

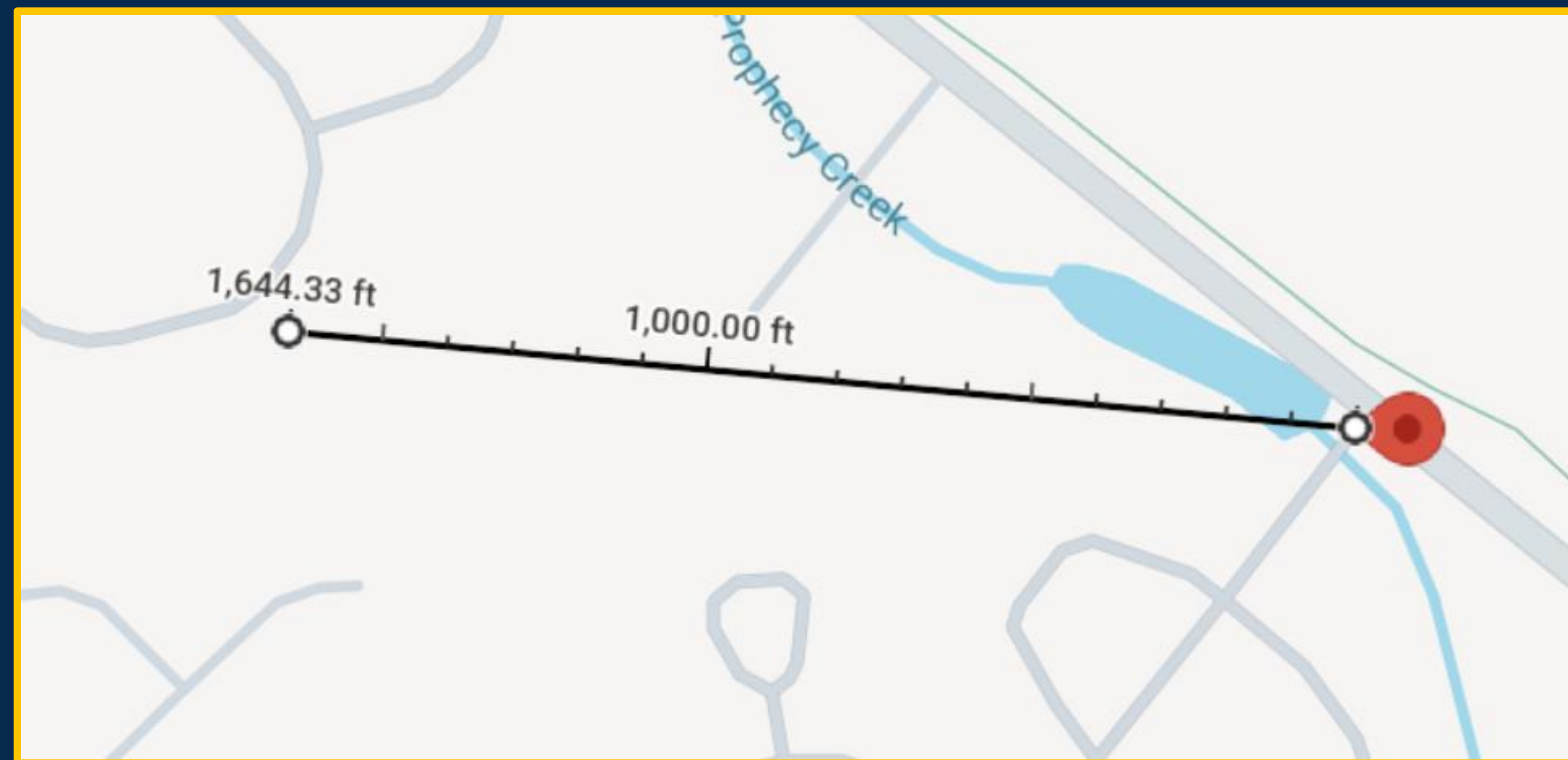
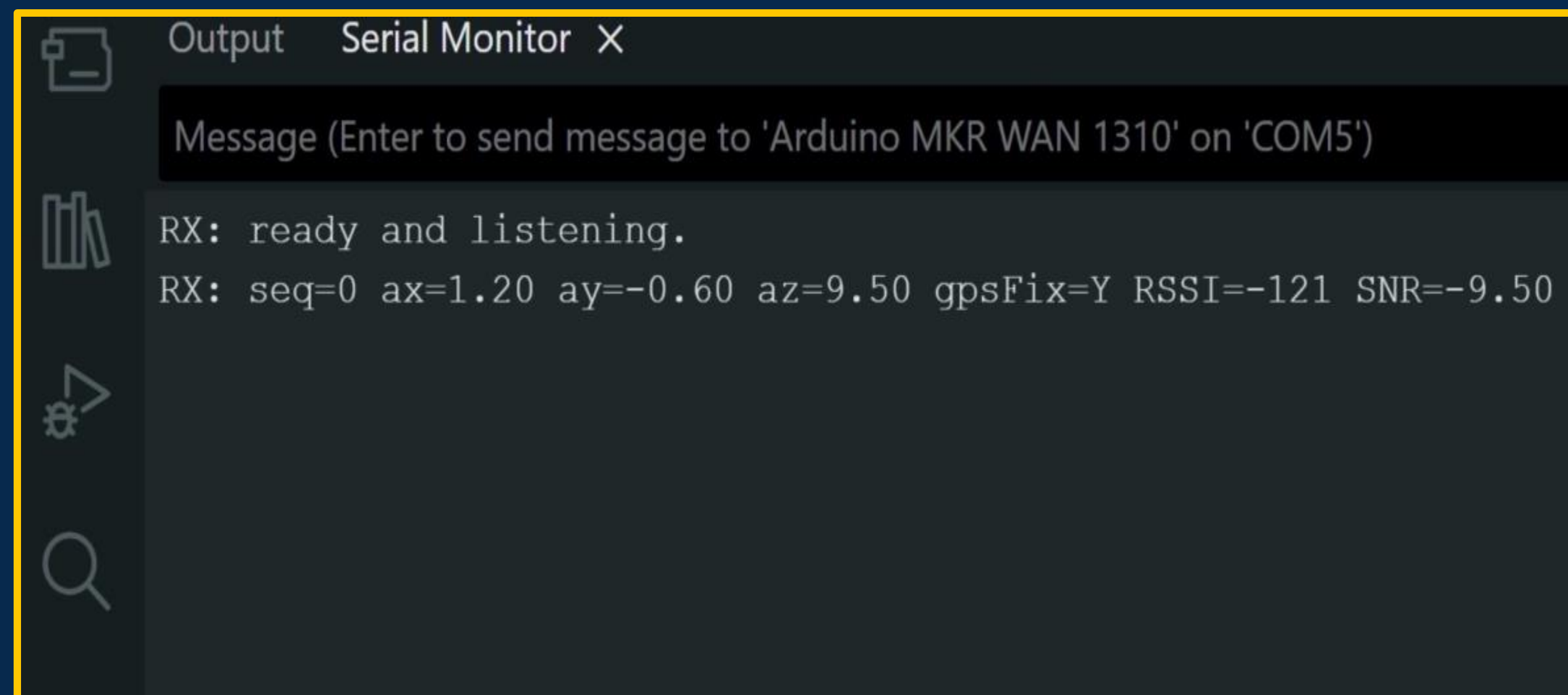
ECE-492 Team 7 Hard Hat Impact Detector

Members: Adem Aydin¹, Ivan Liu¹, Wilber Escobar¹, and Mirahn Alshamry¹

Advisor: Tess Porter

¹Department of Electrical and Computer Engineering

Arduino's GPS Transmitting Data



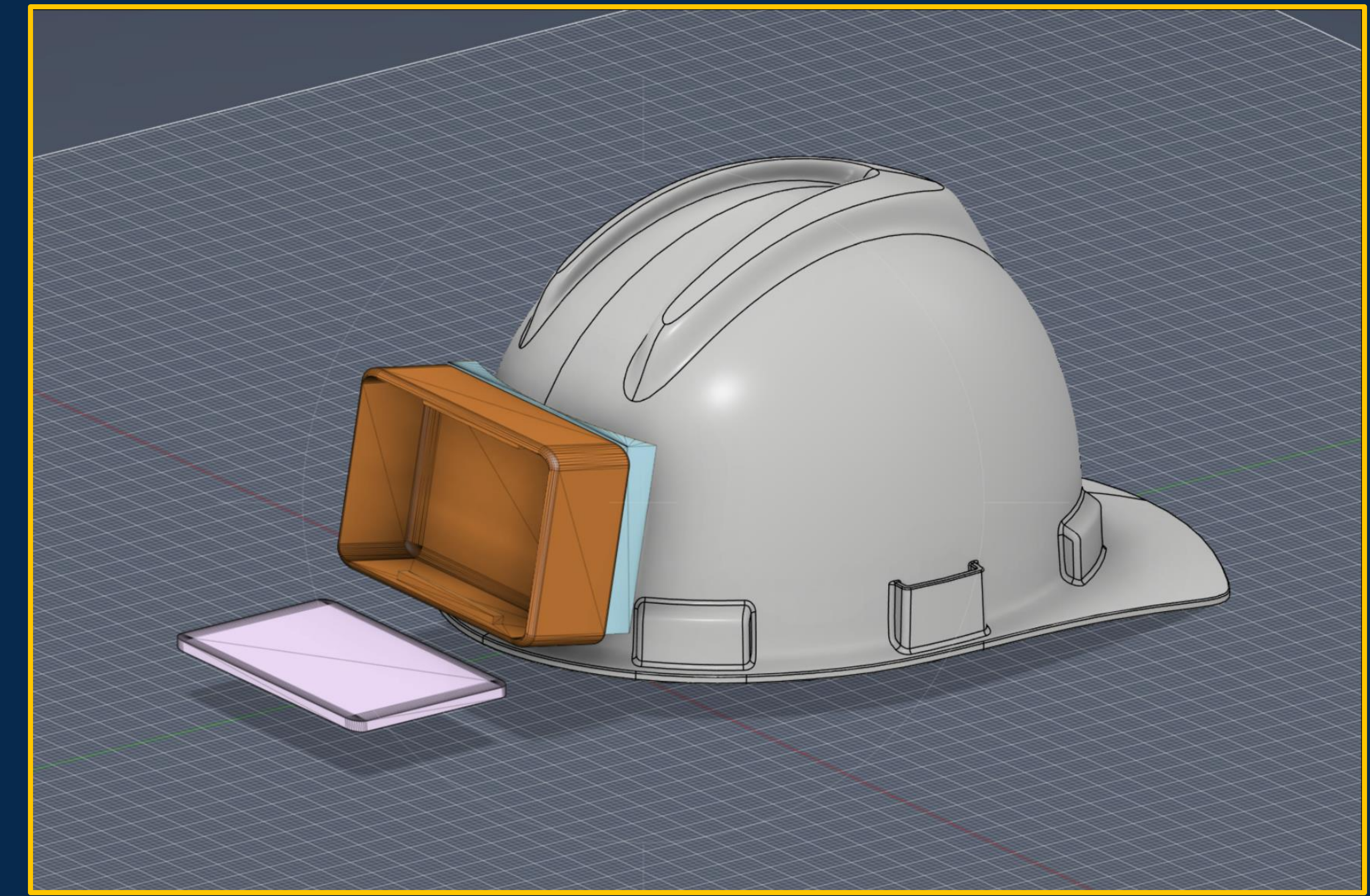
The GPS on the detector was successfully able to work with transmission from 1600+ feet away

Abstract

Construction is one of the most hazardous industries, with head injuries comprising a significant portion of workplace incidents. Traditional hard hats provide only passive protection and lack event monitoring, limiting accident analysis and prevention. This project presents a low-cost, modular smart hard hat sensor that attaches to existing helmets to enhance worker safety. The system uses a microcontroller with IMU-based impact and fall detection, GPS location tracking, and LoRaWAN connectivity to transmit real-time alerts and incident data to a remote dashboard. Housed in a 3D-printed modular enclosure, the device allows damaged helmets to be replaced without replacing the sensing hardware, improving durability and cost efficiency.

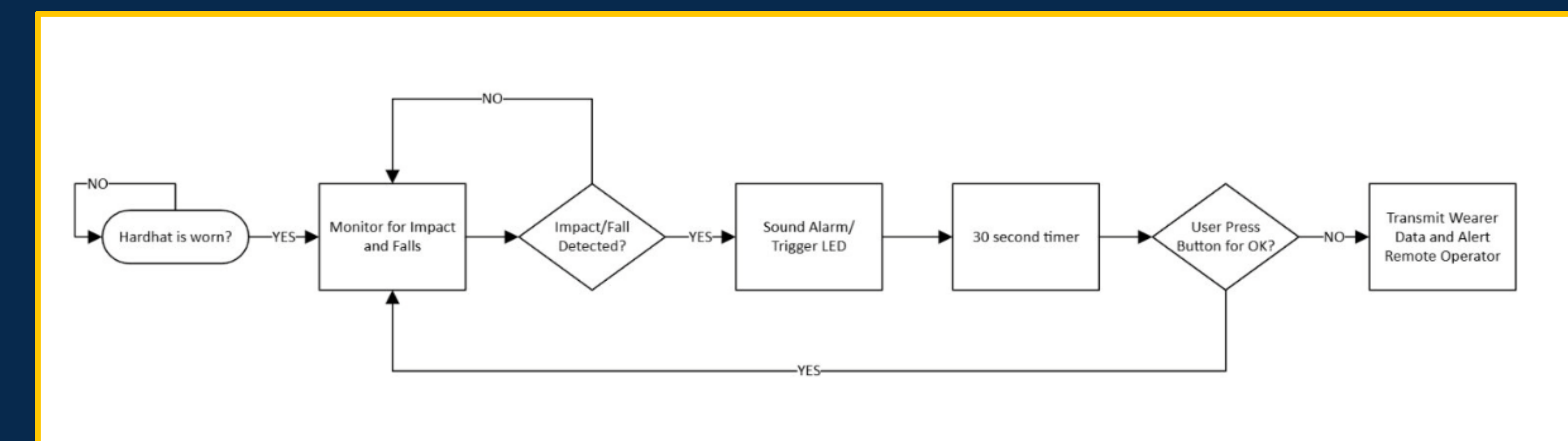


Updated CAD Model of Enclosure on Hard Hat

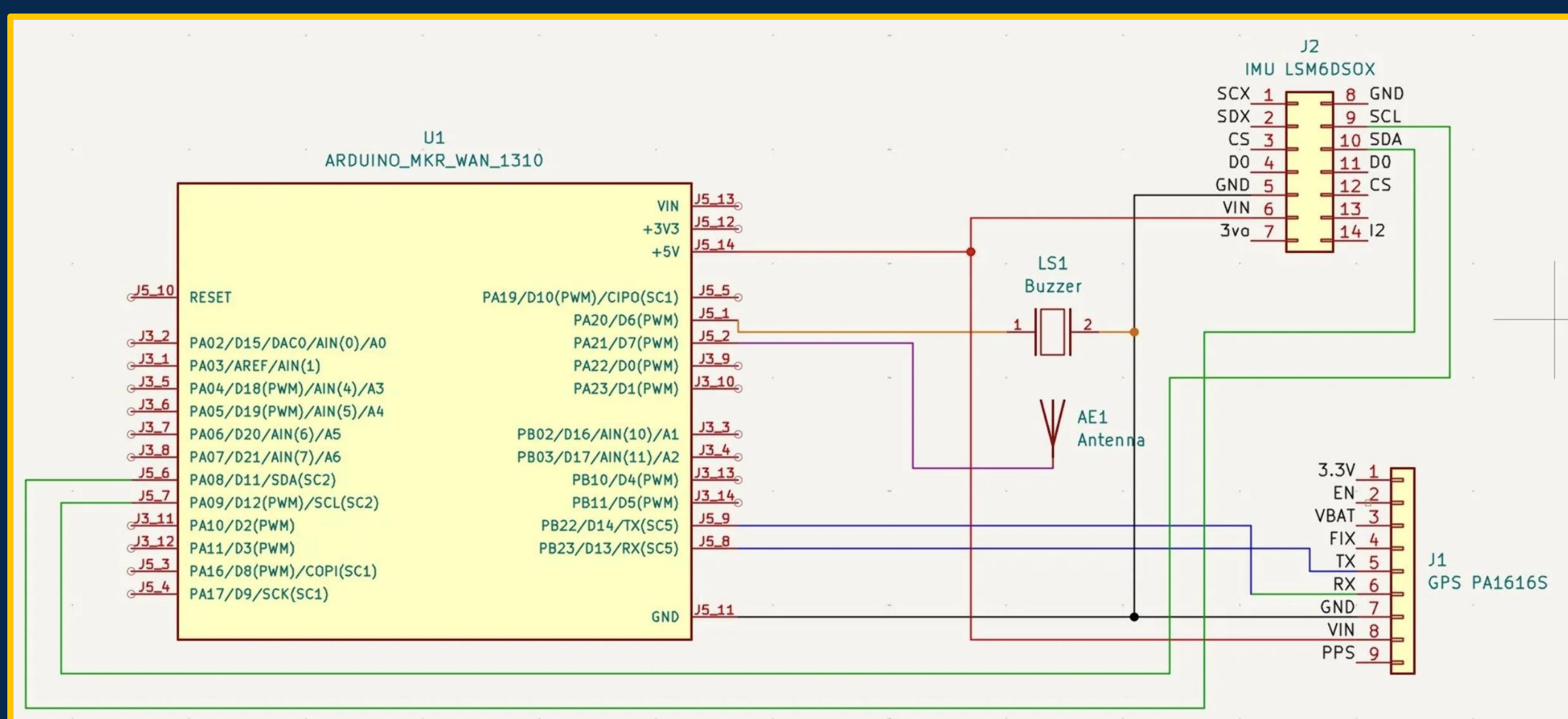


Updated model of the enclosure connected to the hard hat for more surface to attach to using Fusion360

Sequence of Operation & LoRA Topology

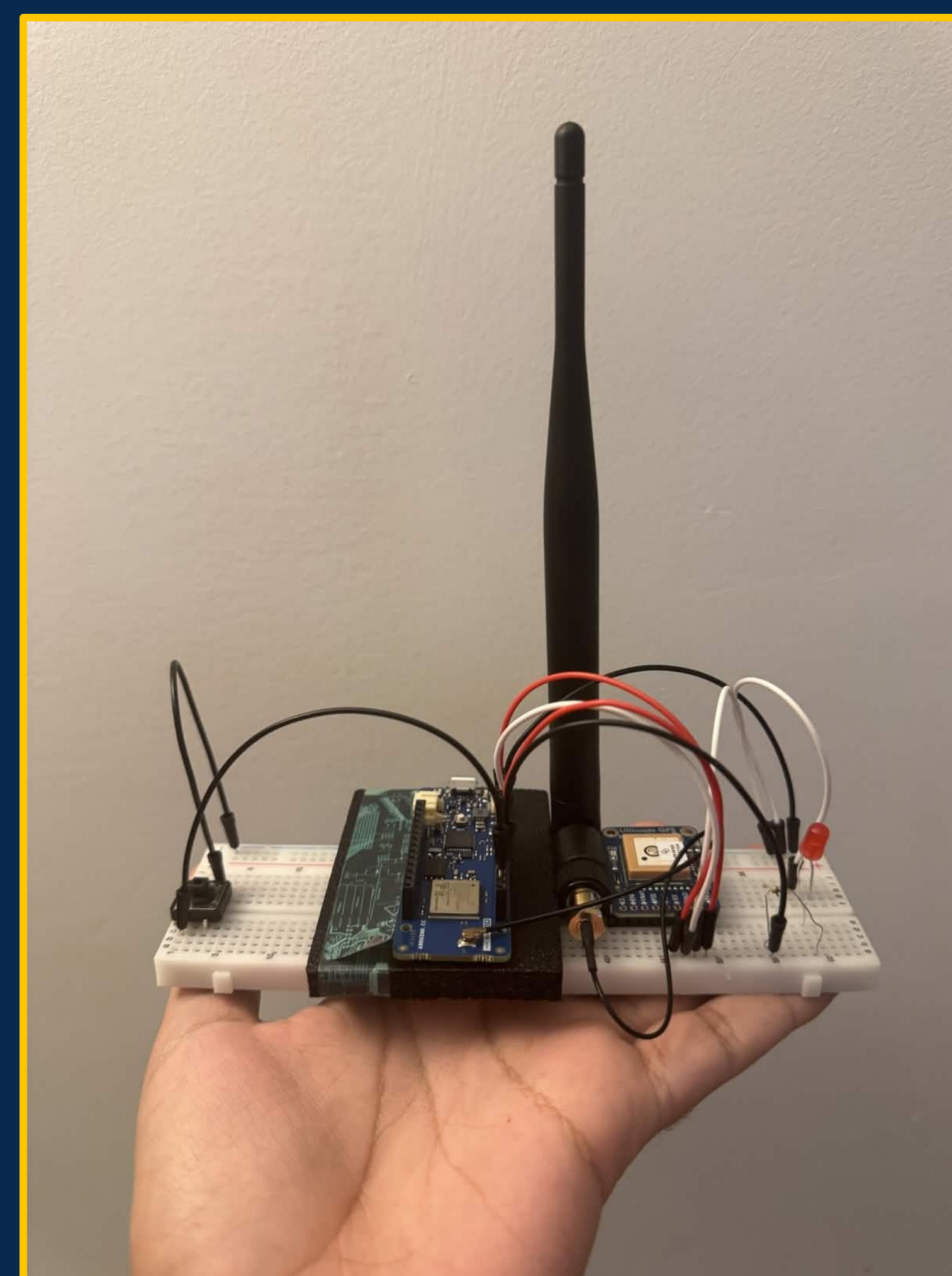


Wiring Diagram



Initial wiring diagram of all components connected to the Arduino created using KiCad

Prototype of the Detector for Testing Communications



Arduino set up used to test out wiring and for communications

