

## Leigh Christie EIT, B.A.Sc. Engineering Physics

*Co-Founder & CEO  
MistyWest Energy and Transport Ltd.*

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## CURRICULUM VITAE

Leigh Christie holds a degree in Engineering Physics from the University of British Columbia, and has more than 7 years of experience in the fields of clean energy and sustainable transportation technologies, including the development and commercialization of electric vehicle powertrains and battery packs. As the first engineer to work for Rapid Electric Vehicles in Vancouver, BC, Leigh gained substantial experience in a start-up business environment where he led a team to develop two generations of electric vehicle systems and components. With extensive experience in top down CAD design, FEA, and systems engineering, Leigh has proven his abilities to take a business plan from a concept to a working prototype and beyond. To stay creative, Leigh regularly designs and invents machines via an educational charity he co-founded called The eatART Foundation. Leigh is best known for his role in the creation of the fastest walking machine in the world: The Mondo Spider.

Leigh's past clients and former employers include Ballard Power Systems, AFCC, Creo Products, Motorola Labs, Electric Autosports, and Rapid Electric Vehicles. Through eatART, Leigh has project-based experience with electric bike generators, mobile solar power systems, golf carts and a multitude of energy storage systems. Leigh holds three patents in the areas of fuel cell design and mechanical pick-up devices.

### **Areas of Expertise:**

- Lithium ion battery packs
- SolidWorks CAD and FEA
- Low volume production
- Sheet metal

### **Areas of Research Interest:**

- Solar photovoltaic systems
- Post-lithium energy storage
- Vehicle to grid and distributed energy storage

## WORK HISTORY

**July 2006-Present**

**MistyWest Energy and Transport Ltd.**

*Co-Founder & CEO*

- Consulting for local and international research, technology and investment organisations
- Engineering research and design focused on sustainable energy and transportation
- Battery pack and module design using LiFePO<sub>4</sub>, NCM, and NiMH batteries

Select clients and projects include:

**Rapid Electric Vehicles (Aug08-Present):** Designed battery enclosures, air cooling systems, support brackets, motor/transmission assemblies, half-shafts, and motor mounts for a Ford Escape based EV drivetrain. As project manager, hired and lead a team of engineers and technicians to complete a prototype electric SUV. Oversaw the implementation of BOM, ECO, CAD and the creation of a supply chain. For the next prototype, recruited and hired top design talent and a engineering product manager. Transitioned to head of R&D and assisted with design of the next generation vehicle.

**Institute for Sustainable Futures (Sept 2010-Present):** Worked with a team of engineers and PhDs to analyze technical barriers to EV adoption in Australia. Co-authored and delivered a barrier and policy solution recommendation report.

**Storefront.com Automated Vending Machines (Apr 2007–Dec 2008):** Designed and fabricated robotic components on contract. Used Solidworks top-down design techniques to develop and integrate optical sensors, conveyor tracks, machined/moulded/stamped parts, servo motors, load-cells and mounting brackets.

**AFCC Automotive Components (Jan 2008–Dec 2008):** Used ProE and Solidworks to design stamped metal plates for effective water management and freeze-start capability. Designed the die/punch sets necessary for stamping stainless steel less than 0.5mm thick. Built/stamped prototype parts and created DOE process for their evaluation. Carried out FMEAs and ex-situ experiments.

**Oct 2005 - Sept 2007**

**Mondo Spider Electro-Mechanical Walking Machine**

Founded and managed the design and construction of the Mondo Spider ([www.mondospider.com](http://www.mondospider.com)). With top-down design techniques in Solid Works, designed the space frame and drive train system. MIG and a TIG welded the frame. Set up a workspace and managed a team of 10 technicians in the construction of mild steel tube leg components using Solid Works weldment templates. Managed the BOM and Gantt chart. Using a milling machine, a lathe and a TIG welder, fabricated the cranks for the leg linkages.

**May 2006 - Aug 2006**

**Polyfuel Inc.**

*Unit Cell Engineer*

Designed and built a hydrogen reference electrode for use in a direct methanol fuel cell. Designed and built a wet/dry membrane cycling machine. The control system consisted of Omron Timers, solenoid valves, pressure regulators, heating pads, and proximity sensors.

**May 2004 – Jan 2006**

**Ballard Power Systems**

*PEM Unit Cell Engineer*

Worked with the Unit Cell team to improve the performance of hydrogen fuel cells. Researched failure modes using standard FMEA techniques. Successfully solved ice blockage problems by inventing a unique plate design (*US20080113254*). Using ProE and AutoCAD, designed flowfield plates. Developed excel-based water management models. Tested fuel cell stacks from 150 watts to 5 kW.

**May 2004-Sept 2004**

**"Farad" Electric Bicycle Project**

Designed and built an electric bicycle for a design course at UBC. Constructed a battery pack and integrated the motor controller and the hub motor into the frame. Top speed was 48 km/hr.

**May 2002-Jan 2003**

**Motorola Labs**

*DMFC Fuel Cell Engineer*

Designed methanol compatible pumps and valves for micro fuel cell systems. Successfully developed a high flow rate, low cost, fully integrated, piezo-electric micro-pump. Measured polarization curves and monitored relatively steep degradation rates.

**Jan -May 2003**

**Engineering Physics Project - Angstrom Power**

Developed a stochastic fuel cell failure model using Excel and Visual Basic programming. Used Monte-Carlo simulations to determine the behavior of an array of PEMFCs connected in series and parallel. Fault tolerance, MTBF, Lifetime and reliability were predicted for specific inputs from Angstrom Power.

**May –Sept 2001**

**UBC DNA Sequencing Lab – Engineering Co-op**

Designed and developed a high throughput gel-electrophoresis sample-loader. Fabrication techniques used: Polyurethane molding, aluminum machining and silicone mold construction. Published: "Facilitated Loading of a Horizontal Gels Using a Capillary Gel Comb", *BIOTECHNIQUES*. 34:814-818 2003

**May 2000- Sept 2000**

**Ballard Power Systems – Fuel Cell Systems Co-op**

Assisted in design and fabrication of prototype gas-to-gas humidifier for a portable PEMFC. Tested multiple iterations of humidifier prototypes. Designed and modified testing equipment for leak testing. Helped setup a facility for the manufacturing of the humidifiers.

**Jan – May 2000**

**Creo Products – Engineering Co-op**

Designed, and developed a silent contactless plate pick-up device. Awarded patent US6,601,888.

**June 1998- Aug 1999**

**UBC Solar Car Project**

Co-designed and built the first UBC Solar Car. Built the wheel fairings using fiberglass and foam. Built aeroshell with vacuum bagging techniques. Performed several lay-ups w/ Kevlar and carbon fiber. Led a team of engineering students to race the car in Washington DC.

**PRACTICAL SKILLS**

- *Shop Tools*: Milling, lathe, MIG/TIG welding, plasma cutting, oxy-acetylene torch, Stamping, jigs, die-cutting, adhesives, two-part polymer casting
- *Composite*: Fiberglass Lay-up, Foams and Resins, Finishing
- *Lab*: Data-Acquisition, Oscilloscopes, LabView, Digital Multi-meters, Thermocouples, SEMs, Test stands, load banks, mass-flow controllers, and humidifiers
- *Electrical*: Sensors, servos, basic circuit design, wiring, debugging
- *Computer*: C++, Vbasic, and Labview
- *CAD Software*: SolidWorks/COSMOS, AutoCAD, and ProE
- *Analysis Skills*: FMEA and DOE, trade-off studies, Excel-based Modeling
- *Communications*: Fluent in French, negotiation and mediation

**SELECTED PUBLICATIONS AND PATENTS**

J. Thompson, T. Pugh, K. Guggenheimer, A. Safarpour, A. Christie, J. Pel, S. Chow, **A. Marziali**, "Facilitated Loading Of Horizontal Gels Using A Capillary Gel Comb", *BioTechniques*, 2003, 34:814-818 (PDF)

US Pat. 10323035 - Passive Membrane Microvalves, Christie, Xie, Phoenix, AZ (US), Motorola Inc. Dec 18, 2002

US Pat. 6601888 - "Contactless Handling of Objects" – Christie, Delta, BC (CA), Creo Inc. Mar 19, 2001

### **SELECTED INVITED PRESENTATIONS**

"Crowdsourcing for large scale collaborative design" Remixology Panel, Fresh Media, Vancouver, BC (CA), Oct 2010.

"Barriers to large scale design" Emily Carr University Foundation Talk, Vancouver, BC, Sept 27<sup>th</sup> 2010

"Developments West of the Pacific" EV2010VE Conference, Vancouver, BC, Sept 15, 2010

"Modular Drive Systems for EVs" EV2010VE Conference, Vancouver, BC (CA), Sept 14, 2010

### **HOBBIES AND INTERESTS**

I love music, art and sports. Currently: kinetic sculpture, DJing, Ultimate, and snowboarding. I am also a director of eatART, an organization that promotes energy awareness through art.