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**Maharyta et al.**(10) **Pub. No.: US 2022/0360275 A1**(43) **Pub. Date: Nov. 10, 2022**(54) **CURRENT-MODE ANALOG-TO-DIGITAL  
CONVERTER SYSTEMS, DEVICES AND  
METHODS FOR MULTI-SENSING**(52) **U.S. Cl.**CPC ..... **H03M 1/34** (2013.01); **G01D 5/14**  
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**ABSTRACT**(72) Inventors: **Andriy Maharyta**, Lviv (UA);  
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A device can include analog circuits formed with a substrate, including a comparator, analog switches, and a balance current circuit. A sensor current and balance current can be applied at an input of the comparator. The sensor current, balance current or both can be modulated with a switch control signal. Digital circuits can include switch control logic that generates the switch control signal in response to an output of the comparator and a modulation clock signal. Digital signal processing circuits can generate a multi-bit digital value from a bit stream output by the comparator circuit. The multi-bit digital value can be an analog-to-digital conversion of the sensor current. Corresponding methods and systems are also disclosed.

