ECE 535 RADAR SYSTEMS

TAUGHT BY

- prof. K R Sarma

COURSE TOPICS

- introduction to radar
- history of radar
- measurement of range & velocity
- unambiguous range
- range resolution
- velocity resolution and their dependence on radar signal
- description of radar system and its subsystems.
- radar range equation and its dependence on systems parameters.
- radar signal design
- need for large time bandwidth product

4.8.2020

2018

2 MAY

Week 22

149-216

Tuesday 29

- uncertainity principle
- woodward's ambiguity function of radar signal, its properties and importance
- Some optimum radar signals
  - pulse train
  - chirp PN sequence
  - barker
  - frank
- their ambiguity fonctions
- target characterization
- radar cross-section
- computation of RCS
- measurement of RCS
- radar target models
  - fluctuating targets
  - slowly fluctuating targets

JUNE

JULY

AUGUST

JUN 2018

S	M	T	W	T	F	S
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3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

MAY 2018

30 Wednesday

- delay and doppler spread targets

9

- Swerling models

10

- noise and clutter, their characterization as random processes

11

12

- radar detection and estimation theory

1

- simple binary detection optimum reciever

2

- matched filter

3

- probability of detection and false alarm.

4

- neymen pearson criterion

5

- coherent detection vs. non-coherent detection.

6

- optimum non-coherent detector - Io detector

7

- multiple observations

- coherent and non-coherent integration

- PD and PF for swerling models for coherent and non-coherent integration.

- optimum reciever for delay and doppler estimation.

- matched filter range
- doppler signal processing
- radar system components
- antennas
- chararacterization
- types of antennas used in radar
- array antennas
- apertore antennas
- reflector antennas
- phased arrays and electronic beam forming and scanning
- multimode radar
- low noise recievers
- low noise amplifiers
- mixers - resistive & parametric
- manley rowe relationships

4.8.2020
5

JUNE 2018

01 Friday

Week 22
152-213

- noise in mixers
- microwave - high power sources for radar
- klystron magnetron
- TWT principles of their operation
- target position estimation
- beamscanning
- monopulse
- target tracking
  - moving target indicator
  - $\alpha\beta$ trackers
- Kalman filter phased array radar
  - description
  - beam formation
  - steering techniques

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02 Saturday

- synthetic array radar
  - principle of SAR
  - azimuth resolution in side looking SAR
  - signal processing of SAR
- radar imaging
- other variants of SAR
  - polarimetric SAR
  - interferometric SAR
- diverse applications of radar ~~technologies~~ techniques.

TEXT BOOKS

1. principles of modern radar ; skolnik. (1981)
2. radar system analysis & design ; mahafza.
3. radar principles ; peebles.
4. radar signals ; levanov.
5. detection estimation & modulation ; trees.

03 Sunday