# BareTag Tool-Tracker

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**Abstract**

Over the past 10 years, the majority of tools on a construction site have converted from wired to battery-powered. While this makes tools easy to move around, it also makes them easy to misplace and an easier target for theives. Data indicates that the construction idustry suffered nearly $1,000,000,000 in loses due to tool theft in 2023 alone [1], strongly indicating the need for a robust and effective theft mitigation system. We propose the BareTag Tool-Tracker, a novel approach to tool tracking that utilizes Ultra-Wideband(UWB) and Bluetooth Low-Energy(BLE) radio in order to real-time track tools, materials, or other valuable items on a construction site. The system utilizes a series of pre-placed Anchor posts, that send UWB pings to a Tag that is connected to a tool. Each Anchor can then calculate its distance to a Tag, relaying that information to a Base station over Long Range(LoRa) radio. The base station runs the aggregated distance data through a multilateration algorithm that can calculate the Tag's location with ± 10 cm accuracy. The calculated location is then output to a local terminal, as well as uploaded to a cloud database for future reference. Altogether, the BareTag Tool-Tracker is highly accurate (± 10 cm), low-power (1 year of battery life), and scalable (increase range by adding additional Anchors).

# 1 Section 1

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## 2 Section 2

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