

POWER AND ENERGY

BLUF TITLE	BLUF STATEMENT
High-Power Jam-Resistant Precision A-PNT from LEO CubeSats	Xona is developing a constellation of small but powerful navigation satellites to provide PNT services with the precision and reliability needed to support even the most demanding technologies. Once fully deployed, Xona's encrypted & jam-resistant signals from low Earth orbit will offer up to 100x stronger signal power than GPS at more than 10x better accuracy enabling modern and autonomous systems to safely navigate anywhere on the planet.
Environmental Defense Shield	The Environmental Defense Shield, the Shield™ is an aircraft modification uniquely positioned upstream, or in front of the jet engine intake (inlet). From this location, the airfoil-shaped vanes can controllably affect small-area flow corrections to mitigate inflow turbulence which is greatly responsible for reduced thrust, which increases fuel consumption and CO2 emissions. The protective vanes of the Shield™ further serve to mitigate engine ingestion of foreign objects such as Drones, which is expected to reduce repair costs and potential loss of life, and to increase mission readiness. These durable vanes and their combined deflective shape offer an in-built counter-drone defense capability to improve survivability from accidental or deliberate drone attacks against military troop and cargo transports.
The Hose Tool, hose coupler/collar repair tool for 3 & 4 inch	The HoseTool is a safer alternative to the brute force sledge hammer method of replacing couplers/collars on industrial hoses. An operator can single-handedly make repairs in the field without the assistance of electricity or pneumatics and without the risk of injury.
	Stronger, lighter, faster through the manipulation of the surface relative to the mass of the vehicle. Creating a compound complex surface to strengthen rigidity and reduce drag resulting in a 'mesmerizing' visual effect with the potential for increased stealth qualities.
AirLoom Energy: Modular, Scalable Wind Energy at a Dramatic Cost Savings	An innovative, lightweight design to generate wind energy, the AirLoom reduces the capital cost of wind turbines by an astounding 93%. Its unique, patented approach offers advantages over conventional wind turbines including fewer materials (23x less); a tremendous reduction in transportation and maintenance costs; and infinitely greater location and height flexibility. The resulting advantages are massive. While the AirLoom is based on exactly the same aerodynamics as the industry standard turbine, the radical geometry turns the design on its ear. Our current R & D is supported by a National Science Foundation Phase II SBIR grant.

<p>Advanced Cyber-Threat Detection & Analysis – Cyber-Intelligence as a Service (Cyber-INTaaS)</p>	<p>Anneal Initiative’s Cyber-Intelligence as a Service (Cyber-INTaaS) methodologies drive highly effective computer network defense. Anneal Initiative’s automated processes include deep data-mining classified threat indicators and making secure, large-scale correlations to network data. This detects & identifies sophisticated threats targeting networks months or years earlier than other methods. Anneal Initiative’s collaborative intelligence analysis processes combine threat knowledge (intent & TTPs) with network vulnerability & consequence knowledge to build targeted risk analysis & cybersecurity strategies.</p>
<p>Replacing metal cable glands with lower cost, lighter weight solutions for the most harsh and hazardous applications</p>	<p>The first, advanced polymer, non-metallic, industrial cable glands with integrated constant force grounding spring suitable for use with armored or non-armored cable types in the most extreme environments. Most adaptable to various cable sizes, lightest weight, lower cost, and faster installations. Applications include ships, vehicles and buildings where cables must be connected to electrical, control, communication, automation or instrumentation equipment or when passing through bulkheads or decks. Providing: Cable retention, protection from water, dust and gases, electrical ground continuity for armored cables and EMC.</p>
<p>Expedient means to reduce volumes of food waste</p>	<p>Amazing Waste has designed a modular, compact, portable, waterless device intended to reduce food and various waste volumes 25%-70%. This safe, deployable, easy to activate, stainless steel device has plans for 220/110, generator or solar power. Smaller pieces of waste will expedite decomposition, incinerate faster and organic waste can become useable yields for compost or onsite fuel. Less volume means fewer hauls and smaller volumes create leaner disposal options.</p>
<p>Torque Turbine - efficient and reliable wind energy conversion</p>	<p>The Torque Turbine provides for an efficient, low maintenance, rugged and reliable wind turbine for converting wind energy into rotational energy. Torque Turbine technology includes a patented vertical axis wind turbine rotor (VAWT) design. This design incorporates a rigid rotating structure formed by three interconnected blades. Within this structure is an enclosed center core giving protection to bearings, and non-rotating support structures from the weather. With this new design, wind turbines can now be constructed to efficiently and reliably produce power in both low and high wind conditions.</p>
<p>Automatic natural gas safety shut off valve</p>	<p>Natural gas lines in your home or business can be damaged due to accidents, earthquakes, tornadoes, and lightning strikes. The resulting release of gas can result in massive property damage, injuries and death from fires and explosions. The affordable Eichler "Shut Safe" excess flow valve cartridge installs in the existing gas piping. If damage occurs to piping that results in escaping gas above a pre set flow limit, the Eichler Valve automatically shuts off the gas similar to an electrical breaker tripping when excess amperage is detected.</p>

<p>Detect, Isolate, and Monitor EMP (DIME)</p>	<p>DIME is a modular EMP detection device capable of isolating protected equipment and infrastructure. It is based on proprietary algorithms and implemented with FPGA cores. One-way optical and HF radio communication for cyber security and EMI immunity. The DIME persistently monitors and can detect signals with a subnanosecond rise time and can identify the signature of an EMP E1 pulse in less than 10ns. Upon positive signature detection, the DIME provides an isolation control signal within 300 nanoseconds to ensure protection for the connected equipment prior to the E2 and E3 phases of the HEMP event.</p>
<p>Long Range/Heavy Lift Advanced Hybrid Fuel Propulsion Power System Integrated into Small Tactical Group 2/3 Unmanned Aerial Systems</p>	<p>There is an urgent need to advance affordable unmanned systems that provide increased range, endurance, and persistence with reduced size, cost, and complexity. With an ever increasing demand for high energy consuming sUAS payloads, the expanding roles and applications of small Unmanned Aerial Systems (sUAS) will depend on a propulsion power system that is both fuel efficient, and capable of providing speed to target with extended hover missions in diverse inclement and hostile environments. The objective of this program is to integrate advanced, miniaturized, hybrid electric power and propulsion systems into the next generation Vertical Take Off and Landing (VTOL) sUAS.</p>
<p>Magnetic Gears for Ultra-Reliable Propulsion</p>	<p>This technology achieves the same benefits of mechanical gearing – reducing the size, cost, and weight of a motor or generator – but operates without making any contact or requiring lubrication, eliminating the maintenance and reliability requirements associated with mechanical gears. FluxWorks’ robust, high performance magnetic gears can be applied to military and civilian future electric delivery drones and air taxis to achieve longer range (higher efficiency), low noise flight, and reduced operational cost due to the reduced maintenance requirements.</p>
<p>Side Drive Eccentric Variable Compression Ratio Engine</p>	<p>It is well known that there is great potential for reducing fuel consumption and greenhouse gas emissions of internal combustion engines, particularly at part load, if the efficiency of the engine can be increased. Part load operation of diesel engines can be enhanced if the geometric compression ratio of the engine can be increased, within the limit of practicality considering piston/valve interaction during part load operation. Grail Engineering has developed a diesel engine design that allows variable compression ratio (VCR) operation between 11:1 and 22:1 compression ratios. This design offers an increase in base engine efficiency through downsizing operations at higher compression ratios as well as improves cold start capability by cranking at higher compression ratios.</p>

<p>Aquaponics grow laboratory made from Magnesium Oxide (MgO) Structural Insulated Panels (SIPs)</p>	<p>This technology provides an aquaponics grow laboratory (grow pod) that is scalable, mobile, and self-sustainable. Our aquaponics pod can grow crop yields at much faster harvest cycles with ½ the human work hours and ½ the water supply all while producing zero waste. The aquaponics grow pod also produces, at the same time, a harvest of 100 tilapia fish 2 lbs each in 3 months. Thus, the aquaponics grow pod provides both a sustainable garden for fruits and vegetables every 2 weeks while also serving as a fish garden every 3 months. Our pod prototype 2 is fully solar powered for off grid growing in remote places or places without a convenient power supply. GPS and ubiquitous thermo monitoring can also be added to each pod. Camouflage and ballistics skinnings are also available for concealment and protective armoring. Wherever people are: Our aquaponics pod makes sure they have fresh food. In a matter of weeks, a fresh food grocery store to serve an entire community can be created by connecting our grow pods together.</p>
<p>Energy Efficient Surface Coatings</p>	<p>“Helios,” is an organic nano-coating designed to slow heat transfer across hard surfaces. This is known as thermally insulating or low-emissive. The synthesis technology used to create Helios is an adaptable process that allows near limitless combinations of coatings based on graphene bonded with a variety of transition metals (e.g. copper, aluminum, titanium, etc.) to meet desired thermal and/or mechanical properties. Helios’s beta prototype was designed specifically as a low-emissive—low-e—glass coating, since nearly 20% of all energy is lost through poorly insulated windows; however, as stated the technology can be optimized for a variety of surfaces and/or designed as an additive for other insulating materials, like fiber glass or spray foam insulation.</p>

<p>14 Days of Energy Resilience</p>	<p>HCI Energy is a multi-disciplined, highly skilled, driven & nimble small business. We design and build power solutions for DoD end users, communication systems, networks for public safety and utility applications. Our patented technology provides the most reliable, resilient, environmentally friendly and efficient power solutions.</p> <p>The HCI ZPM (Zero-glitch Power Module) eliminates the momentary loss of power during system changes and/or maintenance and provides clean, conditioned power and replaces traditional backup power systems.</p> <p>The ZPM prioritizes which source of energy (wind, solar or generator) charges the battery system.</p> <p>The Zero-glitch Power Module is designed to provide reliable power to meet the 14 days of energy resilience required by the DOD, Telecom and Public Safety systems.</p> <p>A computer-based control panel allows for monitoring the systems performance on location or remotely allowing for easy maintenance.</p>
<p>TENIX Nanoadditive for Power-Boosted Batteries</p>	<p>New chemical materials are required for batteries to advance in both performance and sustainability. Ten-Nine Technologies has developed a proprietary nanomaterial – TENIX – that results in more powerful and longer-lasting device performance when utilized as part of single-use and rechargeable batteries. TENIX is domestically produced via an established, ethical supply chain that has just half the greenhouse gas emissions of current battery cathode materials. TENIX is designed as an additive for drop-in manufacturing, and can transform the power and sustainability performance of most batteries.</p>

<p>HS-Drone Next Generation Drone Technology – eVTOL, Faster, Solar Powered</p>	<p>HS-Drone is both a startup company and a portfolio of next generation technologies for faster, lower-cost, solar-powered, and improved-capability aircraft. The portfolio includes two US patents and several additional US and international patent applications. The focal point is a new aerial platform the provides: 1) increased flight efficiency, 2) more surface area for solar panels, and 3) dynamics of decreasing drag with increaseing velocity; a very powerful combination setting new path of evolution for both transportation and industry. Starting at a benchmark of front tiltwing eVTOL drone (e.g. Airlogix hammerhead) the evolution includes: 1) increasing flat plate lifting body area to increase efficiency/range and speed, 2) further increasing the flat plate lifting body area for larger payload 24/7 solar aircraft, 3) larger and more capable 24/7 solar aircraft, 4) aerial platform based industry and power production, and 5) increased capabilities with lighter weiHS-Drone is both a startup company and a portfolio of next generation technologies for faster, lower-cost, solar-powered, and improved-capability aircraft. The portfolio includes two US patents and several additional US and international patent applications. The focal point is a new aerial platform the provides: 1) increased flight efficiency, 2) more surface area for solar panels, and 3) dynamics of decreasing drag with increaseing velocity; a very powerful combination setting new path of evolution for both transportation and industry. Starting at a benchmark of front tiltwing eVTOL drone (e.g. Airlogix hammerhead) the evolution includes: 1) increasing flat plate lifting body area to increase efficiency/range and speed, 2) further increasing the flat plate lifting body area for larger payload 24/7 solar aircraft, 3) larger and more capable 24/7 solar aircraft, 4) aerial platform based industry and power production, and 5) increased capabilities with lighter weight electric motors and hybrid electric-fuel jet engines (both of patent-pending status).</p>
<p>(Portable Coupler Insertion Assembly Tool)</p>	<p>The Hose Tool is a lightweight assembly tool for the quick and safe insertion of 3" and 4" couplings into suction hoses. This tool allows for time and money savings not only for new installations, but for fast repairs in the field. The Hose Tool is safe, efficient and field ready. A high quality product that is proudly Made In The USA.</p>
<p>HyperBorean</p>	<p>HyperBorean is heat to power cooling. www.coldfromheat.com is "Free Cooling" which means not using electrical power for your air conditioning saving both energy and the environment.</p>
<p>IBEC Net Positive HVAC, Halo Magnetic blower drives</p>	<p>We have developed the most efficient HVAC system in history. We are using a patented magnetic blower drive system, and a sophisticated set of controls in a comprehensive design that provides VAV (variable air volume) and VRF (variable refrigerant flow) achieving 26-30 SEER air-conditioning using the frames of existing manufacturers units.</p>

Clean 10MW Mobile Power System	<p>Industrom Power LLC, a clean energy technology company, has developed a rugged energy recovery power system. This power system is very compact – the 10 MW system fits within a 20 by 10-meter area and it can be used worldwide for 50 Hz and 60 Hz electrical grids. This mobile power system can provide distributed, dispatchable, and fast-starting electrical power for grid stability and emergency power. The Industrom innovative power system is energy source agnostic, it uses a closed-loop power cycle, uses no water, and it has no emissions.</p>
SMART Grid System by Kodion Energy	<p>Kodion Power Grid is a proprietary system that leverages our advanced knowledge in technology and engineering, to create a SMART Grid System powered by our saltwater battery technology.</p> <p>This allows Kodion Energy to offer completely clean energy sources. This includes windmills, solar panels and software that uses artificial intelligence, paired with our cutting-edge software solutions and our 6ghz microwave system for easy transmission of data from one grid to another. Kodion is able to produce our products completely in house with our team of software, chemical, radio frequency and mechanical engineers.</p>
Perennial Solar Powered Wastewater Treatment	<p>By using concentrated solar energy to heat domestic wastewater, one can create electricity and an efficiently storable biofuel that can perpetuate the system during times of inadequate solar input.</p>
MITO E-GO (Epoxide POSS functionalized Graphene Oxide)	<p>At MITO Material Solutions, we developed a proprietary graphene functionalization technique to create hybrid polymer modifiers for material manufacturers. MITO E-GO enhances carbon fiber/fiberglass/kevlar composites and thermoplastics (like PA66) 20-135% beyond normal performance. With MITO, you can replace existing metal components with composite materials without sacrificing durability. Additionally, increases in mechanical, electrical, or thermal performance are expected. MITO products are non-hazardous and engineered to integrate into existing production lines at an extremely low concentration. With proven compatibility in a variety of material combinations, MITO E-GO and other in-development products will empower industries to move away from fossil fuel and unsustainable materials.</p>
The Electronic Alchemy eForge: 3D Printing of Electronics	<p>The Electronic Alchemy eForge is world's first 3D printer capable of creating fully functional electronic devices. The eForge is a multi-extruder fusion deposition modeling (FDM) printer that uses proprietary filament to create devices from conductive, resistive, capacitive, insulating, and semiconducting materials. The eForge can create a multitude of sensors and electronic parts on demand and on mission in various architectures and form factors. The eForge works with Autodesk's Fusion 360 CAD package. The development and prototyping of the eForge was funded by STTR and SBIR contracts from NASA.</p>

Enhanced Lithium-ion Battery Performance and Safety with Inorganic Electrolyte Materials	All lithium batteries suffer from heat-related loss of useful power, associated short cycle life, and safety issues. New Dominion Enterprises (NDE) is now in the commercial roll-out of its patented and breakthrough inorganic additive for lithium battery electrolytes that resists this heat-related loss of power, addresses the safety issues, and provides for longer cycle life. NDE's Chief Scientist invented the additive while working at a National Laboratory where it was completed and tested in a U.S. DoD program. NDE's manufacturer has produced the first 2kg for test/validation by six companies. Two of these companies provide batteries to the USG. Adoption by these companies will move NDE's additive from a TRL 6 to a TRL7/8.
P.O.P. (Portable Overflow Prevention) Nozzle and Can Systems	The P.O.P. Nozzle and P.O.P. Can systems rely on a user-friendly technology, an auto-stop mechanism that prevents the overflowing of fuels and reduces the overall exposure to toxic fumes and liquids. The end user can be anyone filling up their lawn mowers or recreational vehicle to an armored vehicle in the field.
Waste to Energy	<p>Garbage and waste are discarded as Pollutants. Instead, we use exciting processes wherein we use these pollutants as a resource & convert them into clean, sustainable renewable energies. In the process, we don't merely reduce air, land & water pollution, but pride in completely eliminating pollution. The added outcome is a drastic reduction in greenhouse gases and carbon footprint, making the environment a nicer, cleaner, and better place to live & breathe for generations to come.</p> <p>Used tires and rubber from heavy vehicles and equipment pollute mother earth. Our processes convert them into products beneficial to humankind thus eliminating hazardous pollution.</p> <p>We handle any kind of waste & custom design each unit to the specific kind and quantity of waste/garbage/tire/plastic available. Given the size of waste to be processed, our units generate anywhere from 0.25 Kw to 10s of Megawatts of electricity and/or other clean sustainable products & byproducts.</p> <p>We are in the business of eliminating pollution, mitigating carbon and fossil fuels, and generating clean energy! Our processes result in products that are highly beneficial in earth's environmental sustenance.</p>
Membrane Refrigeration and Heat Recovery System	The current invention is an improved refrigeration system which offers the potential for energy saving and lower initial cost than currently available systems. It could also be configured as a heat pump system for use in heating, waste heat recovery, geothermal energy, and solar thermal energy.

POWER AND ENERGY/POWER MANAGEMENT	High-rate, safe lithium-metal anodes for solid-state batteries with ultra-high energy	Piersica aims to deliver safer batteries for the warfighter with 2x the energy of legacy systems. Our batteries will enable the Army, Navy, Airforce, Space Force, DoD, Coast Guard, FBI or CIA.
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