Implementing a Compact Data Format for Bluetooth and 3G Communication to Monitor Remote Pipelines

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ABSTRACT:

Non-invasive monitoring of slurry pipelines with a new embedded system is described to complement existing remote sensing techniques via satellites. The behavior of the slurry inside the pipeline may cause sedimentation which may lead to blockages and undesired spillages during cleanup operations. While some intelligence resides in the instruments, their final calibrations need to be based on having acquired a wide range of actual operating conditions, including mine-specific anomalies. These circumstances generally occur randomly and therefore 2-way communication is preferable during the commissioning period to enable rapid responses to fine-tune the calibration. The need for an efficient and flexible data format, which is simple and robust for wireless monitoring of slurry pipelines in remote areas, is described as a case study. From various data format options, the Concise Binary Object Representation (CBOR) format was chosen and implemented to assist in the commissioning of various devices to detect sedimentation of solid particles at the bottom of the pipelines. CBOR's strength is in the self-describing object protocol, but it still consumes a lot of static memory. Challenges were experienced as the format does not support 32-bit processors, and longer objects needed to be broken done to ensure successful transmissions.