

Abstract

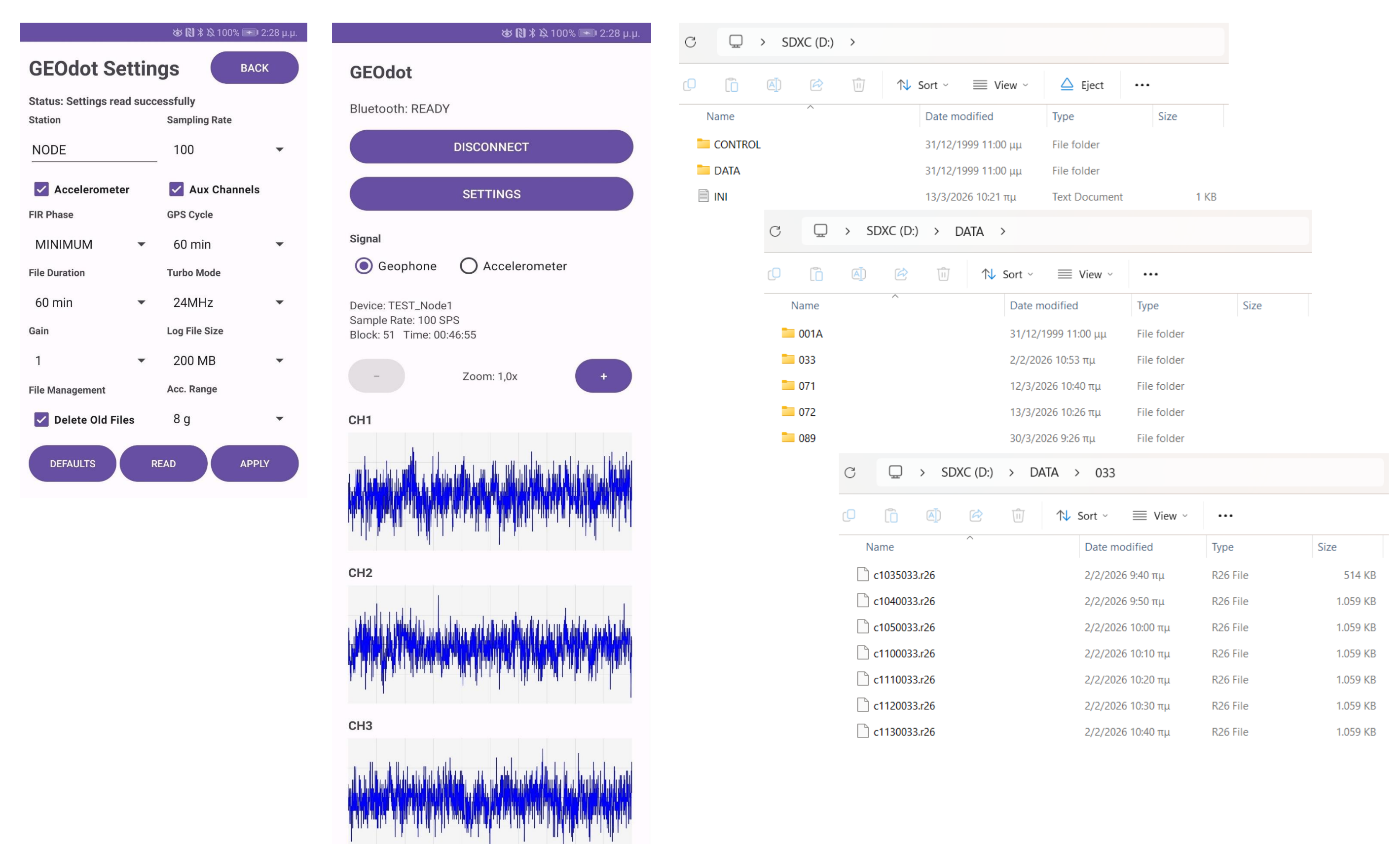
This work introduces a novel, state-of-the-art standalone digital seismometer developed for seismic monitoring applications. The instrument combines a triaxial wideband velocity sensor with a flat frequency response from 10 s to 100 Hz, a high-quality MEMS accelerometer, and a high-dynamic-range digitizer (143dB) based on 32-bit analog-to-digital converters (ADCs). The system supports selectable sampling rates from 50 to 800 samples per second (sps). Data acquisition and instrument control are handled by a high-performance, low-power RISC processor running the proprietary GEObit operating system. Seismic data are stored in GBT file format on a removable microSD card with a capacity of up to 64 GB. The storage medium is directly readable on both Linux and Windows platforms, allowing simple and efficient data retrieval via file transfer. Additionally, data access is available through Bluetooth and USB interfaces, which is particularly beneficial for underground deployments. The instrument includes an onboard three-axis MEMS accelerometer with a dynamic range of 97dB, enabling simultaneous recording of seismic velocity and acceleration data. Accurate time synchronization is provided by a 32-channel GNSS receiver in combination with a TCVCXO clock offering a frequency stability of 0.2ppm. Designed for ultra-low power operation, the system consumes approximately 0.26W, allowing continuous operation for up to six months when powered by a 9V, 170Ah zinc-air battery. User interaction and system management are facilitated via Bluetooth and USB connections, with dedicated iOS and Android applications supporting real-time data visualization, instrument configuration, state-of-health (SOH) monitoring, and full seismometer control. The device features a compact form factor with a diameter of 110mm, a height of 65mm, and a total weight of 450g. It is housed in an IP68-rated enclosure made of hard-anodized aluminum, ensuring durability and reliable operation in harsh environments, including underground installations.

Key Benefits

- Power consumption 0,26W.
- Input Voltage 5-18Vdc.
- 32-bit ADC converters.
- Wide band sensor response 10sec-100Hz.
- Sampling rate 50 – 800 sps.
- Stores data files on a removable MicroSD memory.
- Fast data retrieval by microSD replacement, USB or Bluetooth.
- Connects via Bluetooth to iOS or Android devices.
- Integrates MEMs accelerometer.
- 32-channels GNSS time.
- Ultra stable TCVCXO clock.
- Small size, aluminum casing.



The GEOdot10 seismometer



Mobile App

microSD data files