

GPR Ground Penetrating RADAR



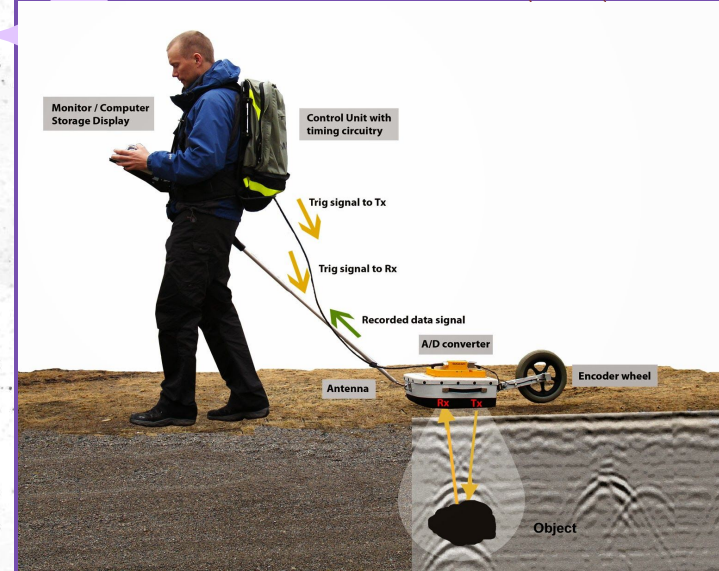
॥ त्वं ज्ञानमयो विज्ञानमयोऽसि ॥

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B21CI041



What is GPR?

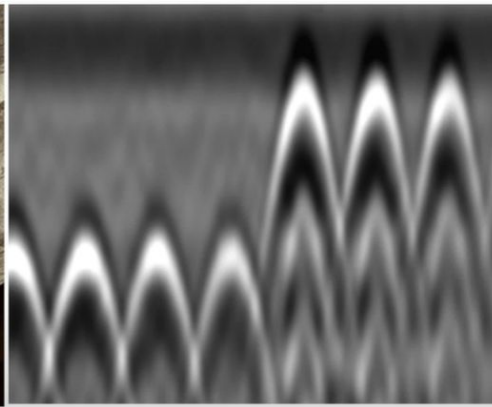
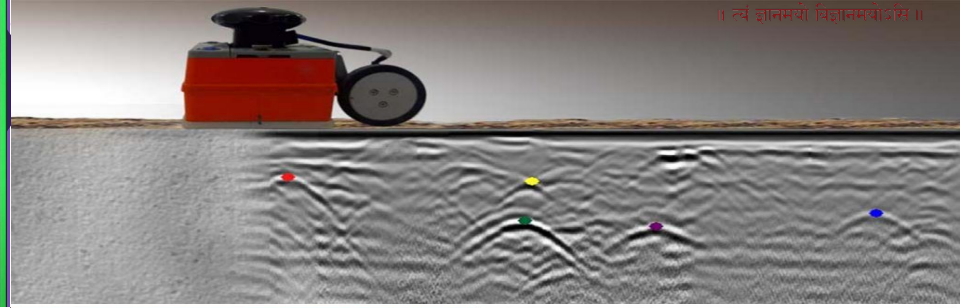
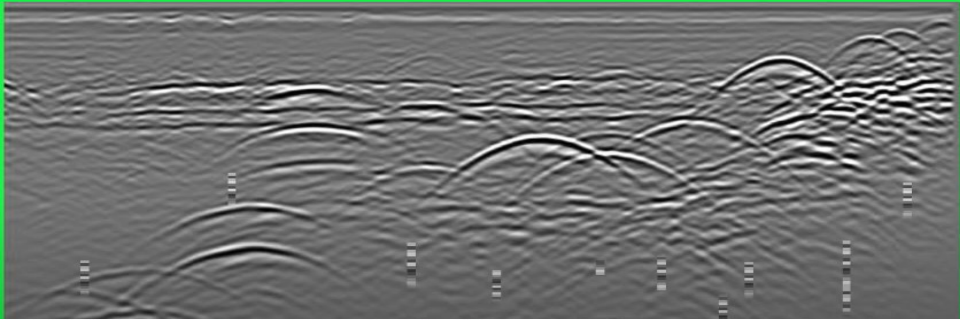
- Ground Penetrating RADAR (Radio Detection and Ranging)
- Emits high frequency electromagnetic reflection
- Waves emitted at 2.7 GHz, in microwave range (concrete inspection)
- Very low power of emission
- Ultra Wide Band (UWB): Uses a wide range of frequencies.



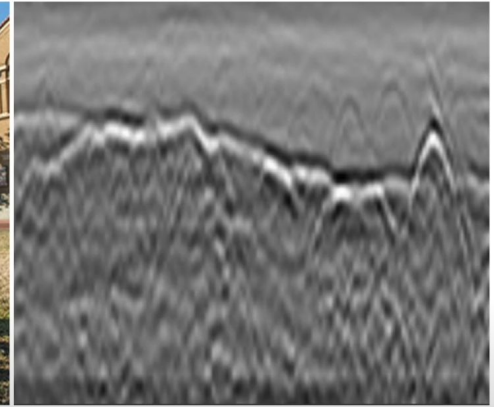
Frequency & Interference



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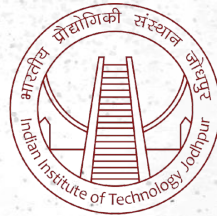


20" in concrete: 2.7 GHz



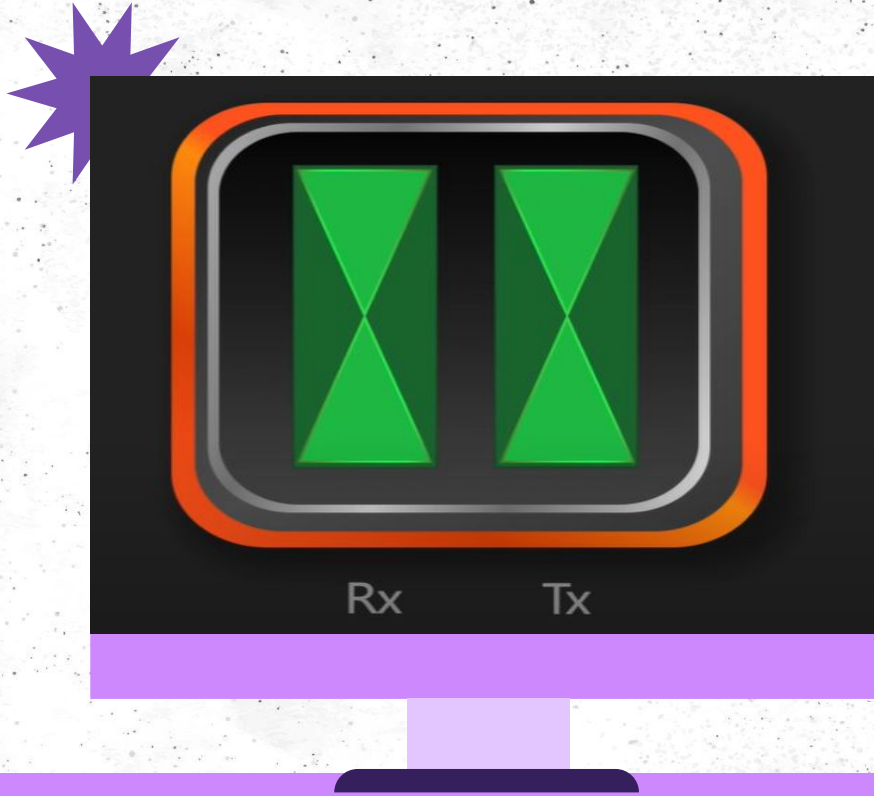
8' in ground: 400 MHz

RADAR Shielding



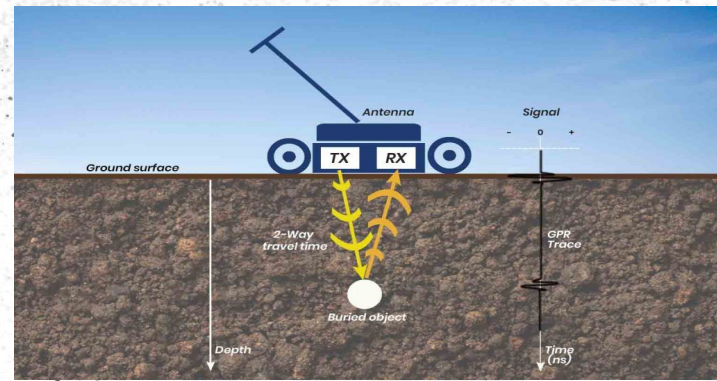
॥ त्वं ज्ञानमयो विज्ञानमयोऽसि ॥

- Antennas are Heavily Shielded
- Surrounded by metal
- Insulated with a carbon foam



How does GPR work?

- 2- travel time



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Dielectric Constant



॥ त्वं ज्ञानमयो विद्वानमयोऽसि ॥

Air

Dielectric 1

Water

Dielectric 81

- Radar travels at different velocities depending on the material and it is traveling through
- Every material falls between **air** and **water** (1–81).
- Metal has infinite (∞)

Calculating dielectric constant



॥ त्वं ज्ञानमयो विद्वानमयोऽसि ॥

1. Published reference age of concrete



2. Migration (Hyperbola fitting)



Low Dielectric
High Velocity
Wide Hyperbola

Aged Concrete

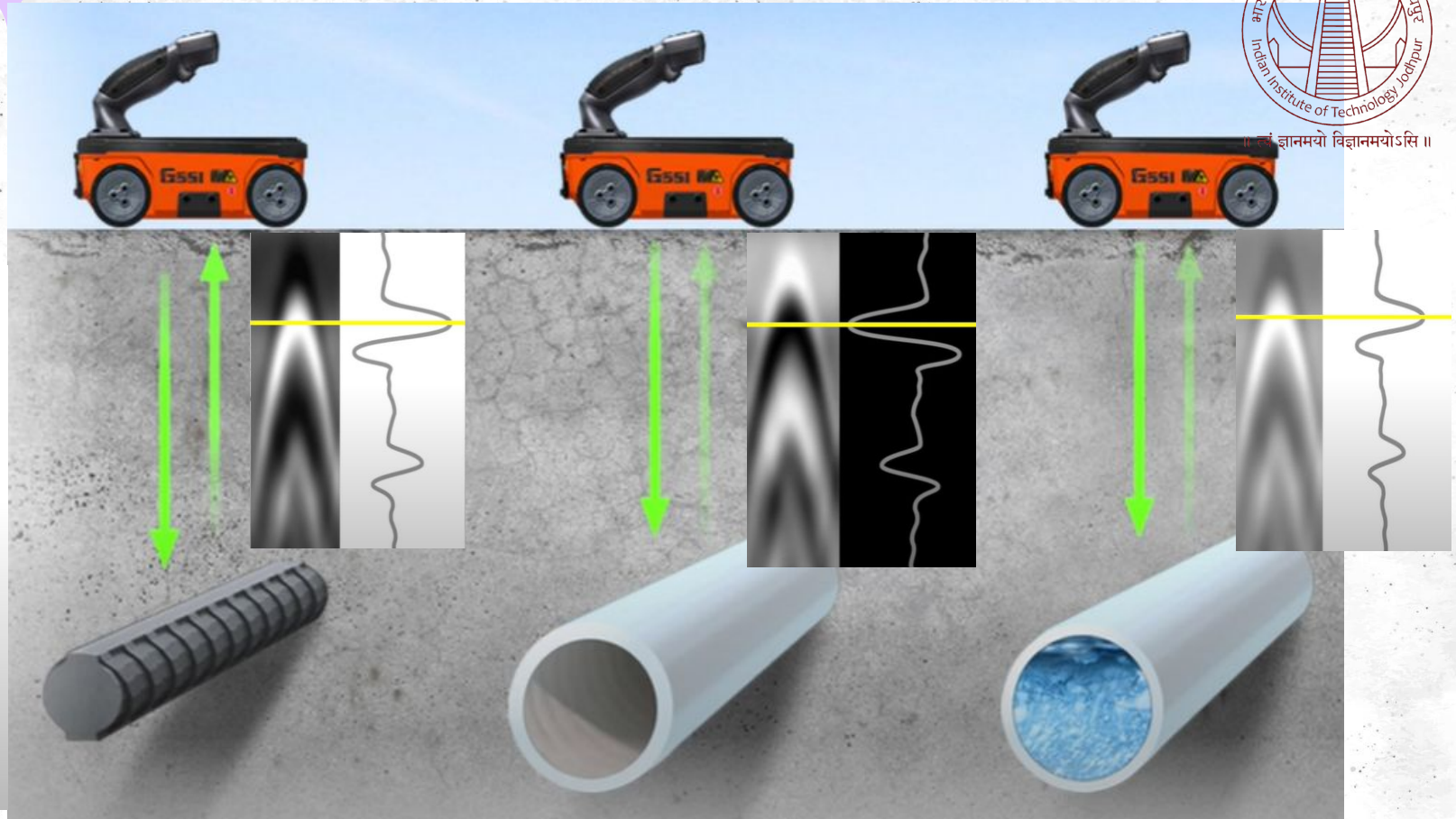


High Dielectric
Low Velocity
Narrow Hyperbola

Green Concrete

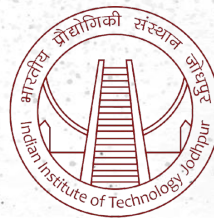


॥ सर्व ज्ञानमयो विद्वानममोऽसि ॥



(-) (+)

oscilloscope



॥ त्वं ज्ञानमयो विज्ञानमयोऽसि ॥

Thank you

