



REMOTE & AUSTERE & CONDITIONS

GRAND CHALLENGE



MARCH 5-7, 2025

It is our pleasure to announce the second annual Remote & Austere Conditions (RAC) Grand Challenge. The RAC Grand Challenge is a research competition that invites teams to propose innovative research solutions for problems facing remote populations such as rural communities and soldiers at isolated outposts.

The RAC Grand Challenge will culminate in a dinner (March 5th), roundtable (March 6th), and pitch competition (March 7th) at the University of Utah. In the pages that follow, we provide details about the RAC Grand Challenge. We hope you will join us in March 2025!

Erin Rothwell
Vice President for Research
U of Utah



“The University of Utah is well equipped for a grand challenge like this. Utah is a place with pristine beauty. But, our state’s geography and environment can make it challenging for some residents to access needed resources. That’s where we can step in. The U and its research are committed to serving all 3.5 million Utahns, regardless of how remote their community may be.”

-Taylor Randall, President, U of Utah, and Keynote Speaker at the inaugural RAC Grand Challenge





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2025 RAC Itinerary

March 5th, 2025: RAC Kickoff Dinner

A VIP dinner that brings together all of the speakers for the round table, judges for the pitch competition, and industry representatives.



March 6th, 2025: RAC Roundtable

A roundtable session focused on a different RAC topic every year. For 2025, Arctic Survival will be the roundtable topic.



March 7th, 2025: RAC Pitch Competition

Sixteen teams will present research designed to enhance the lives of those living in remote and austere conditions.



ARCTIC SURVIVAL

MARCH 6TH, 2025
SALT LAKE CITY, UT



ROUND TABLE



On March 6th, 2025, researchers and thought leaders will gather at the University of Utah to discuss core challenges and emerging opportunities in the area of arctic survival. For this roundtable, “arctic” refers to any remote area prone to severe winter weather and “survival” refers to any process that promotes or sustains human life such as medicine, education, and technology.

A man in a dark suit and glasses is pointing towards a screen. In the background, there is a woman in a white lab coat and a man in a suit sitting at a table. The scene is dimly lit, suggesting a presentation or lecture.

**MARCH 7TH, 2025
SALT LAKE CITY, UT**

RAC

PITCH COMPETITION

On March 7th, 2025, the University of Utah will host a live pitch event for the second annual RAC Grand Challenge. For the RAC Grand Challenge, sixteen teams will present before a panel of judges from government and industry. The judges will select teams to receive seed grants up to \$250,000.



“I have been studying remoteness my entire life and I can tell you that it’s fascinating, but it also dominates everything when you’re in it. It’s the defining characteristic of that environment. That you are away from things. The University of Utah is dedicated to serving anyone that finds themselves in a remote area. It’s part of what we do. It’s part of our DNA.”

-Jakob D. Jensen, Associate Vice President for Research, U of Utah



2024 PROJECTS

Thirty teams submitted projects for the 2024 RAC Grand Challenge. Sixteen of those teams presented at the inaugural pitch competition and nine were selected for funding.

2024 Remote and Austere Conditions Grand Challenge funded projects:

Project: Acute Kidney Injury (AKI) Detection in Remote and Austere Environments

Principal Investigator: Kai Kuck, Ph.D.

Project: Treating Traumatic Pain in Remote and Austere Conditions

Principal Investigator: Derek Sakata, M.D.

Project: Lyophilized Human Amniotic Fluid to Rapidly Treat Remote Patients Suffering Myocardial Infarction

Principal Investigator: Craig Selzman, M.D.

Project: Eradicating Hepatitis C Through a Novel Self-collection Process

Principal Investigator: Ben Bradley M.D., Ph.D.

Project: Venturi Vacuum Suction Devices: A Novel Approach to Field and Tactical Suction Devices

Principal Investigator: Theodore (TJ) Hartridge, D.O.

Project: FrostByte: A Wearable Temperature Monitoring System for Frostbite Prevention and Research

Principal Investigator: Scott McIntosh, M.D.; Jake George, Ph.D.

Project: Freeze-Dried Mitochondria: Next Gen Trauma Care in Remote and Austere Settings

Principal Investigator: Guillaume Hoareau, DVM, Ph.D.

Project: The Three-Armed Medic: Enabling Emergency Medical Assistance in Remote and Austere Environments via a Portable, Intelligent, and Lightweight Robot Arm

Principal Investigator: Alan Kuntz, Ph.D.

Project: Bi-bougie: Safe, Reliable, Effective Intubation

Principal Investigator: Jake Hochhalter, Ph.D.

THE 3-ARMED MEDIC

FUNDED 2024 RAC PROJECT

Combat medics and forward surgical teams often operate in austere, under-resourced environments far removed from the personnel and equipment available at higher echelons of care. Many time-sensitive trauma interventions are not inherently complex but require manual assistance and equipment management - for example, maintaining pressure on a bleed, applying a tourniquet, or prepping materials for the provider.

We envision a compact, deployable robotic arm that could provide this assistance. Recent advancements in robot design, autonomous systems, and machine learning now make such a platform feasible. Through expert demonstration, a robotic system built on the latest advances in machine learning could learn to assist and adapt to the needs of medical personnel, extending their capabilities in austere settings. This force-multiplying technology could enhance the readiness and resilience of our medical teams.



FROSTBYTE THERMAL SENSORS

FUNDED 2024 RAC PROJECT

Our team plans to design and prototype a portable system, called Frostbyte, for monitoring fingertip and toe temperature in the field. The system will be embedded in a glove liner and thin sock with included batteries to enable users to wear the device underneath more protective outer layers. We plan to utilize thermocouples or thermistors on each digit, enabling precise temperature readings from each finger and toe. As research shows that the innate protective response to cold can vary from digit to digit, this would enable us to assess cold injury risk on an appropriately granular level. Data from the sensors will be fed via Bluetooth or a similar technology to a cell phone or Bluetooth receiver, capable of giving alerts to users in real time, as well as saving data for later analysis.





What are Remote & Austere Conditions?

The U.S. Army defines remote and austere conditions as “environments where access to clean water, electricity, and to a fixed or mobile medical facility is significantly degraded or denied, and where diagnostic and treatment resources and medical personnel are unavailable or limited for extended periods of time.” These conditions are common in frontier counties, areas with fewer than 20 people per square mile and a travel time of at least 30 minutes to basic services. Approximately 56% of the U.S. is frontier and the majority of that is concentrated in the intermountain region.

What is the RAC Grand Challenge?

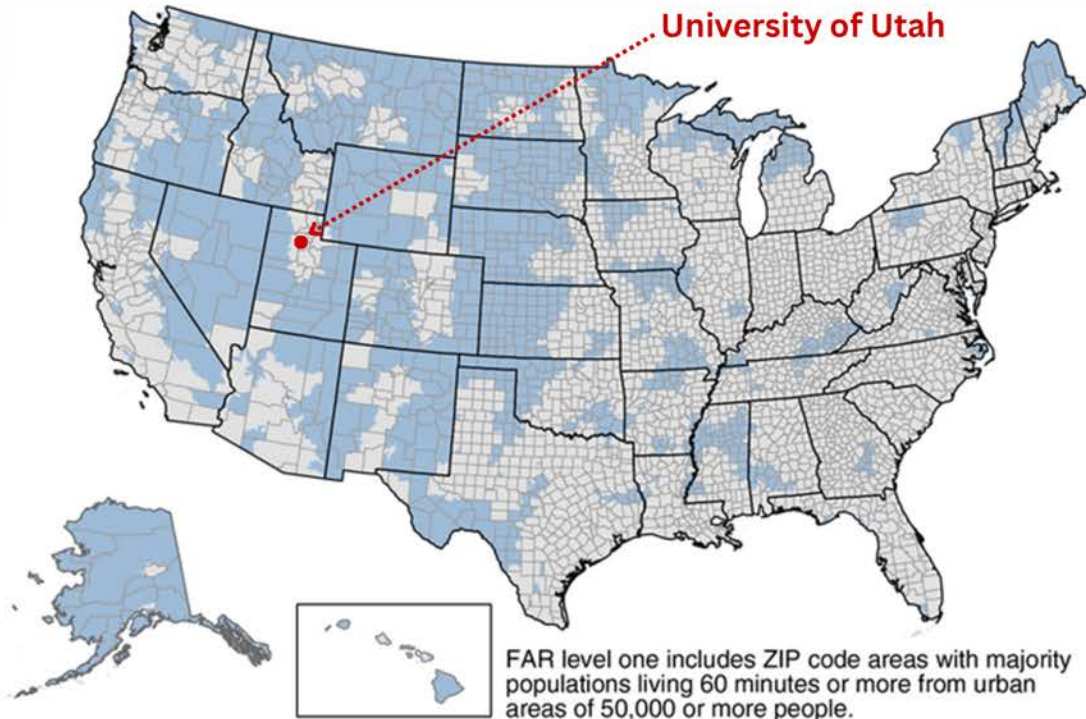
The University of Utah supports research, engages communities, and cares for patients across the largest geographical area in the U.S. The intermountain region is vast, sparsely populated with varying geographical conditions, severe access issues, and supported by limited infrastructure and resources.

From a research standpoint, these challenges make the intermountain region an ideal location for studying remote and austere conditions. To that end, the University of Utah Vice President for Research Office launched the Remote and Austere Conditions (RAC) Grand Challenge. This initiative seeks to fund innovative research projects that focus on developing novel techniques, technologies, and methods for remote and austere environments.

From advances in communication and robotics, breakthroughs in patient triage and patient resuscitation, to effective behavioral and community interventions, the RAC Grand Challenge seeks bold approaches to enhance the safety and well-being of populations living in challenging areas with limited or no resources.



Level one Frontier and Remote (FAR) ZIP code areas, 2010



Source: USDA, Economic Research Service, using data from the U.S. Census Bureau and ESRI.

The western U.S. has experienced significant population growth over the last century, but it remains a region with low population density. Most western counties are still classified as frontier and more than 4 hours from a city. The University of Utah is located in the middle of this remote and austere area.



GLOBAL LEADER

The RAC Grand Challenge is an annual event and a long-term commitment by the University of Utah. Our research community is already known for excellence in this area; the RAC Grand Challenge is designed to transform Utah into the global leader for remote and austere condition research.

Founded in 1850, the University of Utah has spent 175 years building infrastructure and conducting research in remote areas. The RAC Grand Challenge extends this legacy by funding teams to engage the most significant challenges facing populations living in isolated locations.



The RAC Grand Challenge is sponsored by the Office of the Vice President for Research and the Applied Medical Engineering (AME) Lab. AME Lab is dedicated to developing medical care technologies to treat any patient with any injury in any location for any duration.



ANY PATIENT
ANY INJURY
ANY LOCATION
ANY DURATION

AME  Applied Medical Engineering
LABORATORY

