Abstract
The paper presents a thought experiment as to the feasibility of using large scale wireless sensor networks as a vehicle for high level scientific investigation. A sensor payload is proposed, which includes means of seismic, chemical, temperature and visual exploration. The power and communications systems are also discussed, based on the needs of a mission profile which provides no special ‘base station’ nodes on the planet’s surface, requiring each sensor package to be capable of information extraction, in-network collaboration and communication with an orbiting satellite. And different sensor technologies are also discussed.
A high-temperature, low-power silicon-tunnel-diode-based oscillator transmitter with an on-board optical power converter is proposed for harsh environment MEMS sensing and wireless data transmission applications. The prototype sensing and transmitting module employs MEMS silicon capacitive pressure sensor performing pressure to frequency conversion and a coil loop serving as the inductor of the LC tank resonator and also as a transmitting antenna. A GaAs photodiode converts an incoming laser beam to electrical energy to power the prototype. The system achieves a telemetry performance up to 250 °C over a distance of 1.5 meters with a transmitter power consumption of 60 μW.

Reference


Index Terms

Computer Science Communications
Key words

intelligent sensing

MEMS sensors

wireless sensor networks

Distributed computation
information extraction