponsor Overview
  - General Motors, headquartered in Detroit, MI
  - Largest car manufacturer in the US
  - Committed to carbon net neutrality by 2040
- Project Overview
  - Lots of single use plastics in their operations, some not easily identifiable
  - Scanner would trivialize identification, tracking, monitoring of plastics
  - Used by environmental engineers at GM plants
  - Users will scan plastics and monitor contamination in an app

Team GM-RIS

Status Report

[2 of 4]

Recycling Identification Scanner

- Server Systems / Software
  - API stored locally, pending migration to Google Cloud
  - MySQL installed with sample data set
  - Database framework set up
- Development Systems / Software
  - Machine learning modules installed
  - Test API developed using Django
  - Xcode installed with basic app prototype
  - Database parser implemented
  - Hardware requested form the client, to be picked up
- Project Plan Document
  - Executive Description Completed
  - Team Roles
  - 10% Complete

Team GM-RIS

Status Report

[3 of 4]

Recycling Identification Scanner

- Client Contact
  - Every Thursday
  - Toured GM Facility
- Team Meetings
  - Every Tuesday
  - Met 4 times
- Team Organization
  - Split into hardware and software
  - Everyone on software currently

Team GM-RIS

Status Report

[4 of 4]

Recycling Identification Scanner

Risks

- Dataset
  - Needs to be large, diverse, and accurate for a good model
  - Open Source? Creating it ourselves?
- Handling Composite Plastics
  - Some materials can be composed of multiple different types of plastics
  - Treating composites as a different plastic type and including it in the dataset
- Extrapolate To New Plastics
  - The scanner should be scalable and should be able to identify new types of plastics
  - A large and diverse dataset. A manual training mode (“Is this [plastic type]? [Yes\No]”)
- On-Device Compute
  - Running a neural network can be expensive
  - Multiple manual testing. Cloud compute if necessary

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Status Report Presentation

General Motors: Remote Wildlife Habitat Monitoring System

The Capstone Experience

Team General Motors: WHMS

Sanjay Bhuvaneswaran
Anna Clark
Jude Cox
Chase Halligan
Jacob Walsh
Kevin Zhang

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From Students…
…to Professionals

Team General Motors: WHMS

Status Report

[1 of 4]

General Motors: Remote Wildlife Habitat Monitoring System

- Sponsor Overview
  - Global Automaker
  - Industry Leader in Environmental Sciences
  - Tech-Driven Innovation
- Project Overview
  - Environmental Data Aggregation
  - Centralized Database
  - On-Demand Graphical Analysis
  - Easy-to-use Interface

Team General Motors: WHMS

Status Report

[2 of 4]

General Motors: Remote Wildlife Habitat Monitoring System

- Server Systems / Software
  - On-Site Data Collection Apparatus Operational
  - Existing Citizen Science data collections
  - MongoDB database server not yet instantiated
- Development Systems / Software
  - Flask Python Web App skeleton created
  - Docker Container for Web App created
  - Matplotlib to be implemented in the future
- Project Plan Document
  - Document & Outline created
  - First Rough Draft in progress
  - 10% Complete

Team General Motors: WHMS

Status Report

[3 of 4]

General Motors: Remote Wildlife Habitat Monitoring System

- Client Contact
  - 3 Meetings Completed
  - Weekly (scheduled) + On-Site (as necessary)
- Team Meetings
  - 2 Formal Meetings + Many Informal Completed
  - Weekly Meeting scheduled for Tuesdays, 4:30 PM
- Team Organization
  - Database and Data Aggregation
  - Web Application Functionality

Team General Motors: WHMS

Status Report

[4 of 4]

General Motors: Remote Wildlife Habitat Monitoring System

Risks

- Accessibility of Data
  - Chance that some platforms will not have easily accessible data
  - Potentially using an ‘administrator’ account to access user specific data
- Maintaining Real-Time Database
  - Database needs to be persistently providing updated data and editable
  - Learning to create a server to host data and connecting it to web app
- Graphical Data Aggregation
  - Web application needs to be able to create a graph as an exportable file
  - Learning how to generate a downloadable file from web application
- Live/Dynamic Geographical Analysis
  - Utilizing mobile location services to mark data points on virtual map
  - Finding some way to get location from a mobile user

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Status Report Presentation

Healthcare Payer Price Transparency

The Capstone Experience

Team HAP

Mansour Alblooshi
Drew Hamilton
Alvin Hoang
Joshua Thomas
Sai Upparapalle
Manan Vyas

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Fall 2024

From Students…
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Team HAP

Status Report

[1 of 4]

Healthcare Payer Price Transparency

- Sponsor Overview
  - Healthcare provider
  - Use of data to drive insights
  - Improving of healthcare industry
  - Subsidiary of Henry Ford Medical
- Project Overview
  - Innovative transparency solutions
  - Rate comparison
  - Provider coverage capacity
  - Use of generative AI to provide insights

Team HAP

Status Report

[2 of 4]

Healthcare Payer Price Transparency

- Server Systems / Software
  - Docker website up and running
  - Cloud service pending approval
- Development Systems / Software
  - Gitlab set up and connected to IDEs
  - ChatGPT API access has been acquired
- Project Plan Document
  - We've started the project plan document
  - Got the initial format and some of the deliverables constructed
  - 12% Complete

Team HAP

Status Report

[3 of 4]

Healthcare Payer Price Transparency

- Client Contact
  - Initial contact has been made with the client.
  - Weekly calls with the client are scheduled for Thursdays at 5PM.
- Team Meetings
  - In person meetings scheduled Tuesdays after Triage and Thursdays after regular meetings.
  - Team has met a total of 8 times.
- Team Organization
  - Drew and Sai are setting up the cloud service, and comparison algorithm
  - Manan and Mansour are working on setting up the website, and ChatGPT
  - Alvin and Josh are parsing the Json files, and ChatGPT

Team HAP

Status Report

[4 of 4]

Healthcare Payer Price Transparency

Risks

- Risk 1
  - We are not sure if it is possible to parse large Json files in a reasonable amount of time.
  - We are currently reading the documentation of Gson as an avenue to parsing the files.
- Risk 2
  - We are not certain if ChatGPT will be able to handle analyzing a large amount of data.
  - We are considering using alternative LLMs with larger context windows or possibly recursively calling ChatGPT's API to break down large datasets
- Risk 3
  - We are not sure what would be the most memory efficient method to parse the Json file.
  - We are currently reading the documentation for ijson and MongoDB.
- Risk 4
  - Different companies could have different MRF Json structures.
  - Investing individual companies or write a more advance algorithm to parse data.

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Status Report Presentation

Modernizing Robotic-Surgery Education

The Capstone Experience

Team Henry Ford Innovations RSE

Olivia Jordahl
Sid Pawa
Jacob Guty
Lilly Yanke
Shaili Annadurai
Joseph Eisho

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Team Henry Ford Innovations RSE

Status Report

[1 of 4]

Modernizing Robotic-Surgery Education

- Sponsor Overview
  - Henry Ford Health is one of the nation's largest and most respected healthcare providers located in Detroit, MI.
  - With a focus on research, medical professionals and expert researchers work together to develop and adopt new healthcare technologies.
  - We'll be working with Dr. Nalamati who is the director of the residency training program for robotic surgery.
- Project Overview
  - Provide Statistics and Suggestions for Improvement.
  - Reduce Training Time for Surgeons using Robotic Surgery Training Data automatically.
  - Include a Dashboard for Easy Access of Data.
  - Visualize Relevant Trends and Data.

Team Henry Ford Innovations RSE

Status Report

[2 of 4]

Modernizing Robotic-Surgery Education

- MedHub
  - MedHub is a platform for managing medical education and residency programs.
  - MedHub API is designed to facilitate data integration with other systems.
  - We're waiting for access to MedHub and MedHub API.
- Intuitive
  - Robotic surgery platform that collects data from 2 consols, one at the patients bedside and one from the surgical instruments.
  - Currently there's no way to transfer data from Intuitive to Medhub.
- PowerBI
  - Use to visualize the data.
  - Multiple members of team have experience.
  - Able to handle large amounts of data.
- Project Plan Document
  - Have drafted outline of project plan.
  - In the process of developing visual display.
  - 20% Complete

Team Henry Ford Innovations RSE

Status Report

[3 of 4]

Modernizing Robotic-Surgery Education

- Client Contact
  - Conference calls on Thursdays at 4:30.
  - Limited time because Dr. Nalamati has a busy schedule.
- Team Meetings
  - We have met 5 times (including 1 client meeting).
  - We will be having scheduled meetings twice a week after class on Tuesdays and Thursdays.
- Team Organization
  - Investigating analysis of data.
  - Assigning roles as data investigation is in process.

Team Henry Ford Innovations RSE

Status Report

[4 of 4]

Modernizing Robotic-Surgery Education

Risks

- Risk 1
  - Description: Unsure of the exact kind of access to both MedHub and Intuitive that we need to see the data; not sure of the size of the data;
  - Mitigation: Our HFI sponsors have reached out to intuitive (a week ago) and are awaiting a response and for them to send sample data so we can begin planning our project.
- Risk 2
  - Description: Understand connection between dashboard and MedHub/Intuitive.
  - Mitigation: Add dashboard to Teams channel.
- Risk 3
  - Description: Working with schedules of employers within the Health Care system.
  - Mitigation: Prioritize important questions and information for each meeting.
- Risk 4
  - Description: No member has knowledge of the Health Care field.
  - Mitigation: Do research outside of project to better understand the material.

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Status Report Presentation

MSU-HFH Research Synergy Vanguard Portal (RSVP)

The Capstone Experience

Team HFH-RSVP

Tom Brown
Mannan Dhillon
Michael Faucher
Aarham Khan
Harshita Rathod
Pranav Shukla

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Fall 2024

From Students…
…to Professionals

Team HFH-RSVP

Status Report

[1 of 4]

MSU-HFH Research Synergy Vanguard Portal (RSVP)

- Sponsor Overview
  - Henry Ford Health is an innovative delivery engine
  - Nationally recognized leadership
  - Clinical disease management + other areas of expertise
- Project Overview
  - Connect researchers at MSU and HFH
  - Assist in finding capabilities, resources, and collaborators
  - Intranet based, regularly updated, self-editable
  - Seamless collaboration and new research development

Team HFH-RSVP

Status Report

[2 of 4]

MSU-HFH Research Synergy Vanguard Portal (RSVP)

- Server Systems / Software
  - Ubuntu is set up on server
  - Apache set up is in progress
  - Docker is being evaluated for use
- Development Systems / Software
  - GitLab is set up and repository is connected to member machines
  - Visual Studio Code and environments are running
  - MongoDB is currently in set up
- Project Plan Document
  - Organization of document is completed
  - Executive Summary is complete
  - 20% Complete

Team HFH-RSVP

Status Report

[3 of 4]

MSU-HFH Research Synergy Vanguard Portal (RSVP)

- Client Contact
  - Project scope has been established
  - Weekly Friday meetings at 1 PM
  - 2 meetings so far
- Team Meetings
  - 7 Team Meetings so far
  - Biweekly, Mondays (Online) and Thursdays (In-Person) - 7:30 PM
- Team Organization
  - Product Manager/Point of Contact – Harshita Rathod
  - Frontend/Database – Harshita Rathod, Tom Brown, Michael Faucher
  - Search Engine/Backend – Aarham Khan, Mannan Dhillon, Pranav Shukla, Michael Faucher

Team HFH-RSVP

Status Report

[4 of 4]

MSU-HFH Research Synergy Vanguard Portal (RSVP)

Risks

- Risk 1
  - Risk: Selecting a search and recommendation algorithm
  - Mitigation: Experiment with different search algorithms to determine best choice
- Risk 2
  - Risk: Procuring data from MSU Scholars and Scholarly Commons (HFH)
  - Mitigation: Either web scrape data or access API for information
- Risk 3
  - Risk: Authentication for both MSU and HFH Researchers
  - Mitigation: Implement email logins for both organizations
- Risk 4
  - Risk: Poor data quality due to different institution standards
  - Mitigation: Preprocess data to account for inconsistencies and inaccuracies

MICHIGAN STATE UNIVERSITY

Status Report Presentation

Governance of Expense in Kohl's Cloud Operations

The Capstone Experience

Team Kohl's

David Cody Taupo Lingan

Adhyan Negi

Meredith Heberling

Jason Lin

Aiden Dixon

Samay Achar

Department of Computer Science and Engineering

Michigan State University

Fall 2024

From Students…
…to Professionals

Team Kohl's

Status Report

[1 of 4]

Governance of Expense in Kohl's Cloud Operations

- Sponsor: James Hendley
  - Sr. Software Engineer at Kohl's
  - Undergraduate Degree from Univeristy of Wisconsin – Mil Waukee
  - Interested in Software Development, World Traveller, Experienced in Java, C/C++ and Android Development
- Project Overview
  - Implement a system to gather detailed usage, activity, and cost data from all GCP services across the organization.
  - Implement mechanisms to accurately attribute GCP costs to respective departments, projects, and initiatives.
  - Consult with Data Science Team, and identify and document opportunities for cost optimization and resource efficiency based on collected data.

Team Kohl's

Status Report

[2 of 4]

Governance of Expense in Kohl's Cloud Operations

- Server Systems / Software
  - Google API's (Recommender)
  - Google Big Query
  - GKE (Kubernetes)
- Development Systems / Software
  - React JS
  - Docker
  - Flask
  - PyTorch
- Project Plan Document (20%)
  - Assigned roles and positions (temporary)
  - Developing high-level design prototype (for sponsor)
  - Design & Technical Specifications

Team Kohl's

Status Report

[3 of 4]

Governance of Expense in Kohl's Cloud Operations

- Client Contact
  - Zoom Meeting due to different time zone
  - Weekly remote meetings on Fri. at 1:30 PM (2)
- Team Meetings
  - Weekly in-person meetings on Wed. at 4:30 PM (2)
  - Weekly remote meetings on Mon. at 4:30 PM (1)
- Team Organization
  - Specialization in: ML, Full-Stack, BigQuery/SQL Development
  - Back-end: David, Aiden, Jason, Adhyan
  - Front-end: Meredith, Samay
  - POC - David

Team Kohl's

Status Report

[4 of 4]

Governance of Expense in Kohl's Cloud Operations

Risks

- Risk 1: How to interface with GCP via Python?
  - Description: Unknown how we will directly interface with GCP features, using APIs, BigQuery, Gcloud Console, etc…
  - Mitigation: Extensive research and educational videos on GCP and Python, experimenting with multiple avenues for solutions.
- Risk 2: How exactly to determine a GCP job is "is too much" or "unnecessary" for Kohl's (Business Logic)?
  - Description: We don't know what their biggest expenditures are for GCP operations. (Space, memory, usage, VMs, etc…)
  - Mitigation: Suggestion from James, we will start by analyzing user usage and access.
- Risk 3: Board Data Scope for Machine Learning.
  - Description: There are multiple aspects to the API for insights and recommendations collection. This ambiguity can make determining which specific categories are relevant for ML models hard.
  - Mitigation: Converse with the ML team and lead, Patrick. (9/13)
- Risk 4: Local Development to Server Deployment
  - Description: Whether the dataset we are given will cause any discrepancies between local and server deployment.
  - Mitigation (Temporary): A snapshot given by James, working on static data for the time.

MICHIGAN STATE UNIVERSITY

Status Report Presentation

Spatial IoT Control Using Apple Vision Pro

The Capstone Experience

Team Launch

Ethan Egger
Jacob Hakala
Sanaye Lewis
Nathan Motzny
Noah Wolff
James Ashworth

Department of Computer Science and Engineering
Michigan State University

Fall 2024

From Students…
…to Professionals

Team Launch

Status Report

[1 of 4]

Spatial IoT Control Using Apple Vision Pro

- Sponsor Overview
  - Previously known as VectorForm, acquired by Launch by NTT Data in 2022
  - Launch helps your team to strategize, ship, and scale digital experiences that will drive growth for your organization
  - Developed innovative solutions for brands (Jeep, Axon, & Adidas)
- Project Overview
  - Integrate control over your smart home devices into the Apple Vision Pro
  - End users with the AVP headset and smart home devices may utilize our application to enhance their smart home experience
  - Use object tracking to allow seamless control by simply looking at a device
  - Stretch goal of controlling a custom device with multiple control schemes

Team Launch

Status Report

[2 of 4]

Spatial IoT Control Using Apple Vision Pro

- Server Systems / Software
  - No need for a server at this point
- Development Systems / Software
  - Xcode is up and running
  - Beta OS downloaded and installed
  - Enabled dev tools on Vision Pro
- Project Plan Document
  - Document has been created
  - Begun formatting and adding content
  - 5% Complete

Team Launch

Status Report

[3 of 4]

Spatial IoT Control Using Apple Vision Pro

- Client Contact
  - We have met with our client contact twice
  - Weekly conference call each Friday at 9:30 AM
- Team Meetings
  - Our team has met 4 times
  - Two meetings a week, Monday 10:20 AM and Friday 10:00 AM
- Team Organization
  - Noah & Jacob: visionOS Application & Object Tracking
  - James & Nathan: iOS Application & Object Tracking
  - Ethan & Sanaye: IoT Connections Between Smart Device and visionOS/iOS Applications

Team Launch

Status Report

[4 of 4]

Spatial IoT Control Using Apple Vision Pro

Risks

- Wyze SDK/API
  - There is no official Wyze SDK/API available
  - Look into unofficial APIs or other software to find a replacement
- iOS Object Tracking Reliability
  - Object tracking on iOS is much less reliable than visionOS
  - Build demo applications to learn how to improve reliability
- Maintaining Cross-System Consistency
  - Building the same experience on two different operating systems will be challenging
  - Work closely to implement features across platforms
- Tracking Identical Objects
  - Tracking in between two indistinguishable objects
  - Find examples of projects that track two of the same object

MICHIGAN STATE UNIVERSITY

Status Report Presentation

Offline-Ready Mobile App for Delivery Optimization

The Capstone Experience

Team Magna MADO

Chetan Chigurupati
Adam Farkas
Mia Granata
Shrey Kohli
Shane Patrarungrong
Muhammad Shaikh

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Michigan State University

Fall 2024

From Students…
…to Professionals

Team Magna MADO

Status Report

[1 of 4]

Offline-Ready Mobile App for Delivery Optimization

- Sponsor Overview
  - Magna is a global leader in automotive technology, with over 174,000 employees in 28 countries
  - Its diverse portfolio includes body systems, powertrains, electronics, ADAS, EV, and mobility technologies.
  - Magna New mobility wing drives innovation in mobility and sustainability, shaping the future of the automotive industry.

- Project Overview
  - Improving Delivery Service by optimizing delivery routes and orders with a cross platform mobile application.
  - Adding offline communication capabilites to avoid service disruption.
  - Leveraging AI to optimize delivery routes for faster service.
  - Implementing a web dashboard to offer real time location and status updates.
  - Application will be used by the Magna new mobility division (including delivery drivers and fleet operators) to increase efficiency of their delivery service.

Team Magna MADO

Status Report

[2 of 4]

Offline-Ready Mobile App for Delivery Optimization

- Server Systems / Software
  - Mongo DB Atlas is set up and running, implemented a primitive communication channel between flutter and Mongo DB Atlas.
  - Tested communication using Mongo DB Realm that facilitates offline communication capabilities
- Development Systems / Software
  - Created a simple to do list app using flutter that stores daily tasks in the database.
  - Curated a simple Magna themed home page in flutter
  - Awaiting access codes for NextBillion AI, to help with route optimization and map interface.
- Project Plan Document
  - Completed the executive summary and functional specification sections of the document.
  - Started working on the screen mockups for both the mobile and web application.
  - 10% Complete

Team Magna MADO

Status Report

[3 of 4]

Offline-Ready Mobile App for Delivery Optimization

- Client Contact
  - Have met the client twice and discussed the project and expectations in great detail.
  - Set up weekly recurring meetings every Friday at 11 am with the client.
- Team Meetings
  - The team has met 6 times thus far, leveraging the capstone lab and the library's digital scholarship lab as meeting locations.
  - Scheduled biweekly recurring meetings on Friday and Monday after our client and triage meetings respectively.
- Team Organization
  - Shrey/Chetan – Working on the flutter mobile app used by delivery drivers.

    Status: Created a Magna themed home page.
  - Mia/Shane – Working on the web application to be used by the fleet operators

    Status: Set up a different flutter web app, added certain Magna themed elements.
  - Adam/Miran – Working on MongoDB integration.

    Status: Created simple MongoDB integration code in flutter.

Team Magna MADO

Status Report

[4 of 4]

Offline-Ready Mobile App for Delivery Optimization

Risks

- NextBillion AI
  - There is no free version of NextBillion AI.
  - Client is working on getting us access before the next meeting.
- Offline capabilities
  - Storing geocode data offline and syncing it back with the database when online.
  - Understanding how NextBillion AI processes geocode data should help mitigate this risk.
- Syncing a common database between two different apps
  - Maintaing integrity of our database while communicating with the web app and the mobile app simultaneously.
  - Will have to create robust code that demarcates reading and writing capabilities.
- Database Schema
  - We do not have the client's database schema.
  - Client is working on getting us the database schema before the next meeting.

MICHIGAN STATE UNIVERSITY

Status Report Presentation

Test Driven Development For Embedded Software

The Capstone Experience

Team Magna TDD4ES

Eliezer Amponsah
Matthew Wu
David Mikola
Radhe Patel
Duong Nguyen
Camilo Carmona

Department of Computer Science and Engineering
Michigan State University

Fall 2024

From Students…
…to Professionals

Team Magna TDD4ES

Status Report

[1 of 4]

Test Driven Development For Embedded Software

- Sponsor Overview
  - One of the largest automotive suppliers, producing systems, modules, and others for companies like GM, Ford, and BMW.
  - 7 different branches.
  - Headquarters in Ontario, Canada.
- Project Overview
  - Engineers are working with large, untested code bases.
  - Introduce TDD framework in embedded software development.
  - Provide test cases for embedded software code.
  - Create a continuous integration pipeline to run test cases.

Team Magna TDD4ES

Status Report

[2 of 4]

Test Driven Development For Embedded Software

- Server Systems / Software
  - Virtual machines on iMacs for emulating Windows environment set up.
  - Emulator (QEMU/TI simulator) for emulating hardware has not been set up yet.
  - GitHub Actions for automation and interfacing with tests are being reviewed.
- Development Systems / Software
  - C/C++, GoogleTest, CMake for developing, testing are ready.
  - TI SDK for embedded development has been installed and ready.
  - Example software has been provided but not tested yet.
- Project Plan Document
  - Functional specifications & summary in progress.
  - Risks assessment and mitigation done.
  - ~15% Complete

Team Magna TDD4ES

Status Report

[3 of 4]

Test Driven Development For Embedded Software

- Client Contact
  - Client has been contacted. Regularly scheduled meeting on Fridays at 1PM.
  - Remote meetings until client is available for in-person meetings.
- Team Meetings
  - Regularly scheduled meetings after Triage meetings
  - Team check-ins every other day to report on status.
- Team Organization
  - Divided test cases by file per person
  - Delegate exploring hardware when they are available to us. Awaiting that from the client.

Team Magna TDD4ES

Status Report [4 of 4]

Test Driven Development For Embedded Software

Risks

- Running Code on Embedded Systems
  - Code must be tested on embedded systems that we don't have.
  - Establish and understand simulated environment with sponsor
- Testing Frameworks for Embedded System
  - Unsure what testing frameworks are compatible with hardware.
  - Discuss and test options with client.
- GitHub Actions Frontend
  - Users should be able to interact with tests through GitHub. GitHub Actions may not provide an Emulator for our architecture.
  - Review available Emulators that can support our architecture (if any)
- Optimization Requirements
  - Tests are ineffective if it takes a long time to complete. In addition, limited resources
  - Have multiple job running in parallel. Split unrelated tests to different jobs. Measure times with increased code coverage

MICHIGAN STATE UNIVERSITY

Status Report Presentation

Visualizing Neural Network Gradients

The Capstone Experience

Team Magna VNNG

Devin Dematta

An Le

Arhan Mulay

Sarah Regan

Alex Stornant

Don Truong

Department of Computer Science and Engineering

Michigan State University

Fall 2024

From Students…
…to Professionals

Team Magna VNNG

Status Report

[1 of 4]

Visualizing Neural Network Gradients

- Sponsor Overview
  - Magna is the largest automotive parts manufacturer in North America
  - Specializing in various parts such as body exteriors, powertrains, chassis, electronics, and more.
  - Employs over 150,000 people
- Project OverviewDescription Point 3
  - Develop an interactive UI for visualizing the training of ML models
  - Various ML models operate as “black boxes” and we hope to allow a better understanding of the behind-the-scenes of ML
  - Engineers working with all types of machine learning will use our service to debug and understand their models.

Team Magna VNNG

Status Report

[2 of 4]

Visualizing Neural Network Gradients

- Server Systems / Software
  - Electron application setup for deploying web & desktop app
- Development Systems / Software
  - Frontend, React + Tailwind up and running with initial pages.
  - Backend, Node.js, simple APIs created for reading HDF5 files
  - ML/Logging, simple PyTorch and Tensorflow FNN and CNN gradients logging to HDF5 files.
- Project Plan Document
  - Draft screen mockup pages and system architecture diagrams created
  - Document outline setup
  - 20% Complete

Team Magna VNNG

Status Report

[3 of 4]

Visualizing Neural Network Gradients

- Client Contact
  - Conference calls via Zoom on Friday's at 2pm
  - Met with client 2 times.
- Team Meetings
  - Meetings via Teams and in person - after class
  - We have met 4 times
- Team Organization
  - Devin, An, Don - Frontend
  - Arhan, Sarah, Alex – Backend/ML

Team Magna VNNG

Status Report [4 of 4]

Visualizing Neural Network Gradients

Risks

- Usability Concerns
  - Description: Need to generate intuitive and meaningful visualizations from the logs; otherwise, this tool will not be useful.
  - Mitigation: Research on model training process to understand the needs and preferences for visualizations
- Performance Issue
  - Description: Handling large amounts of data from logger could slow processing and visualization
  - Mitigation: Implement efficient data storage, use data sampling techniques (mean, median, max, min, etc…) and optimize the backend
- User Log Inconsistencies
  - Description: When users train their models, the logs can vary from user to user, which will affect how we parse and visualize.
  - Mitigation: Discuss with client possible options for best ease of use for users, i.e. create python library that users can add to their code to generate consistently structured logs.
- Generalizing varying network architectures
  - Description: How will we generalize our log parsing for varying networks, and how will this transfer to frontend? There are infinitely many ways a network can be setup, FNN, CNN, RNN, etc, how will we deal with this?
  - Mitigation: Focus on certain network architectures for now, FNN and simple CNN, then focus on generalizing.

MICHIGAN STATE UNIVERSITY

Status Report Presentation

World Feature Generation for ADAS Simulation

The Capstone Experience

Team Magna WFG4ADAS

Ethan Gomez
Rohit Chavan
Walker McDonald
Gabriel Militello
Jake Brown
Yi Wu

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Michigan State University

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From Students…
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Team Magna WFG4ADAS

Status Report

[1 of 4]

World Feature Generation for ADAS Simulation

- Sponsor Overview
  - MAGNA is a leading supplier of the automotive industry
  - The largest automobile manufacturer in North America by sales of original equipment parts.
  - The company is headquartered in Aurora, Ontario
- Project Overview
  - Increase automated driving safety
  - By enhancing simulation quality
  - With procedurally generated environments

Team Magna WFG4ADAS

Status Report

[2 of 4]

World Feature Generation for ADAS Simulation

- Development Systems / Software
  - Unreal Engine: installed, “Hello World” created
  - Carla: Installed, manual control functional
  - Blender: Installed
  - Roadrunner: Deliberating usability/necessity
- Project Plan Document
  - Shared with all team members
  - Title and project sponsor overview slides complete
  - 5% Complete

Team Magna WFG4ADAS

Status Report

[3 of 4]

World Feature Generation for ADAS Simulation

- Client Contact
  - Weekly meeting scheduled, 2 completed so far
  - Started process to add client to MSU GitLab
- Team Meetings
  - 2 weekly meetings scheduled, 4 completed so far
  - All in-person
- Team Organization
  - Primary client contact: Gabriel Militello
  - Half of team focuses on Unreal, half on Carla

Team Magna WFG4ADAS

Status Report

[4 of 4]

World Feature Generation for ADAS Simulation

Risks

- Risk 1
  - Uncertain on the feasibility of an automated pipeline to/from Carla
  - Develop a simple proof of concept in the first portion of the semester. If not possible, seek out alternative tools
- Risk 2
  - Ability to generate the extent of assets necessary for effective testing
  - Create simple variations of a few base assets and create a framework to easily allow more assets to be added over time
- Risk 3
  - Use of AI and its integration into Carla and Unreal to generate assets and maps out of scope of procedural algorithms
  - Focus primarily on procedural algorithms. Use generative AI only when necessary
- Risk 4
  - Generate assets performant enough to effectively test without reducing simulation quality
  - Start assets at a simple level of detail. Gradually increase quality until a limit is reached

MICHIGAN STATE UNIVERSITY

Status Report Presentation

Increasing Awareness of Meijer Branded Products

The Capstone Experience

Team Meijer

Viraj Shah
Ishita Saripalle
Robby Dewar
Sonia Thalatoti
Mackenzi Steinmetz

Department of Computer Science and Engineering
Michigan State University

Fall 2024

From Students…
…to Professionals

Team Meijer

Status Report

[1 of 4]

Increasing Awareness of Meijer Branded Products

- Sponsor Overview
  - Meijer was founded in 1934 in Greenville, Michigan
  - Meijer has over 18 original brands
  - Meijer donates 6% of its annual profit to nonprofit organizations
- Project Overview
  - Create a web application for exclusively Meijer brands
  - Increase awareness of Meijer's simply give program to increase donations to nonprofit organziations
  - Targets mPerk's users (Meijer's loyalty program)
  - Create incentives through gamified rewards program

Team Meijer

Status Report

[2 of 4]

Increasing Awareness of Meijer Branded Product

- Server Systems / Software
  - Azure services managed by Meijer
  - Gitlab initialized with ReactJS
  - MySQL DB initialized
- Development Systems / Software
  - Jira Board set up for project management
  - Hello World Application in ReactJS
  - Web scraping data from Meijer.com using Selenium with Python
- Project Plan Document
  - Created 6 Figma mockups
  - System architecture diagram
  - 30% Complete

Team Meijer

Status Report

[3 of 4]

Increasing Awareness of Meijer Branded Products

- Client Contact
  - Met with our client twice
  - Weekly Meetings on Fridays at 3PM
- Team Meetings
  - In person team meetings twice a week after class
  - Zoom meetings on weekends
- Team Organization
  - Frontend/Design: Ishita and Mackenzi
  - Backend/APIs: Sonia, Viraj, Robby

Team Meijer

Status Report

[4 of 4]

Increasing Awareness of Meijer Branded Products

Risks

- Risk 1
  - Loading product data into provided item cards
  - Develop and test prototypes
- Risk 2
  - Performance degradation due to a heavy DB and overloaded client-side code
  - API Pagination, DB Partitioning, Lazy Loading
- Risk 3
  - Following cloud-based security practices
  - Optimize Azure resource usage and monitoring to ensure cost-effectiveness and efficiency
- Risk 4
  - Gamifying an engaging promotion for users to feel incentivized to continue shopping Meijer brands
  - Conduct digital marketing research during the development phase to better align website features with customer expectations.

MICHIGAN STATE UNIVERSITY

Status Report Presentation

Robotic Job Coaching

The Capstone Experience

Team Michigan State University CSE

Adam Cohen
Kaiwen Jiang
Olivia Pal
Stavro Polis
Kyle Roleson
Ekene Umobi

Department of Computer Science and Engineering
Michigan State University

Fall 2024

From Students…
…to Professionals

Team Michigan State University CSE

Status Report

[1 of 4]

Robotic Job Coaching

- Sponsor Overview
  - Dr. Charles Owen
  - Dr. Ranjan Mukherjee
  - Dr. Hung Jen Kuo
- Project Overview
  - Allow Job coaches to monitor multiple trainees remotely
  - Allow job coach to have full motion control of an iPad camera through a robotic arm
  - Facilitate interactive feedback

Team Michigan State University CSE

Status Report

[2 of 4]

Robotic Job Coaching

- Server Systems / Software
  - WebRTC signaling server tested – Works fine for basic video calling
  - Raspberry Pi iPad/Robot interface – Planning on acquiring – Talked to TM
- Development Systems / Software
  - iOS app- Successfully set up video calling
  - CoreMotion API – Rotation, acceleration successfully sampled.
  - Kinova JACO robotic arm – broken before receiving, extensive communication with Kinova support and troubleshooting led to no success. Setting up meeting with previous user of robot
- Project Plan Document
  - In discussion with client over specific details of executive summary.
  - First draft of design and functional specifications sections done.
  - 15% Complete.

Team Michigan State University CSE

Status Report

[3 of 4]

Robotic Job Coaching

- Client Contact
  - Met with clients twice, weekly in-person meeting set up Fridays
  - Dr. Owen visited lab to attempt to help fix robot (no success)
- Team Meetings
  - Weekly in-person scheduled for Fridays
  - Discord server established for constant communication
- Team Organization
  - Split into two teams focusing on iOS app and robot
  - Might change depending on if robot works

Team Michigan State University CSE

Status Report

[4 of 4]

Robotic Job Coaching

Risks

- Risk 1
  - Robot doesn't work
  - Have been in discussions with Kinova support, now contacting previous user who may have more knowledge
- Risk 2
  - Tracking the relative position of the job coach iPad
  - Plan to make a prototype demo app that utilizes the iPad Pro's LiDAR sensor for spatial tracking
- Risk 3
  - Geofencing
  - Dependent on the robot's status
- Risk 4
  - Holding the iPad
  - Contact Kinova Support regarding if fingers are removable without damaging it further
  - If so, look into 3D printing a compatible mount

MICHIGAN STATE UNIVERSITY

Status Report Presentation

Branch Pick Up Lockers

The Capstone Experience

Team MSUFCU

Rida Mahmood
David Kuehn
Lucas Fankhauser
Abdulla Alblooshi
Will Morant

Department of Computer Science and Engineering
Michigan State University

Fall 2024

From Students…
…to Professionals

Team MSUFCU

Status Report

[1 of 4]

Branch Pick Up Lockers

- Sponsor Overview
  - MSU Federal Credit Union
  - Safe and reliable banking
  - Help members achieve financial freedom
- Project Overview
  - Members are unable to place orders during all business hours
  - Create applications for customers to place orders
  - Create branch locker system for storing items
  - Notify customers when their pickup is ready

Team MSUFCU

Status Report

[2 of 4]

Branch Pick Up Lockers

- Server Systems / Software
  - Firebase DB up and running
  - AWS EC2 instance for locks to be set up
  - AWS EC2 instance for apps to be set up
- Development Systems / Software
  - Android studio set up and hello world created
  - Flask web server set up and hello world created
  - Planning on creating API for apps and locks
  - IOS app not set up
- Project Plan Document
  - Filled out skeleton for all sections
  - Mock ups and system architecture created
  - 35% complete

Team MSUFCU

Status Report

[3 of 4]

Branch Pick Up Lockers

- Client Contact
  - Contact established with client and weekly meeting scheduled
  - Met two times and presented early software ideas
- Team Meetings
  - Team met and weekly meetings established
  - Met three times
- Team Organization
  - Frontend: Rida, Abdulla
  - Backend/Locks: Lucas, David, Will

Team MSUFCU

Status Report

[4 of 4]

Branch Pick Up Lockers

Risks

- Smart Locks
  - Don’t know how to make our lock communicate with our applications
  - Use Raspberry Pi as communication layer between server and locks
- IOS development
  - Team has no experience developing in the IOS atmosphere
  - Identified YouTube videos on IOS development and read Apple IOS dev page
- Keeping experience the same across IOS, Web, and Android
  - Three different programming environments could lead to discrepancies between the applications
  - Keep one API to communicate with endpoints to the DB and all three applications, parallel program the applications to iron out discrepancies

MICHIGAN STATE UNIVERSITY

Status Report Presentation

Intelligent Benefits Parser and Knowledge Assistant

The Capstone Experience

Team Roosevelt Innovations Knowledge Science

Austin Sawicki
Jada Clark
Riley Cook
Brenden Cwiek
Maanasi Ganapathy
Kyle Raeside

Department of Computer Science and Engineering
Michigan State University

Fall 2024

From Students…
…to Professionals

Team Roosevelt Innovations Knowledge Science

Status Report [1 of 4]

Intelligent Benefits Parser and Knowledge Assistant

- Sponsor Overview
  - Subsidiary of Delta Dental of Michigan
  - Creates insurance processing software.
- Project Overview
  - Time consuming document transfer between insurance companies
  - Benefit certificate translation
  - Find important benefit information
  - AI Chatbot

Team Roosevelt Innovations Knowledge Science

Status Report [2 of 4]

Intelligent Benefits Parser and Knowledge Assistant

- Server Systems / Software
  - MongoDB
  - Azure Blob Storage
  - OpenAI API
- Development Systems / Software
  - Angular
  - FastAPI
- Project Plan Document
  - 0% Complete

Team Roosevelt Innovations Knowledge Science

Status Report [3 of 4]

Intelligent Benefits Parser and Knowledge Assistant

- Client Contact
  - Two meetings through Teams
  - Meeting every Monday 1-2PM
- Team Meetings
  - Every Thursday after Triage meeting
  - Talk after sponsor meeting
  - Have met twice
- Team Organization
  - Frontend – Maanasi, Jada, Brenden
  - Backend – Austin, Riley, Kyle, Brenden

Team Roosevelt Innovations Knowledge Science

Status Report [4 of 4]

Intelligent Benefits Parser and Knowledge Assistant

Risks

- PDF differing formats
  - PDFs that holds insurance benefit information are different based on company.
  - Look through example PDFs given by sponsor and look for similar information that is in every document.
- Extracting non-text data from PDFs
  - How will be extract things like tables and other non-text data from PDFs to put in database?
  - Find string extractor on excel documents for tables. Other non-table information is irrelevant and can be discarded.
- OpenAI API restrictions
  - How does the chatbot know what is a relevant question?
  - Inform the chatbot what page the user is on. Send the chatbot the extracted PDF information.

MICHIGAN STATE UNIVERSITY

Status Report Presentation

The Capstone Experience

Team RPM

Thomas Huynh
Brandon Linville
Palmer McGuire
Connor Sheridan
Ajay Suresh

Department of Computer Science and Engineering
Michigan State University

Fall 2024

From Students…
…to Professionals

Team RPM

Status Report

[1 of 4]

Automated VIN Integration for RPM Logistics

- Sponsor Overview
  - Freight Brokerage Company specializing in vehicle transportation (including OEM) operating in 30 countries
  - Based in Royal Oak, Michigan. Manage shipping of 60k vehicles/month
  - Creating software systems to further automate freight brokerage process
- Project Overview
  - 20% of RPM's clients email order status in ambiguous formats instead of using their app
  - Automatically classify file types and extract data from emails, parse text, and submit orders to RPM
  - Used by RPM Broker who currently handles all unautomated VIN orders via email
  - Broker will have access to software maintenance dashboard to resolve order issues and view automated order statistics

Team RPM

Status Report

[2 of 4]

Automated VIN Integration for RPM Logistics

- Server Systems / Software
  - Azure Cosmos SQL (Created, up and running, not yet tested)
  - Azure Hosting Services (Docker) (Tested Docker availability through Azure services)
- Development Systems / Software
  - OpenAI (Client credentials received, Credits set to auto refill, API keys not yet created or used)
  - Microsoft Azure (All members added to client Tenant, Researching/Exploring Azure tools)
  - Python and React (Members successfully printed hello world on separate machines)
  - Flask (Just discovered this is needed, will configure and test this week)
  - JSON (Downloaded, not yet needed as database hasn't been tested)
- Project Plan Document
  - Document Created (9/7). Previous 2 client meetings have been architecture and design decisions
  - Technical specifications being created, will demo to client midweek (9/11) (20%)
  - Architecture Design demoed to client and completed (9/9). Screen mock ups in progress (25%)
  - 25% Complete

Team RPM

Status Report

[3 of 4]

Automated VIN Integration for RPM Logistics

- Client Contact
  - Initial client meeting Aug 29th. Scheduled bi-weekly virtual meetings (Mon PM & Thurs AM) (4 total completed thus far)
  - Discussed MSU team visit to RPM. Date/Time TBD as RPM project lead will be out of town for two weeks
- Team Meetings
  - Initial Team meeting Aug 28th. Scheduled tri-weekly meetings (Mon, Wed, Fri 1:00-1:30 pm) (8 total completed thus far)
  - Maintaining detailed meeting notes including action items, Trello board, and a personal task list
- Team Organization
  - Palmer – Communication Lead (Py, SQL, OpenAI) | Brandon – PM (React, Flask, JS)
  - Connor - (Py, Azure, File Parsing) | Ajay - (Py, SQL, File Parsing) | Thomas - (Py, React, Flask)

Team RPM

Status Report

[4 of 4]

Automated VIN Integration for RPM Logistics

Risks

- Final integration with RPM's system and client mapping between software
  - RPM has a relatively complex API that is part of their legacy code and has pointed out the connection may take substantial time. Similarly, RPM maintains multiple client identifiers that will need to be maintained or created through our system
  - RPM will add MSU to API. Will create mock orders to test external API connection and ensure complete correctness. Will develop plan with RPM to handle clients not in RPM's system
- Email classification correctness and file to text conversion
  - RPM receives VIN data in various file types. Each file type must be categorized and handled differently. This poses a serious risk if every file type is not accounted for
  - Received expansive RPM email order data examples. Categorize and maintain list of all current options and research niche or future file types and formats. Also, explore and test technologies that currently handle ambiguous file types
- Access permission and Authentication of RPM employees
  - Our system needs a limited number RPM internal maintenance accounts that can be connected to the current RPM authentication credentials. How will we handle interfacing with RPM's current SSO and/or permission structure as current permissions are assigned manually
  - Develop a permission assigning strategy with RPM developers and significantly test prior to deployment. Automated email to the permissions manager at RPM may be a viable solution

MICHIGAN STATE UNIVERSITY

Status Report Presentation

Surgical OR Instruments and Needle Tracking

The Capstone Experience

Team Stryker IST

Declan Bahen
Aditya Chaudhari
Ryan Filipiak
Joshua Mae
Ashley Siegmund
Duong Tran

Department of Computer Science and Engineering
Michigan State University

Fall 2024

From Students…
…to Professionals

Team Stryker IST

Status Report

[1 of 4]

Surgical OR Instruments and Needle Tracking

- Sponsor Overview
  - Founded by Dr. Homer Stryker, an orthopaedic surgeon, in 1941
  - Global leader in medical technologies
  - Impacting more than 150M patients anually
  - Promoting access, affordability, and safety to quality healthcare
- Project Overview
  - Surgical instruments/needles need a more streamlined approach to tracking
  - The surgical tech and circulating nurses are responsible for counting the instruments before, during, and after procedures
  - An application will be created to implement real-time tracking and instrument documentation

Team Stryker IST

Status Report

[2 of 4]

Surgical OR Instruments and Needle Tracking

- Server Systems / Software
  - Ubuntu Server backend: Up and running
  - Node.js and Express for backend service: Created Hello World
  - PostgreSQL for database: Initial Schema designed
- Development Systems / Software
  - Swift, SwiftUI, Xcode, UIKit: Initial UI Prototype
  - CoreML, Pytorch, YOLOv8: Default model tested
- Project Plan Document
  - Outline created with Executive Summary and Functional Specifications drafted
  - Schedule completed
  - 20% Complete

Team Stryker IST

Status Report

[3 of 4]

Surgical OR Instruments and Needle Tracking

- Client Contact
  - Weekly Sponsor Meetings @ 4:30 on Mondays (Sponsor Online, Team In-Person)
  - Prior Meetings: 2
- Team Meetings
  - Weekly Team Meetings @ 4:30 on Thursdays (In-Person)
  - Prior Meetings: 6
- Team Organization
  - Front End – Joshua, Ashley, Aditya
  - Back End – Duong, Ryan, Declan

Team Stryker IST

Status Report

[4 of 4]

Surgical OR Instruments and Needle Tracking

Risks

- Dataset Acquisition:
  - May not be able to acquire properly annotated dataset
  - Determine if sponsor has existing annotated images as well as research any existing datasets found online
- Individual Instrument Tracking
  - Many instruments/needles are very small in size limiting the ability to tag and label for ID reference or may be single-use only
  - Balance AI and manual input of instruments into system
- Speed and Accuracy of AI Compute
  - Instruments need to be detected in real-time, any lag or misclassification could result in improper tracking
  - Use a quantized or mobile model while testing multiple versions

MICHIGAN STATE UNIVERSITY

Status Report Presentation

Video Insight & Knowledge Interface (VIKI)

The Capstone Experience

Team TechSmith

Samuel Blashill
Brandon Hwang
Tyler McDonald
Prajeeth Naliganti
Sania Sinha
Andrew Strominger

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Fall 2024

From Students…
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Team TechSmith

Status Report

[1 of 4]

Video Insight & Knowledge Interface (VIKI)

- Sponsor Overview
  - TechSmith is the company behind Camtasia and Snagit
  - Camtasia is a powerful and easy to use video editor
  - Snagit allows effortless screen capture and recording
- Project Overview
  - VIKI aims to help video creators receive tailored feedback based on their target audience
  - Scans uploaded video and provides feedback based on an AI persona
  - Will provide analysis at key points throughout the video
  - Allows users to enhance video quality by optimizing content for their purpose such as education materials or entertainment productions

Team TechSmith

Status Report

[2 of 4]

Video Insight & Knowledge Interface (VIKI)

- Server Systems / Software
  - Basic FastAPI server set up with endpoints
  - Azure Blob Storage client initialized, but missing URL, credential, etc.
  - User authentication (token acquisition) implemented, but missing credential
- Development Systems / Software
  - React application set up w/ Tailwind CSS and TypeScript, dependencies installed to support client-side routing
  - Two test landing routes up and running locally
  - Initial video to audio and audio transcription completed
- Project Plan Document
  - Screen mockups and design drafts in progress
  - Tech stack and system architecture decisions agreed upon by client
  - 10% Complete

Team TechSmith

Status Report

[3 of 4]

Video Insight & Knowledge Interface (VIKI)

- Client Contact
  - Weekly on Thursday from 4:30pm
  - Met twice, with initial confirmations on tech stack
- Team Meetings
  - Weekly on Tuesdays from 4:30pm
  - Sub teams meet at least once weekly and as needed
  - Met five times, both virtually and in person @ Capstone Lab
- Team Organization
  - Frontend: Tyler, Andrew
  - Backend: Samuel, Brandon
  - AI: Sania, Prajeeth

Team TechSmith

Status Report

[4 of 4]

Video Insight & Knowledge Interface (VIKI)

Risks

- Testing effectiveness of AI insights
  - Testing AI insights on video quality is a subjective evaluation with no standard precedents to rely on.
  - Mitigation: Ample user testing and inclusion of multiple video quality metrics to ensure robustness.
- Latency with computations on large videos
  - Large videos take up immense computational resources and can lead to lag in performance with reduced user experience.
  - Mitigation: Doing latency tests to analyze and decide on optimum use of host versus cloud resources.
- Video & timeline frontend integration
  - Along with allowing the user to playback their video, we want to have a fully interactive video timeline that allows the user to move through their video frame-by-frame so they can view specific feedback at given timestamps throughout the video.
  - Mitigation: Deep dive into the online collection of React libraries to find the best package (or combination of packages) to upload, render, and play videos. May also need to do additional research into external APIs for certain parts of this process.
- Video encryption & storage
  - Large videos may be costly to store in Azure, especially considering our client-mandated budget.
  - Mitigation: Try to find a way to compress the videos when they are uploaded and monitor costs to prevent exceeding the budget.

MICHIGAN STATE UNIVERSITY

Status Report Presentation

Virtual Reality Inspection Training

The Capstone Experience

Team Union Pacific

Sean Burch
Nicolas Georgescu
Sasha Tarasova
Luc Walz
Mohammad Zaman
Tyler Ziegenfelder

Department of Computer Science and Engineering
Michigan State University

Fall 2024

From Students…
…to Professionals

Team Union Pacific

Status Report

[1 of 4]

Virtual Reality Inspection Training

- Sponsor Overview
  - The largest railroad company in North America by freight volume
  - Now sell their tech to other railroad companies
  - Committed to enhancing railroad safety and efficiency
- Project Overview
  - Replatforming existing web-based training solutions to VR
  - Train mechanics to detect defects on locomotives
  - Custom synchronization when connecting the VR headset with the Learning Management System (LMS)
  - Courses replatofrmed will be: Freight Car Anatomy, Airbrake Test and Mechanical Inspection, and Locomotive Daily Inspection

Team Union Pacific

Status Report

[2 of 4]

Virtual Reality Inspection Training

- Server Systems / Software
  - AWS EC2 Linux Instance is up and running with Tomcat, Java and a PostgreSQL RDS
  - Programmed a SpringBoot test application using IntelliJ IDEA and the Spring Initializr framework and plan to implement it onto our EC2 server
  - Using IntelliJ IDEA, Tomcat, PostgresSQL and Postman applications, the GET, POST, and DELETE functionality work on a local web server
- Development Systems / Software
  - Unity Installed with the WebGL build of the project
  - Meta Quest Link App installed and set up to connect the Meta Quest headset to the computer
  - Learning project, Open XR, and device agnostic libraries
- Project Plan Document
  - Began the project plan document and discussed it with our client
  - Started designing system architecture and screen mockups
  - 5% Complete

Team Union Pacific

Status Report

[3 of 4]

Virtual Reality Inspection Training

- Client Contact
  - Weekly meetings with client on Fridays at 12pm
  - Met twice, with smaller Team meetings when needed
- Team Meetings
  - Team meetings are on Wednesdays at 5pm
  - Communication is regular and we meet frequently during the week
- Team Organization
  - Sean, Mohammad, Nico – web systems: backend and frontend
  - Luc, Tyler, Sasha – simulation systems: VR and AR courses

Team Union Pacific

Status Report

[4 of 4]

Virtual Reality Inspection Training

Risks

- Risk 1
  - Difficulty optimizing VR performance.
  - Mitigation: using Unity's profiler and texture compression.
- Risk 2
  - Misconfigured security groups in AWS EC2 Instance could expose sensitive data or allow unauthorized access.
  - Mitigation: apply least privilege principles for AWS security groups, only opening necessary ports like SSH or HTTP, and enabling firewalls where possible.
- Risk 3
  - Making sure that our VR application doesn't cause motion sickness.
  - Mitigation: testing our application with multiple students outside of our team who are prone to motion sickness.
- Risk 4
  - Platform specific issues between different VR systems.
  - Mitigation: researching device-agnostic libraries, and testing on available headsets.

MICHIGAN STATE UNIVERSITY

Status Report Presentation

Predicting Automotive Sales Using Generative AI

The Capstone Experience

Team Urban Science

Samantha Wycoff
Max Tetlow
Trinity Johnson
Aidan Gollan
Zeeshan Naeem
Quang Nguyen

Department of Computer Science and Engineering
Michigan State University

Fall 2024

From Students…
…to Professionals

Team Urban Science

Status Report

[1 of 4]

Predicting Automotive Sales Using Generative AI

- Sponsor Overview
  - Automotive Business Scientists
  - Conduct data-driven analysis to increase market share and profitability
  - Services every major automater in the US and abroad
- Project Overview
  - Web application that analyzes sales data
  - Provides insights with the use of GenAI
  - Automotive customers working with Urban Science will use insights to improve profitability and marketing strategies
  - Predicts future sales data for use in planning

Team Urban Science

Status Report

[2 of 4]

Predicting Automotive Sales Using Generative AI

- Server Systems / Software
  - MySQL server setup locally
  - Azure cloud account setup
  - Azure OpenAI credits acquired
- Development Systems / Software
  - Prophet server hello world complete
  - C# server hello world complete
  - Frontend hello world complete
- Project Plan Document
  - Initial functional and design specifications complete
  - System design architecture diagram complete
  - 5% complete

Team Urban Science

Status Report

[3 of 4]

Predicting Automative Sales Using Generative AI

- Client Contact
  - Met with client twice
  - Scheduled weekly meeting for Wednesdays at 10:30AM
- Team Meetings
  - Met as a team three times
  - Scheduled weekly in-person meetings for Tuesdays at 4:30PM
- Team Organization
  - Aidan is working on Frontend
  - Quang and Max are working on Backend
  - Sam and Trinity are working on the Database and the DAL
  - Zeeshan is working on the LLM and Prophet

Team Urban Science

Status Report

[4 of 4]

Predicting Automative Sales Using Generative AI

Risks

- Integrating Python REST API with .NET
  - Using Python with ML models allows .NET to use predictions for data analytics
  - Mitigating by watching tutorials on how to write to one DB with two APIs
- Implementing Cron job for monthly data updates using Prophet
  - Implementing a system for updating the database with new predictions every month from Prophet
  - Breaking the task into smaller manageable pieces, writing dummy data to DB with a Cron job, then figuring out how to use real data
- Misinformation from Large Language Model
  - Ensuring the LLM will hallucinate when used to create visuals, graphs, and explanations for the data in the database
  - Mitigate by curating data along with limiting the LLM's scope / controlled responses

MICHIGAN STATE UNIVERSITY

Status Report Presentation

AI Cyberattack Early Warning System

The Capstone Experience

Team Vectra AI

Alex Fortsch

Graham Holley

Ajay Kumar

Morghane McAnelly

Alex Popovic

Jacob Sock

Department of Computer Science and Engineering
Michigan State University

Fall 2024

From Students…
…to Professionals

Team Vectra AI

Status Report

[1 of 4]

AI Cyberattack Early Warning System

- Vectra AI
  - Founded in 2011
  - Attack detection, investigation, and response solutions
  - Able to detect attacks without decryption
- Project Overview
  - Identify and collect threat intel sources
  - Leverage an LLM to extrapolate C2 config parameters
  - Generate samples from C2 simulator execution
  - Identify any potential coverage gaps using Vectra's product
  - Create configurations of known tools, generate samples, and determine potential coverage gaps.

Team Vectra AI

Status Report

[2 of 4]

AI Cyberattack Early Warning System

- Server Systems / Software
  - Lab Virtual Machines & Python (100% Complete)
  - Flask/Jinja, MySQL, Wireshark, & Vectra's APIs (100% Complete)
  - Vectra's C2 Simulator (90% Complete)
- Development Systems / Software
  - Web Scraping Tools
    - Installed and Tested
  - LLM Framework Used
    - Installed and Tested
  - UI Interface
    - Wireframe and Frontend Drafts Complete
- Project Plan Document (30% Complete)
  - UI Mockups
  - System Architecture Diagram
  - Prototypes of the Web Scraper & LLM

Team Vectra AI

Status Report

[3 of 4]

AI Cyberattack Early Warning System

- Client Contact
  - Brad Woodberg, Senior Product Manager
  - Campbell Robertson, Associate Product Manager
  - Weekly Tuesday Meetings (4:30 P.M)
    - Additional Friday Meetings to start
    - In-Person Meeting After Pictures 9/20/24
- Team Meetings
  - Thursday Triage (9:40 A.M)
  - Wednesday Standups (6:30 P.M)
  - 9 Team Meetings
- Team Organization
  - API/LLM: Ajay, Alex F
  - Front End/UI: Morghane
  - Web Scraping: Graham, Alex P
  - Vectra C2 Simulator: Jacob
  - Ajay is Vectra's point of contact

Team Vectra AI

Status Report

[4 of 4]

AI Cyberattack Early Warning System

Risks

- Risk 1
  - Automating running cyberattack tools given GitHub URLs
  - Understanding the structure/configurations of common cyberattack tools
- Risk 2
  - Unsure of website content filtration for social media URLs
  - Have a more advanced (possibly manual) filtration process for particular URLs
- Risk 3
  - LLM model tiers can be expensive
  - Test around with tiers within LLM models
- Risk 4
  - Certain URLs are inaccessible without accounts
  - Maintain reliable ways for authentication or circumnavigating

MICHIGAN STATE UNIVERSITY

Status Report Presentation
Safe Journey AI

The Capstone Experience

Team Volkswagen

Ricardo Quinonez
Pranav Premchand
Maui Baba
Shashank Jayaram
Navya Singh
Sudhanv Komanduri

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Michigan State University

Fall 2024

From Students…
…to Professionals

Team Volkswagen

Status Report

[1 of 4]

Safe Journey AI

- Volkswagen Overview
  - One of the largest automobile manufacturers in the world based in Germany
  - Parent company to some of the largest car brands such as Porsche, Audi, Lamborghini
  - Creators of timeless classics such as the Beetle and the Microbus
- Project Overview
  - Optimizing route planning by prioritizing speed and safety using AI
  - Provides real-time alerts based on crime, weather and traffic
  - Used as the navigation system within certain Volkswagen cars

Team Volkswagen

Status Report

[2 of 4]

Safe Journey AI

- Development Systems / Software
  - Prototype of crime ML model completed and tested
  - Prototype of real time alerts ML model started
  - Basic React App with Google Maps API running
  - Landing page UI started
- Server Systems / Software
  - Currently running our code locally right now
  - Google Cloud Platform chosen as hosting service
    - Cloud Run (Tier 1) for initial webapp hosting (1 vCPU, 4GB)
    - Exploring GCP options for running ML tasks
  - Also investigating Snowflake (Data warehouse provider) for storage
- Project Plan Document
  - First written draft of executive summary and functional specifications completed
  - 2 Mockups pages designed on Figma
  - 20% Complete

Team Volkswagen

Status Report

[3 of 4]

Safe Journey AI

- Client Contact
  - Spoken with our client twice
  - Scheduled weekly meetings on Fridays through conference calls
- Team Meetings
  - Team has met 8 times so far
  - Two formal meetings on Thursdays and Sundays in person
  - Weekly sprints starting on Sundays, bi-daily stand-ups
- Team Organization
  - Frontend: Sudhanv, Navya, Ricardo, Shashank
  - Backend: Pranav, Maui, Navya
  - Cloud: Maui, Pranav, Shashank, Ricardo

Team Volkswagen

Status Report [4 of 4]

Safe Journey AI

Risks

- Ethics considerations
  - Application could be biased against low-income areas with regards to safety concerns
  - User could customize safety rating thresholds or may toggle safety navigation
- Sending ML&AI responses
  - The team has no experience on how to send the data from the backend to the frontend
  - Create a dedicated API endpoint in the backend that the map services can call checks for route updates
  - Implement webhook that can send a payload to the maps service with details of the affected area and suggested rerouting instructions.
- Web app turn by turn directions
  - Limited to no resources found on GPS navigation on web apps which limits providing user with real-time safety alerts
  - Option to pivot to a step-by-step directions API without GPS navigation
  - Call geolocation API once per second on user's current position
- Simulated route navigation testing
  - No real time GPS on the web application to test navigation
  - Inject a list of fake location coordinates into our application to simulate movement along the route

MICHIGAN STATE UNIVERSITY

Status Report Presentation

Cooking GPS

The Capstone Experience

Team Whirlpool

Ruitao Liu
Audrey Parsons
Bruce Smith
Conner Smith
Chris Swiecicki
Connor Wurtz

Department of Computer Science and Engineering
Michigan State University

Fall 2024

From Students…
…to Professionals

Team Whirlpool

Status Report

[1 of 4]

Cooking GPS

- Sponsor Overview
  - Based in Benton Harbor, MI
  - A World Leader in Household Appliances
  - $19 Billion in Sales
- Project Overview
  - Simplify the Process of Cooking a Meal by Tracking and Planning Recipe Completion
  - Interacts with User's Appliances
  - Coordinates the Simultaneous Completion of Multiple Recipes

Team Whirlpool

Status Report

[2 of 4]

Cooking GPS

- Server Systems / Software
  - Backend Flask Server
    - Prototype Running on iMac and PythonAnywhere (Remote Server Host)
- Development Systems / Software
  - Flutter
    - Installed and Prototype App is Working
  - Job-Shop Algorithm
    - Working Prototype With Basic Variables accounted for
  - GitLab
    - Created with All Team Members and TMs Added
- Project Plan Document
  - High-Level Design Done
  - Details are in Progress
  - 10% Complete

Team Whirlpool

Status Report

[3 of 4]

Cooking GPS

- Client Contact
  - Had Initial Meeting
    - Introductions and Project Overview
  - Weekly Meetings Scheduled
- Team Meetings
  - Met Five Times
  - Weekly Meetings Scheduled
- Team Organization
  - Conner – Main Client Contact
  - Three Team Members on Front-End
  - Three Team Members on Back-End

Team Whirlpool

Status Report [4 of 4]

Cooking GPS

Risks

- Android/iOS Cross Compatibility
  - Can our App Perform in the Same Way on Both Operating Systems?
  - Research Flutter's Documentation for the Necessary Components of Cross Compatibility and Develop A Simple Cross Compatible Application
- Back-End Algorithm Accounting For All Variables
  - Can the Job-Shop Algorithm Handle All of the Necessary Inputs?
    - Number of Burners, Burner Size, Number of Oven Racks, Oven Temperatures, etc.
  - Read the CP Solver Documentation for Different Constraints and Create Testable Prototypes
- Re-Routing GPS
  - When the User Fails to Follow Meal Preparation Steps exactly, How can we Efficiently Adjust?
  - Research the Job-Shop Algorithm to find Common Re-Routing Handling
- Connection to Whirlpool Appliance Screens
  - How do we get our App to Communicate with Whirlpool Appliances?
  - Discuss with our Client on the Different APIs that Whirlpool Appliances use

MICHIGAN STATE UNIVERSITY

Status Report Presentation

Cereal Industry Analysis Tool using Generative AI

The Capstone Experience

Team WK Kellogg Co

Suryansh Singh
Roshni Kaur
Shubh Sharma
Anand Pinnamaneni
Daniel Flanagan
Samin Matin

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Michigan State University

Fall 2024

From Students…
…to Professionals

Team WK Kellogg

Status Report

[1 of 4]

Cereal Industry Analysis Tool using Generative AI

- Sponsor Overview
  - Global leader in the food industry, specializing in cereals, snacks, and convenience foods.
  - Iconic brands like Corn Flakes, Froot Loops, and Krave.
  - Focusing on innovation in nutrition and sustainability in over 180 countries
- Project Overview
  - Automates analysis of extensive cereal company financial data to uncover key trends and insights.
  - Industry analysts and financial professionals are the target users.
  - Queries model for quick insights into industry trends and strategic changes.
  - Delivers actionable summaries on major industry shifts, mergers, and macroeconomic impacts.

Team WK Kellogg

Status Report

[2 of 4]

Cereal Industry Analysis Tool using Generative AI

- Server Systems / Software
  - Snowflake – Operational, Waiting on client credentials
  - AWS Secure Storage Service – Waiting for client credential
  - Snowflake Arctic – Needs integration with Snowflake
- Development Systems / Software
  - Python – Snowflake Python Connector needs installation
  - SQL – Operational
  - Streamlit – Operational
- Project Plan Document
  - Rough outline of Specifications, requirements discussed
  - Working on Mockups Prototypes
  - 10% Complete

Team WK Kellogg

Status Report

[3 of 4]

Cereal Industry Analysis Tool using Generative AI

- Client Contact
  - Two conference calls (scheduled weekly Fridays at 12:30pm) with our client, Jay Swiatek.
  - Documents signed and sent, waiting for the client to send over credentials for the required resources.
- Team Meetings
  - Biweekly meetings in person and asynchronous meetings as needed (met thrice in person and twice over conference call so far).
  - During our meetings, we've been collaborating on the product's design and usage based on the client's input while also learning new technologies like Snowflake and Amazon S3 through tutorials.
- Team Organization
  - Shubh and Suryansh are exploring Amazon S3 and Snowflake by setting up and experimenting with the platforms, while Samin and Roshni are filtering public datasets to align with the model's requirements.
  - Daniel and Anand are focused on designing the front end of the product as part of the initial research phase, which is centered on data analysis.

Team WK Kellogg

Status Report

[4 of 4]

Cereal Industry Analysis Tool using Generative AI

Risks

- Clean Data
  - Ensuring that the data used is properly formatted
  - Proper testing of different data formats
- LLM Integration
  - Integrating the AI/LLM with Snowflake
  - Finding the proper AI model for the job
- Quality Data
  - Ensuring that the model adequately fits the data to ensure reliability
  - Searching for both diverse and relevant sets of data
- Accessing Resources
  - Acquiring credentials to access tools such as Snowflake
  - Sent the client information regarding the NDA, client will discuss next steps with coworker to get us the access as soon as possible.