



ABOUT CREARE



Creare, founded in 1961, is an innovative technology and product development firm working in a wide range of industries: aerospace, biomedical, cryogenics, and more. For more than 60 years, Creare has served both industry and government on the frontiers of product and process technology. Our *People & Technology* newsletter provides just a sampling of our 100+ active engineering projects.

Creare engineers work on challenging problems requiring multi-disciplinary solutions for improved energy efficiency at a time of global need, increased national security, improved medical assessment and delivery systems, and much more.

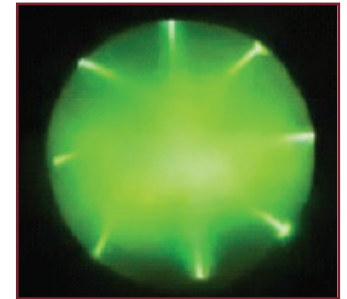
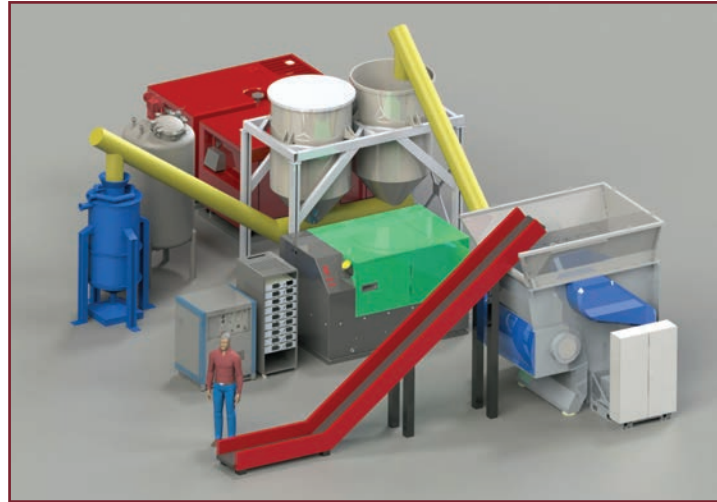
We are a company of approximately 160 people, including 70 engineers. Find more *People & Technology* newsletters on our website.



To learn more, please contact:
Human Resources
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Creare is an Equal Opportunity Employer. Female/Minority/Disabled/Veteran

Waste-To-Energy Conversion




Top View of Gasifier Space Filled Completely with Plasma

Responsible waste disposal has become a critical challenge as the world population has grown, concern about the environment has increased, and energy costs have risen. Landfills are unsustainable and can contaminate groundwater, while current incineration plants consume fuel and create hazardous airborne emissions. For the military, the pollution hazards created by “burn pits” used to burn all manner of waste at forward operating locations represent a significant health risk to our troops and other personnel.

To address these important challenges, Creare teamed with Cogent Energy Systems to develop an ionic gasification system that converts unsorted household and industrial waste material into fuel and electricity. The resulting system enables environmentally responsible and economical waste disposal while simultaneously creating a non-fossil fuel source. Our present configuration processes up to 3.5 tons of waste material per day, which is suitable for about 300 people. Distributed widespread implementation will have a profound global impact on the environment and energy consumption.

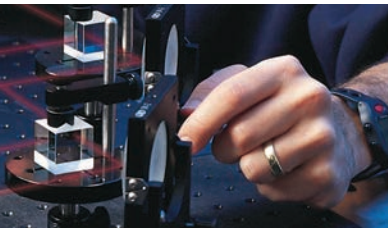
The key technology is a patented, multi-stage, elongated plasma configuration. This innovation forms a large, conjoined plasma region where waste material is dissociated at extremely high temperature as it falls directly through the

electrified plasma column. Adjacent electrode pairs supplement power to each other, which helps minimize electric power consumption and maintain temperatures in excess of 10,000 °C while materials are processed. The results are greater net energy production and more complete material processing than alternative gasification approaches. Extremely high processing temperatures also eliminate hazardous byproducts completely, as demonstrated by test results from the Department of Energy Idaho National Laboratory.

Currently, Creare is working with Cogent Energy Systems and other large, industrial concerns to transition the technology to applications. Fundamentally, Creare is providing systems engineering to design, integrate, and render the overall waste-to-energy system operational with minimal on-site support. These goals require the unique engineering expertise of a firm like Creare to make this innovation a reality. 

Paul Movizzo is a retired U.S. Navy Captain with more than 4,000 combined flight hours in the following aircraft: E 2C, C 2A and E 2D. With Creare since June 2016, he helps project teams understand military requirements to align project initiatives for high probability commercialization and acquisition by DoD.





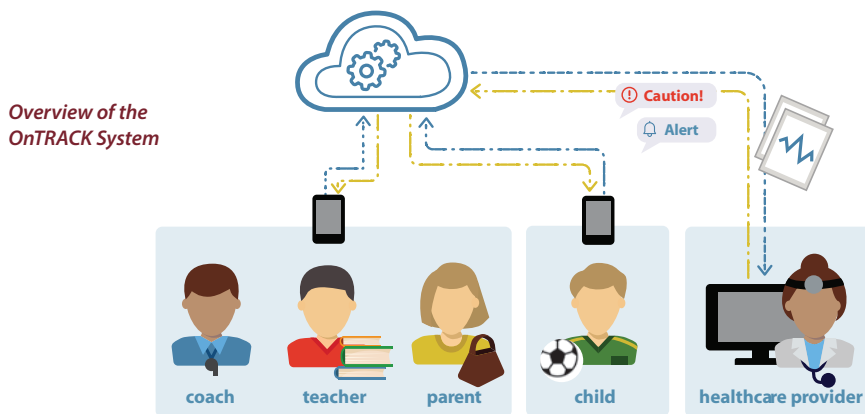
WAHTS™: TRANSITION SUCCESS THROUGH EDARE

Founded in 2010, Edare is an affiliate of Creare with a mission of commercializing promising technologies, often borne from Creare. Following the successful license and commercialization of the Fastener Measurement Tool (FMT)™ in 2018, Edare licensed a second technology from Creare in 2020: WAHTS (Wireless Automated Hearing Test System)™ and Edare is successfully bringing this product to market for both government and commercial customers.

The WAHTS™ is a boothless audiometer—allowing diagnostic-quality hearing testing outside of the sound booth. The system was initially developed by Creare for the U.S. Army for research purposes. In 2021, the U.S. Army Public Health Command purchased 140 of the devices from Edare to ensure that servicemen and servicewomen are deemed “fit for duty” (i.e., that their hearing is good enough for active-duty service). To facilitate the commercialization of the WAHTS™, which is a medical device, Edare successfully registered with the FDA as a medical device manufacturing facility. This is a unique and key capability for Edare that we hope to leverage for future medical device manufacturing.

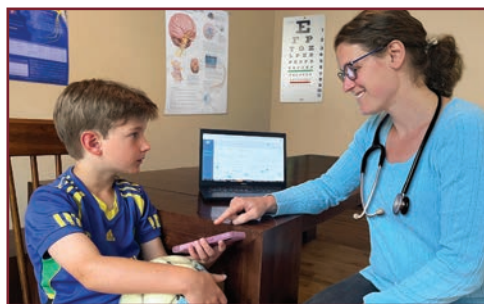
While Edare sees a large opportunity in defense sales, most recently selling a large quantity of devices to the UK Ministry of Defence, 2022 has marked a milestone in an expansion into commercial sales. With a new app custom-built for occupational health purposes, Edare is actively selling WAHTS™, along with its new Audhere app, to commercial customers and occupational health service providers, who are looking for ways to bring hearing testing and care to their patients, rather than requiring travel offsite to clinics.

OnTRACK™: Online Treatment Recovery Assistance for Concussion in Kids



Traumatic brain injuries, commonly known as concussions, are extremely prevalent in children and teenagers.

There are about 3 million sports and recreation related concussions each year in the U.S. and about 10% of that number are kids ages 5 to 18. Brain injuries cause more deaths than any other sports injury and it's the number one cause of death in children and young adults.



Healthcare Provider and Child Interaction Using the OnTRACK System

Concussions can also have serious long-term health effects, as symptoms affect the child's ability to function physically, cognitively, and emotionally. Fewer than 1 in 20 patients get the facts they need to understand their injury and to take action to get better.


Over the past 10 years, the standard of care for treating concussion has shifted to an active approach, where an individualized plan allows for a quicker, more effective, and more engaging recovery.

At Creare, we have developed OnTRACK™ to help manage concussion symptoms during

recovery. OnTRACK™ is a mobile health platform targeting children and teenagers aged 5 to 18 years old who have suffered from concussion.

OnTRACK™ includes 3 main components: (1) a decision support dashboard for healthcare providers; (2) a mobile app for patients, their families, and school staff; and (3) a data server with smart algorithms.

Responses on the mobile application are compiled and presented to the healthcare provider with additional indicators regarding recovery. For example, the tool can predict longer than usual recoveries and can support individualized management plans. The system helps children and families implement customized strategies to get better sooner.

Our team has excelled at developing a complex software architecture that works seamlessly with intuitive user interfaces to achieve better health outcomes for kids. We are currently working with digital therapeutics companies to commercialize the technology. 

Veronique Archambault-Leger received her B.S. in Chemical Engineering at UNH and a Ph.D. in Engineering at Dartmouth, where she worked on cellulosic biofuel production. She joined Creare in 2014 as an engineer. At Creare, she has worked on projects ranging from developing mobile health applications, analyzing cutting-edge heat exchangers, and developing a model to analyze body fluid pressures in microgravity. Her main interests involve solving health challenges and developing a sustainable world.



Inside Perspective




I happened upon Creare's website while job searching and was initially intrigued by the work related to biomedical and human systems. I was also excited that it was a small company doing a large variety of work, which I knew would be a great opportunity for a new engineer starting their career. Being a Maryland native, I was hesitant to relocate to New Hampshire and brave the cold winters. However, after my interview, I was convinced this was the best next step for me and quickly accepted the offer.

The Upper Valley proved to be an incredibly welcoming place and I was quickly able to build a community of friends both inside and outside of work. Living in downtown Lebanon, I love that I'm only a short walk away from several great food spots (Lucky's Coffee Garage and Black Magic Mexican are two of my favorites), Colburn Park, the Northern Rail Trail, and my CrossFit® gym. Within 20 minutes I can be at Mascoma Lake setting up my paddleboard or at the base of Mount Cardigan prepping for a hike. The great thing about living in the Upper Valley is that you get the perks of living in a smaller town, but it's hard to run out of things to do or new people to meet.

After working at Creare for 2 years, it's amazing to look back at what projects I've had the opportunity to work on and everything I've been able to learn in such a short period of time. In addition to fostering my passion for biomedical applications of engineering through my work on our head simulators and bladder-related projects, I've also developed a strong interest in Acoustics and hearing-related technologies. By now, most people know that if I'm not in my office then I'm most likely down in the sound room running an experiment or troubleshooting a piece of

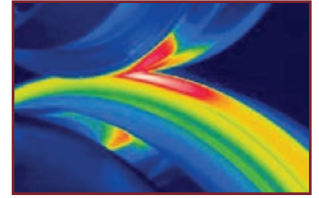
hardware. I've worked on several projects where our prototypes have been used by collaborators conducting human research studies. These projects are a lot of fun because preparing and supporting studies is a new experience for me and I get to work with several of Creare's incredible collaborators.

With Creare's support, I've been pursuing my master's degree in acoustics through Penn State's online program. I am very grateful for the opportunity to take graduate courses while still working full-time at Creare. I am constantly able to apply what I'm learning in my courses to my work, which benefits both my projects and my understanding of what I'm learning. I am excited for what the future holds for me at Creare as I continue this path of technical growth and discovery. Creare has truly been an ideal place to start and grow my engineering career. 

Anna Frazier holds a B.S. in Mechanical Engineering from John Hopkins University where her concentration was in biomechanics. Since joining Creare in 2020, Anna has worked on a multitude of projects, ranging from evaluating improvements to the WAHTS™ headset, developing an implantable bladder-voiding device, and developing a new biofidelic blast test surrogate.



ILACS™ UPDATE



Creare's mission is to develop new, innovative technologies and turn them into products that enhance the performance of commercial, military, space, or healthcare systems. Our ILACS™ (Integrated, Laser-Assisted Consolidation System) uses multi-diode laser technology to effectively heat composite materials as they are being manufactured using Fiber Placement Systems (FPS). The resulting parts are used in commercial and military aircraft and a host of other applications. This technology has been demonstrated on various military-grade composite materials and large-scale parts. Recently, the ILACS™ team developed a high-speed feedback controller to modulate the laser power of each of the individual laser diodes based on a multi-point surface temperature measurement capability. Using this system, we completed a full, fuselage demonstration part with a major aerospace prime. The results enabled by our ILACS™ are truly game-changing for composites manufacturing. First, straight-line speed during the layup is almost 2X higher than the current process and more gains are possible. Second, the intricate "steering" movements around doorframes, for example, are more than 5X faster. As a result, the prime wants to continue working with Creare, FPS manufacturers, and the Air Force to "productionize" the ILACS™ through our product-focused affiliate company, Edare LLC. ILACS™ is another example of Creare developing, demonstrating, and transitioning another paradigm-shifting technology.

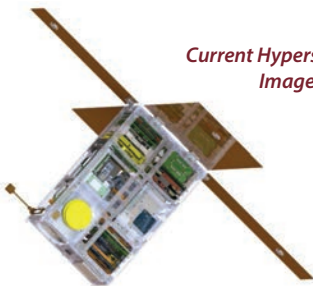


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Cryocooler Control Electronics for Small Satellites

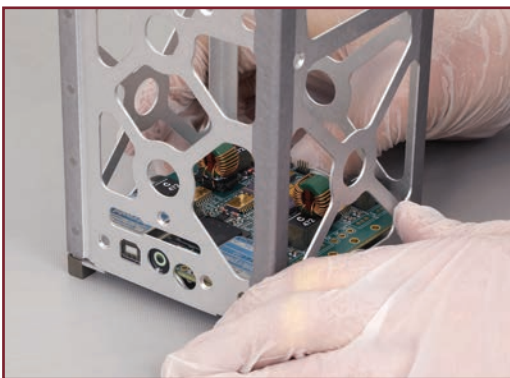
Recent advances in lower-cost launch vehicles have enabled a new generation of smaller satellites ("Smallsats") that can be deployed to Low Earth Orbit (LEO) for space-borne science, astronomy, surveillance, and reconnaissance applications with substantially lower cost and development time. While several existing compact Stirling and Pulse Tube cryocoolers exist that are well-suited to these Smallsat applications, flight-ready cryocooler control electronics and power-conditioning circuits are not generally available.

To address this need, Creare has developed a low-cost cryocooler control electronics package, the Miniaturized Cryocooler Control Electronics



Current Hyperspectral Thermal Imager satellite design

(MCCE) that is designed to target these Smallsat applications. New electronics have been designed to meet the stringent requirements of LEO, including high radiation tolerance, demanding thermal management, high reliability, and launch vibration levels. Meanwhile, the design needs to meet tight space and weight limits while meeting the highest standards of space compatibility. Creare's design was carefully optimized to meet these requirements while minimizing costs.




Initial electronics design done for NASA



Rich and Isaiah doing an electronics inspection

The initial MCCE was developed by Creare under a Phase II SBIR funded by NASA, and has been further optimized to support current Smallsat mission concepts for a number of scientific and aerospace clients. One such system, planned for launch in late 2022, is the Hawaii Space Flight Laboratory's Hyperspectral Thermal Imager (HyTI) Satellite. Funded by NASA's Earth Science Technology Office InVEST (In-Space Validation of Earth Science Technologies) program, HyTI addresses the need for high spectral and spatial resolution long-wave infrared image data for quantifying the chemical composition and temperature of the Earth's solid surface, its oceans, and its atmosphere.

Creare's MCCE technology was adapted to provide the cryocooler control electronics that operate HyTI's onboard cryocooler while meeting the extremely tight spatial constraints internal to the HyTI chassis. This is yet another example of a key Creare technology transitioning to meet critical needs for our aerospace partners and customers. 

Rich Kaszeta received his M.S. and Ph.D. in Mechanical Engineering from the University of Minnesota, and a B.S. in Mechanical Engineering from Michigan State University. In over 20 years at Creare, he has addressed a multitude of challenges in spacecraft electronics design, cryogenics, UAV design, thermal-to-electric power conversion, software engineering, turbomachinery, and biomedical applications.

UPPER VALLEY LIVING



Creare's location in Hanover, New Hampshire, offers the best of four-season living in a New England college town. The area offers excellence in medical centers and schools, a wide range of affordable housing options, and cultural amenities offered by Dartmouth College

Creare's location in the midst of this pristine area offers a wonderful array of fun activities for all ages and interests and a beautiful drive to work for all.

Activities change with the seasons. The casualness of Creare promotes collegial opportunity to enjoy hiking trails on our back 30 acres, mountain biking, cycling, running, skiing, or snowshoeing during lunch, after work, and on weekends. Lunchtime activities include on-site exercise classes and team sports like volleyball, football, and soccer. After work, paddling is a favorite summertime outing.

Travel to and from the area is made easy by the I-89 and I-91 interstates, Dartmouth Coach daily service to Boston and New York, the Lebanon airport (a small jetport), and easy access to Manchester, New Hampshire, and Boston Logan international airports.

You can balance lifestyle and personal interests with a challenging and rewarding engineering career at Creare.