

Continuous Wave Radar for Speed Measurement of Target using Doppler Effect

Dr. Md. Selim Hossain and Md. Mamunur Rashid

Rajshahi University of Engineering & Technology
Department of Electrical & Electronic Engineering
Rajshahi-6204, Bangladesh

E-mail: prof.selim@eee.ruet.ac.bd website: www.ruet.ac.bd

In Continuous Wave (CW) Radar, the transmitter transmits continuously. Since the maximum detection range of a radar system is a function of average transmitter power, CW systems can achieve considerable maximum ranges without the high peak-power levels required in pulse radar. CW radar systems are generally simpler, less costly, and more compact than pulsed radar systems. This type of radar is extensively used by police to enforce traffic speed limits, and can also be used by sportsmen to measure the speed of a baseball thrown by a pitcher.

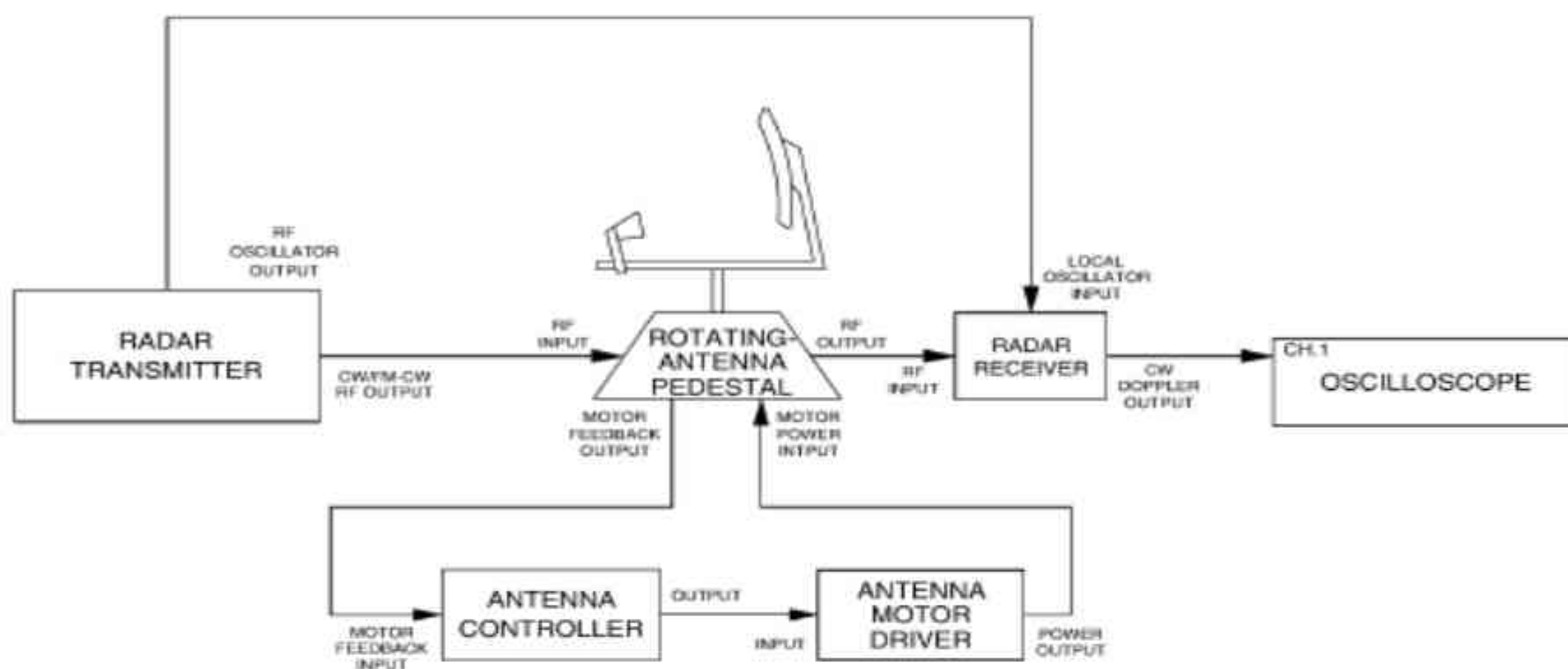


Figure: Block Diagram of the CW Radar

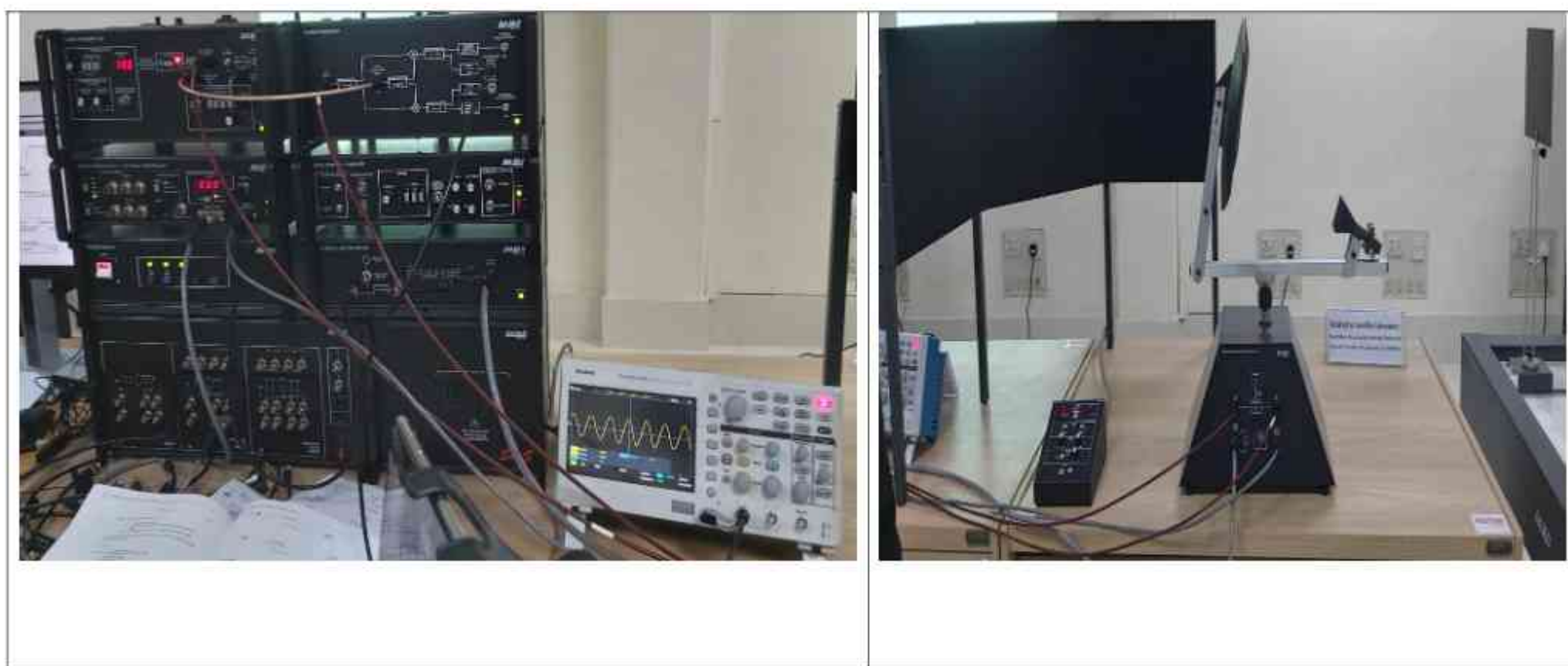
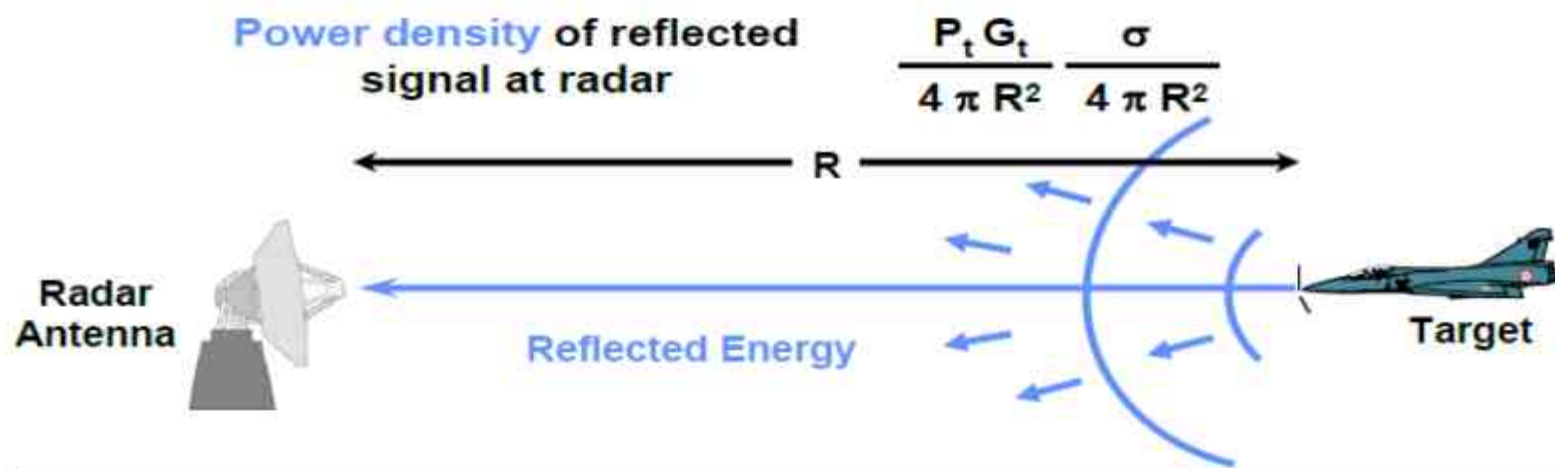


Figure: Experimental Setup for CW Radar



The received power = the power density at the radar times the area of the receiving antenna

Power of reflected signal from target and received by radar

$$P_r = \frac{P_t G_t}{4 \pi R^2} \frac{\sigma A_e}{4 \pi R^2}$$

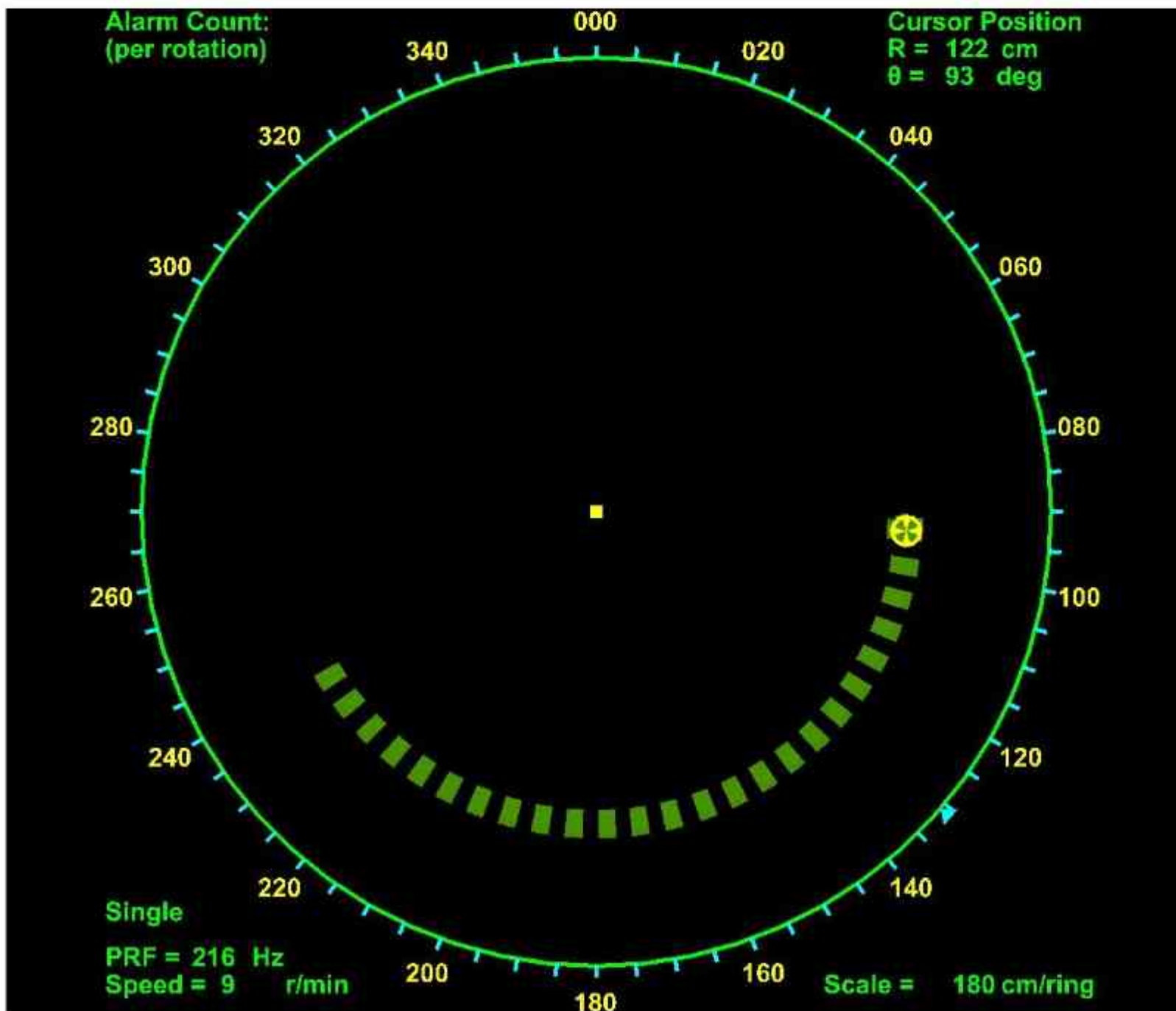
P_r = power received
 A_e = effective area of receiving antenna



Rajshahi University of Engineering & Technology
 Department of Electrical & Electronic Engineering

Rajshahi-6204, Bangladesh

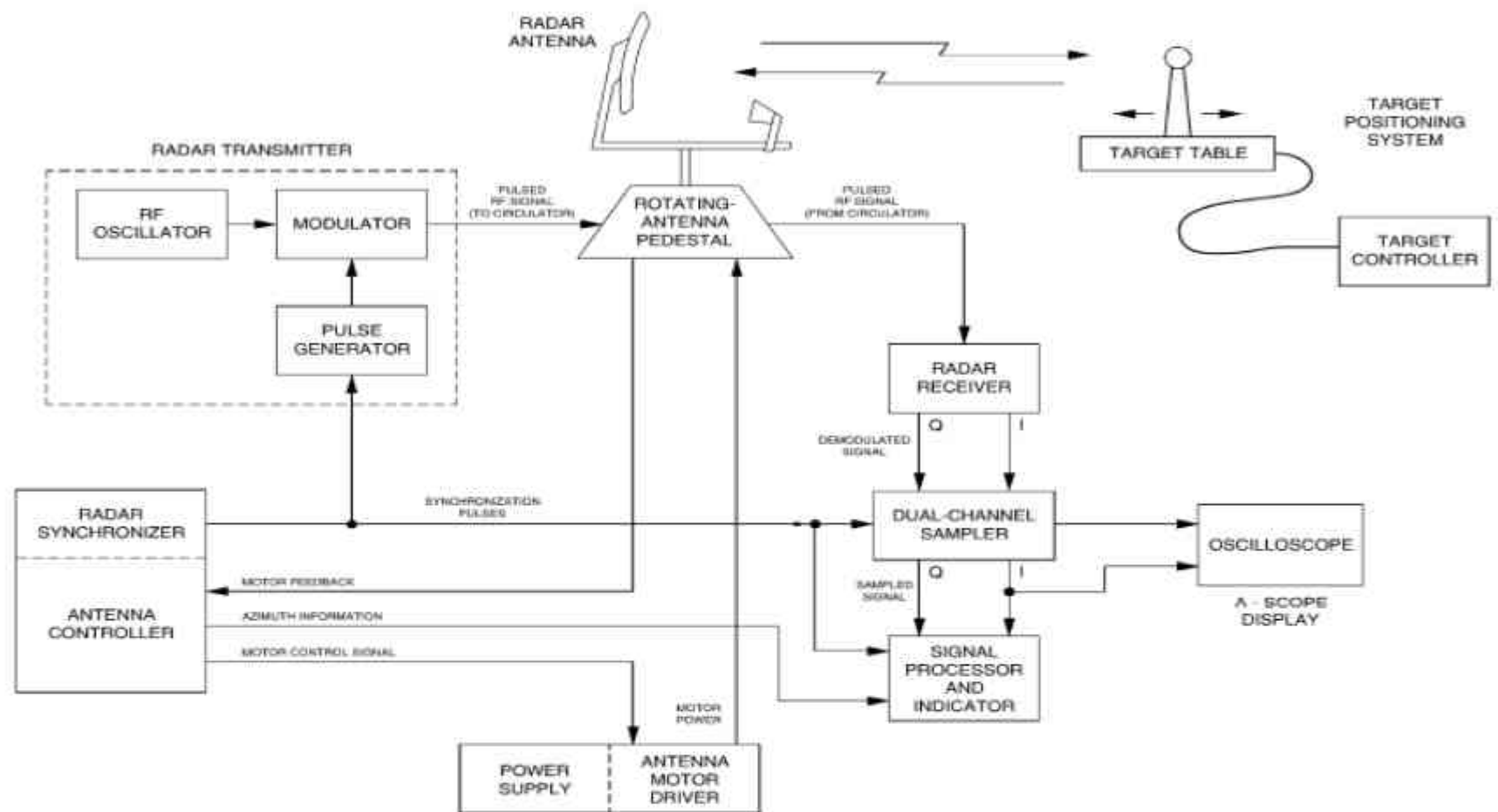
E-mail: prof.selim@eee.ruet.ac.bd website: www.ruet.ac.bd



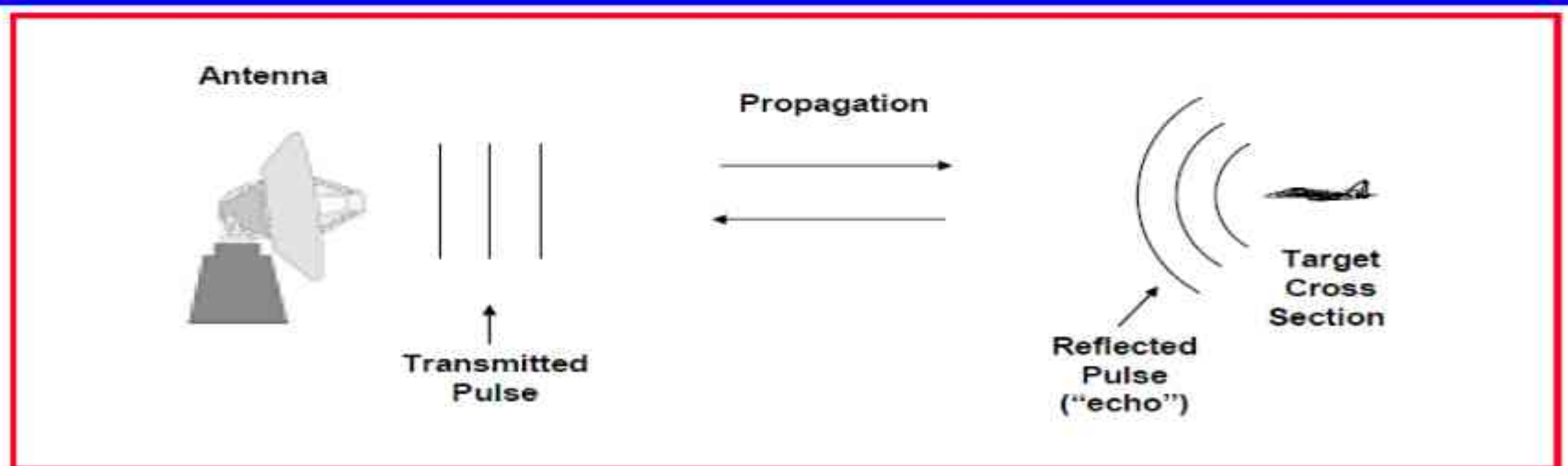
Analogue Pulse Radar System to detect the Range of a Drone

Purpose of radar: The purpose of radar is to detect far-away objects, or **targets**. A target is any object, whether of interest or not, that reflects energy back to the radar receiver as an echo. The radar will detect a target only if the echo signal from the target is strong enough to exceed a detection threshold. When this happens, an **alarm** is said to occur.

An analog radar system with MTI processing can be considered to consist of three parts: (1) a pulsed radar that uses analog circuitry for transmission and reception of the radar signal, (2) an analog MTI signal processor, and (3) a display processor that generates the PPI display. Together, these are referred to in the Radar Training System as the Analog Pulse Radar. The MTI processor contains circuits that process the signal information in analog form.



RADAR Radio Detection And Ranging



Radar observables:

- Target range
- Target angles (azimuth & elevation)
- Target size (radar cross section)
- Target speed (Doppler)
- Target features (imaging)

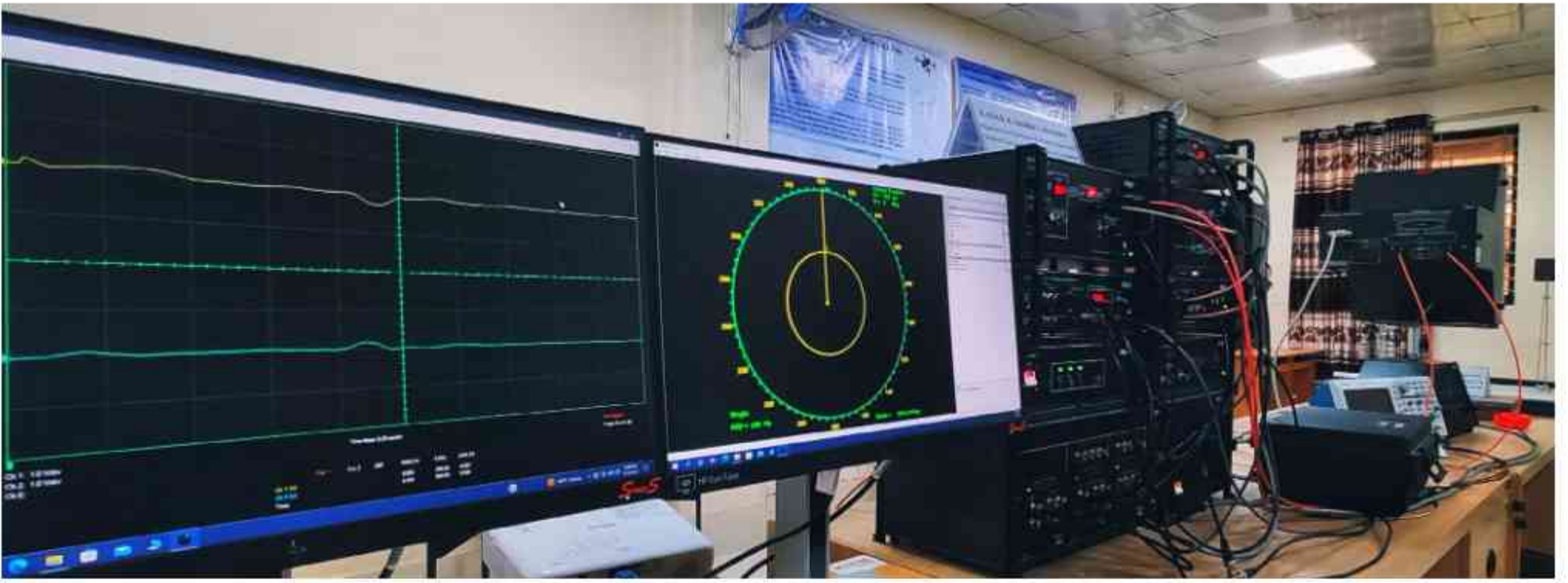
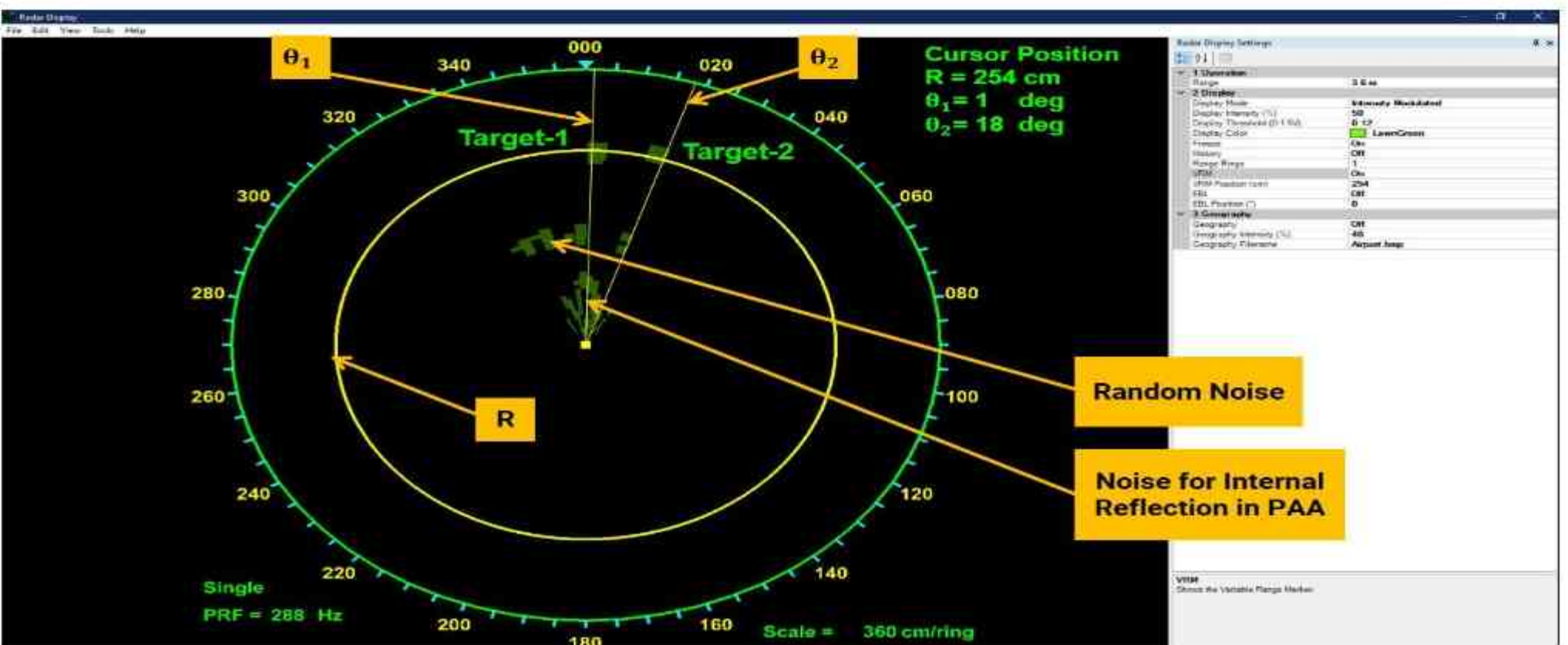
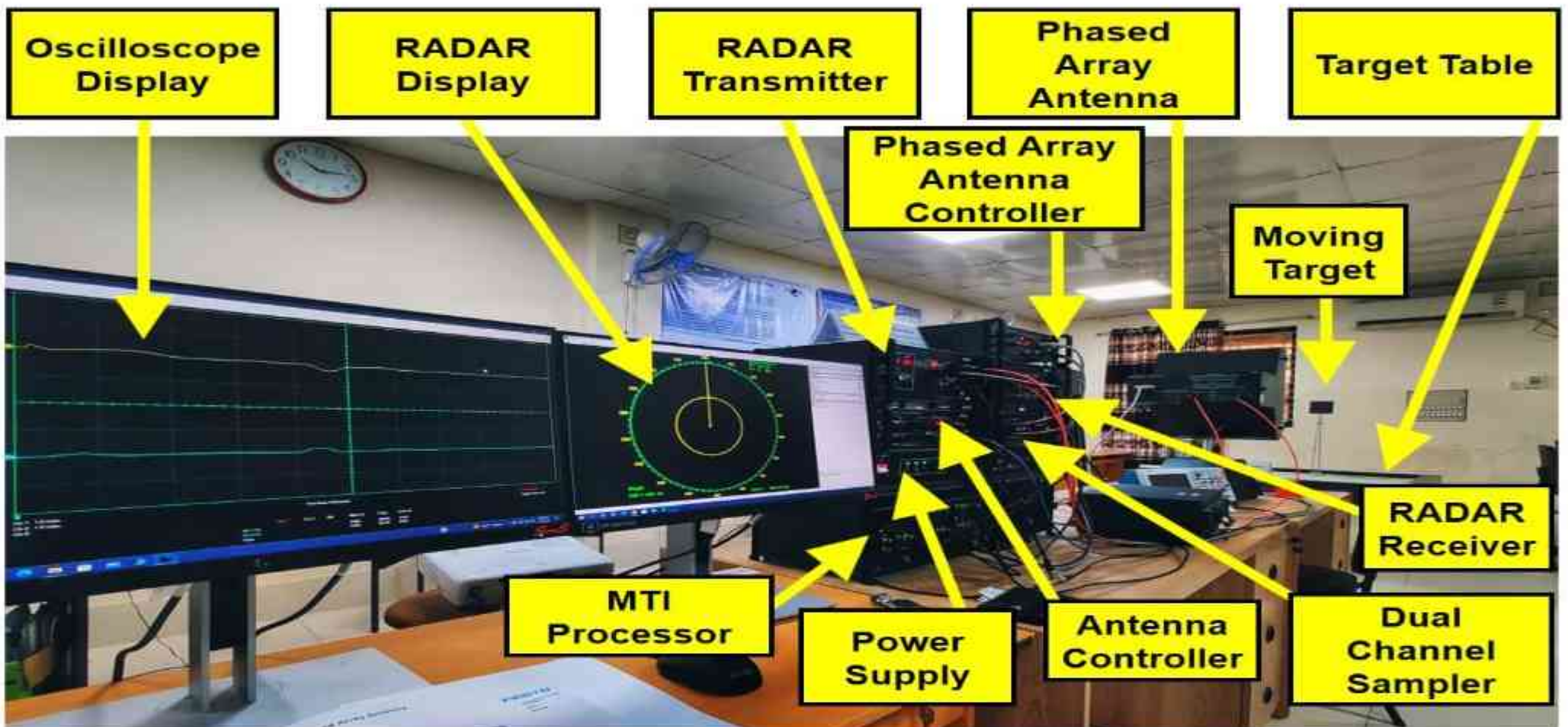


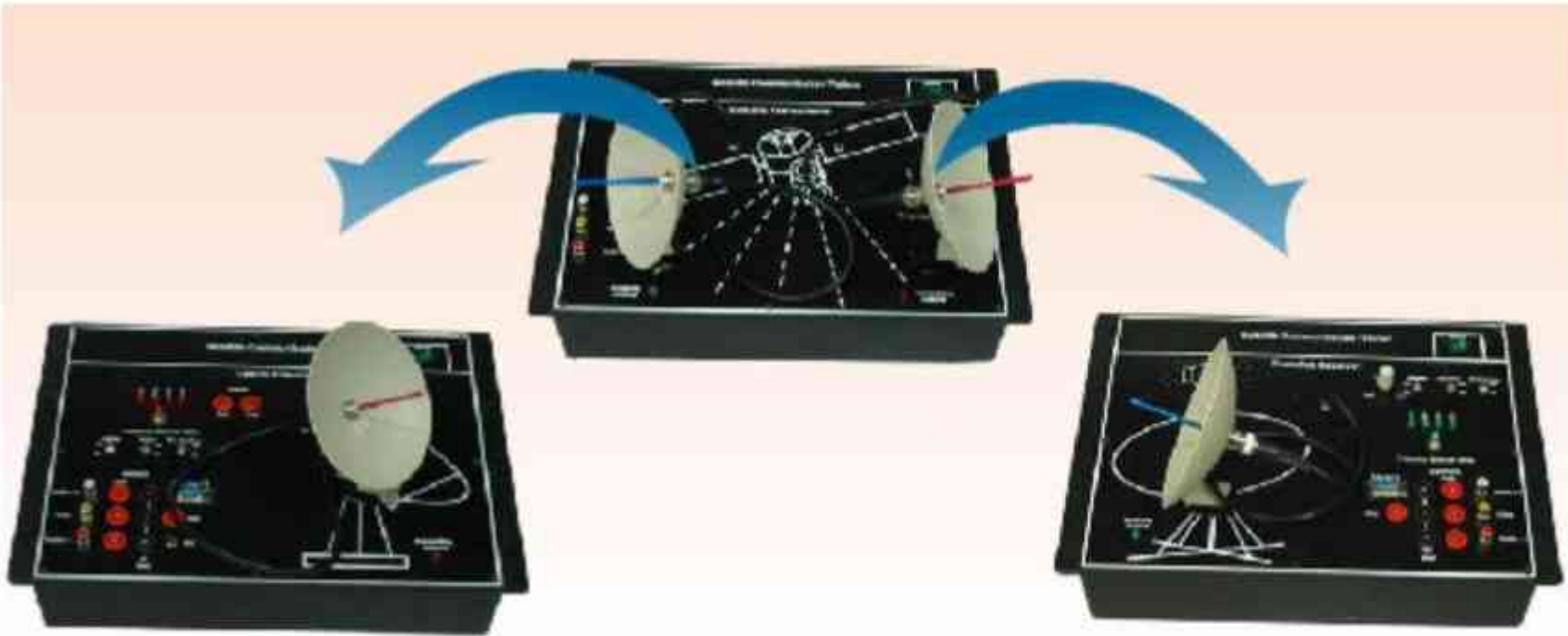
Fig: Experimental Setup for Phased Array Radar



Satellite Communication Lab@ RUET

Rajshahi University of Engineering & Technology
Department of Electrical & Electronic Engineering
Rajshahi-6204, Bangladesh

E-mail: prof.selim@eee.ruet.ac.bd website: www.ruet.ac.bd



Experiments

Experiment 1

To establish a direct communication link between Uplink Transmitter and Down link Receiver using tone signal.

Experiment 2

To setup an Active satellite link and demonstrate Link Fail operations.

Experiment 3

To establish an AUDIO-VIDEO satellite link between Transmitter and Receiver.

Experiment 4

To communicate VOICE signal through satellite link.

Experiment 5

To change different combinations of uplink and downlink frequencies and to check the communication link.

Experiment 6

To transmit and receive three separate signals (Audio, Video, Tone) simultaneously through satellite link.

Experiment 7

To transmit and receive function generator waveforms through satellite link.

Experiment 8

To transmit and receive PC data through satellite link.



Uplink, Downlink and Satellite Transponder.

