American Society of Civil Engineers (ASCE)
Computing Division
Visualization, Information Modeling, and Simulation (VIMS) Committee

5th Annual ASCE VIMS Datathon Competition 2024

Description: The ASCE VIMS Committee invites all interested parties to its 5th Datathon competition during the 2024 i3CE conference in Pittsburgh, Pennsylvania, hosted by Carnegie Mellon University. The 2024 Datathon is focused on interactive virtual reality (VR) model development that is of importance to the Architectural, Engineering, Construction, and Facilities Management (AEC/FM) community. Teams will be provided with relevant documents of a bridge and use them to build an interactive VR model.

Team Formation: Teams will consist of 4 or 5 undergraduate and/or graduate students, who have vested interest in computing in civil engineering, visualization, simulation, and information modeling. Teams can be formed with students from the same institution or from multiple institutions. Each team must have a mentor, who is selected by the members of that team from full-time faculty members in one of the participating institutions. The faculty mentor should be a current member of any of the four ASCE Computing Division Committees (VIMS, DSA, EDU, Global). Only teams that are formed and registered through Google Form: https://forms.gle/hRLnjDGb3GGtMUQ47 on or before **11:59 p.m. EST on June 21, 2024** will be eligible to participate in the 2024 Datathon.

Benefits: Winners will be announced and formally recognized **(with monetary prizes and certificates)** during the ASCE VIMS Committee's 2024 annual meeting (July 30, 2024) at the i3CE conference in Pittsburgh.

First place: $800 ***Second place:*** $500 ***Third place:*** $200

In addition, all the participating teams will have the right to utilize the generated work and initial data in the future.

Dataset: A full set of design and inspection documents (PDF formats) of a bridge in Pennsylvania will be provided to all registered teams. This set includes (i) plans and drawings, (ii) inspection reports, and (iii) sample site photos.

Datathon tasks: Teams will utilize the released dataset to create an as-designed model and model the most probable distribution of defects (cracks, stains, spalls, and delamination) on the surface of the model. Teams are not constrained to use any specific software packages or platforms throughout the process. Specific tasks required from the teams are listed below:

- Create a detailed 3D model of the bridge structure including steel, superstructure (e.g., deck, girders, beams, railing), substructure (e.g., abutments, piers, foundation), and approach slab.
- Apply realistic textures and materials to the 3D model to enhance visual fidelity.
- Include the surrounding environment, such as the terrain, water bodies, and nearby infrastructure.

- Model the most probable distribution of defects (i.e., cracks, rust stains, spalls, delamination, and rebar corrosion if any) on the surface of the model.
- Import the model into Unity or Unreal game engine, and submit the final project (2023 or newer versions).

Important Dates:

- Call for participation: **May 24, 2024**
- Team formation and registration (official time frame): **May 24 - June 28, 2024, 11:59 p.m. EST.** Registered teams will receive additional information on the next steps.
- Datathon period: **June 21 - July 22, 2024, 11:59 p.m. EST**
- Progress check point: **July 5, 2024**
- Evaluation/Review by the judges: **July 25, 2024, 10 a.m. EST** (teams will sign in a virtual session to specific 15 min time slots and will be notified ahead of time)
- Final announcement of results: **July 30, 2024**, **during VIMS annual meeting**

Evaluation Criteria: VIMS Officers (and ad-hoc experts, as needed) will evaluate all submissions, and identify the top 3 teams of this Datathon. The evaluation criteria are listed below:

- Model completeness and visual fidelity (25%): All major components of the bridge structure that are detailed in the plans and drawings.
- Representation of the surrounding environment (10%): Realistic and accurate representation of major elements (e.g., terrain, water bodies, and nearby infrastructure) surrounding the bridge.
- Model accuracy (20%): All model components are evaluated in terms of correct shape, size, position, orientation, and connections.
- Allocation of surface defects (30%): The surface of the model structure should be applied with defects (i.e., cracks, rust stains, spalls, delamination, and rebar corrosion if any). Reasonableness (location, density, type) of the defects allocated on the modeled structure's surface will be examined based on the inspection report and the knowledge of the domain expert.
- Rendering and presentation (10%): Each participating team will need to render their finished model with a rendering tool of their choice and prepare a video presentation. The quality of the video presentation will be evaluated.
- Build-readiness, i.e., the readiness to build the project as an executable file (5%): Each submitted model should be build-ready to export as an executable file (.exe) with a brief guideline for such purpose provided.

Interim Deliverable: Progress check point: July 5, 2024: Submit a presentation in .ppt or .pptx format, showing the progress on each specific task listed under the Datathon tasks section to the Google drive entry here: https://forms.gle/8aRGwsiDidGtCxyNA.

Final Deliverables: Teams will upload the following deliverables on the designated Google Drive folder (link will be provided to participating teams). The submission deadline is on or before **11:59 p.m. EST on July 22, 2024**. The deliverables are:

1. The created game engine project of the bridge. Please use the following naming convention when creating your model: ASCE-VIMS-Datathon5-TeamName. Submit a zip file of your source files and the model.
2. A presentation in .ppt or .pptx format:
    - Overview of your Datathon project planning and management.
        - Project scope, objectives, and deliverables, along with tools used in each step.
        - Timeline defined by the team internally with milestones.
        - Assigned roles and responsibilities to each team member.
    - Overview of the modeling process (bridge and surrounding areas).
    - Overview of the texture and material application.
    - Rationale and overview of the defect modeling process.
    - Embedded video illustrating the visual effects of structure, surface defects, and surrounding of the bridge model.

At the VIMS Committee's 2024 annual meeting in Pittsburgh, the winning teams of the 2024 VIMS Datathon will be invited to give a short presentation to attendees.

Disclaimer: ASCE VIMS Officers reserve the right to interpret the rules of the competition.

ASCE VIMS Officers: Fei Dai, WVU (VIMS Chair); Jing Du, UFL (VIMS Vice-Chair); Reza Akhavian, SDSU (VIMS Secretary); Youngjib Ham, TAMU (VIMS Member-at-large); Semiha Ergan, NYU (VIMS Past-Chair).