**DAILY ASSESSMENT FORMAT**

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| **Course:** | **Online Course through IIRS-ISRO E-CLASS** | **USN:** | **4AL16EC058** |
| **Topic:** | **Concepts of Satellite Photogrammetry** | **Semester & Section:** | **8th sem & ‘B’ section** |
| **Github Repository:** |  |  |  |

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| **Image of session** |
| **Report –**  In my first session today I have studied about –Concepts of Satellite Photogrammetry**The use of 3D surface imaging technology is becoming increasingly common in craniofacial clinics and research centers. Due to fast capture speeds and ease of use, 3D digital stereophotogrammetry is quickly becoming the preferred facial surface imaging modality. These systems can serve as an unparalleled tool for craniofacial surgeons, proving an objective digital archive of the patient's face without exposure to radiation. Acquiring consistent high-quality 3D facial captures requires planning and knowledge of the limitations of these devices. Currently, there are few resources available to help new users of this technology with the challenges they will inevitably confront. To address this deficit, this report will highlight a number of common issues that can interfere with the 3D capture process and offer practical solutions to optimize image quality.**  **What is remote sensing?**  For remote sensing we may give the following generalized definition: "Remote sensing is the science (and to some extent, art) of acquiring information about the Earth's surface without actually being in contact with it. This is done by sensing and recording reflected or emitted energy and processing, analyzing, and applying that information." The instrument used to measure the electromagnetic radiation reflected/emitted by the target under study are usually referred to as remote sensors. Henceforth, we shall just refer to them as sensors.  Sensors, which sense natural radiations, either emitted or reflected from the earth, are called passive sensors. Sensors which carry electromagnetic radiation of a specific wavelength or band of wavelengths to illuminate the earth’s surface are called active sensors. The major parameters of a sensing system which can be considered as indicators of a quality of data and which have bearing on optimum utilizing for specific end use include. 27 Remote Sensing, Satellite Photogrammetry & data processing: an overview Spatial resolutionthe capability of the sensor to discriminate the smallest object on the ground of different sizes; usually specified in terms of linear dimension. As a general rule, higher the resolution, smaller the object that can be identified. Spectral resolutionthe spectral bandwidth with which the data is collected. Radiometric resolutio nthe capability of the sensor to discriminate two targets based on its reflectance/emittance difference; it is measured in terms of the smallest reflectance/emittance that can be detected. Higher the radiometric resolution, smaller the radiance differences that can be detected between two targets.  Temporal re s o lu tio n the capability to view the same target, under similar conditions, at regular intervals. These four resolutions are the most basic requirements of any sensor system. There are no unique acceptable values for them. It depends on specific applications. For example, to study the motion of clouds (cloud motion vector), spatial resolution of about a km is acceptable, while the frequency of observation (temporal resolution), should be 30m or better. This is because cloud formation characteristics are spatially large, but they are subject to dynamic mobility. On the other hand, for agricultural studies, a few tens of meter spatial resolution is desirable with a few days temporal resolution. This is because, the land use changes in small spatial units, while change due to growth occurs gradually over a few days. There are other aspects like dynamic range (the minimum to maximum radiance that can be faithfully measured), radiometric accuracy, 28 Chapter 2 geometric fidelity, etc., which should be borne in mind while designing, realizing and utilizing a sensor. From Beginning to end of remote sensing The following textual section are adopted from the source which is mentioned corresponding to each figure after concerning different referred documents . In much of remote sensing, the process involves an interaction between incident radiation and the targets of interest (Figure 2.1). This is exemplified by the use of imaging systems where the following seven elements are involved. Note, however that remote sensing also involves the sensing of emitted energy and the use of non-imaging sensors  1. Energy Source or Illumination (A) - the first requirement for remote sensing is to have an energy source which illuminates or provides electromagnetic energy to the target of interest.  2. Radiation and the Atmosphere (B) - as the energy travels from its source to the target, it will come in contact with and interact with the atmosphere it passes through. This interaction may take place a second time as the energy travels from the target to the sensor.  3. Interaction with the Target (C) - once the energy makes its way to the target through the atmosphere, it interacts with the target depending on the properties of both the target and the radiation.  4. Recording of Energy by the Sensor (D) - after the energy has been scattered by, or emitted from the target, we require a sensor (remote - not in contact with the target) to collect and record the electromagnetic radiation.  5. Transmission, Reception, and Processing (E) - the energy recorded by the sensor has to be transmitted, often in electronic form, to a receiving and processing station where the data are processed into an image (hardcopy and/or digital).  6. Interpretation and Analysis (F) - the processed image is interpreted, visually and/or digitally or electronically, to extract information about the target which was illuminated.  7. Application (G) - the final element of the remote sensing process is achieved when we apply the information we have been able to extract from the imagery about the target in order to better understand it, reveal some new information, or 30 Chapter 2 assist in solving a particular problem.  These seven elements comprise the remote sensing process from beginning to end. We will be covering all of these in sequential order throughout this chapter of thesis including basics of analytical photogrammetric model, building upon the information learned as we go. Indian space effort had its modest beginnings in 1962 with the establishment of a rocket launching station at a place in the southern part of India through which the geomagnetic equator passes.  **Satellites & Sensors**  The word ‘satellite’ originally came from a French word, which means a guard or attendant. Johannes Kepler (1571-1630) gave a new meaning to word. While studying the planet Jupiter, Kepler discovered several objects moving around Jupiter, which Kepler called satellites of Jupiter- maybe he thought of them as ‘guardians’ of Jupiter. Astronomers use the term ‘satellite’ to denote objects moving around a planet. Thus, moon is the natural satellite of earth. With the launch of Sputnik in 1957, we have artificial satellites around the earth. In general, we can talk of satellites as those moving around the gravitational force of a central mass. We learned that remote sensing instruments can be placed on a variety of platforms to view and image targets. Although ground-based and aircraft platforms may be used, satellites provide a great deal of the remote sensing imagery commonly used today. Satellites have several unique characteristics which make them particularly useful for remote sensing of the Earth’s surface. We will cover different terminologies for earth orbiting satellites from different platforms.  Orbit selection can vary in terms of altitude (their height above the Earth's surface) and their orientation and rotation relative to the Earth. Satellites at very high altitudes, which view the same portion of the Earth's surface at all times have geostationary orbits shown in Figure 2.4. These geostationary satellites, at altitudes of approximately 36,000 kilometers, revolve at speeds which match the rotation of the Earth so they seem stationary, relative to the Earth's surface. This allows the satellites to observe and collect information continuously over specific areas. Weather and communications satellites commonly have these types of orbits. Due to their high altitude, some geostationary weather satellites can monitor weather and cloud patterns covering an entire hemisphere of the Earth. Many remote sensing platforms are designed to follow an orbit (basically northsouth) which, in conjunction with the Earth's rotation (west-east), allows them to cover most of the Earth's surface over a certain period of time.  These are 37 Remote Sensing, Satellite Photogrammetry & data processing: an overview nearpolar orbits shown in Figure 2.5, so named for the inclination of the orbit relative to a line running between the North and South poles. Many of these satellite orbits are also sun-synchronous such that they cover each area of the world at a constant local time of day called local sun time. At any given latitude, the position of the sun in the sky as the satellite passes overhead will be the same within the same season. This ensures consistent illumination conditions when acquiring images in a specific season over successive years, or over a particular area over a series of days. This is an important factor for monitoring changes between images or for mosaicking adjacent images together, as they do not have to be corrected for different illumination conditions. |