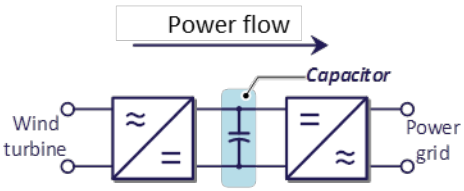
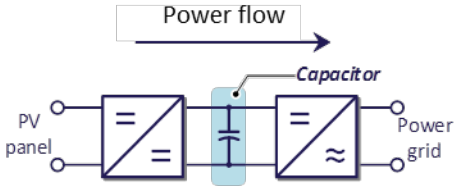
A Two-terminal Active Capacitor Device





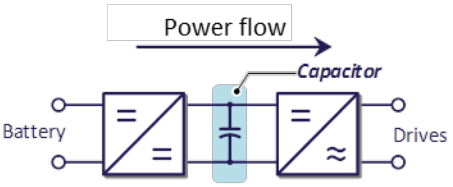


Figure 1. Applications of capacitor.

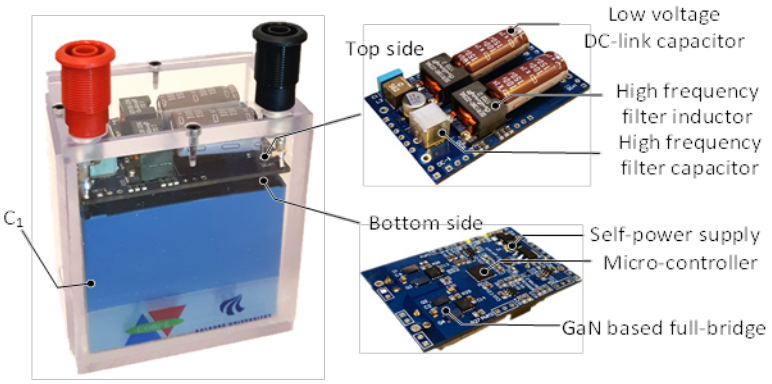


Figure 2. An active capacitor prototype uses 16.9% energy storage of a passive capacitor to fulfill the same design specifications.

- ***High cost-effectiveness***
- ***Ease of manufacture and assemble***
- ***Modular, scalable***
- ***Online tuning of parameters***

Value Proposition

The invention offers a two-terminal active capacitor device for DC and AC applications, with demonstrated capability to achieve variable capacitance, more than doubling capacitor lifetime, or potentially reducing the cost, size and weight by 50% compared to a passive capacitor of same rating. To end-user, the two-terminal active capacitor device will look the same as a conventional capacitor, as it has two terminals, so it can easily replace existing capacitors in any product. Finally, the two-terminal active capacitor device can be produced with wireless connection. And as the capacitance can be programmed online, manufacturers are enabled to optimize production, and reduce the number of product variants.

Business Opportunity

- Capacitors is a 25.7 billion dollar industry by 2020 from "Global discrete capacitors market report" by Global Industry Analysts, Inc, 2015.
- The invented variable active capacitor can be used to replace passive capacitors in general power electronic applications, especially for AC and DC-link applications, online damping for stability, adaptive energy buffering, etc. Thereby making it applicable for major market segments includes power supplies, power transmission and distribution, drives, inverters, motors, etc.
- Producing these new two-terminal active capacitor device, require standard electrical production skills. The products can easily be implemented in current production facilities. Or form the basis of a startup.

Technology Summary

- This active capacitor has two terminals without any additional connection, making it possible to be packaged as a conventional capacitor.
- It is potentially reducing the cost, size and weight and improving the reliability performance.
- The active capacitor can be used for both DC and AC applications.
- Further, the capacitance of the active capacitor can be programmed online.

	Passive	Active
Capacitance	100 %	≈ 10 % -500 %
Cost	100 %	≈ 50 %
Size	100 %	≈ 50 %

Current State of Development

Proof of concept has been achieved in a laboratorial prototype. A case study has demonstrated a programmable capacitance from 5% to 100% of maximum value. For a 500 W single-phase application, it is around 36% cost reduction with a target of 30 years of lifetime, compared to an optimal passive capacitor solution, while both DC-link voltage ripple can be limited into 5 %.

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Seeking

- Funding/Investors
- Licensee
- IPR Sale

Patent Pending