# Principles of Remote Sensing

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***Abstract - Remote sensing provides us information without being in physically contact with the object and being in contact with on site observation. It is a sub-field of geographical sciences. Presently remote sensing is used for aerial technologies for detection and classifying objects on earth both on surface and ocean through propagated signals. It has two parts active and passive remote sensing.***

**Keyword-EMR reflection, transmission and vegetation.**

## I. INTRODUCTION

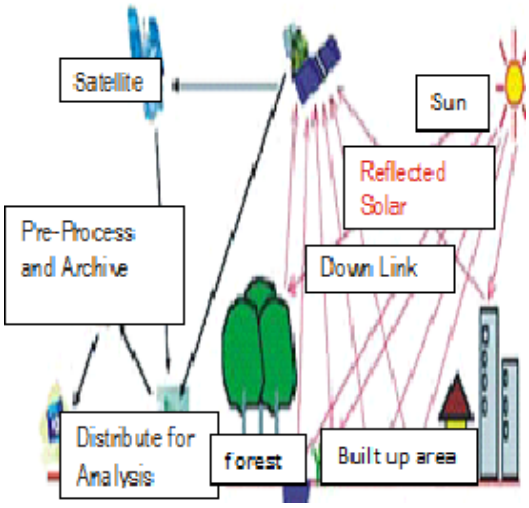
In scientific terms remote sensing is used for making interferences about material object from measurements, made from a distance, without being in physically contact with the object. This technique is used for any force field like-gravitational, magnetic, electromagnetic, covering various disciplines [1]. Presently, remote sensing is used for determining the earth features detecting characteristic of electromagnetic radiations emitted by the earth surface. Every object emits electromagnetic radiation based upon its physical property. Objects emit radiations based on two main characteristics like temperature and emissivity [2]. Basically, there are three components of remote sensing- the sensors (from a platform), the signals (from object), the sensing (get knowledge about the object after analyzing the signals). When the objects and signals interact with each other we get information about it, when signals and transmission channels interact we get reduced information [4,7].

## II. Principles of remote sensing

Detection and decimation of objects surfaces means recording and detecting decimation and decimation of objects of surfaces and recording the radiant energy reflected by the objects surfaces. Different objects release different amount of energy based upon the band of spectrum of the electromagnetic spectrum incident upon it. It is dependent on the material, surface roughness of the object, intensity, wavelength of the radiant energy, intensity. It is multidisciplinary science which work as a combination of multiple sciences. All the sciences are integrated and combined into one complete system known as Remote Sensing System [1]. There are many stages in the process of Remote Sensing System and these all play a very important part for the successful operation [2].

## III. PRINCIPLE STAGES IN REMOTE SENSING

The energy is transmitted from the source to the surface of earth, as well as absorption and scattering. The transmission of energy from the surface to the remote sensor. Interaction of EMR of with the earth's surface: reflection and emission sensor data output.




Emit

We observe that when the temperature is above the absolute zero, the objects emit electromagnetic c wave atomic and molecular oscillation. The amount of emission of radiations increase with the absolute body temperature and the shorter wavelengths. The major source of energy is sun. The emission and illumination and radiation allowing reflected light to be captured by the conventional sources such as cameras and films. The concept behind electromagnetic radiation is clear. Everything in nature has its unique distribution of reflected, emitted and absorbed radiations. The spectral characteristics if indigenously exploited can be used to c= one object from another and obtain shape, size, physical and chemical properties of the objects**.**

## IV. TYPES OF REMOTE SENSING

Remote sensing can be either of two types active or passive. In active sensing the object is the own source of energy e.g., RADAR whether in passive sensing it depends on the other external sources for the source of illumination e.g., SUN.

## V. FUNCTION OF REMOTE SENSING

We must know what EMR or electromagnetic radiation is.EMR is a dynamic for radiated energy and propagates as a wave motion and is equal to the velocity of light. The sun is the basic and main source of energy. The radiations of sun cover all the regions as ultraviolet to infrared, visible and radio waves of all frequencies. All objects of the earth's surface emit EMR. The wavelength of the EMR depends upon the temperature and other properties of the objects. It is possible to produce the EMR of specific wavelength by the sensors to change the object. The is active remote sensing while the other two EMR from sun and the self radiance from the object is known as passive remote sensing.

## VI. EFFECT OF ELECTROMAGNETICS RADIATION AND ELECTROMAGNETIC SPECTRUM IN REMOTE SENSING

EMR is a dynamic form which propagates as wave motion with the velocity of 3 X 1010 cm/sec. The parameters characterizing the wave motion are wavelength (λ), frequency (ν) and velocity (c). The relation is

**C=** $\lambda \nu$

According to the wave theory of electromagnetism, electromagnetic energy is travelling in harmonic sinusoidal manner and it travels with the velocity of light. Particle theory describes how the electromagnetic energy interacts with the matter. The theory describes the electromagnetic radiations composed of discrete unit that is photon/quanta.

Q=h c

Where Q is the energy of quantum.

h is Plank's constant.

The interaction of EMR with the earth's surface:

When the radiation of the sun incident upon the earth surface is reflected by the earth surface is transmitted or absorbed or emitted by the earth's surface. This experiences change in magnitude, direction, wavelength and polarization. The changes are predicted by remote sensor reflect and get the useful information about the object. The both spatial and spectral information in remotely sensed data. The radiations that are sensed by the sensors are because of the sun and the region of spectrum is reflected by the RADAR sensor is inactive sensor as it has its own source of EMR. The EMR by the earth surface is reflected back and recorded and analyzed. The microwave region can also be monitored with passive sensors**.**

The interaction of all the reflective information. Reflection occurs when the radiation of light is directed on the non transparent surface. The intensity of reflection depends upon the reflective index of the surface, absorption coefficient and the angle of incidence and reflection [7].

Transmission

Transmission of radiation occurs when the radiation is passed through the substance without a significant attenuation. For a thickness or depth of given substance the ability of a medium to transmit the energy is transmittance [6,8]. Three main characteristics of earth's surface are: Vegetation the vegetation's spectral characteristics vary with wavelength. The chlorophyll that is plant pigment strongly absorbs the red and blue radiations and emits the green wavelength. The healthy leaves internal structure acts as diffuse e reflector of near infrared wavelengths. The infrared and middle infrared radiations are absorbed by the water. In the visible regions the reflectance depends upon the reflectance by the water bodies, bottom materials and other suspended materials in the water body. The reflectance of the water bodies increases with the turbidity. Blue and red light absorption increases with the increase in the chlorophyll concentration. There is no spectral response change in the water due to any dissolve salts. Soil reflectance increases with the increase in the wavelength. Other parameters influencing this is moisture content, amount of organic matter, iron oxide, clay, sand, silt, and rough surface of soil. The reflectance decreases with increased moisture in the soil.

## VII. CONCLUSION

Remote sensing developed from the balloon photography to serial photography and now to satellite imaging. The interaction characteristics of radiations with earth and atmosphere in different regions of electromagnetic spectrum are useful for analyzing the characteristics of the atmosphere of the earth. It also has the capability of providing the large amount of data. It will take more than years to manually handle the remote sensing data. Without the remote sensing technique there would be no use of the techniques based on it. Remote Sensing techniques provide voluminous data[9,10].

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