GPS Surveying
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Lecture - 05
GPS Software

Friends, welcome you on to fifth lecture on GPS surveying. Today I am going to discuss on GPS software

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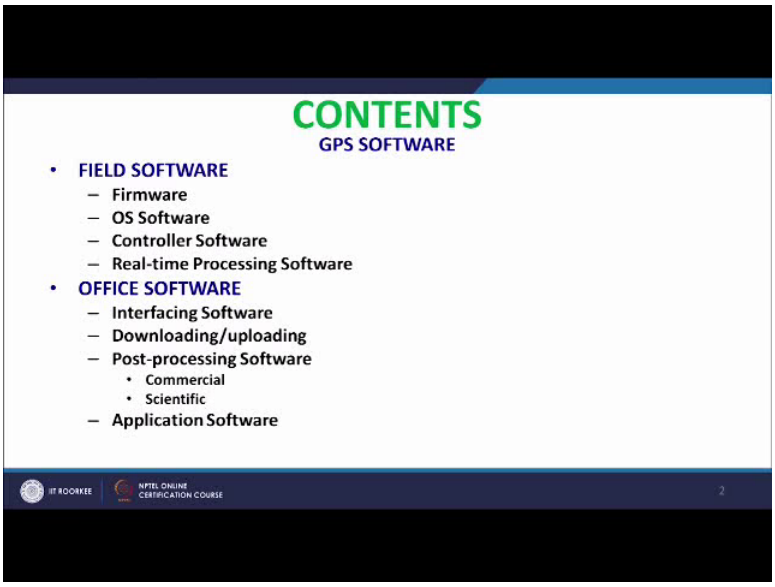

The class will be primarily dealt on two aspects of GPS software, that is the field software and office software. Now the field software actually there are four types of field softwares, we will discuss firmware, operating system software then controller software and real time processing software; whereas in office software we will discuss interface software, downloading and operating software post, processing software and application software. Apart from that there is one more type of software available that is called planning software.

Now, what is GPS software, why it is required; actually all activities during GPS surveying is being carried out by making use of some or other types of software and in making use of the software, we use two types of computer; one is that used in the field, that is called field computer, another is in the office that is called office computer. Now within the field computer these field software's get installed to carry out all activities in

the field and the office software's gets installed in the office computer, to carry out mostly the processing part of GPS surveying

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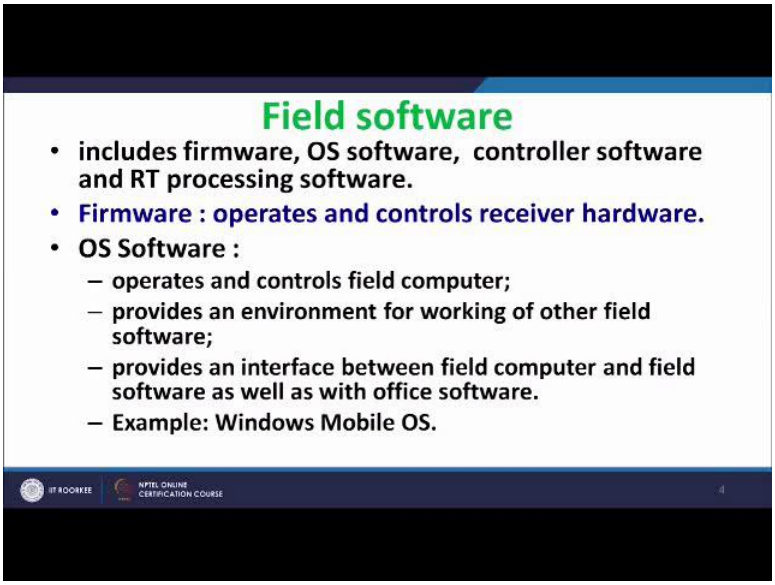

As I told you the field software primarily consist of four types, that is the firmware then it is the operating system software, then the controller software and the real time processing software. Now what is firmware? firmware are the software or programs or set of programs that is installed inside the receiver consisting of different hardware's and these are required to operate and control the different hardware's that is available inside the GPS receiver. Next the operating software actually inside the field computer, there is a operating software which primarily operates and controls the field computer and it provides the basic framework, in which the other field software's gets installed and works and interfacing is to be done, it provides the interface between the field computer as well as field software.

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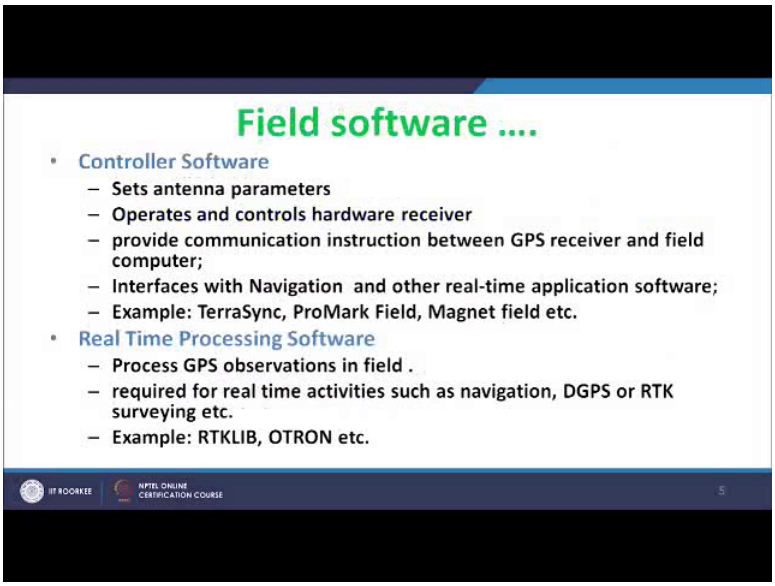

Now, example of operating system software in GPS surveying or one of that is windows, mobile operating system. Next the controller software actually as I told you in the last class, controller of GPS receiver is nothing, but a contact computer or field computer where the input, output devices are there and to carry out the field surveying work, that controller also gets installed one particular software called controller software, sometimes it is also called field software which really helps in carrying out all surveying activities.

Now, this controller software also guides and provides the necessary parameter to antenna, to work then it also provides the necessary parameter to the receiver hardware to function the nature of function of GPS receiver hardware also depends on what the controller software provides it as an instruction. Also the controller software provides an interface between the navigation software and our real time application software. Now some of the field software that is available nowadays is TerraSync software then ProMark, Magnetic field software. Apart from that there is one more type of software available within the controller of GPS receiver, that is the real time processing software; these software makes use of the processed data of GPS receiver and provides the user, the real time information like the position, the real time information about the position of a receiver or the navigation status, if we want to navigate around in a city then the real time processing software will provide us the necessary guideline or navigational

parameters, now some of the real time software that we use are RTKLIB, OTRON etcetera.

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Now, let me demonstrate you the different types of field software that is available in different types of controller. Now let me demonstrate about firmware, the firmware that is available inside this controller that we can get by first tapping the start menu, here the start menu is coming then in that menu you will get the setting and inside the setting we will get the system and within that if we go to system information, we will get the information about the firmware by tapping the info. So, this provides us the details about the firmware that is being used like the processor we are using is t i r a m 37 x 1.2 speed ram size. So, like this we can have the information about firmware inside the system information for any controller or any other hardware we use in GPS surveying.

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Now, let me tell you about operating system software that is working inside this controller. Now in order to know what is the operating system software that is working inside this controller, we go by start; first we have to click start, then we should click to setting, inside the setting if we go to the system and inside the system if we go the about then it will provide us the information about the operating system that is windows embedded hand held 6.5 professional. So, in this way we also know what is the operating system and further work on operating system can be done.

Now, I will like to demonstrate on controller software. Controller software that is available inside this controller, to find out the controller software that is being used by this controller we first tap the start and here you can see in the start menu itself these Trimble access is the controller software that is available within this controller. So, now it is opening, now this is the opening menu so we can see, we can go for general survey then equip manager, settings other things are there and this is access sync which gives some connectivity between different units to be operated, so we will be learning in detail about this afterwards.

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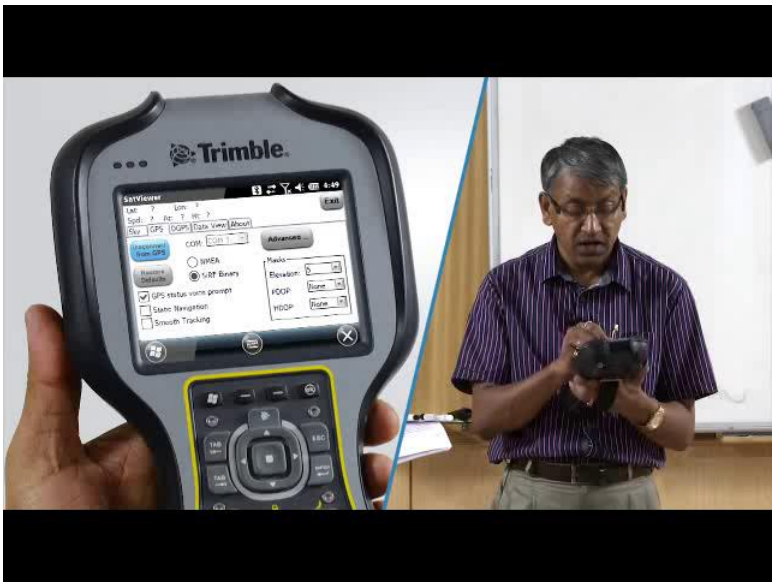

Now, let me demonstrate about the real time software. So, real time software in this controller there is very powerful real time software which is called set map that we can get access through tapping this start and so you can see that setviewer, setviewer is the name of the real time software that is available.

Now since we are inside this room, it is unable to capture the GPS signal, otherwise this real time software will capture the GPS signal and also it will provide us the latitude, longitude, speed, azimuth art so many parameters, it will also show us the sky view of the GPS satellite, then like we can get the GPS data, data view if some data comes. So, now, I would like to demonstrate you software which provides connection between the field computer and the office computer that is called software to connect the field computer, office computer.

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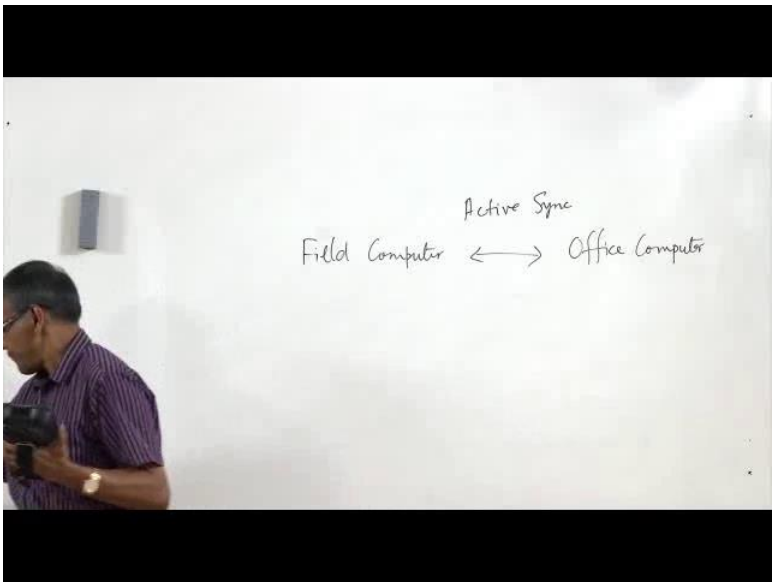

And the software that is being used by this controller is the active sync; in this controller we can get it from start menu, actually this is the very fundamental thing so it is available in the start menu itself that you can see here active sync. So, once we get connected then this error will go, so now we are not connecting so it is standstill now.

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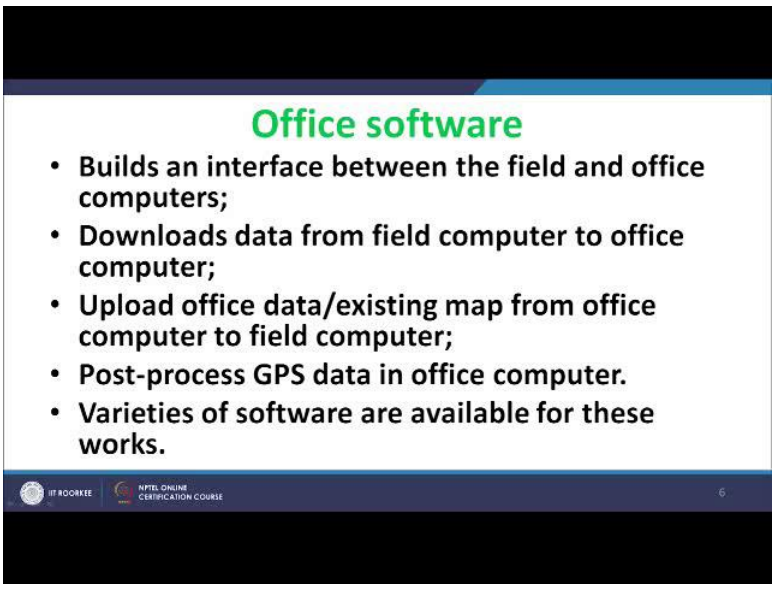

Now, let me go to seven category of the GPS software, that is the office software now whatever we have collected the data using the GPS receiver, now that requires to be downloaded and processed in the office. So, we need another kind of software that is

called office software, which primarily carries out some basic functions like it provides the interface between the field computer and the office computer then to download the data from field computer to office computer then to process the data that has been downloaded from the field computer to the office computer.

Now, many times we need to upload the data from office computer to field computer that is also done by some office software. Then to carry out these activities actually there are many software's available in the market and these software's sometimes carry out these works independently like they are making a particular software, which only provides the interface between the field computer and the office computer or there may be some software which may only download the data from field computer to office computer or some software may be working for both downloading and uploading data from field computer to office computer and vice versa. Also there may be some software which carries out all these works together; that means, it has the capability to provide interface between the field computer and office computer, that software also have the capability to download the data from the field computer to office computer, that software may also be capable of carrying out post processing of the GPS data.

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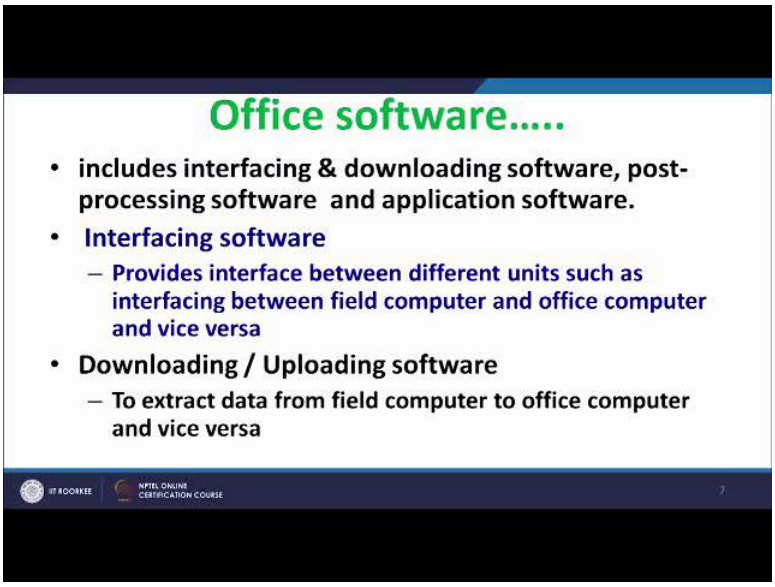

So, there are many software available having different capabilities, now depending upon the different types of software available, office software may be primarily divided into few types like interfacing software, downloading and uploading software then post

processing software then planning software. Now this interfacing software what is that, it provides the interface between the field computer and the office computer and vice versa. So, like active sync is a software which is generally used for interfacing purpose, now the downloading or uploading software as I told you that some software is required to download data from field computer to office computer and for staking out operations sometimes we need to upload the data from office computer to field computer. So, we need a specific type of software to upload the data from office computer to field computer.

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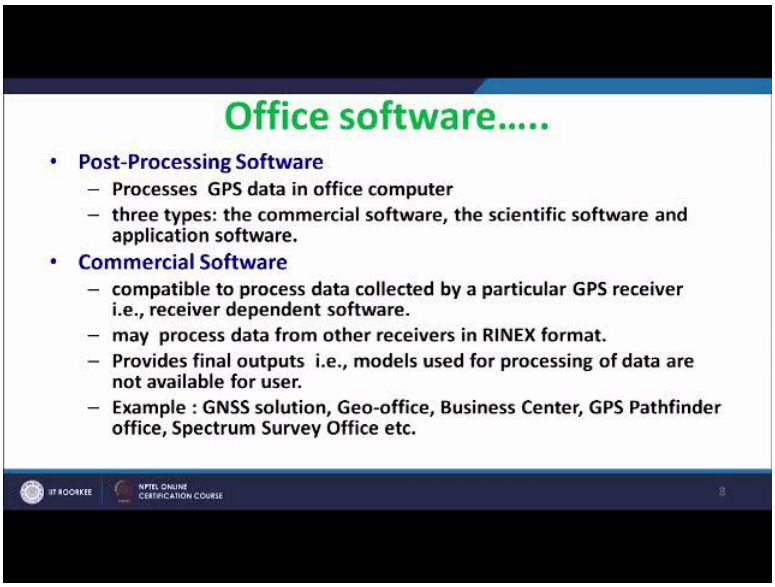

But the most important operation that the office software is required to be done is the post processing that means, to process the GPS observation that has been taken by field computer and downloaded to office computer and to further process it to provide us the necessary information like position, time, base and line length etcetera. Now there are different types of post processing software's are available in the market and depending upon the defined capabilities of the software, the processing differs, some software only has the capable to extract code based information of the GPS signal.

Some software can process the frequency part of the GPS signal, but some software may also go for single frequency processing, some may go for double frequency processing; is still better quality of GPS post processing software go for triple frequency or sometimes still better or high quality software which can process the GRSS signals.

However, all these software's may fundamentally be divided into two types one is called commercial software; another is called scientific post processing software. Now what is commercial software, post processing software, commercial post processing GPS software's are the software's which has the capability to process the data received by some particular GPS receiver, what does it mean? Actually particular GPS receiver, receives and stores the data in particular format and that particular software can only decipher information when it is one, it is available in particular format. Actually each one of the GPS receiver manufacturers, they store their data in particular format and corresponding to that format they develop some specific software to process the data or their own receiver.

However, because many times we will be collecting the data using receivers from different manufacturers, so the good quality software must have the capability of interoperability means it must be capable of processing data from other receiver. Now, how they do generally they have the capability to import data in RINEX format and also capability to export data in RINEX format, what is RINEX format? It is a receiver independent exchange format. So, most of the post processing receivers sorry most of the post processing GPS software must have the capable of processing the data also in RINEX format.

Now, this post processing software has some other characteristics that, it provides the final output of the processing operation. So, really what are the different model, mathematical models or assumptions it is taking, it has done during processing that is not available for the users. So, these commercial software's are receiver dependent as well as are unable to know what really limitations inside these software are; however, for our day today's GPS surveying work, this serves a very good option.

Now, some of the commercial software's that we generally come across are Business Center, Geo-office, GNSS solution, Spectrum Survey Office etcetera.

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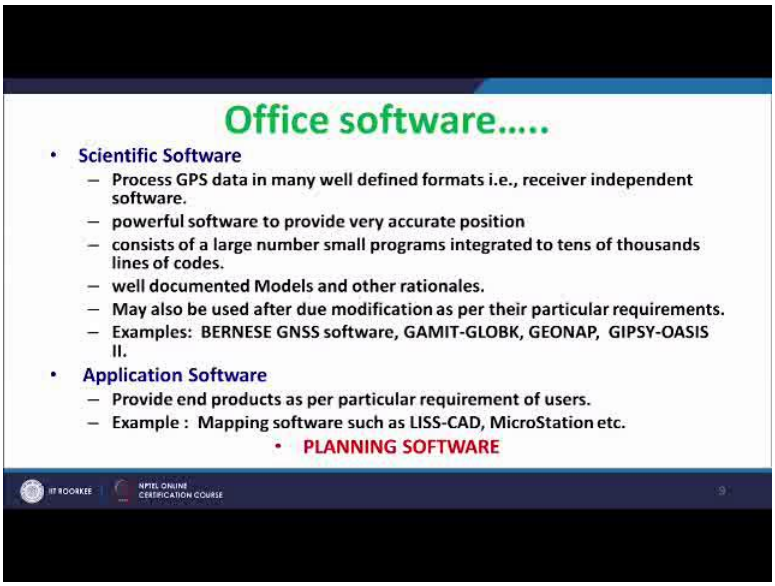

Next, the GPS processing software is a scientific type; scientific software's are the GPS processing software which is capable of processing data having defined formats. So, this software's are of very high capable in nature, these software's are generally developed by high scientific organization. So, these software's are receiver independent and these software's consist of a numbers of programs; small programs put together to give a robust program and most of the times the models and the working of the software makes public, so a user make use of those models know what are the mathematics involved, what are the mathematical models that has been used and moreover when a user is in need, they make they can make use of those software, those models and they can modify it for some other purpose or according to their need.

So, these scientific software's are the most capable variety of software GPS processing software available in the market and in most cases these scientific software's are available free of cost and these as I told you these software's can process the data in different formats also it has the capability to process the data in RINEX format, so they are considered to be very versatile in nature and the last or the most important another important variety of the post processing software is the application software. Application software's are the software's, which serves the users in particular need, once we get the GPS data and that gets processed through the post processing software or real time processing software, those information can be feed to these type of software; application software and they provide us a particular solution.

As for example, that AutoCad 3 D 7, this is software for drafting purpose, so once we get the GPS post process information like position then we may prepare the planimetric map as well as the contour map using the AutoCad 3 D 7. Like that there are many other software's available like Liscad, Microstation etcetera, which are primarily used for our GPS surveying work; that means, specifically for mapping purpose.

Now, over and above this software's which are primarily used for GPS surveying work, there is software which is of very importance for GPS surveying work. Of course, this software is not directly used during surveying work, but this software is required for planning purpose of the GPS surveying. Now the planning of GPS surveying is very important because the availability of the satellites and their conditions for surveying, whether it will be suitable or not, but we need to do before we really start the GPS surveying. So, to carry out the planning of GPS surveying, there is another software called planning software that is available and in many cases this software is available either independently and many times it is available in open source and many times these software is available, this work can be done as a module; this available as a module in highly developed post processing software and these software's are useful for planning purpose.

With these I would like to summarize today's lesson that for GPS surveying work, we are in need of different types of surveying whether we can say GPS surveying works involves making use of different types of these software called GPS software, they may be primarily divided into two types; one is called field software which is being installed in the field computer another variety is called office software which is been installed in office computer. Fields software's are mostly used in controlling, operating the GPS receiver as well as to collect the GPS data in the field and that data is got transferred to the office computer through interfacing software, office software and further it gets processed.

For processing there are different varieties of software available in the market depending upon the capability of the post processing software, we may get the quality of information whether the quality of information that the GPS surveying provides depends upon the quality of the processing, post processing software also and of the post processing software, scientific software are of the most capable variety and there is another type of software called application software which is being used to make use the

data, the information we get from post processing software for our particular use, like in surveying work we need to have the mapping software like AutoCad 3 D 7 to map the surveying field and then another software called planning software, which helps in planning the GPS surveying.

Now, with this I want to conclude today's class see you again in the next class wherein which I will be talking on GPS position.

Thank you, see you again.