HIGH PERFORMANCE RESEARCH COMPUTING

ACES: Applying for Allocations
ACCESS, NAIRR, TAMUS/ TAMU

HPRC Short Course
February 4, 2025

High Performance
Research Computing
DIVISION OF RESEARCH

ACES
ACCELERATING COMPUTING
FOR EMERGING SCIENCES

Outline

- Introduction to ACES
- Obtaining an ACCESS ID/Account
- ACCESS Project Types
- Exchanging ACCESS Credits for ACES Service Units
- NAIRR Projects
- Getting Started on the TAMU ACCESS & NAIRR Clusters

Introduction to ACES

ACES

- ACES is a Dell cluster with a rich accelerator testbed
  - Intel Max GPUs (PVC)
  - Intel FPGAs (Field Programmable Gate Arrays)
  - NVIDIA H100 and A30 GPUs
  - NEC Vector Engines
  - NextSilicon co-processors
  - Graphcore IPUs (Intelligence Processing Units).

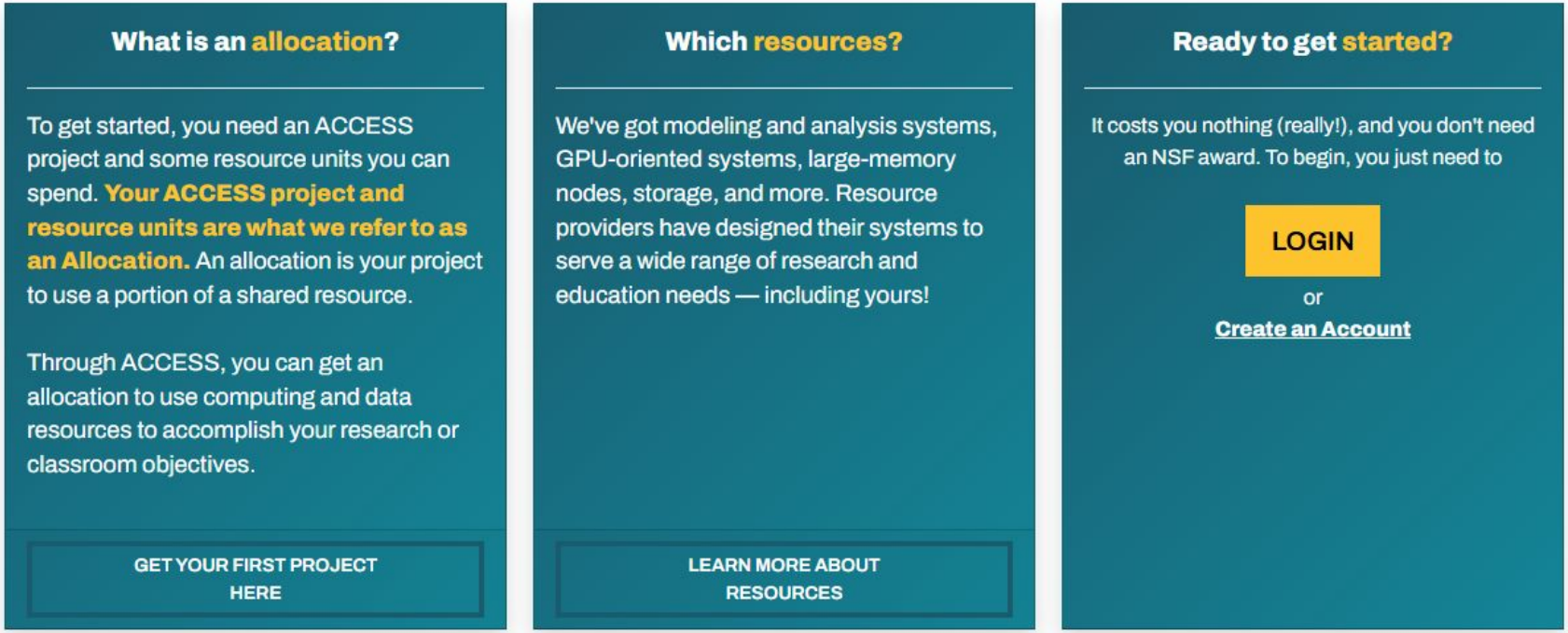
https://hprc.tamu.edu/kb/User-Guides/ACES

ACES System Description

Component	Quantity	Description
Sapphire Rapids Nodes: Compute Nodes Data Transfer Nodes Login & Management Nodes	 110 nodes 2 nodes 5 nodes	96 cores per node, dual Intel Xeon 8468 processors 512 GB DDR5 memory 1.6 TB NVMe storage Compute: NVIDIA Mellanox NDR 200 Gbps InfiniBand adapter DTNs & Login & Management nodes: 100 Gbps Ethernet adapter
Ice Lake Login & Management Nodes	2 nodes	64 cores per node, dual Intel Xeon 8352Y processors 512 GB DDR4 memory 1.6 TB NVMe storage NVIDIA Mellanox NDR 200 Gbps InfiniBand adapter
PCIe Gen4 Composable Infrastructure	50 SPR nodes	Dynamically reconfigurable infrastructure that allows up to 20 PCIe cards (GPU, FPGA, etc.) per compute node
PCIe Gen5 Composable Infrastructure	60 SPR nodes	Dynamically reconfigurable infrastructure that allows up to 16 H100s or 14 PVCs per compute node
NVIDIA InfiniBand (IB) Interconnect	110 nodes	Two leaf and two spine switches in a 2:1 fat tree topology
DDN Lustre Storage	2.5 PB usable	HDR IB connected flash and disk storage for Lustre file systems

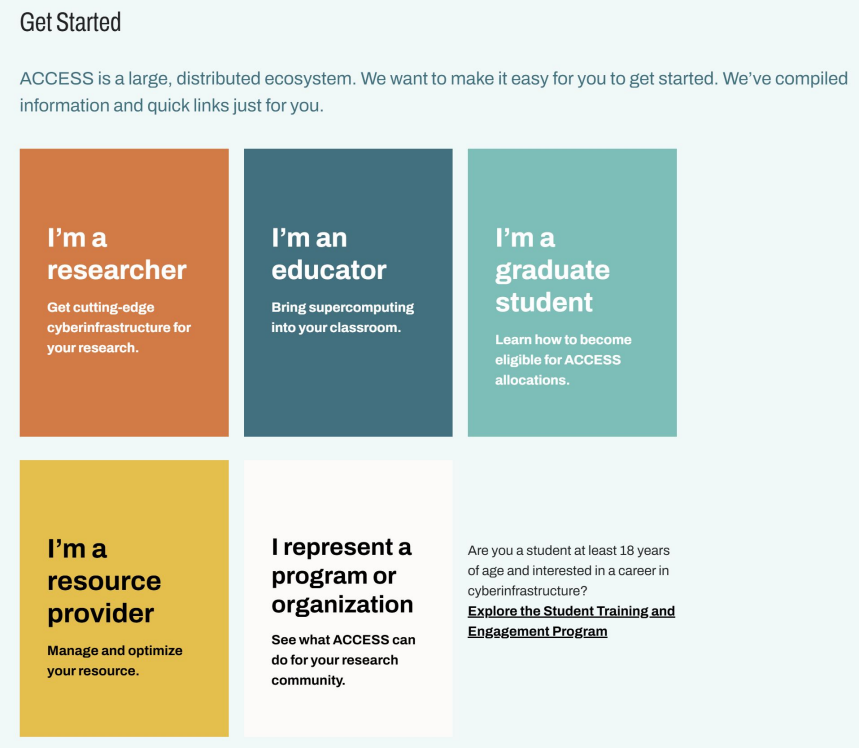
Obtaining an ACCESS ID/Account

ACCESS Allocations



https://allocations.access-ci.org/

ACCESS New User Registration



https://access-ci.org/get-started/

ACCESS New User Registration

Two Options for New User Registration

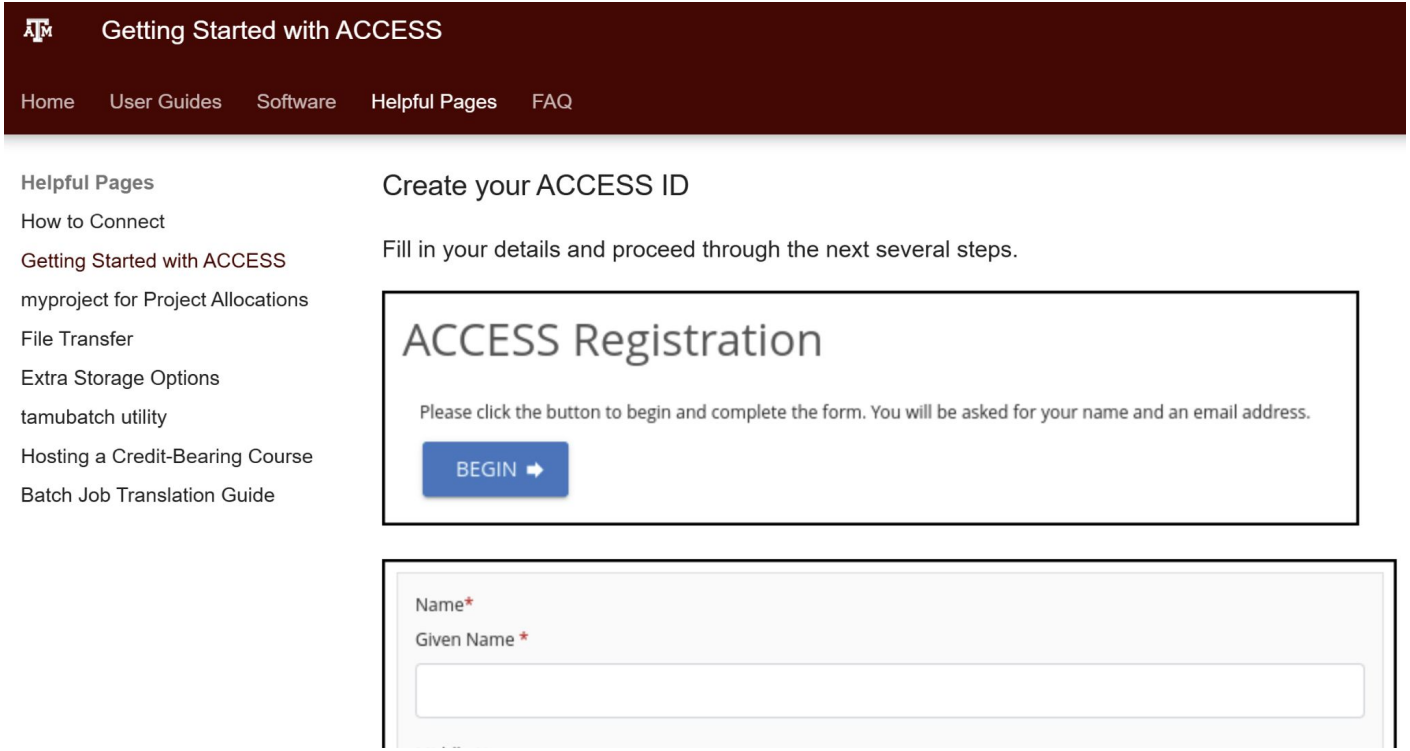
If you don't already have an XSEDE or ACCESS account, there are two registration options:

1. **Register with an existing identity**: Using an existing University account when registering with ACCESS simplifies the sign-up process and enables you to log in to ACCESS using that existing account. With this option, creating an ACCESS-specific password is optional during registration, and you will also have the option to create an ACCESS-specific password later if needed.
   If your University is not included in the listing or you have trouble logging in with your University account, please use the other registration option.

2. **Register without an existing identity**: With this option, you'll be prompted to enter all your registration info and select an ACCESS-specific password and set up **Duo MFA for ACCESS**. You can **link** a GitHub, Google, Microsoft, ORCID, or University account later if desired.
   When configuring Duo MFA, we recommend that you **install the Duo security app** on your phone and configure it to use Duo Mobile / **Duo Push**. We do not recommend the **Phone Call** option, because it is unreliable.

https://operations.access-ci.org/identity/new-user

ACCESS New User Registration



https://hprc.tamu.edu/kb/Helpful-Pages/ACCESS-ID/#create-your-access-id

ACCESS Project Types

ACCESS Projects

Get Your First Project

Getting a project is the first step toward accomplishing your research, development, or instructional goals. Follow these steps to get your first project and use resources in the ACCESS ecosystem.

- **Create an ACCESS Account and Log In**
- **Choose the Project Type that's Right for You**
- **Find the Resources that Fit Your Needs**
- **Prepare and Submit Your Request**
- **Exchange Credits for Resource Time**
- **Add Users & Start Using Resources!**

https://allocations.access-ci.org/get-your-first-project

Four Project Types

- EXPLORE — Great for resource evaluation, graduate student projects, small classes and training events, benchmarking, code development and porting, and similar small-scale uses.
- DISCOVER — Designed for research grants with modest resource needs, Campus Champions, large classes and training events, graduate student projects, benchmarking and code testing at scale, and gateway development.
- ACCELERATE — Best for experienced users with mid-scale resource needs, consolidating multi-grant programs, collaborative projects, preparing for Maximize ACCESS requests, and gateways with growing communities.
- MAXIMIZE — The choice for large-scale research activities that need more resources than the limit for Accelerate ACCESS projects.

https://allocations.access-ci.org/project-types

Comparison of Project Types

Project Type	Explore	Discover	Accelerate	Maximize
ACCESS Credits*	400,000	1,500,000	3,000,000	Awarded in resource units
Project duration	Supporting grant duration or 12 months	Supporting grant duration or 12 months	Supporting grant duration or 12 months	12 months
Requests accepted	Anytime	Anytime	Anytime	Every 6 months
	Multiple requests allowed	Multiple requests allowed	Multiple requests allowed	1 allowed (some exceptions)
Requirements and review process	Overview	1-page proposal	3-page proposal (max. length)	10-page proposal (max. length)
	Confirmation of eligibility and suitability of requested resources	Confirmation of eligibility and suitability of requested resources	Panel merit review	Panel merit review

https://allocations.access-ci.org/project-types

Explore ACCESS Request

Applicants must submit:

- A summary of the planned work
- NSF biosketch, CV or Resume for PI and Co-PIs (pdf)
- Letter of collaboration from advisor (for graduate students)
- Data fields:
  - Title of project
  - Research keywords
  - Field of science
  - Supporting grant details, if applicable

See https://allocations.access-ci.org/current-projects for examples of public abstracts

https://allocations.access-ci.org/prepare-requests

Discover ACCESS Request

Applicants must submit:

- All items required for the Explore request
- One-page description of proposed use of ACCESS resources
  - How you plan to use ACCESS resources
  - Research or Education Objectives (e.g., research questions, classroom exercises, other activities)
  - Description of resource needs
    - Specific computing architectures (e.g. GPUs, large memory)
    - Storage needs
    - Specific software needed

https://allocations.access-ci.org/prepare-requests

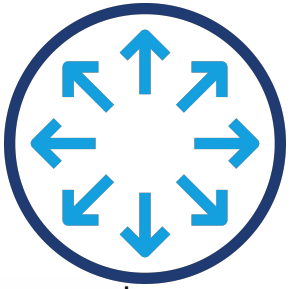
Accelerate ACCESS Request

Applicants must submit:

- All items required for the Explore request
- Three-page description of the project, explaining how you plan to use ACCESS resources
  - Research Objectives
  - Estimate of Compute, Storage, and Other Resources
  - Computational plan
  - Software & Specialized Needs
  - Team and Team Preparedness (team qualifications and readiness)

https://allocations.access-ci.org/prepare-requests

Maximize ACCESS Request



Maximize allocations are for large-scale research projects that are beyond the scope of an Accelerate allocation.

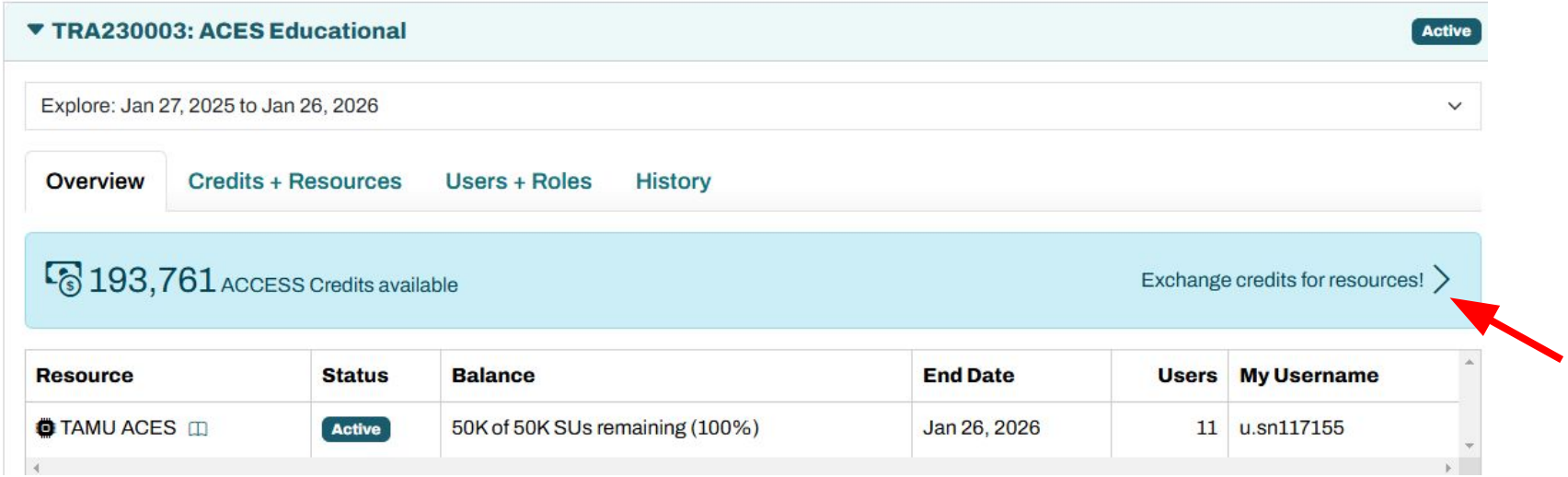
Maximize requests are open for submission on a semi-annual basis

Please visit: https://allocations.access-ci.org/prepare-requests for submission windows and instructions to submit a successful Maximize ACCESS request.

https://allocations.access-ci.org/prepare-requests

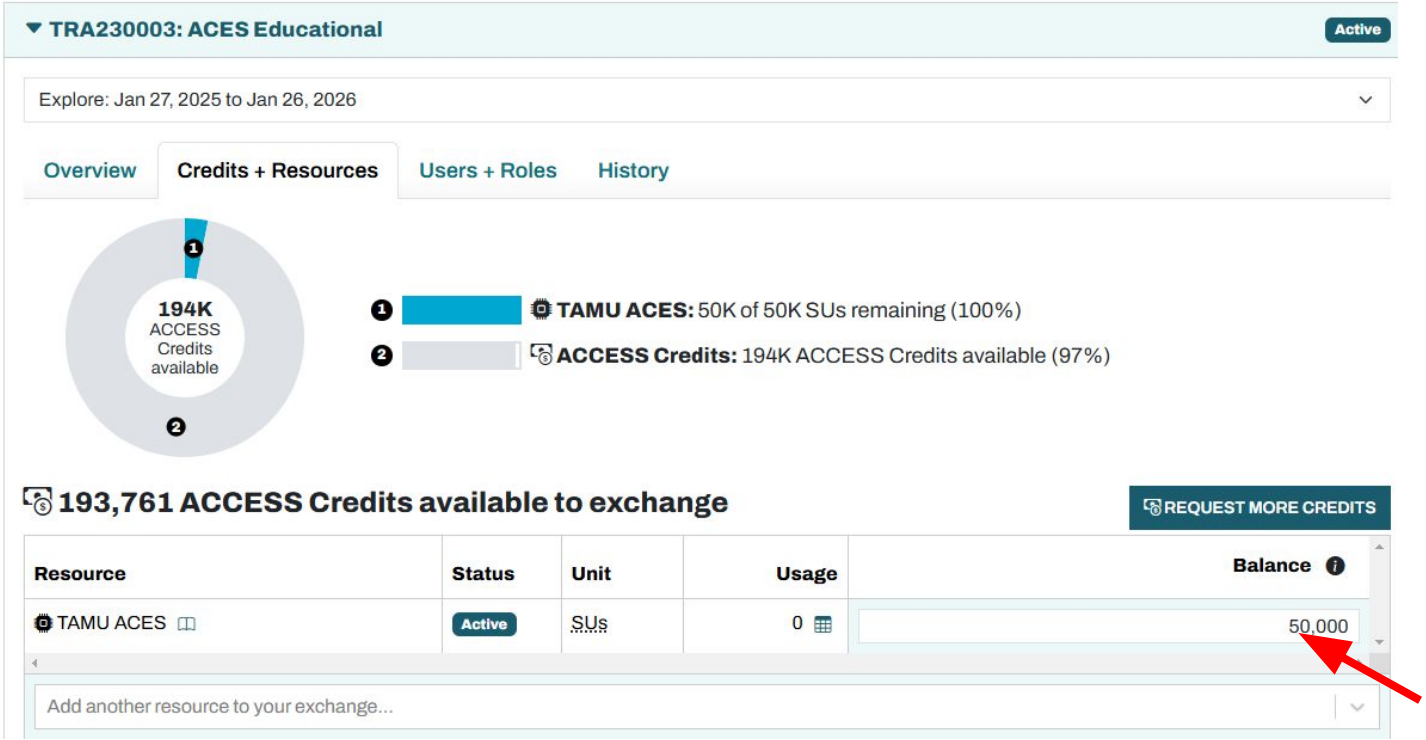
Exchanging ACCESS Credits for ACES Service Units

Where to Exchange ACCESS Credits



https://allocations.access-ci.org/

Where to Exchange ACCESS Credits



https://allocations.access-ci.org

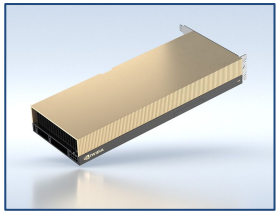
ACCESS Exchange Calculator

Exchange Rates Overview

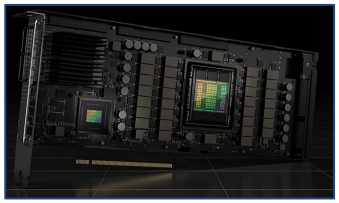
Units	Target System
1,000	ACCESS Credits
8,015	TAMU ACES
8,015	TAMU FASTER
8	TAMU Launch

https://allocations.access-ci.org/exchange_calculator

ACES Charging Scheme



Effective GPU	Service Units (per hour)
NVIDIA A30	128
NVIDIA H100	128
Intel PVC GPUs	60
Bittware Agilex FPGA	100
Intel D5005 FPGA	50
NEC Vector Engine	150
NextSilicon Co-processor	100
Graphcore IPU Classic	90
Graphcore IPU Bow	120
Intel Optane Memory	60



https://hprc.tamu.edu/kb/User-Guides/AMS/#aces

NAIRR Projects

The National Artificial Intelligence Research Resource (NAIRR) Pilot

The NAIRR Pilot aims to connect U.S. researchers and educators to computational, data, and training resources needed to advance AI research and research that employs AI. Federal agencies are collaborating with government-supported and non-governmental partners to implement the Pilot as a preparatory step toward an eventual full NAIRR implementation.


Spur innovation


Develop workforce talent


Improve capacity


Advance trustworthy AI

Learn more about NAIRR Pilot

Subscribe for updates

https://nairrpilot.org/

What is the NAIRR?

“AI holds the potential to accelerate discovery and innovation and help solve critical societal and global challenges. However, many researchers lack the necessary access to the AI resources needed to fully conduct their research activities and to train the next generation of researchers. The National Artificial Intelligence Research Resource (NAIRR) is a concept for a shared national research infrastructure to bridge this gap by connecting U.S. researchers to responsible and trustworthy Artificial Intelligence (AI) resources, as well as the needed computational, data, software, training, and educational resources to advance research, discovery, and innovation. The aim is to ensure that AI resources and tools are equitably accessible to the broad research and education communities in a manner that advances trustworthy AI and protects privacy, civil rights, and civil liberties.”

https://nairrpilot.org/about

What is the NAIRR Pilot?

"The purpose of the NAIRR Pilot is to demonstrate the NAIRR concept and advance its main goals, namely to: spur innovation, develop workforce talent, improve capacity, and advance safe, secure, and trustworthy AI in research and society. The NAIRR Pilot aims to address researcher needs by increasing access to a different ensemble of AI-related infrastructure resources including computational capabilities, AI-ready datasets, pre-trained models, software systems and platforms. This is an iterative process, beginning with the initial launch of the NAIRR Pilot in January 2024. In its first Phase, the NAIRR Pilot is providing researchers and educators with:

- The ability to apply for access to advanced computing, software, platforms, and collaborations for AI research and education.
- Access to a growing list of contributed AI-specific resources, such as pre-trained models, AI-ready datasets, and relevant platforms.

More background on the first phase of the NAIRR Pilot and engagement mechanisms for your research communities can be found at the following NSF webinar recording held February 21, 2024. The NAIRR Pilot will continue to bring together government-supported and non-governmental contributed resources in phases over a two year period to demonstrate the NAIRR concept and to deliver early capabilities to the U.S. research and education community."

https://nairrpilot.org/about

NAIRR Pilot to Advance AI Research

Cross-cutting focus areas:

- Advancing AI methods that enable scientific discovery.
- Creating open-source foundation models for specific applications.
- Using large-scale models to explore complex datasets interactively.
- Advancing approaches for integrating simulations and AI.
- Using experimental data from sensors, detectors, or other edge instruments.
- Empowering use of scientific data by other stakeholders and the public.
- Training and educating a cohort of scholars in AI technologies and their responsible use.
- Probe key AI challenges using sensitive data including privacy-preserving methods.

https://nairrpilot.org/opportunities/allocations

NAIRR Pilot to Advance AI Research

Domain specific focus areas:

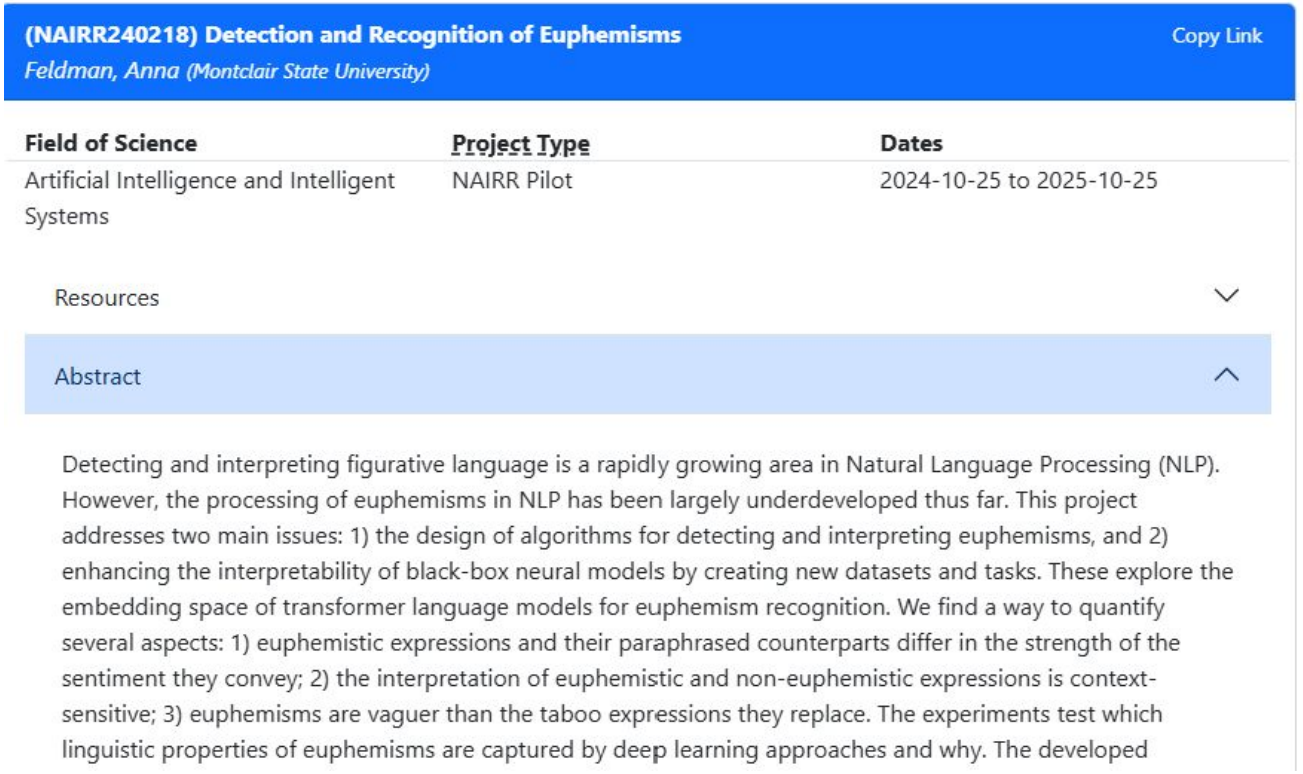
- Accelerating societally-relevant research on AI safety, reliability, security, and privacy.
- Empowering advances in cancer treatment and individual health outcomes.
- Supporting resilience and optimization of agricultural, water, and grid infrastructure.
- Improving design, control, and quality of advanced manufacturing systems.
- Addressing earth, environmental, and climate challenges via integration of data and models.

Other projects that align with the broader objectives of the NAIRR Pilot, as well as projects in other areas of AI research and applications, may secondarily be considered for allocation.

https://nairrpilot.org/opportunities/allocations

NAIRR Pilot Example

This project uses ACES for it's AI work with large language models.



(NAIRR240218) Detection and Recognition of Euphemisms Copy Link

Feldman, Anna (Montclair State University)

Field of Science	Project Type	Dates
Artificial Intelligence and Intelligent Systems	NAIRR Pilot	2024-10-25 to 2025-10-25

Resources

Abstract

Detecting and interpreting figurative language is a rapidly growing area in Natural Language Processing (NLP). However, the processing of euphemisms in NLP has been largely underdeveloped thus far. This project addresses two main issues: 1) the design of algorithms for detecting and interpreting euphemisms, and 2) enhancing the interpretability of black-box neural models by creating new datasets and tasks. These explore the embedding space of transformer language models for euphemism recognition. We find a way to quantify several aspects: 1) euphemistic expressions and their paraphrased counterparts differ in the strength of the sentiment they convey; 2) the interpretation of euphemistic and non-euphemistic expressions is context-sensitive; 3) euphemisms are vaguer than the taboo expressions they replace. The experiments test which linguistic properties of euphemisms are captured by deep learning approaches and why. The developed

https://nairrpilot.org/projects/awarded

Classroom/Educator Resources

"To request access to NAIRR Pilot Classroom resources, you must prepare a description, no longer than three (3) pages, describing your course and requirements for computational resources available through this program. Do not include any proprietary information in proposals."

Eligibility

"This call is open to proposals by US based educators and researchers who are teaching undergraduate or graduate courses or shorter duration training sessions to US based students that include subject matter in artificial intelligence and require that students use advanced computational resources as part of their coursework. Courses from any discipline are eligible for this program. Courses and training sessions must not allow participants who are not US based."

https://nairrpilot.org/opportunities/education-call

Getting Started on ACCESS and NAIRR Clusters

Computing Allocated via NSF ACCESS & NAIRR

Advanced Cyberinfrastructure Coordination Ecosystem: Services and Support (ACCESS) is a system supported by the National Science Foundation for researchers to access national high performance compute resources. TAMU has three such resources:

- ACES is one of our newer computing platform available to national researchers. It is allocated through NAIRR as well as ACCESS. You can learn more about the specialty hardware and software it has to offer here: https://hrpc.tamu.edu/resources/

- FASTER can be accessed through ACCESS but is also accessible by SSH for TAMU researchers.

- Launch is our newest cluster especially for under-resourced MSIs, that prioritizes schools in the Texas A&M University System.

Resources to Help You Get Started

- On our website, visit the Knowledge Base pages for ACES, FASTER, and/or Launch
  https://hprc.tamu.edu/kb/User-Guides/ACES/

  https://hprc.tamu.edu/kb/User-Guides/FASTER/

  https://hprc.tamu.edu/kb/User-Guides/Launch/

- On our YouTube channel, check out the following playlists
  - ACES: Getting Started
    https://www.youtube.com/playlist?list=PLHR4HLly3i4YMsOuqkBpDUB5W2dIqGViU
  - ACES Training
    https://www.youtube.com/playlist?list=PLHR4HLly3i4bWn-qQuhZJzb49u_Voe-GI

Thank you

Contact: help@hprc.tamu.edu

Please give us feedback on the class with this survey: https://u.tamu.edu/hprc_shortcourse_survey