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Hack the Herd 2025

"AI in Campus Sustainability" Hackathon

Achieving sustainability is perhaps the most defining goal of our generation. With the recent advancements in artificial intelligence, we now have powerful tools to analyze, optimize, and revolutionize our approaches to environmental challenges. **This year's Hack the Herd invites teams to harness AI-driven solutions to make Amherst College more sustainable.** Sustainability challenges are complex, multi-faceted, and often overwhelming in their magnitude and global reach. In order to maximize the chances of success in making traction toward real solutions, we suggest narrowing your focus to very specific sub-challenges. Moreover, we find that teams make the most progress when they frame their challenges by identifying who are the "users" (i.e. actual people!) they are trying to serve, and what is the exact pain point that the users are experiencing.

Challenge Areas

Participants will build AI-driven applications that address one or more of the following Amherst College-specific sustainability challenges:

- **Food Waste & Sustainable Dining:** Valentine Dining Hall and campus dining generates food waste daily. Can AI predict demand, optimize food distribution, or improve efforts to reduce waste?
- **Waste Management & Recycling:** Despite composting and recycling programs, much waste still ends up in landfills. How can AI enhance waste sorting, track sustainability efforts, or encourage better disposal habits across campus?
- **Sustainable Transportation & Campus Mobility:** Many students rely on PVTA buses, bikes, and carpooling to get around. How can AI optimize transportation routes, encourage more sustainable commuting, or reduce vehicle emissions on campus?
- **Climate Resilience & Carbon Footprint Tracking:** The college has ambitious sustainability goals, including carbon neutrality. Can AI help track emissions, predict energy needs, or support Amherst's climate action plan?

Your Challenge

Design an AI-driven application that addresses a key campus sustainability challenge. Your solution should be practically scalable and adaptable, with the potential to be implemented at Amherst College or similar institutions. Due to limited access to Amherst-specific data, your app/software-prototype does not need to be designed exclusively for Amherst College, but it must be built in a way that allows for easy adaptation to Amherst's campus sustainability efforts. You can use simulated data to power your ML/AI models.

Below, we provide topic-wise detailed research, breakdown and guidance!

Quick Example Ideas/Products

Food Waste & Dining: [Winnow Vision](#) uses computer vision to categorize and track food waste in commercial kitchens, helping restaurants optimize inventory and reduce unnecessary waste. A similar system could be implemented at Valentine Dining Hall, where AI could analyze dining trends, predict meal demand, adjust portion sizes, and optimize composting efforts to minimize food waste.

Waste Management & Recycling: [Recycleye](#) uses computer vision and robotics to improve waste sorting efficiency and accuracy, reducing contamination in recycling streams. Amherst College could adapt a similar AI-driven system to analyze waste disposal patterns, improve campus recycling programs, and provide real-time feedback to encourage better disposal habits among students.

Transportation and Campus Mobility: [DeepMind](#) has partnered with Google Maps to predict traffic conditions, optimize travel routes, and reduce congestion dynamically. A similar AI system could be used at Amherst to analyze PVTA bus usage, optimize shuttle routes to reduce wait times and emissions, or even develop a bike/car-sharing recommendation tool to promote more sustainable campus transportation options.

Carbon Tracker: [Carbon Tracker](#) leverages AI and satellite imagery to monitor carbon emissions from industries and power plants, providing insights into sustainability goals. Amherst College could implement an AI-driven carbon tracking system to monitor campus-wide energy consumption, optimize heating and cooling strategies, and provide real-time insights to help the college meet its carbon neutrality commitments.

Datasets

You are not required to use these datasets, but they serve as a good starting point.

1. [FAO's Food Loss and Waste Database:](#) This extensive collection offers data on food loss and waste across various commodities and supply chain stages, aiding in understanding and addressing food waste issues.
2. [TACO (Trash Annotations in Context):](#) An open dataset comprising images of waste in the wild, annotated for training AI models in waste detection and classification.
3. [General Transit Feed Specification (GTFS) Data:](#) A standardized format for public transportation schedules and associated geographic information, with datasets available from numerous transit agencies worldwide.
4. [Sample Public Dashboards & Data Sets:](#) A collection of public data from various agencies, offering insights into transportation operations & environmental data.

Tips and Tricks

1. **Choose your tech stack wisely.** You only have 24 hours to build as complete of an application as possible, so spend time thinking about if your choice of languages and frameworks makes sense given the time constraints. When in doubt, choose a python-based framework like Django, Flask, or FastAPI.
2. **Strive for completeness, not sophistication.** A simpler yet very complete application will score better than a half-done sophisticated application. Make sure your idea is able to be completed in 24 hours.
3. **Use pre-existing APIs and libraries.** Don't reinvent the wheel if it is already created. Leverage pre-trained AI models, APIs, and open source libraries to save time and remove moving parts.
4. **Assign clear roles within your team.** Make sure everyone knows what features they are working on from the get go. It might be helpful to elect a technical product manager within your group who can drive synergies, draft, summarize, and record the demo!

Tutorials, Templates, and Examples

AI-Related:
Computer Vision
EDGAR RAG

Web Dev:
Full Stack Cloudflare SaaS
Web Dev: Django backend + pure css/js frontend
Web Dev: Next.js

Data Extraction:
Web Scraping

Mobile Dev:
Mobile Dev (IOS and Android)