# **Paper 5:** Breakaway Session 11(BS 3.11.1)

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## Experimental use of Arduino-based accelerometers for assessment of train induced soil vibration characteristics

### Abstract

Vibration is a significant factor causing structural damage to nearby structures. This study, conducted in accordance with ISO-14837, focuses on the importance of structural health monitoring and structural audits for existing structures.

The instrumentation and data acquisition system used in this study comprised triaxial ADXL-345 and MPU 6050 accelerometers, Arduino Uno R3, and I2C protocol communication for data logging.

Field measurements were conducted on moving trains, revealing a maximum peak particle velocity of 50.77mm/s at the rail vibration source, and a minimum of 1.049mm/s at a distance of 16 meters from the rail. According to BS7385-2 (1993), ground borne vibration becomes damaging at a peak particle velocity of 50mm/s at 4Hz, while the vibration Standards Association of Australia (ASCA) prescribes a limiting value of 25mm/s. The Swiss Association for Standardization recommends a limiting value of 8mm/sec within the frequency range of 10-60Hz.

The measured vibration values were consistent with established standards for peak particle velocity values for damage and demonstrated the effectiveness of the proposed methodology in assessing and managing ground borne vibrations.

This research emphasizes the importance of early vibration detection through digital technology to mitigate structural damage and as a precondition prior to development approvals.

Keywords - Peak Particle Velocity,Vibration Standards,train, Accelerometer, Arduino Uno R3