

Sensor Array Signal Processing – 2016W

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List of exercises – 1

1. Explain with your own words the types of information a signal impinging on a sensor array may convey.
2. Which types of sensor arrays that are often available to designers? What are their pros and cons?
3. Explain the concepts of near and far fields.
4. Consider a uniform circular array (UCA) with N sensor elements and radius r .
 - a) Derive the expression of the steering vector for a signal impinging on the UCA with azimuth angle ϕ and elevation angle θ .
 - b) Write a Matlab code to generate sensor data for the UCA considering spatially white Gaussian noise with zero mean and variance σ^2 . Suggestion: please check the slides and the example for a ULA.
5. Consider a uniform planar array (UPA) with $N=N_1N_2$ sensor elements.
 - a) Derive the expression of the steering vector for a signal impinging on the UCA with azimuth angle ϕ and elevation angle θ .
 - b) Write a Matlab code to generate sensor data for the UPA considering spatially white Gaussian noise with zero mean and variance σ^2 . Suggestion: please check the slides and the example for a ULA.