INTRODUCTION TO RADAR SYSTEMS

UNIT-IV

Lecture-8

Delay-line Integrators

- In some radar applications, the integration of radar pulses must be performed automatically without the benefit of an operator viewing a CRT.
- There are manypossible electronic integration techniques for this purpose. Integration is usually performed in the video (postdetection) portion of the radar receiver rather than in the IF (predetection).

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- Postdetection integration is not as efficient as ideal predetection integration, but it is often easier to implement.
- Postdetection integration techniques may be classed as either analog or digital, depending upon whether the integrator operates on continuous or on quantized signals.

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- Most digital integration techniques are similar in principle to analog techniques except that they quantize the analog signal voltages in time and amplitude and perform the necessary operations digitally.
- Digital integrators use conventional digital circuitry such as flip-flops, shift registers, magnetic-core memories, and magnetic-drum memories.

Binary Integration

- One method of processing the output of the radar receiver, based on digital-detection techniques, consists in looking for a cluster of pulses corresponding to the number n expected from a target on each scan.
- If m of these pulses exceed a predetermined minimum value, a target is declared to be present.
- This method of digital detection is basically an integration and compares favorably with other integration techniques.

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- The radar video is passed through a threshold detector (or bottom clipper).
- Only those signals whose amplitude exceeds the preset threshold are allowed to pass.
- The output of the first threshold detector is sampled at regular intervals of time by the quantizer.
- The quantizer generates a standard pulse if the video waveform exceeds the threshold, and nothing if it does not.

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- Examples of analog integrators include RLC bandpass resonant circuits, RC low-pass filters, magnetic drums, electrostatic storage tubes, and recirculating delay lines.
- An important digital technique known as binary integration is described in the next section.

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- These are designated by 1 or 0, respectively. A suitable quantizer sampling rate might correspond to one sample per range resolution interval.
- The analog video voltage output from the radar receiver is quantized in both range and amplitude by the binary integrator.
- The amplitude is quantized in but two levels (0 and 1); hence the name binary.
- More quantizing levels could be used if desired.