Hybrid Force Radiometric Array with Direct Analog Force-to-RF Conversion

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BRIEF DESCRIPTION

This technology introduces a novel approach for bridging force sensing with wireless communication through direct analog force-to-RF conversion provides lower power consumption and lower costs.

FULL DESCRIPTION

This innovative design combines a thin-film force sensor array, a flexible printed circuit board (PCB), class-D voltage-controlled oscillators (VCOs), and a multiport loop antenna to convert force directly into radio-frequency (RF) signals. Aimed at reducing power consumption while increasing the dynamic range and resolution of force measurements, this system facilitates robust wireless connectivity over distances greater than 5 meters, making it suitable for a variety of applications in robotics, healthcare, automotive, and aerospace industries.

SUGGESTED USES

- Real-time force monitoring in robotics for tasks such as assembly alignment and adaptive gripping.
- Low-cost sensing in security or military applications
- Patient monitoring and diagnostic devices in healthcare.
- Enhanced control and feedback systems in automotive technologies.
- Force measurement and communication in aerospace applications.
- Wearable technologies for fitness and rehabilitation.

ADVANTAGES

- Direct analog force-to-RF radiation conversion for efficient wireless communication.
- Low power consumption of less than 2 mW due to class-D VCOs.
- Linear force-to-frequency relationship enabling precise measurements.
- High force dynamic range (0-105 N) and fine resolution (0.1 N).
- Flexible and compact design suitable for wearable technologies and non-line-of-sight applications.
- Robust, orientation-tolerant performance across 3.1–4.7 GHz frequency range.

PATENT STATUS

Patent Pending

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OTHER INFORMATION

CATEGORIZED AS

- **Biotechnology**
  - Health
- **Communications**
  - Wireless
- **Sensors & Instrumentation**
  - Analytical
  - Biosensors
  - Other
  - Process Control
- **Transportation**
  - Aerospace

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