SIGHT Project: Meeting 03 Minutes

Date: August 01, 2025
Time: 11:00 AM - 12:09 PM
Location: Zoom
Slides: https://fmegahed.github.io/sight/presentations/meeting03/meeting03.html

Attendees

- **Miami University (MU):** Fadel Megahed (PI), Arthur Carvalho (Co-PI), Jay Shan (Co-PI), Reza Abrisham Baf (SP), Ibrahim Yousif (Post Doc), Michael Wise (Future Graduate Research Assistant), Mohamed Farrag (PM), Maressa Dixon (Evaluator), Yue Li (Evaluator), Kristen Morio (Evaluator)
- **University at Buffalo (UB):** Lora Cavuoto (Safety Consultant)
- **MaxByte:** Ramshankar C S (CEO), Harish Chittaluri (Tech Lead), Gift Selvin (Education Liaison)
- **MeetKai:** Kevin Bresnahan (VP Business Development), Jacquie Babakanian (Chief of Staff), Vincent Cheong (Software Engineer), David Arcia (Software Engineer)

Agenda Items

1. Recap and Approval of Meeting 02 Minutes.
2. Project Technical and Administrative Updates.
3. Open Discussion.
4. Next Steps and Wrap-Up.

Discussion Summary

1. Recap and Approval of Minutes (Fadel Megahed)

- F. Megahed opened the meeting and asked for any concerns regarding the minutes from Meeting 02, which were previously circulated.
- No concerns were raised by the team. The minutes for Meeting 02 were approved.

2. Administrative Updates

- **Contracts & Procurement (Fadel Megahed):**
  - Contracts have been sent to all partners (MaxByte, MeetKai) and the safety consultant (Lora Cavuoto).
  - The final deadline for all signed contracts is August 15, 2025. F. Megahed encouraged partners to reach out directly with any questions, acknowledging that as a state school, Miami University has to abide by specific Ohio laws.
- **IRB Submission (Jay Shan):**
  - The Level-2 Expedited Review Application was submitted on July 23.
  - Initial feedback was received and addressed, including updates to CITI training and clarifications on data confidentiality, survey tools, and consent processes.
  - The revised application was submitted on July 31 and is awaiting final approval.

    - Once approved, the documentation must be submitted to the Ohio BWC within 10 days.
    - New team members (students, post-docs) will need to complete CITI training before being added to the IRB protocol.
- **Notion Workspace (Arthur Carvalho):**
    - The Notion workspace is active and being populated with all administrative tasks and deadlines to centralize project management.
    - A. Carvalho will begin assigning individuals to tasks. He noted he is delaying this slightly to allow team members to adjust their notification settings to avoid an influx of emails.
    - The next step is to add research and development tasks to the Notion board.

3. Technical Update

- **RAG System Documentation (Lora Cavuoto):**
    - L. Cavuoto has started gathering foundational safety documents to build the knowledge base for the Retrieval-Augmented Generation (RAG) system.
    - The initial focus is on safety for the three primary machines (lathe, collaborative robot, CNC).
    - Key documents include OSHA regulations on machinery/machine guarding (29 CFR 1910 Subpart O) and the control of hazardous energy (Lockout/Tagout). These documents represent the minimum federal safety requirements.
    - This will be supplemented with specific instruction manuals for the equipment at the Miami University Innovation Hub.
- **Initial RAG Design & Demo (Fadel Megahed):**
    - A preliminary proof-of-concept chatbot has been developed.
    - The current design involves processing PDF and HTML documents from OSHA and NIOSH, converting them to Markdown, chunking the text, and generating embeddings. This knowledge is stored in a graph database.
    - A Streamlit app provides a user interface where questions are embedded, and the top-k relevant chunks are retrieved to generate an answer using GPT-4o-mini.
    - F. Megahed provided a live demo, showing how the chatbot answers questions and cites its sources. He noted this is an early version for students to build upon.
- **Plan for Expanding the Chatbot (Arthur Carvalho):**
    - A four-month research plan has been developed to systematically determine the best architecture.
    - The team will explore different RAG approaches (e.g., graph-based, different re-ranking methods) versus a non-RAG approach where documents are loaded directly into the model's context window.
    - **Quantitative Evaluation:** The approaches will be benchmarked on cost, accuracy, and latency.
    - **Qualitative Evaluation:** The team will conduct interviews with safety experts to validate the correctness of answers and with prospective users (students) to assess the system's utility.
    - The goal is to have a robust, scalable, and professionally deployed system by the end of December 2025.

- **Image to 3D CAD Rendering (Ibrahim Yousif):**
  - I. Yousif presented his extensive Ph.D. research on autonomous assembly systems, which provides a strong foundation for the project.
  - He detailed a computer vision pipeline that uses instance segmentation for precise object identification and a diversity-aware active learning strategy to minimize the need for manual data labeling.
  - He also presented a method for using synthetic data generation (NVIDIA Omniverse) to train models on rare or difficult-to-replicate scenarios.
  - **Live Demo:** I. Yousif demonstrated an in-house pipeline that takes an image of a piece of equipment, identifies it, and uses its corresponding CAD file to render an interactive 3D model in a web browser. The system can display equipment dimensions and associated safety/operating procedures. This process bypasses the need for commercial CAD software for rendering.
- **MeetKai Integration Discussion:**
  - The MU team sought guidance on the best way to integrate their knowledge base and 3D models into MeetKai's VR platform.
  - **Knowledge Base Integration:** Vincent Cheong (MeetKai) outlined two options: 1) MeetKai's system could make an API call to a server hosted by MU, or 2) MU could provide the finalized knowledge base and methodology for MeetKai to host and productionize on their more robust servers. The MU team expressed a strong preference for the second option.
  - **3D Model/CAD Integration:** A detailed discussion occurred between I. Yousif and David Arcia (MeetKai) on file formats.
    - I. Yousif's system currently outputs STEP or STL files.
    - D. Arcia explained that game engines typically use formats like glTF, GLB, FBX, or OBJ for real-time rendering, as manufacturing CAD files are often too large and complex ("heavy").
    - I. Yousif confirmed he can modify his script to convert the models to a preferred format.
    - It was agreed that a follow-up meeting is needed to share example files and determine the best pipeline for optimizing and converting the CAD models for use in the VR environment.
- **MaxByte Workshop at Miami Hamilton (Reza Abrisham Baf):**
  - R. Abrisham Baf announced a workshop with the MaxByte team scheduled for Friday, August 8, 2025, at the MU Hamilton campus.
  - The purpose is for the MaxByte team to see the lab equipment firsthand and discuss the technical roadmap.
  - Harish Chittaluri (MaxByte) confirmed their attendance and stated they will also provide a demo of their platforms and capabilities.

Action Items

Who	What	Due Date
Arthur Carvalho / Fadel Megahed / Ibrahim Yousif	Follow up with Vincent Cheong and David Arcia (MeetKai) to provide sample CAD/3D model files and discuss the technical pipeline for conversion and integration into the VR environment.	August 15, 2025
Reza Abrisham Baf / Harish Chittaluri	Host the collaborative workshop at the Miami University Hamilton campus.	August 8, 2025
Jay Shan	Upon receiving IRB approval, submit the approval letter to the Ohio BWC via the OIA platform within 10 days.	TBD
All PIs/Co-PIs	Continue drafting content for the Q1 Project Management Plan.	August 29, 2025

The meeting adjourned at 12:09 pm.

Next Meeting: Friday, August 15, 2025 at 11:00 AM.