

# BareTag Tool-Tracker

Walter Tebbetts, CompE, Sean Brown, CompE,  
Ken Su, CompE, and Connor McGarry, CompE

October 14, 2024

## 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 thieves. Data indicates that the construction industry suffered nearly \$1,000,000,000 in losses 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  $\pm 10$  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 ( $\pm 10$  cm), low-power (1 year of battery life), and scalable (increase range by adding additional Anchors).

## 1 Section 1

Lorem Ipsum

## 2 Section 2

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