

## MIT Industrial Liaison Program Faculty Knowledgebase Report

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2019 MIT Madrid Symposium

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November 7, 2019 9:30 am - 2:30  
pm

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9:30am

Welcome and Introduction  
Raimundo Pérez-Hernández y Torra  
Director, [Ramón Areces Foundation](#)



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Raimundo Pérez-Hernández y Torra has been director of the Ramón Areces Foundation since 2008. A Law graduate from the Complutense University in Madrid, he joined the Diplomatic Corps in 1976.

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Karl Koster  
Executive Director, MIT Corporate Relations  
Director, Alliance Management  
MIT Office of Strategic Alliances & Technology Transfer



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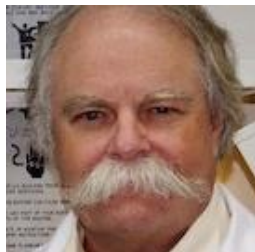
He is past chairman of the University-Industry Demonstration Partnership (UIDP), an organization that seeks to enhance the value of collaborative partnerships between universities and corporations.

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9:45am

Inventions that will reduce CO2 generation  
Ian Hunter

George N Hatsopoulos Professor of Mechanical Engineering  
Head, BioInstrumentation Laboratory  
MIT Department of Mechanical Engineering



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His main area of research is in bio-instrumentation and biomimetic materials, specifically research on new high throughput and massively parallel measurement techniques and instrumentation in the medical, biological and pharmaceutical areas. Ian is also working on a new approach to the development of instrumentation and devices using systems whose components (actuators, energy storage, sensors, wires etc) are grown out of conducting polymers. As a result of his research, Ian has over 350 refereed publications. He also invents instruments and devices based on this research. This has led to over 100 issued and pending patents. Ian's inventions have been used by numerous companies and in addition he has founded or co-founded 20 companies.

Prof. Ian Hunter an award-winning Inventor, Scientist and Entrepreneur made it his scientific mission to invent sustainable environmentally friendly technology solutions that will change the world and better humanity. In his speech he will outline the modern experimental research and teaching approach that combines many traditional disciplines including biology, optics, mechanics, mathematics, electronics and chemistry (BOMMEC), that resulted in many disruptive inventions and startups like: needle- pain -free injections, in-wheel propulsion system, carbon-based energy storage devices, Solar powered cars, truck and agricultural robots, robotic seed planting with weed, pest and fertilizer management, elimination of dairy cow methane production, miniature instruments (e.g. MS, GC, Raman, NMR), rapid 3D printing with Nano building blocks and high force artificial muscle. He founded over 25 companies and his speech will be complimented by his latest startup companies that outline the commercialization efforts of his inventions.

10:45am

Sustainable Startups that are changing the world

## Portal Instruments: Medical Injections Transformed with Connected Needle-free Technology

Patrick Anquetil

CEO, [Portal Instruments](#)



Patrick Anquetil

CEO

[Portal Instruments](#)

Dr. Patrick Anquetil is Portal Instruments' chief executive officer. Dr. Anquetil brings more than 20 years of experience leading high-tech bioengineering companies from the lab to the market place and building world-class teams. Prior to founding Portal Instruments, he was co-founder of SynapDx Corp., an autism diagnostic company, and Aretais, Inc. a venture in the field of blood glucose monitoring. Dr. Anquetil began his career as a science and nanotechnology equity research analyst at Susquehanna International Group, authoring and marketing industry and equity research reports to hedge funds and portfolio managers. Dr. Anquetil holds a doctorate in bio-instrumentation from MIT, an MBA from Harvard Business School, and a master's degree from the ETH in Zurich and the University of Tokyo. His scientific work has appeared in peer-reviewed publications as well as mainstream media, including MIT Technology Review, Wired Magazine, PBS, and CNBC.

The adherence to treatment in injectable therapies for chronic diseases (e.g. rheumatoid arthritis, multiple sclerosis, psoriasis, Crohn's disease, etc.) is extremely low (45% - 60%) and in part due to the inconvenience and anxiety associated with using needles and syringes. Biological medicines treating those conditions cannot be formulated as pills and as such there is a huge opportunity for new technologies replacing needles and syringes to transform the perception, approachability and market penetration of such therapies. Portal has developed a next-generation needle-free drug delivery platform that is computer-controlled, easy to use and patient preferred. Real time injection tracking via cloud-based connectivity enables patients and their care teams to manage their condition better and take charge of their wellbeing. Issued from Professor Ian Hunter's research at the MIT BioInstrumentation Lab, this technology leverages advances in multiple disciplines such as high-power density electromagnetic actuators, ARM-based micro-electronics and embedded software, and energy storage. The company is at the commercial stage, preparing to launch a drug/device combination product with Takeda Pharmaceuticals in the field of Inflammatory Bowel Diseases. A live demonstration of the Portal Device will be presented at the Symposium.

Indigo Technologies: In-wheel motors - the key to unlocking tomorrow's mobility

Marshall Chapin

President and Chief Revenue Officer, [Indigo Technologies](#)



Marshall Chapin

President and Chief Revenue Officer

[Indigo Technologies](#)

Marshall leads all go-to-market activities at Indigo, including growth strategy, marketing, business development and commercial sales.

Previously, Marshall served as Chief Strategy Officer at Sense, a home energy IoT company using AI and machine-learning to build the world's first high resolution library of home device energy signatures. Marshall built Sense's earliest collaborations with electric utilities, designing solutions to help them

Technology is changing the world at a blistering pace, and established industries are being rapidly displaced, often in a matter of years. Airbnb, Uber, Netflix, Spotify - all multi-billion dollar businesses which unseated highly entrenched incumbents. Nowhere is this more evident than the transportation sector, and the highly integrated and coordinated automotive industry.

The automotive industry is telling the world that it's reinventing itself too, but the supposedly groundbreaking new vehicles they offer are largely built on the same century-old vehicle designs. Global need for immediate order-of-magnitude improvements in vehicle efficiency combined with a rise in mobility-as-a-service preferences and autonomous systems mean the traditional incremental change in vehicle design will not be sufficient for auto makers to remain competitive.

Indigo Technologies is working to break this vehicle design paradigm. The vehicles of tomorrow need to be highly efficient, lightweight, modular, and flexible, using advanced manufacturing techniques and materials. Indigo unlocks this future with its core technology, an innovative in-wheel motor with integrated active suspension, which frees vehicle designers from the constraints of encapsulating a traditional powertrain and allows for efficient design. Marshall will explain how this technology, as well as Indigo's wireless power transfer system, is helping forward-thinking OEMs design and build the future of mobility.

PolyJoule: Stationary Energy Storage: The Epicenter of Renewable Adaptation and the 21st Century Grid

Eli Paster

CEO, [PolyJoule](#)



Eli Paster

CEO

[PolyJoule](#)

Eli Paster holds a M.S. and PhD from MIT, in the fields of electrochemistry, high-throughput instrumentation, and entrepreneurship. As the CEO of PolyJoule, he manages the PolyJoule team, oversees the research efforts, reconciles R&D schedules with commercialization targets, and provides foundational information for business and manufacturing strategy. Before PolyJoule, Dr. Paster co-founded Polymer Devices, another MIT start-up venture that resulted in technology transfer collaboration with national research laboratories and won

Stationary energy storage seeks to disrupt the electricity markets on a global scale. Safe, inexpensive energy storage, the missing link in the electricity grid's 140-year history, will: (1) supplement large capital infrastructure upgrades with low-cost storage; (2) pair with renewables to realize cost effective alternatives to fossil fuel generation; (3) upturn legislative and regulatory restrictions, ushering in digital and energy-sharing economic and societal opportunities.

PolyJoule has developed a non-lithium form of energy storage that is built purposely for the electricity grid. Safety is molecularly designed into our battery chemistry, streamlining permitting and usability. PolyJoule batteries can respond to both base loads and peak loads in microseconds, allowing the same energy storage system to participate in multiple power markets and deployment use cases. Upfront asset costs are low. Lifetime battery reliability is high. This lecture will introduce PolyJoule, our proprietary energy storage chemistry, its performance profile, and how congested electricity grids, renewable adaptation, and environmental tidal waves all benefit from low-cost, high-power energy storage assets.

12:15pm

Break

12:45pm

Industry speaker: Fonterra Co-operative Group Limited  
Carl MacInnes  
Director of Sales and Marketing Disruption, [Fonterra](#)



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Carl MacInnes is the Director of Sales and Marketing Disruption at Fonterra Co-operative Group Limited. He is responsible for leading Fonterra's Behavioral Hub, its dedicated behavioral sciences unit. The Behavioral Hub exists to bring a deeper understanding of the behavioral and brain sciences to Fonterra's global businesses and to their partner organizations. The core areas of focus are consumer behavior and global health, and they are working with external and internal clients across the retail, manufacturing, lifestyle and pharmaceutical sectors to deliver transformative, insight-driven strategies in these areas. By more deeply understanding the human mind and the drivers of human behavior, they aim to create better products and solutions for customers and consumers, better experiences for employees, and sustainable value for the farmer owners. Before his current position, Carl was General Manager Category, Shopper and Retail Development at Fonterra.

Fonterra is a global dairy nutrition co-operative owned by 10,000 farmers and their families. As part of its strategy Fonterra puts sustainability at the heart of everything it does. Fonterra is working with MIT and Professor Ian Hunter, to look at new ways it can fundamentally transform its sustainability foot print from grass (on farm robots) to glass (sustainable packaging). This work includes the goal of reducing and repurposing cow methane from a pollutant to an energy source while simultaneously leveraging other interlinked breakthroughs.

Carl MacInnes, the Director Sales & Marketing Disruption will outline some of the ideas and approaches that are being considered.



1:15pm

MICA: Revolutionizing STEM Education  
Lynette Jones

Senior Research Scientist in the Department of Mechanical Engineering, MIT



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Lynette Jones is a Senior Research Scientist in the Department of Mechanical Engineering at MIT. She is a recognized leading scientist in the area of haptics and tactile displays and wearable technologies. Her research group at MIT has built a number of tactile and thermal displays that have been used in research conducted by both academic and industrial organizations. Dr. Jones has served on several national committees including the Committee on Space Biology and Medicine of the National Research Council. She is the author of over 100 referred scientific publications and of two books. Dr. Jones is the Editor-in-Chief of the IEEE Transactions on Haptics and is a Fellow of the IEEE.

[View full bio](#)

The traditional lecture and laboratory approach used in teaching science and engineering has dominated education at high schools and universities for centuries. Although classroom demonstrations are sometimes used to provide instructive and motivating examples of taught concepts, in large classes they are difficult to see and without direct “hands on” involvement of the students have limited effect. Our initiative to address this shortcoming is MICA (Measurement, Instrumentation, Control and Analysis) an educational approach designed for subjects in Science, Technology, Engineering and Mathematics (STEM). Students interact with an experimental workstation (MICA workstation) to conduct experiments, analyze data, undertake parameter estimation, and fit mathematical models, while learning the theory and relevant subject history under the guidance of a virtual tutor (MICA avatar). As students interact with the MICA workstations their skill level, rate of learning and progress is quantified. Based on these data, deep learning techniques and mathematical modelling are then used to generate an individualized model of a student’s state of knowledge which is augmented every time the student interacts with a MICA workstation. This ‘state of knowledge’ model is then used by the MICA tutor to personalize (and eventually optimize) the teaching pace as well as the way in which subject material is delivered.

Roundtable Discussion  
Klaus Schleicher  
Director, [MIT Industrial Liaison Program](#)

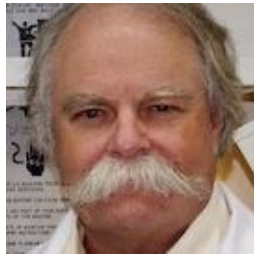


Klaus Schleicher  
Director  
[MIT Industrial Liaison Program](#)

Klaus Schleicher joined the Office of Corporate Relations in 2013. He has a Global Operations and Technology background that has delivered rapid profitable growth in the imaging systems, speech recognition, IT security and consulting, digital printing & media industries. He has executive experience in Sales, Marketing, Product Development, Strategy and Business Development and has held senior positions at Universal Wilde, Presstek Inc., Consul Risk Management B.V. (IBM), Lernout & Hauspie (Nuance), Agfa (Bayer Corp.) and Honeywell Inc. He holds a Master Degree in Computer Science and Engineering, from the Technical University of Giessen in Germany.

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Carl MacInnes  
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2:30pm

Wrap up and closing  
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