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Utilizing RFID-WSNs for reducing the footprint of the Oil Sands industry

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Abstract: In harsh operational conditions, machines lose components on a frequent basis, causing a significant footprint to the surrounding environment. This affects operational up-time, safety measures and cost effectiveness. This paper proposes the use of an integrated RFID-WSN architecture to reduce the footprint of mining equipment used in the Canadian Oil Sands industry. Sensors and RFID tags provide both identification and positioning data for detecting broken parts from Ground Engaging Tools (GETs), such as huge shovel teeth. A delay-tolerant delivery approach utilizes mobile couriers, placed on loading trucks available in the vicinity, to store and carry data from readers and relays to remote base-stations. Delivering data in such harsh mining environments poses several challenges including power scarcity, vast transmission distances and the lack of an accessible communication infrastructure. We provide a use case to demonstrate how this architecture successfully overcomes these challenges within the harsh industrial environment of the Oil Sands.