Synthetic Aperture Radar Imager

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Purpose

To create a structural prototype that successfully utilizes Synthetic Aperture Radar (SAR) technology to detect and image metal from a distance for use in the security industry.

What is SAR?

Synthetic Aperture Radar:

Typically, a single antenna is attached to an aircraft flying over a target zone capturing several high resolution images to create a single image map.

- Typically for military use

Project Scope

Objective:
- Develop a static, multi-antenna Synthetic Aperture Radar (SAR) Imager

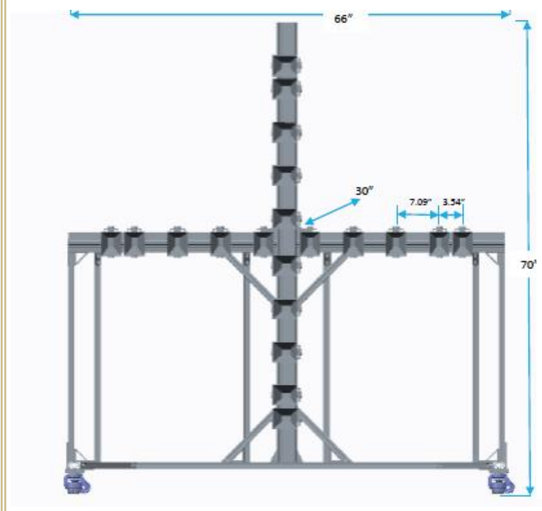
Application:
- Homeland Security - prevention of guns, knives, or dangerous objects from entering public facilities

Project Goals

Improve upon aspects of design from previous year's project:
- Lower weight
- Improve stability
- Add adjustability and flexibility to antenna horns
- Easy to access and set up

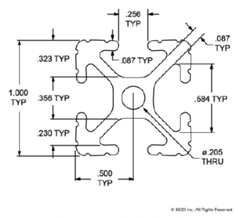
Frame Design

Extruded Aluminum (80/20) was preferred so the structure could be modified as needed.

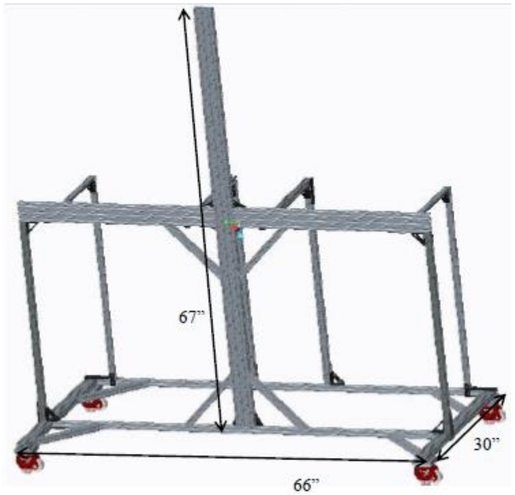


Advantages:
- The structure is light and modular
- Gives maximum flexibility for adaptation
- Adds strength and stability
- Reduces error in readings

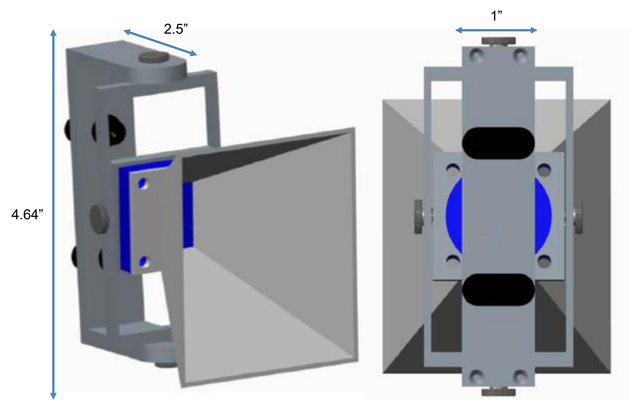
Features:
- Weight of frame ~55lbs
- Rubber wheels
- Leveling casters



10-Series Extruded Aluminum

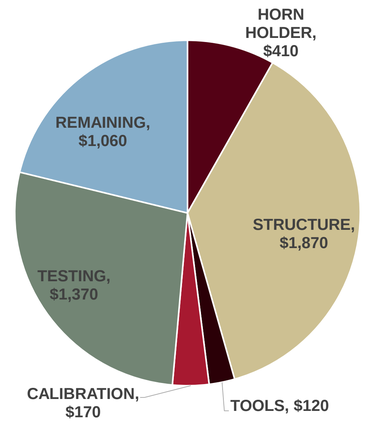


Horn Holder Design



Advantages/Features:
- Antennas have 3 degrees of freedom.
- Locking mechanism implemented for each degree of freedom with thumb srews
- Screw distance compatible with 80/20 rail spacing (3")
- Ample space for movement freedom
- Keeps assembly stationary
- Easy to machine

Budget Review



Total Budget: $5000

Future purchases:
- Secure case for electrical components
- Storage for testing equipment
- RF Panel setup
- Replacing faulty equipment
- Renting testing equipment