



Ito Lab

RF/Analog Circuits and Integrated MEMS for IoT

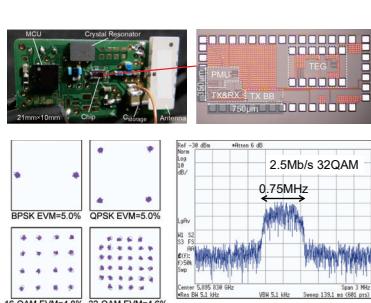
Nano Sensing Unit, FIRST

Applied Electronics Research Core, ICE Cube Center
NuFlare Future Technology Laboratory

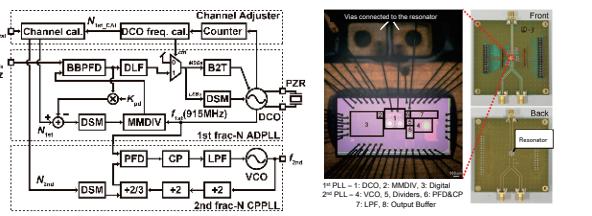
<http://masu-www.pi.titech.ac.jp>

- Ultra Low Power ($<1\mu\text{W}$) RF/Analog Circuits
 - High Sensitivity ($< \mu\text{G}$) MEMS Accelerometer
 - Low Noise Synthesizer, Small Atomic Clock
 - Advanced Electron Beam Writer
 - Cow Monitoring System
 - Hydroponic Cultivation System, and so on

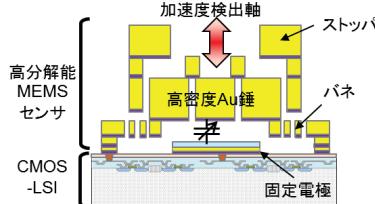
Integrated Circuit & RF Technology



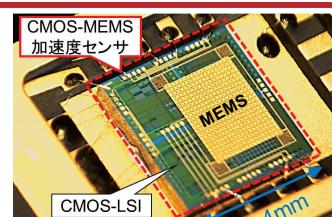
Low Noise Synthesizer Exploiting Piezo Resonators



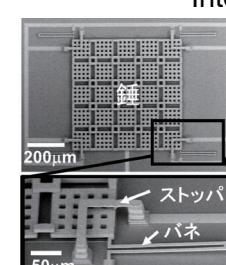
MEMS Accelerometer With micro-G Resolution



Energy Harvesting Device



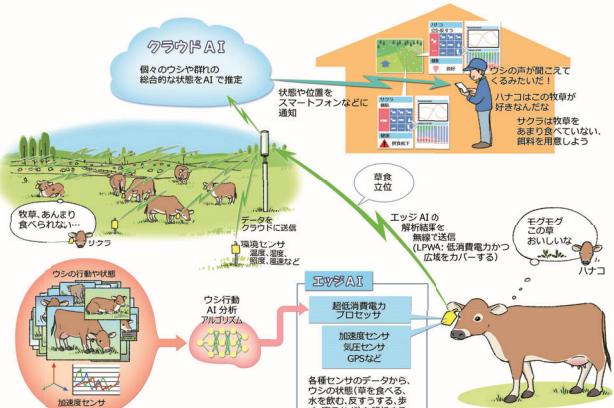
Heterogeneous Integration (CMOS-MEMS)



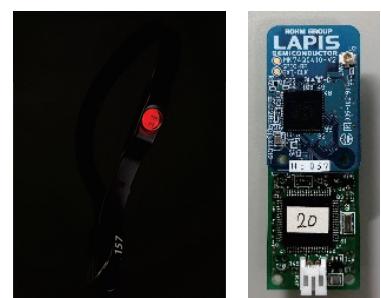
MEMS Accelerometer

The figure illustrates the co-design of CMOS and MEMS components. The left side shows a circuit schematic for a variable capacitor C_v connected to a voltage-controlled voltage source V_c . The right side shows a simulation plot of Frequency (Hz) vs. Time (ns), with a red bar indicating the operating frequency range from 6.9MHz to 7.0MHz.

Agriculture & Husbandry



Edge-AI Device f



Medical & Health Care