

USU Technology Highlight:

# ADAPTIVE ENERGY CONTROL SYSTEM FOR SEA VESSELS WITH ELECTROMAGNETIC WEAPONS

*USU researchers and collaborators have enabled particular power and energy systems to be compatible with the emerging technology of sea vessels equipped with electromagnetic weapon systems.*

*This technology is part of the wireless power transfer system for electric vehicles, a patented technology commercialized through Sustainable Electrified Transportation (SELECT).*

## PROBLEM

Current methods of powering electromagnetic weapons on sea vessels can't properly exchange energy storage between various loads in different locations.

Using conventional methods, one solution is decoupling loads with large energy-storage elements to reduce impedance, but that requires impractically large amounts of energy storage. Another possible solution is medium-voltage, direct-current, integrated power and energy systems (MVDC), which enhance power transfer capacity and increase power quality. However, to this point, MVDC systems are incompatible with electromagnetic weapons systems due to instabilities with bidirectional-pulsed power flow and energy storage.

## SOLUTION

The researchers have created an energy-based adaptive stability control system with a novel system architecture, including a direct-current bus configured to provide bidirectional-pulsed power flow and energy storage, as well as a four-level power control system.

This architecture reduces system mass and volume through lower energy storage requirements. The system also continuously measures, compiles and analyzes DC bus impedance to develop control algorithms that regulate impedance in the DC bus and maintain stability of the system.

## BENEFITS

This adaptive energy control system creates compatibility between MVDC power systems and electromagnetic weapons systems, allowing for enhanced power transfer and quality potential in the array. The energy-based adaptive stability control system is also more cost-effective than conventional systems due to lower energy storage requirements.

## APPLICATIONS

This technology is designed for use in future sea vessels equipped with electromagnetic weapons systems that use a medium-voltage bidirectional power distribution or MVDC system.

## CONTACT

Questions about this technology including licensing availability can be directed to:

### ALAN EDWARDS

*Manager*

Technology Transfer Services

(435) 797-2328

[alan.edwards@usu.edu](mailto:alan.edwards@usu.edu)

## INVENTORS

### REGAN ZANE, PH.D.

*Electrical and Computer Engineering Dept.*

## DEVELOPMENT STAGE

TRL 3

## PATENT STATUS

Patent applied for.

## WEBSITE

[rgs.usu.edu/techtransfer/  
adaptive-energy-control-system](https://rgs.usu.edu/techtransfer/adaptive-energy-control-system)

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GRADUATE STUDIES  
UtahStateUniversity