

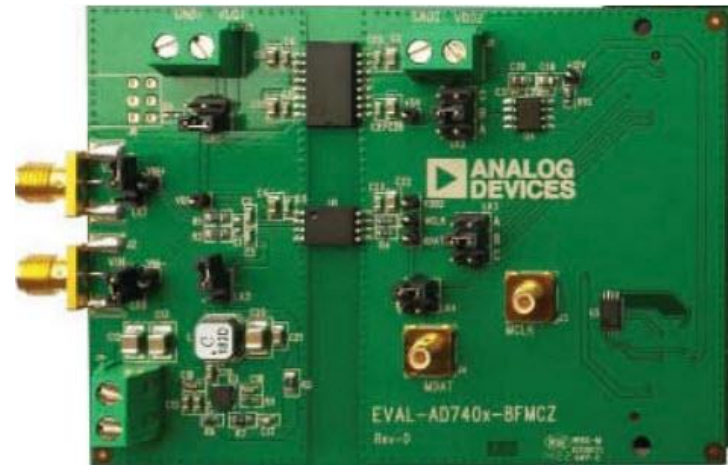
# ASIC<sup>2</sup> Project: Full Lab analysis of $\Sigma$ - $\Delta$ Modulator as Memristor Driver

**Background:** Memristors are considered a promising technology with very attractive properties, essentially two terminal thin-film devices with non-volatile varying analog resistance. It describes the relation between the flux and the electrical charge via integral on applied time interval. Therefore, it is equivalent to apply either a specific voltage for longer time or bigger voltage value for less time. This attribute makes the memristor a good candidate to work with encoded pulses completely compatible with sigma-delta modulator.

Thanks to the memristor properties, artificial intelligence hardware is now achievable either for brain simulations or for building machine learning accelerator for running machine learning algorithms based on artificial neural networks. A major challenge in machine learning algorithms is to converge to global optimal solution, depend on the limited hardware precision and the number of layers. Therefore, in this project students are required to show that using sigma-delta neurons will improve the precision and minimize the learning error dramatically.

## Project Description:

- Comprehension of sigma-delta modulators and memristor
- Full Characterization of the Modulator
- Verification plan
- Testing
- Output grabbing and using with memristor model for simulations.
- Connection to memristor.
- Proposition of an application in the field of Neural network.



Prerequisites: LAB1

Recommended: TBD

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