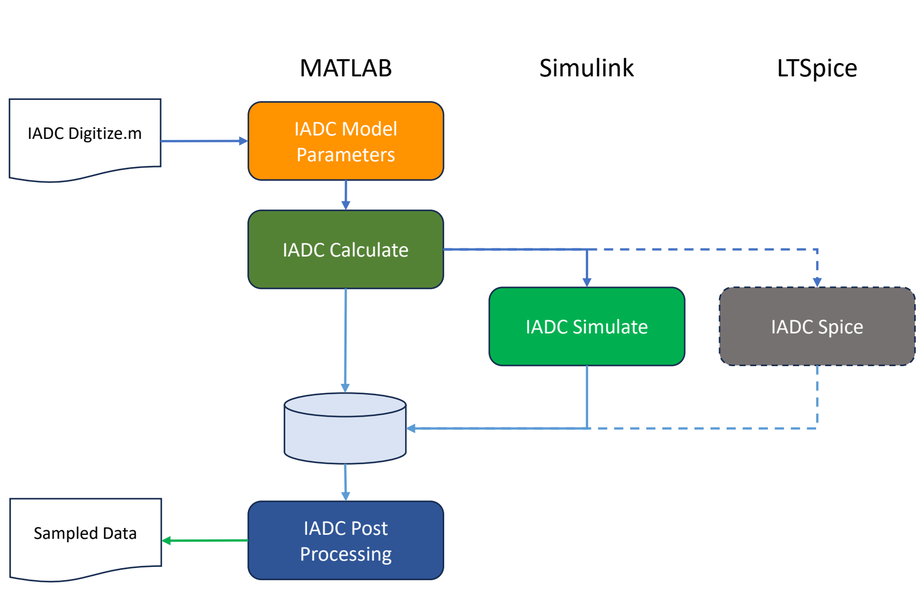
22RPT02 *True*8DIGIT
Towards a true 8-digit digitiser

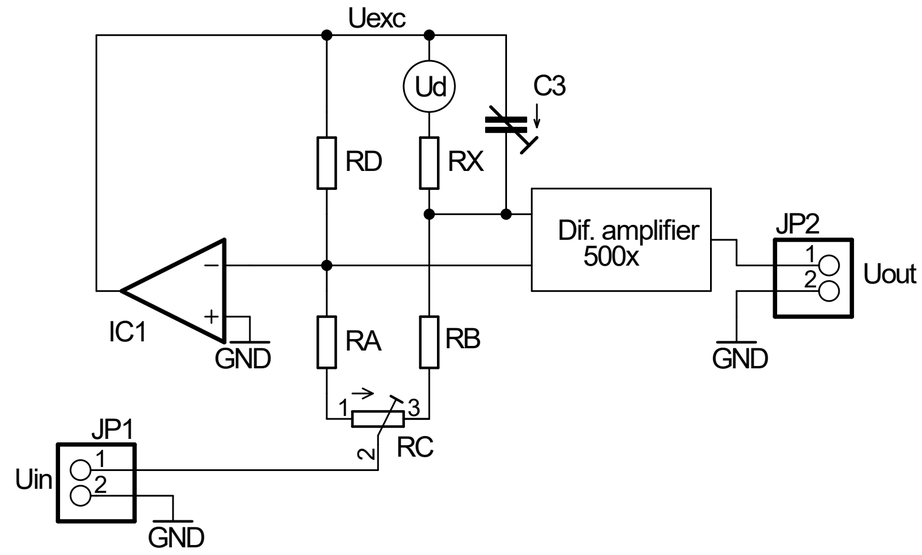
True8DIGIT is a research potential project which started in June 2023. Its principal objective is to perform the preparatory research for a follow-on project which will aim to develop a digitiser with a performance beyond the state of the art. A number of the essential elements of a digitiser, namely the ADC and its components, the timing and synchronization platform, and the power supply were chosen for study, as well as the necessary associated measurement methods. Some of the project outcomes are described below.

IADC MODEL AND SIMULATION



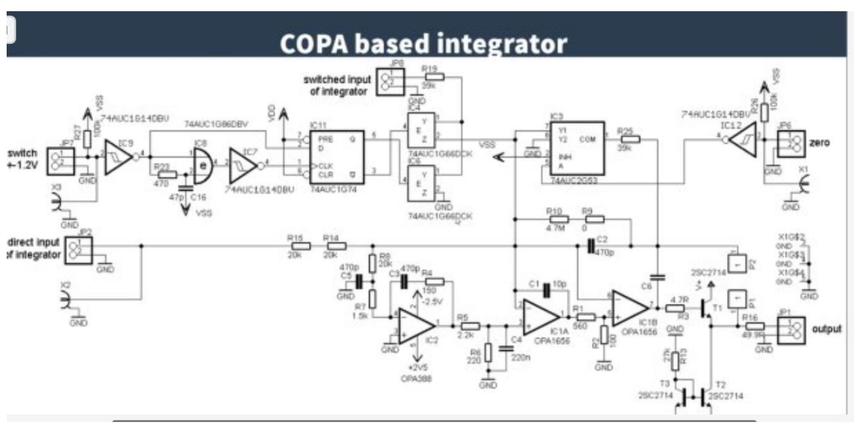
A comprehensive and adaptable IADC model that provides insight into many non-ideal IADC behaviours

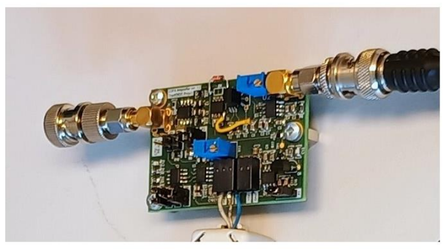
CHARACTERISATION OF PASSIVE COMPONENTS



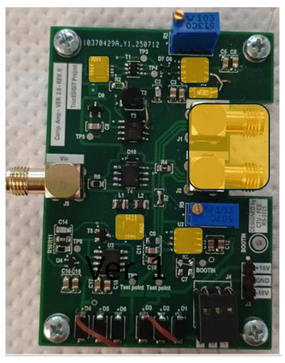
A novel AC bridge which can measure the non-linearity of capacitors and resistors below the -160 dBc level

IMPROVED COMPOSITE OPERATIONAL AMPLIFIERS





Ver. 1

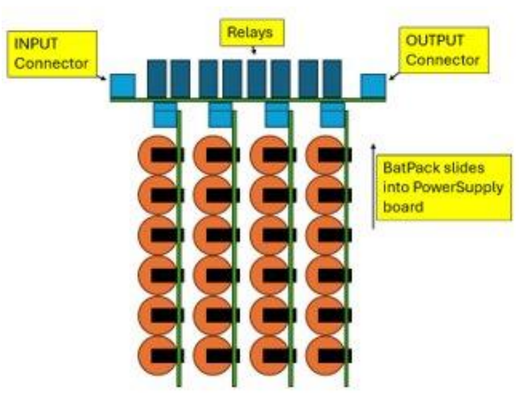


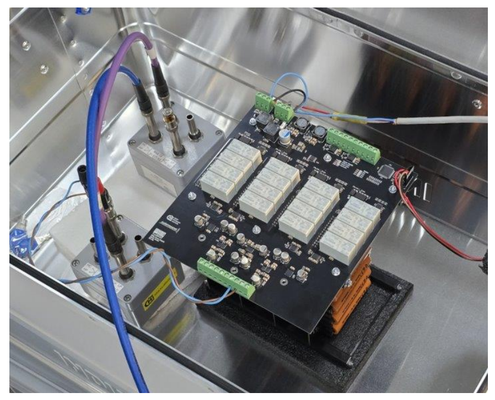
Ver. 2

Front-end COPAs

Improved COPAs for use in the front end of the digitizer and as part of the integrating ADC have been developed and are being characterised.

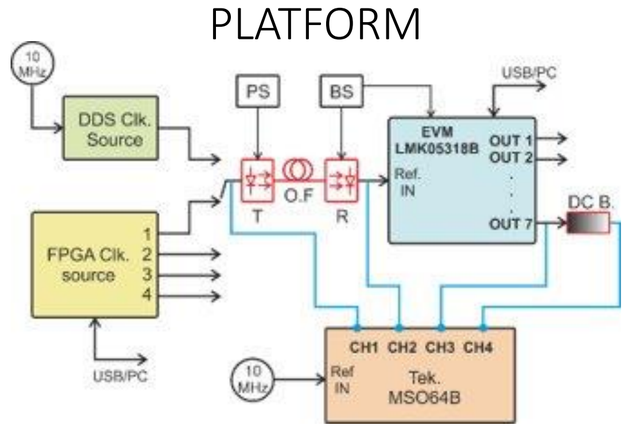
ULTRA-LOW-NOISE POWER SUPPLY PROTOTYPE

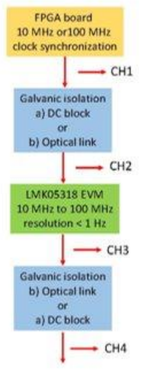


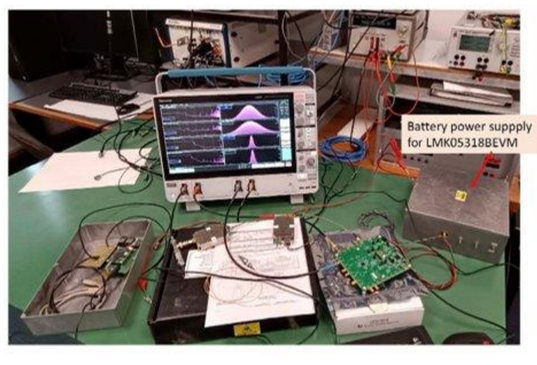


A battery powered power supply unit which provides a continuous output with very high isolation and low noise has been designed and prototyped.

TIMING AND SYNCHRONISATION PLATFORM







A timing platform with 10 MHz and 100 MHz outputs featuring galvanic isolation and ultra low jitter (< 10 ps)

Further details of the project may be obtained by visiting our website https://true8digit.eu/ or by contacting:

oliver.power@nsai.ie

It is planned to submit a PRT for a follow-on project to the EPM 2026 Industry call. If you are interested please contact

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