Real-time Positioning via LoRa for Construction Site Logistics

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Abstract –
Tracking and monitoring resources in construction is of great interest to an industry that is in the pursuit of continuous improvement. Real-time location sensing technology like Global Navigation Satellite Systems (GNSS) and (or in combination with) Radio Frequency Identification (RFID) have already been introduced in commercial applications to report the position of valuable construction resources such as materials or equipment. While several other communication protocols exist (e.g. Ultrawideband), unfortunately little is known about the performance (i.e., location error, reliability, and practical benefits) of LoRa (Long Range), a wireless data communication technology for very-long-range transmissions up to several kilometers with low power consumption. This paper first introduces the need for such technology and then explains the integration of LoRa in an Internet of Things (IoT) network, which enables to connect, collect, and exchange data for construction applications. The further focus of the study is to evaluate and test LoRa in realistic construction work environments. The experiences made with the developed technology are in particular useful for demonstrating the applicability of LoRa in construction logistics and management.

Keywords –
Building Information Model (BIM), construction resources, Global Navigation Satellite System (GNSS), Internet of Things (IoT), logistics, Long Range (LoRa), Radio Frequency Identification (RFID), tracking and monitoring, Ultrawideband (UWB).