

Research News

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Perfecting the tools to manage power

BY SEAN MOORE
Research Promotion

The hybrid car recently zipped to the forefront of environmentally-friendly vehicles, which is admirable, but where is the champion of clean commuting – the all-electric engine?

In the race to reduce greenhouse gas emissions, why does the production of electric cars continue to crawl along at the speed of a wounded turtle?

In short, it has a power management problem. But things are about to change.

Shaahin Filizadeh, electrical and computer engineering, is designing new circuitry that will make power flow to where it is needed more smoothly and with remarkably increased efficiency.

"We have a powerful motor and we have batteries with limited energy storage. What's needed is an interface to manage how much power flows from the batteries to the motor, and how it is done. That's one of the things we're working on," Filizadeh said.

He is developing computer simulation models that can be used to create better power electronics, which are being installed into an electric all terrain vehicle (ATV) his lab is building. He chose an ATV because it epitomizes the problem: farmers, for example, use it for long trips involving many stops



Photo by Sean Moore

Shaahin Filizadeh, left, and Erwin Dirks, electrical and computer engineering.

and starts and recreational users want it to go fast.

When power flows from its source to its destination, it travels through a combination of electronic switches called a power electronic converter. The topology of such converters and

the way switches are turned on and off affects the way power flow happens. Simulation tools play an important role in the way such systems are designed to enhance their operation and make them more efficient by smart use of the energy available.

"You can't just waste energy. Everything counts," he said.

A previous design his lab developed in early 2007 was used to create an electrical vehicle driven by some American parking authorities. The simulated energy savings were 95% accurate compared to subsequent real-world results.

"I think what distinguishes us from other researchers working on electric and hybrid vehicles is the real power of good simulation tools that we have and develop. It's our niche area," Filizadeh said.

His work is also applicable to larger scale projects, like power grids.

By adding better power electronic devices to a system you could, for example, select how much power you want to send down a particular corridor, thus making much better use of existing power transmission networks.

"If information technology is the art of data processing, power electronics is the art of energy processing. You have different forms of energy available to you but if you want to use them responsibly you need to process them in a way that is efficient and gives you performance and reliability. That's what these interfaces we design can do."

Researchers examine our views on zoos

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Apparently, there's something captivating about captive animals.

Every year, North American zoos have greater attendance numbers than all professional North American sports teams combined. They are prominent cultural institutions found in nearly every major city; you are brought to them when you are young and you bring your own young to them when you are old. Indeed, Winnipeg's 103-year-old zoo is the oldest zoo in Canada. The first Canadian zoo, however, was a privately owned one established in 1847 in Halifax, but it closed in the 1890s.

"What is it about these places that bring people out in droves?" Bonnie Hallman, environment and geography, asked.

Hallman and Mary Benbow, associate dean (academic) of the Clayton H. Riddell Faculty of Environment, Earth, and Resources, are studying zoos. Both examine zoos from different angles, but often their work overlaps and they have recently begun collaborating on new studies.

The rich repository of environmental, social and cultural information held in zoos, and disseminated by them – from maps and

signs to souvenir stuffed animals and conversations at an animal's cage – is being tapped and examined by Benbow who wants to know what impacts zoos have on people. Such information is valuable to conservationists.

"It's been stated that, for many people in Western countries, their only contact with biodiversity is in zoos. I thought if that's the case, then that contact means people get a fundamentally different view of nature," Benbow said. "What are the implications of that?"

To learn more, she studies maps because they reveal how zoos portray themselves. Zoo maps from the late 19th century, like Philadelphia's, were designed to be formal and convey an image of a scientific institution. By the 1930s, animals on zoo maps were portrayed using symbols and even cartoons. These images reveal how the animals were viewed; for example, gorillas were once depicted as brooding and monstrous but recently, and more appropriately, as sensitive and nurturing creatures.

Meanwhile, Hallman is looking at how people, with a particular interest in families, interact within the zoo. She has also received funding from a Centre on Aging Research Fellowship to examine the ways zoos can be more



Photo by Sean Moore

Mary Benbow, left, and Bonnie Hallman, environment and geography, are studying zoos.

inviting to seniors – important future clientele.

Current zoo goers, Hallman said, are mostly mothers with their children.

"A zoo helps define who we are and it helps people grow into the role of being a good parent," she said. "It gets an unquestioned stamp of approval for a good family outing."

To shed more light on their work, Benbow and Hallman recently studied photographs taken by families in zoos

because a zoo, they've noticed, is one of the top spots families take photos of each other with surprisingly consistent formulaic compositions.

Benbow said this is just one example of the wealth of research opportunities zoos have to offer.

"If you look around, you realize there are essentially so many projects that the big challenge is figuring out where we want to go next," she said.

"There are so many untapped areas," Hallman added.

Bringing Research To Life

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