

# A Piezoelectric Harvesting Interface with Capacitive Partial Electric Charge Extraction for Energy Harvesting from Irregular High-Voltage Input

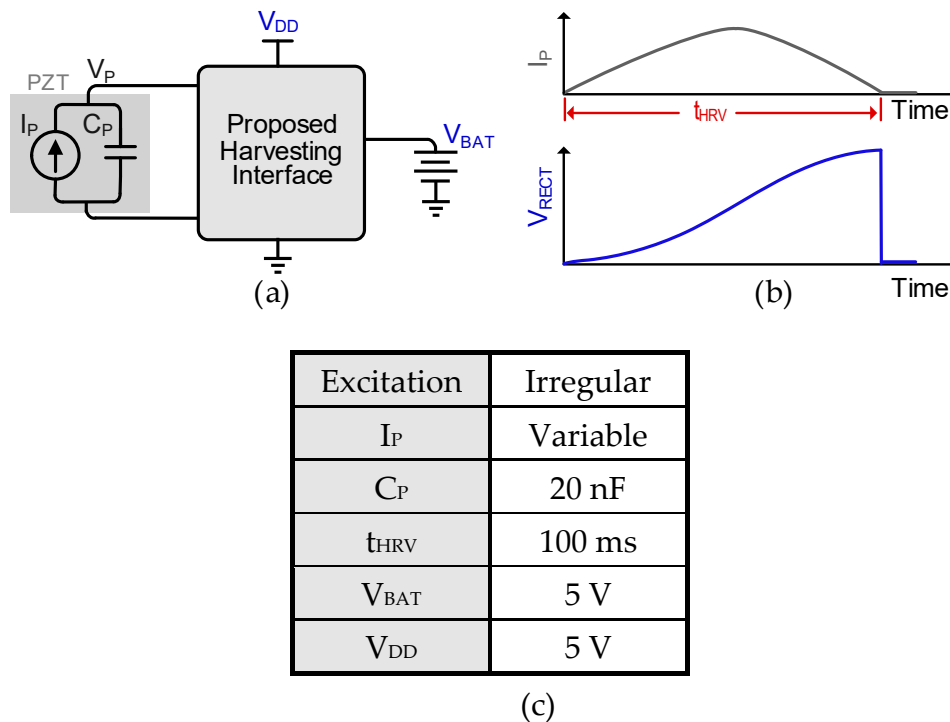
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A proposed harvesting system is simulated in Cadence Spectre using the commercial 350 nm BCD process. As explained in the manuscript, the piezoelectric transducer (PZT) can be electrically modelled as a current source ( $I_P$ ) in parallel to its parasitic capacitance ( $C_P$ ) [13]. Therefore, in the simulation model, the proposed harvesting interface circuit input side was connected to the PZT model, and output was connected to a battery, as shown in Figure S1(a).

As input excitation is assumed to be irregular in this work, different pulse excitations were applied to the PZT (as shown in Figure 7a). The duration of  $I_P$  refers to the time during which bending displacement is applied to the PZT (Figure S1b). Targeting for human body motion, bending displacement pulse duration ( $t_{HRV}$ ) was kept in milliseconds. For various weak and strong input excitations, the magnitude of  $I_P$  is varied, which results in different  $V_{RECT}$  levels. Parameters used for simulations to achieve the results shown in Figure 7 are summarized in Figure S1c.



**Figure S1.** (a) Simulation setup of proposed harvesting interface; (b) conceptual waveforms of input current applied to the piezoelectric transducer (PZT) with generated output voltage; (c) simulation parameters for Figure 7,8.