

Simulating Ad Hoc Noise Radar Networks for Locating Targets

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Goal: To simulate a radar location system that is difficult to detect and has minimal setup requirements.

Ad Hoc:

Created for and existing for one specific purpose.

Allows for a simple setup.

Noise Signal:

A random signal with no discernable pattern.

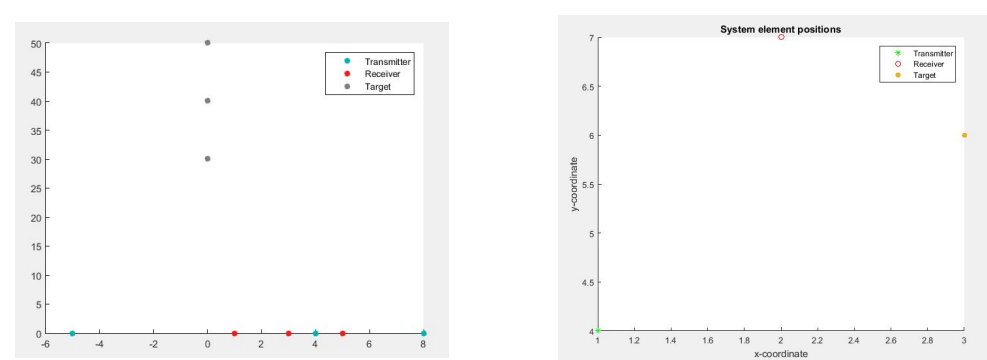
Difficult to detect.

Radar Network:

A group of connected receivers/transmitters

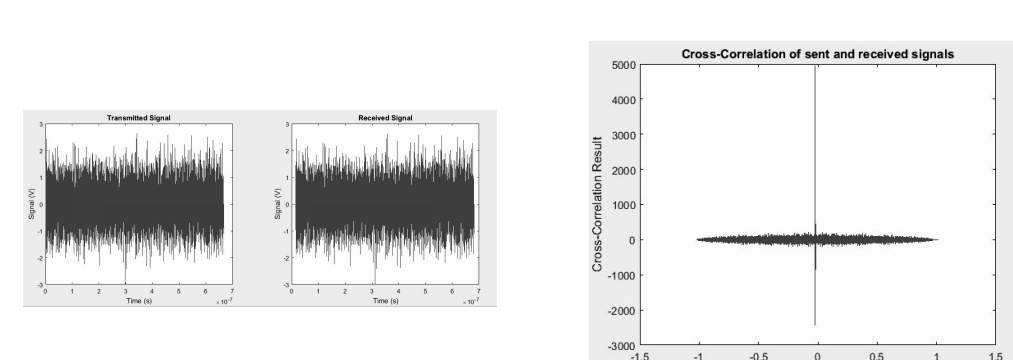
Provides more information.

I. Setting up a Network



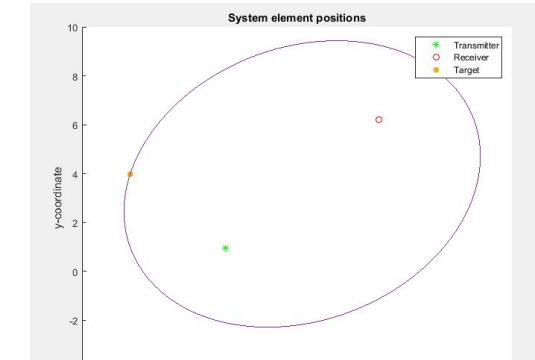
- Placed targets, transmitters, and receivers on X-Y coordinates in MATLAB
- Chose Single-Input, Multiple-Output model

II. Determining Distance



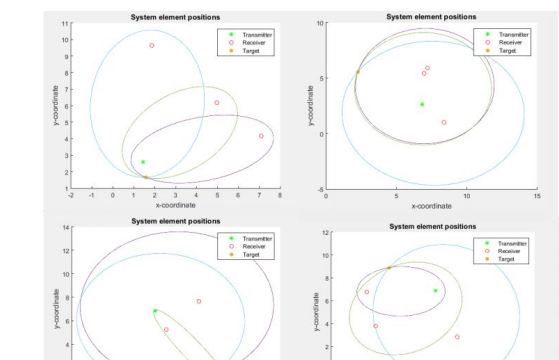
- Compared received and transmitted signals using MATLAB's cross-correlation function
- Location of highest correlation gives distance

III. Plotting Ranges



- Known as a result of II: the sum of transmitter-target and target-receiver distances
- This defines an ellipse of possible target locations

IV. Determining Location



- Three receivers at randomly generated locations each provide a target location ellipse
- Their intersection point is the target location

Results and Conclusions

- Simulated determining target location for a multiple-input single-output ad hoc noise radar system
- This is a mathematically feasible way to execute a radar system that is both difficult to detect and requires minimal setup.

Future Work

- Modify model to support single-input multiple-output, then ultimately multiple-input multiple-output
- Run experiments using a noise signal generator and collect data to identify areas of potential improvement for the simulation



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