

## ARCS Scholar Andrew DeYoung Defends His Thesis

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Andrew was worried. Several years ago, a storm had just cut electricity to the home in Export, PA, that he shared with his parents and his brother, Henry. Both young men suffered from Spinal Muscular Atrophy (SMA), a neuromuscular illness similar to Stephen Hawking's. Electricity powered not only their wheelchairs, but the ventilators keeping them alive. It also powered their computers, a portal to their work.

Using a computer mouse was one of only two things Andrew could do by himself; the other was powering his wheelchair.

"If I eat something," he said, "someone else is holding the spoon and fork."

Their father, David, is an engineer who, with his wife, Joan, had designed their house with wide hallways and doors for their sons' wheelchairs. Both young men were studying now towards a PhD at Carnegie Mellon University. Andrew worked under Professor Hyung Kim, experimenting with computer-simulated liquids in capacitors, which can store a charge like a battery. Electric cars depend on similar batteries to store large amounts of energy. Andrew had already published two of his four PhD thesis chapters in prestigious scientific journals.

But at the moment, the house had no electricity. Andrew's father retrieved the small emergency generator he had bought at Home Depot, and filled it with gas. But when he pulled the cord, similar to that on a lawnmower, it broke. The cord slipped into the cavity. David could not reach the end to pull it, or even attach a rope to it.

Time passed. All four DeYoungs knew how much depended on electricity, aside from life itself. Twice a day, Andrew and his brother got breathing treatments. For bathing, toileting and every transfer, the chains of a hydraulic lift attach to a sling, on which Andrew sits and is hoisted onto a special table; from there, he can be lifted again to

a wheelchair. For transfers to a special van, they use a forklift inherited from Andrew's grandfather with ALS.

One of Andrew's hobbies was watching old films, which also required electricity. Recently, he saw the PBS remake of *All Creatures Great and Small*. He could not watch a movie now.



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Then, their father remembered the family's specially outfitted van. He found a large, heavy-duty extension cord, and managed to run it between the van and the house. He turned the van's ignition; lights in the house temporarily lit up. The van had half a tank of gas.

While they waited, Andrew thought of his parents, of their endless devotion, and their love. He thought of his work. "So many people have helped me," he told me later, "probably thousands. Volunteers, church members, students. I'd like to tell ARCS members, 'You're part of that, too.'"

The local electricity finally came on. By then, the gas tank in the van actually read "Empty."

"After our close call," Andrew said, "my parents bought a back-up generator for the whole house."

On January 22, 2021, within a few weeks of his brother's own PhD defense, Andrew DeYoung

successfully defended his thesis, *Molecular Dynamics Simulation Studies of Graphene Oxide Supercapacitors*." Now, he looks forward to a lifetime of doing the research he loves.

Linda Burke, Maren Cooke, and I attended Andrew's virtual PhD defense, proud of what Andrew had accomplished, with his parents' help, against unimaginable odds.

*Andrew DeYoung was an ARCS Pittsburgh Scholar from 2010-2012.*