Biocene 2018

EVENT ORGANIZERS:

EVENT SPONSORS:

Tracks include Technical, Education and Business

Tuesday, August 14th 2018 (Pre-symposium activities)				
Program	**Summary**	**Speakers**	**Start Time**	**Track**
EPSCoR SME "1 on 1's"	Batteries, AI, Quantum biology, Photovoltaics, Sensors, Biomaterials		9:15 AM	Technical
Tour 1 of NASA Glenn Research Center	Glenn tours are a unique blend of education and entertainment. Visitors can explore America's research facilities and see where scientists and engineers develop propulsion, power and communication technologies for NASA'S aeronautics and space programs. Space limited to 50 participants; US citizens and green card holders only. The tours are free.		1:00PM	Education
Early Bird Registration/ Volunteer Orientation			1:00PM	All
Biocene 2018 Cafe	Poster set up and viewing, Bio-inspired Art Competition Begins: Nature-inspired interstellar travel; Earth 2150, Ultimate artificial intelligence.		1:30PM	All
Bio-inspired Art Competition	3 Topics: -Nature-inspired interstellar travel -Earth 2150 -Ultimate AI Poster set up and viewing, Bio-inspired Art Competition Begins: Nature-inspired interstellar travel; Earth 2150, Ultimate artificial intelligence.		1:30PM	All
Tour 2 of NASA Glenn Research Center	Glenn tours are a unique blend of education and entertainment. Visitors can explore America's research facilities and see where scientists and engineers develop propulsion, power and communication technologies for NASA'S aeronautics and space programs. Space limited to 50 participants; US citizens and green card holders only. The tours are free.		3:00PM	Education
Wednesday, August 15th 2018				
Program	**Summary**	**Speakers**	**Start Time**	**Track**
Continental Breakfast			8:00 AM	

Welcome: Day 1	Introduction and Welcome by Howard Thompson (Ohio Aerospace Institute)	Dr. Vikram Shyam, NASA Glenn Research Center Jeff Rolf(President, OAI), Tom Tyrrell (Founder, GLBio). Dr. Ajay Misra (Deputy Director for Research, NASA Glenn Research Center)	8:45 AM	All
Summit Objectives: Blockchain, Bionics and the Biocene		Dr. Vikram Shyam, NASA GRC	9:00 AM	All
Keynote 1: Healthy Buildings for Everyone: Tapping Into Biology to Grow the Next Generation of Buildings	In 2016, the XPRIZE Foundation set out to establish a “moonshot” for construction by creating the XPRIZE for Healthy Buildings. In this talk, you’ll learn how the team approached this unique opportunity to develop a way to (literally) grow buildings by fusing synthetic biology, genomics, parametric modeling and 3D printing to create a disruption and paradigm shift that could switch us from a PETRO-chemical world to a BIO-chemical one.	Eric Corey Freed (Principal, organicARCHITECT)	9:15 AM	Keynote
Biomimicry: What's in your R&D?	Biomimicry thinking is a powerful tool for bringing unique potential solutions to the table in ways traditional innovation processes do not. The ROI for organizations is real and is something every organization needs to consider.	Dr. Peter Niewiarowski (Department of Biology, University of Akron)	10:15 AM	Business
Break			10:45 AM	All
Design of Soft Machines	Evolutionary optimization techniques are utilized for the rational design of soft artificial creatures, characterized by different scales and operating across environments. Applications range from slithering and swimming biolocomotion strategies to artificial muscles and bio-hybrid systems	Dr. Mattia Gazzola (Blue Waters Professor at National Center for Supercomputing Applicaitons, University of Illinois Urbana Champaign)	11:00 AM	Technical
Meet Animal Ambassadors	Meet Biological Ambassadors (live biological interactions)	Harvey Webster (Cleveland Museum of Natural History)	11:30 AM	All
Lunch & Announcements	'-Biocene Lunch + Poster Review + Lightening Round Sign-ups -Discovery Space (Exhibit Area) -Poster Presentations		12:00 PM	All
Break-out session 1	Please choose one event at this time			
Animal Engineering	Whether in accessing scarce water resources, providing energy-free HVAC or utilizing adaptive building materials, animals have evolved strategies to address problems that we share. Examples of active research from the lab and from termite architecture, nesting birds and desert insects will be reviewed in the context of the potential application.	Dr. Hunter King (University of Akron)	1:30 PM	Business
The Ultimate Physiomimetic Machine- A Leap Towards a Self-Replicating Machine for Planetary Colonisation	Physiomimetic approaches yield a potential solution to bypass high launch costs by exploiting local in-situ resources and leveraging those resources to create self-replicating machines which proceed to replicate exponentially. Indeed, it might be argued that a self-replicating machine encapsulates the most biological of life functions that differentiate the biological from the non-biological. If this can be achieved, entire infrastructures can be constructed robotically with only a modest injection of hardware into space onto the Moon, Mars, asteroids, etc.	Professor Alex Ellery (Carleton University)	1:30 PM	Technical
Biomimicry & Business Panel : Moderated by Steve Percy	This panel discussion will explore the on-the-ground experiences of three companies who have employed biomimicry to enhance their innovation. Steve Percy, former Chairman and CEO of BP America and one of the co-coordinating lead authors of the UN's Millennium Ecosystem Assessment, will lead a conversation with Owens Corning, Lubrizol, and GOJO Industries to uncover and explain the discoveries, challenges and perspective-changing results of looking to nature for inspiration.	Steve Percy, moderator: (retired Chairman and CEO of BP America) Tom Marting (panelist, Facilities, and Resource Management Director, GOJO) Teresa Wagner (panelist, Director, Roofing Science & Technology, Owens Corning) Jeff Finefrock (panelist, Corporate Technology Portfolio Manager, Lubrizol)	2:00 PM	Business
Intentional Networking Activity		Led by Great Lakes Biomimicry	2:45 PM	Business

Break			3:00 PM	All
Break-out Session 2	Please choose one event at this time			
Pattern Alphabet	In 2016, na2ure jointly released the Pattern Alphabet at RISD Design Science and MIT Sandbox Summit to great acclaim as a powerfully simple and versatile tool to aid learning and creativity. The goal of this pattern set, fashioned after the most essential building blocks in nature, is to create a universal, non-verbal language to visualize math in a way that humans can understand by non-verbal reasoning, including at pre-verbal ages.	Alex Wolf (na2ure) Dr. Vijal Parikh (na2ure)	3:15 PM	Technical
Biomimicry Explorer	Inventions and discoveries triggered by biomimicry are usually highly creative and efficient. However they happen due to serendipity: knowledge transfer between biology and engineering is not straightforward since biology and engineering are generally studied in isolation of each other. There are no systematic ways to incorporate ideas from nature/biology into the design process of engineering solutions. A knowledge base of biology goals and mechanisms and an "intelligent" tool to navigate them and map them to engineering problems would take serendipity out of the loop and provide a systematic way of connecting engineering challenges to biology inspiration.	Ioana Baldini (IBM Artificial Intelligence)	3:45 PM	Technical
Lightening Round Presentations	Participants self select to give a 3-5 minutes presentation about a big idea, an interesting fact, a burning questions or anything they want to present to advance learning and the perspective of biomimicry.	Moderated by Calvin Robinson	4:15 PM	Business
Wrap up of the Day			5:15 PM	All
Reception & Networking, Cleveland Museum of Natural History	When you visit the Cleveland Museum of Natural History, you become a part of a tradition of science and exploration nearly 100 years in the making. Known as a great place for everyone curious about science, the Museum is also a center for world-class scientific research. We will learn what the Museum is doing in biomimicry, visit exhibits and join a scavenger hunt for biomimetic ideas from their collections.		6:30 PM	All
Thursday, Augustin 16th 2018				
Program	**Summary**	**Speakers**	**Start Time**	**Track**
Continental Breakfast			8:00 AM	All
Welcome: Day 2	Introduction and Welcome by Howard Thompson (Ohio Aerospace Institute) Theme: AI, UAVs, Education, Nature, and Business *Plenary Sessions 8:45 am - 11am*	Curt Mcnamara (INCOSE/Minneapolis College of Art and Design)	8:45 AM	All
Keynote 2: Responsibly Imagined Future and Quantum Biology	The biomimetics task going forward is to elicit from nature how the quantum processes that are present and operable in bioprocesses are enabled, and to determine ideal potential applications of these quantum bio approaches to quantum technology practice.	Dennis Bushnell, (NASA Langley Research Center)	9:15 AM	Keynote
Workshop: Growing V.I.N.E. (Virtual Interchange for Nature-Inspired Exploration), Introduction to Clusters		Facilitated by Colleen Unsworth (Biomimicry Fellow, U Akron/NASA)	10:00 AM	Workshop
Drone Demonstrations			10:30 AM	All
Break-out Session 3	Please choose one event at this time			
Impact of Biological Analogies on Creativity of Business Professionals	When front end innovators are presented with biological analogies as ideation stimulus, what is the effect on creativity of product concepts generated? Dr. Emily Kennedy will present results of a field study investigating this question. The study provides insight for strategic design of industry brainstorming sessions.	Dr. Emily Kennedy (University of Akron)	11:00 AM	Business

Current Limitations of Biomimicry in Artificial Intelligence Research	Deep learning is biomimicry inspired by neural systems applied to artificial intelligence, however artificial neural networks can be fooled in ways that humans' often aren't. As detailed in the recent landmark Malicious AI Report, this is a problem for all of us concerned with AI's short- and long-term impact on society. This session will present the major technical problems leading to malicious AI, focusing on those that occur when biomimetics falls short. Novel research connecting two of these technical challenges is presented, and directions for future critical-path work outside of AI research are discussed.	Jason Mancuso (OpenMined);	11:00 AM	Technical
Systems Mapping and Modeling for Biomimetic Education	Using a systems view has proven useful in both biomimcry education and in practice. This session presents three distinct approaches, which are usable across a range of environments. The Systems Explorer is a simple diagram which has been adapted by the Biomimicry Institute for their Toolbox. There are a multitude of ways to use this approach, and these will be briefly discussed. Agent based modeling is a straight-forward way for students to explore emergence and see how simple models lead to complex behavior. There will be a brief overview of NetLogo models, and resource material for creating your own models will be made available. Structure-behavior-function modeling is an approach that allows students to see how system construction (structure) supports system properties.	Curt McNamara (Minneapolis College of Art and Design) ; Curt McNamara, P.E. is a Biomimicry Education Fellow, teaches in the Sustainable Design Online program at MCAD, and chairs the Natural Systems Working Group of INCOSE. Stephen Thompson is a software engineer and educator who studies artificial intelligence.	11:00 AM	Education
Break			11:30 AM	All
Break-out Session 4	Please choose one event at this time			
Biomimicry: Creating Conditions Conducive to Discovery	How well do we really understand the problems we are trying to solve? Problem abstraction with a biomimicry design process exposes new pathways for exploration, allowing us to view a broader scope of opportunities and promote discovery.	Doug Paige (Cleveland Institute of Art)	11:40 AM	Business
Evolving Rule-based, Explainable Artificial Intelligence (XAI) for Decision Support System of Unmanned Air Vehicles	An effective XAI should be able to deliver explanation with a high level of accuracy, handle uncertainty, and learn from experience. To address these points and provide meticulous explanation this research utilizes a hybrid learning technique that combines explanation ability of Fuzzy logic that incorporates uncertainty with learning abilities of nature-inspired artificial Neural Networks.	Dr. Devinder Kaur (University of Toledo)	11:40 AM	Technical
Resources and Techniques for K-12 Biomimicry Education	This session will briefly introduce biomimicry, suggest how it relates to science education standards and supports STEAM educational methods, and how it can be integrated into a K-12 classroom. Topics include ways to introduce biomimicry to students and engage them from the start. Several project ideas will be given with student examples for your perusal. The Biomimicry Institute's Youth Design Challenge will be discussed, along with best case studies in the classroom. Lessons for K-6, as well as junior high and high school students will be offered. Field trip ideas and a summary of references to resources, curricula, and applications will be shared.	Angie DeLeon, Amherst Steele High School, Amherst, Ohio	11:40 AM	Education
Lunch & Presentation: Nature-inspired Artificial Intelligence		Dr. Doug Riecken (Program Officer, Science, Information, Learning & Fusion, Air Force Office of Scientific Research)	12:10 PM	Keynote
Break-out Session 5	Please choose one event at this time			
Introducing Biomimicry to Lockheed Martin		Michael Haro	1:30 PM	Business
Evolutionary Data Mining in Aerospace	Evolutionary Computation (EC) techniques are a subset of artificial intelligence, but they are slightly different from the classical methods in the sense that the intelligence of EC comes from biological systems or nature in general. The efficiency of EC is due to their significant ability to imitate the best features of nature which have evolved by natural selection over millions of years.	Dr. Amir Gandomi (Stevens Institute of Technology)	1:30 PM	Technical
Best Practices in Informal Biomimicry Education	Moderator DeLeon, Ballou, Wilson	Great Lakes Biomimicry & Akron Zoo	1:30 PM	Education
Break (vote on artwork)			2:00 PM	All

Featured Speaker Dr. Sofi Bin-Salamon, Program Officer, AFSOR, Biophysics at Air Force Office of Scientific Research	Biophysics at Air Force Office of Scientific Research	Dr. Sofi Bin-Salamon, Program Officer, AFOSR	2:15 PM	Keynote
Workshop: Democratizing Science (Citizen Scientists, K-12, Technology, Business)	3 Tracks : -Citizen science for K-12 -Technology, -Business and IP	Calvin Robinson (NASA, MIT Media Lab)	2:45 PM	Workshop
Break			3:40 PM	All
Break-out Session 6	Please choose one event at this time			
Flourishing Organizations		Sally Parker(TimeZero Enterprises) Argerie Vasilakes (TimeZero Enterprises)	3:45 PM	Business
Artificial Intelligence Led Discovery of Sense and Avoid Taxonomy and Strategy for sUAS The Business of Drones		Zen Ahmed (QUID)	3:45 PM	Technical
Education: Art Approaches to Bio-Inspired Design		Markus Vogl(University of Akron Myers School of Art)	3:45 PM	Education
Break-out Session 7	Please choose one event at this time			
Envisioning Human-Centered Tools for Systematic Biologically Inspired Design that Solve Real Needs and Bring People Joy	In this presentation, Ethan Smith, Director of the Biomimicry Institute's AskNature program, reveals key audience insights gleaned from a decade's worth of surveys, interviews, and analytics. Ethan highlights best practices for human-centered design and user research, and envisions how some of today's most promising concepts might materialize via an array of tangible and relatable interface mockups. How might today's open source projects toward systematic biologically inspired design collaborate to best leverage these kinds of information and techniques?	Ethan Smith (The Biomimicry Institute)	4:15 PM	Business
Neuromorphic Target Tracking and Control for Insect-Scale Aerial Vehicles	Insect-scale aerial vehicles have a wide variety of potential applications in areas such as search and rescue and surveillance in narrow or confined spaces, thanks to their small size. These insect-scale vehicles, however, are challenging to control because their response is characterized by dominant time scales on the order of only a few hundred milliseconds. Neuromorphic sensors and control techniques can potentially provide a biologically-inspired solution to this problem.	Taylor Clawson (Laboratory for Intelligent Systems and Controls, Cornell University)	4:15 PM	Technical
Bio-inspired Augmented Reality for Astronaut Extra Vehicular Activity	Extra Vehicular Activities (EVAs) are a complex sequence of tasks that must be executed with precision in an uncertain and risky environment. In the current state, the Astronaut is supported during an EVA by audio communications with the flight crew and ground crew. While this approach has worked effectively for several decades, emerging augmented reality technologies offer new opportunities to improve the safety, reliability, and effectiveness of EVAs.	Dr. Shivakumar Sastry (Director, Data Science, University of Akron)	4:15 PM	Education
V.I.N.E. Cluster Breakouts - How to Bring Business, Education and Technology to Build PeTaL (Periodic Table of Life)			4:45 PM	Technical
Picnic in Cleveland Metroparks/ Rocky River Reservation	Picnic in the Park. Hike with a Naturalist. Be part of a swarm. This casual event in the Cleveland Metroparks at Willow Bend will feature a grilled dinner, a nature walk to discover the "genius of place" and an opportunity to be part of a swarm. Or just kick back and enjoy a relaxing summer evening in a beautiful park that's part of a nationally-awarded Metro Parks system.		5:00 PM	All
Friday, August 17th 2018				
Program	**Summary**	**Speakers**	**Start Time**	**Track**
Continental Breakfast			8:00 AM	All

Welcome: Day 3	Welcome by Howard Thompson (Ohio Aerospace Institute) *Plenary Sessions 8:45 am - 11am*	Chris Maurer (Principle Architect, redhouse Studio, LLC.)	8:45 AM	All
Meet Zoo animal ambassadors	Meet a biological ambassador, Cleveland Metroparks Zoo		9:00 AM	All
The Structural Form	The structural form seen in bones and tree branches defines their function and design. The natural meaning of structural form can be adopted in architectural structures and industrial design objects that might represent an alternative and more attractive vision.	Dr. Luca Frattari (Director of Business Development, Altair)	9:15 AM	Keynote
Break			10:15 AM	All
Wind-Resilient Buildings and Structures: What Can We Learn from Nature?	The presented paper takes the biomimicry perspective on wind hazard mitigation by identifying the most vulnerable aspects of buildings and other civil structure in strong winds on one side, and the wind-resilient examples of biology systems on the other side, in order to link problem areas with potential biomimicry solution proposals.	Dr. Petra Gruber (Integrated Biosciences, University of Akron)	10:30 AM	Technical
V.I.N.E. Clusters Report out - Including Communication Strategy, Targeted Solicitations, PeTaL Collaboration/ Application			11:00 AM	Technical
City 2100		Phillip Vandermey (Spectacle-Bureau and University of Calgary)	11:30 AM	Technical
Lunch & Awards	Tom Tyrrell Award Al Hepp Award ART COMPETITION AWARDS Radiodurans Award (people's choice) Tardigrade Award (critics choice)	Facilitator - H. Thompson (OAI)	12:00 PM	All