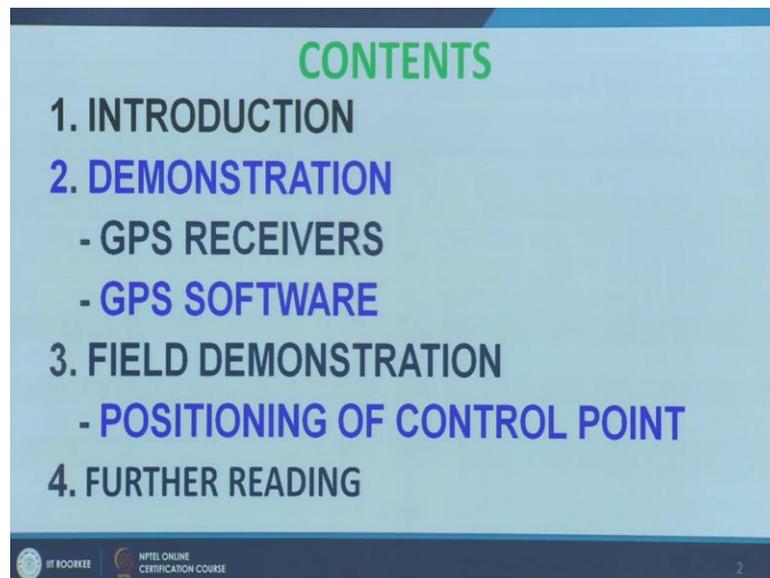


Digital Land Surveying and Mapping (DLS and M)
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Lecture - 08
Demonstration of GPS Receivers, Software and Positioning of Control Point

Welcome students this is the 8th class on digital land surveying and mapping. In today's class I am going to demonstrate a few GPS receivers, then some sample surfers as well as the field demonstration of the method of surveying that will be required to done for establishment of control point.

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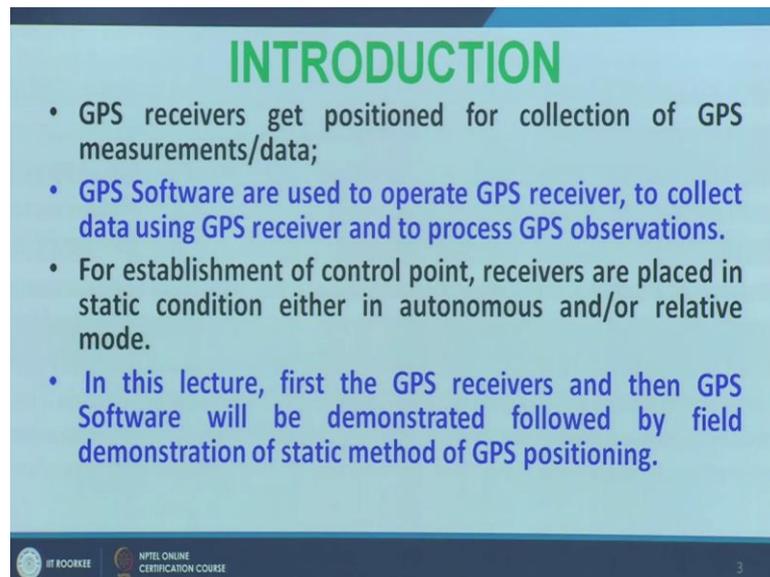
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So, the class will be consisting of these points like introduction demonstration in the class and field demonstration of positioning of control point.

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INTRODUCTION

- GPS receivers get positioned for collection of GPS measurements/data;
- GPS Software are used to operate GPS receiver, to collect data using GPS receiver and to process GPS observations.
- For establishment of control point, receivers are placed in static condition either in autonomous and/or relative mode.
- In this lecture, first the GPS receivers and then GPS Software will be demonstrated followed by field demonstration of static method of GPS positioning.

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Now, as we already know that GPS receivers we do place at the point for which we want to establish the control point. After setting up the instrument it is the software that is placed inside the receiver that will be used for doing the different operations for receiving the data and for subsequently that data will be downloaded to office computer using again some software, and the data will be processed also using some software. So, GPS software there are different types of GPS software that we use for GPS data collection as well as processing, and some of them will I will show I will demonstrate in this class.

And while we are collecting the data for establishment of control point we do make use of the method of static positioning. Either it may be in autonomous condition or it may be in relative condition. So, that type of GPS positioning will be shown in you field demonstration. So, now, start to start with now I will demonstrate a pure GPS receiver.

Now, you know that the ah GPS receiver maybe of 2 types than single code receiver as well as frequency receiver.

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DEMONSTRATION OF GPS RECEIVERS

- Code receivers
 - Single code GPS receiver
 - Dual code GPS receiver
- Frequency GPS receiver
 - Single frequency
 - Dual-Frequency receiver
 - GNSS receiver

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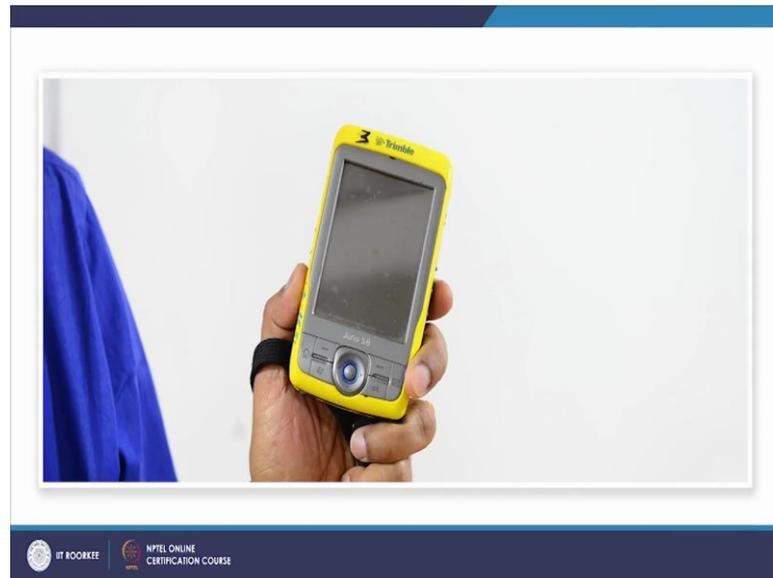
I will show you 2 types of code receiver one is single code receiver followed by a dual code receiver. And I will show you 3 types of receiver single frequency receiver dual frequency receiver and GNSS receiver. So, the demonstration starts now.

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Now, let me show you one of the single code GPS receiver, that we generally use for recognizance survey is this one; however, there are hundreds of varieties of single code GPS receivers are available, and most of the GPS enabled mobile phones are also associated with CCA code or single code GPS receiver.

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Now, this is a dual code GPS receiver and this receiver may be used for mapping purpose let me now demonstrate you a single frequency GPS receiver.

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Now, here you can see a receiver where this is the antenna and this is the receiver and this is the controller receiver and controller are together and they are connected to antenna using a connector and they are mounted on a tripod stand. So, these if we take these arrangements outside this room in open sky, and through this antenna we will be able to get the GPS signal and recorded through this GPS receiver.

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Now, let me demonstrate you on a second dual frequency GPS receiver, here you see a dual frequency GPS receiver where this is the antenna of the receiver and the receiver as well as controller is this one which is connected using a connector and it is been set up on an on it is stand. Now if we take this instrument outside in open sky then it will be able to receive signals dual frequency L 1 and L 2.

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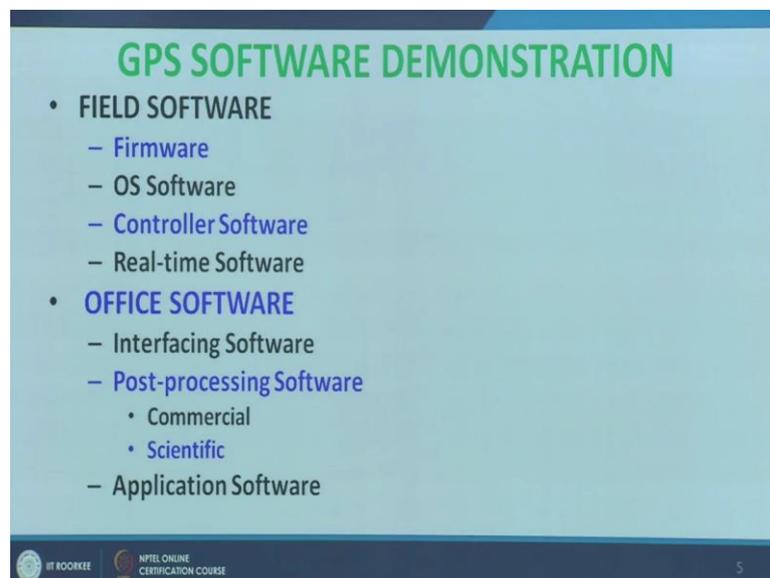


Now, let me demonstrate you a type of GPS receiver. Now this is you can see this is the antenna geriatric gaffer antenna. This is the antenna which is useful for very precise

measurement of position, and this is a receiver and this is the controller. Now in this case you can see all the 3 unit is being independent to each other, and they are connected using some connectors. Now this receiver can receive signals from GPS satellites as well as from gonar satellites as well as from s bar satellites. So, this is a very powerful receiver the signals can be useful for many precise measurement activities that is all about the demonstration of GPS receiver.

Now, we will I will demonstrate some of the GPS software that we use for collection as well as processing of GPS data and this software maybe divided primarily into 2 types that field software and office software.

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And under field software I am going to demonstrate about the firmware operating system software controller software and real time software. An under office software I am going to demonstrate the interfacing software than post processing software and under post processing there are 2 types one is that commercial software and scientific software.

Now, let me start the demonstration of GPS software. Now let me demonstrate about firmware. Now firmware that is available inside these controller, that we can get by first tapping.

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This start menu once the start menu is coming then in that menu we will get the setting, and inside the setting we will get the system. And within that if we go to system formation we will get the information about the firmware by tapping the info. So, that this provides us the details about the firmware that is being used like the processor we are using this T I ram 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 ah hardware we use in GPS surveying.

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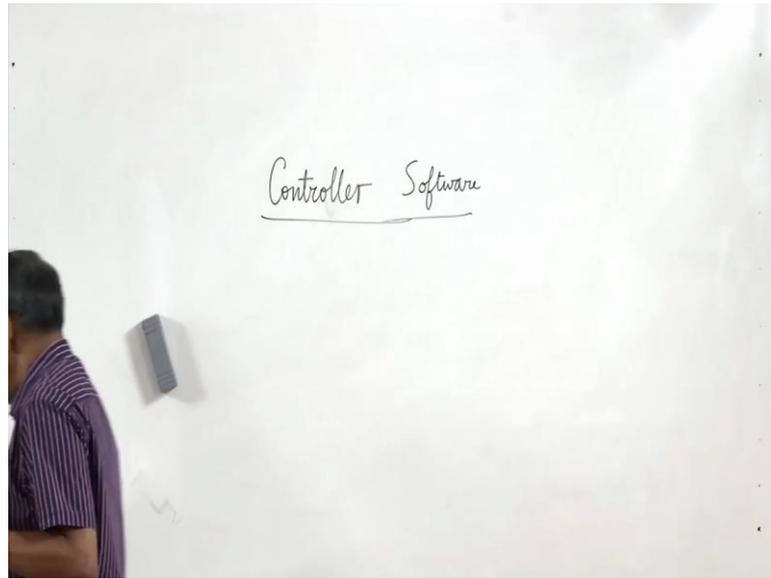
Now, let me tell you about operating system software that is working inside this controller. Now you know to know what is the operating system software that is working inside this controller.

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We go by start first you 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 handheld 6.5 professional. So, in this way we also know what is the operating system and further work on operating system can be done.

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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 step the start and here you can see in the start menu itself this trimble access is the controller software that is available within this controller. So, now, it is opening, now the this is the opening menu. So, here we can see we can go for general survey than equipment management settings other things are there and this is an access sync which gives some connectivity between different unit is to be operated. So,

we will be learning in detail about this afterwards. Now let me demonstrate about the real time software.

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So, real time software in this controller. There is a very powerful real time software which is called set map that we can get access through tapping this start.

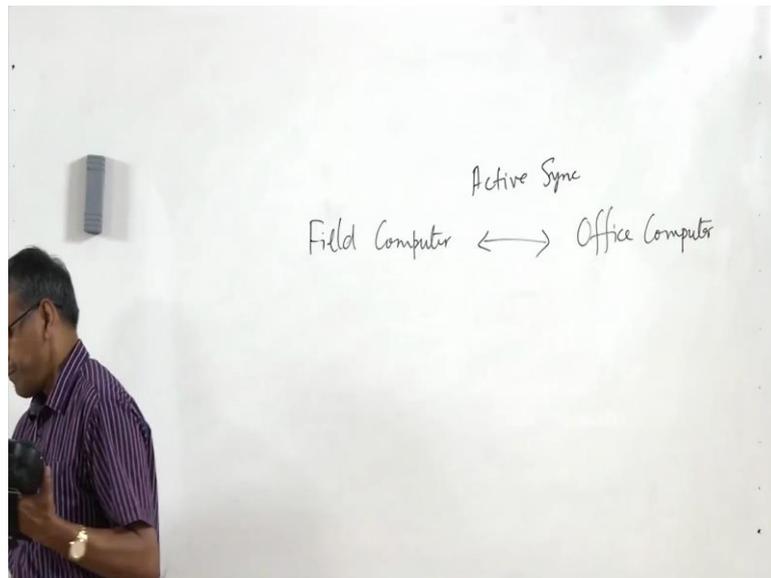
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And. So, you can see that satviewer, satviewer is the name of the real time software that is available. Now since we are inside this room it is unable to capture the GPS signal

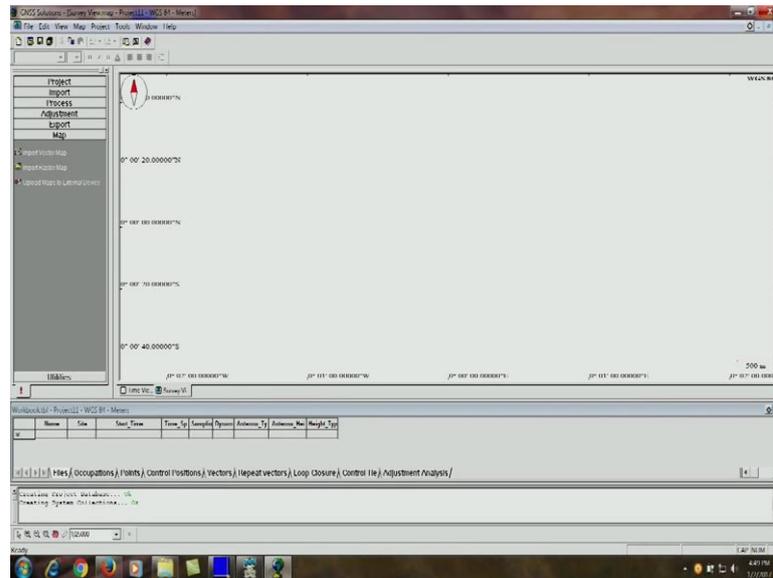
otherwise this real time software will capture the GPS signal and also it will provide us the latitude longitude speed azimuth height. So, many parameters it will also show us the sky view of the GPS satellite, then like we can get the GPS data not our view if some data comes.

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So, now I will like to demonstrate you a software which provides connection between the field computer and the office computer, that is called software to connect the field computer office computer and the software that is being used by this controller is the active sync in this controller we can get it from start menu.

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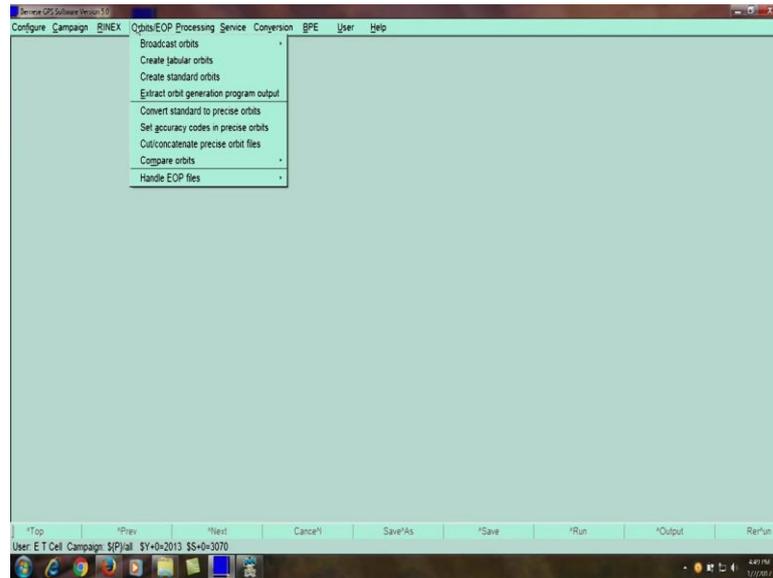


Actually this is the very fundamental things. So, it is available in the start menu itself that you can see here active sync. So, once we get connected than this arrow will move. So, now, we are not connecting. So, it is stand still now let me now demonstrate the post processing software.

Among the post processing software there are the 2 types, as I already told you the commercial software and the scientific software. So, first I will demonstrate the commercial software. At the commercial software there are again 2 types one for code processing only and another for code kind of frequency processing. So, for code processing we one of the sample software is GPS pathfinder which I am now demonstrating it contains many modules the content of different modules of the software are as follows

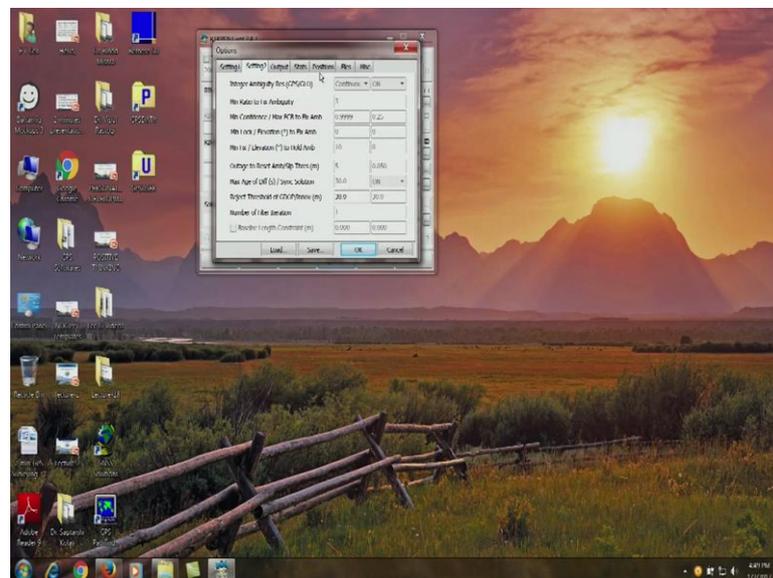
So, now I will demonstrate the frequency processing software, the sample software is GNSS solution. So, here you can see also it also contains many modules it works for different modules. So, I am showing you the different modules that this software contains and different functions it can do.

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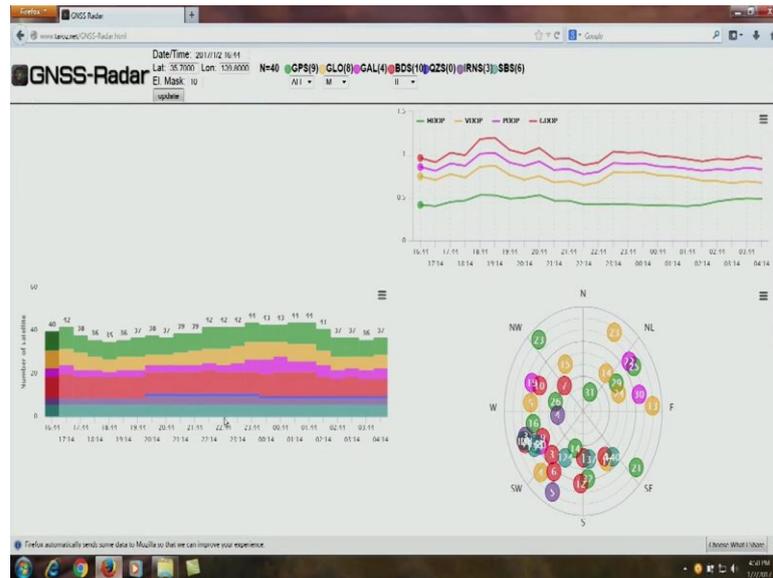
Now, I will like to demonstrate the post processing scientific software the bernese software version 5.0 it also contains many modules the contents of different modules are as shown.

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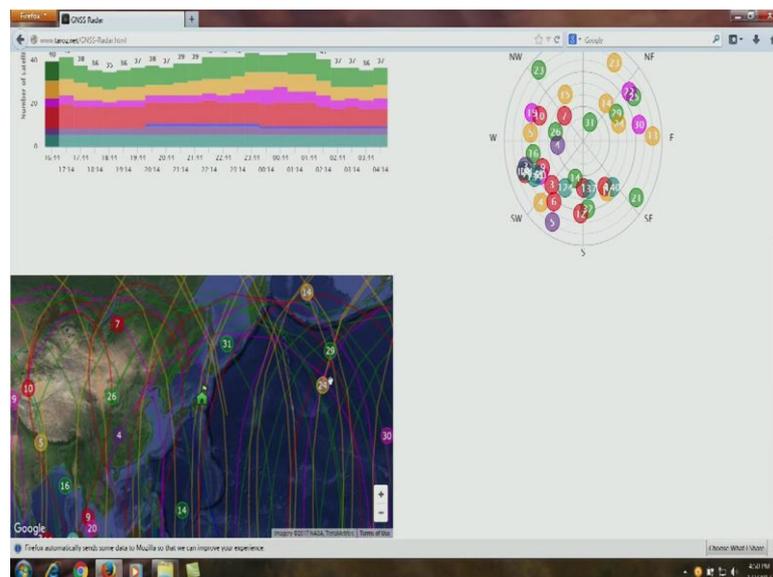
Next I will like to demonstrate the real time software which is rtkpost. Actually this software can also be used for post processing work and the different modules in this software as are follows.

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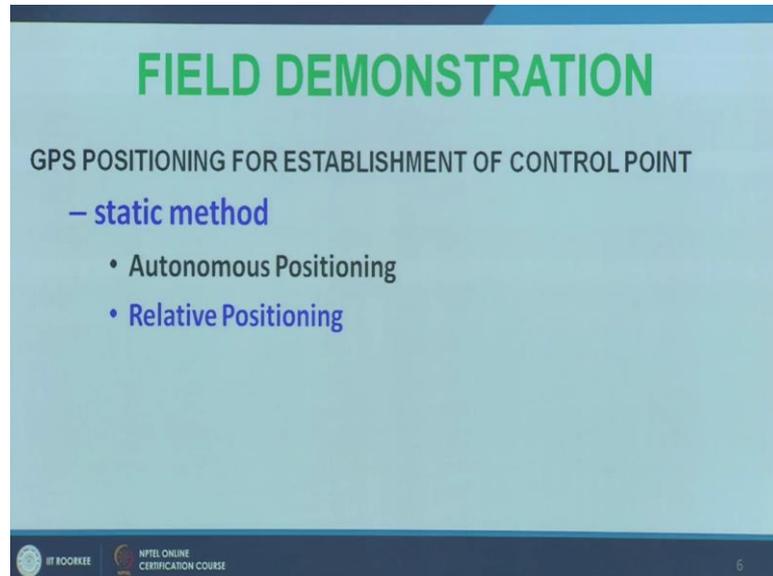
Finally, I will like to show you one planning software which is GNSS radar software. In this software if you give the latitude and longitude of that place and date and time then corresponding to that latitude long and the time date you will get the approximate number of different types of GNSS satellites along with the different criteria like drop values and all these thing,

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So, these software is useful for planning purpose, with this I conclude the demonstration of GPS software, that is all about the demonstration of GPS software now I will take you to I will take you to the field and demonstrate the static method of GPS positioning.

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In which I will first demonstrate the autonomous positioning where I will set up the single instrument and that data from that we can make use for establishment of control point than I will show you relative positioning considering the reference as well as row work. So, the demonstration starts now.

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Let us do the point positioning. So, at the time of point positioning first we have to identify a station on which we have to set up our instrument and that is generally known as reference station. So, this one is our reference station where I am we are kept a pointer. So, that that is the for centering purpose. So, after identifying the station we have to keep our tripod stand. So, this is the tripod stand which we are like to set up on this before setting up we have to first open it and take it out to as much height as possible convenient to your height. So, now, we are fixing it after raising it.

Now, we have to take it spread around it in such a way that all these three legs should be spread well equally spread and these this should look for this part to make the approximate centering as well as we have to make the leveling approximate. So, approximate centering and approximate leveling has to be done spreading the legs of these tripod stand, after that we have to take the tribrach this is this is the tribrach along with this is the this is the tribrach, and this is the antenna adaptor both are put together and before we are placing it on the head of the tripod stand we have to make these foot screws in the middle between the tribrach and the tribrach. So, that approximate leveling is to be done and that you can see through this bubble there is a bubble where you can see about the leveling part.

Now, we will fix it. So, this is the optical plummet of the instrument through which we look through to see whether our centering is just at on this tip or not, now by adjusting this tripod leg we have to make it level leveling we will be able to understand by seeing the bubble at the bubble tube which should be at the center of this bubble tube. So, now, it is levelled now you have to check whether centering has been don, now this part he has been centered properly as well as levelled this is a very important operation to reduce the amount of gas error as I have discussed in errors in GPS observation class,

Now, we will fix the antenna this is a very high handed antenna called geriatric gaffer antenna which removes the multipath errors. So, now, we are fixing it. So, taking the adapter here placing it. So, this is how we have placed the antenna now we will connect our antenna with the GPS receiver, now this antenna will be connected using this connector to this receiver. So, in this receiver there is a symbol where it will be easily understood where you have to make it. So, there is a symbol of GPS. So, because this antenna will ex receive the GPS signal. So, we will be. So, now, it is connected.

Next we will connect with this receiver the controller. So, already I have shown in the class this is the controller which we will be using here. So, one end of the controller will be placed here and the other end will be kept here. So, after this we have to. So, the battery is already within these part as well as this part. So, we do not need any external battery for our work now we can start. So, one thing we should note that after connection is over we should be as far away as possible from the antennam because otherwise the signal will come GPS from our head also it can go to here which we may cause multipath.

Now, you can see our arrangement we have open sky and you can see if we take an approximately 10 degree or 15 degree. So, there will not be any obstruction physical obstruction. So, that is very important. So, we have taken our reference station on the top of the roofm after the receiver has been setup; that means, antenna has been centered and leveled on the point or reference station, and the proper connection with the receiver as well as controller first we have to make this controller open.

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So, that after opening we get this screen now from the start menu we can go inside and we can see the trimble access is the field software which is to be used for our surveying work. So, this is to be opened now it is opening.

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So, this is the first menu. So, now we have to open the general survey. So, here you can see here the 95 percent is the amount of battery charges that is available here, then the than another 91 percent is for from the receiver. So, anyway. So, now, here you can see the satellite there are 8 satellites we get connected. And our controller is properly connected with the receiver. So, it is given an antenna is also properly installed. So, now, we have to go for jobs we have to create a new job. So, we have to give a name let us say the job name is job one first job one and keeping all other parameters now we will not be changing any other parameters.

So, we can also cogo settings we can do it here the if we want we change some of the like sea level we want to get the height with respect to sea level than we can tick it accept. So, we are accepted; that means, job has been created.

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Now, we have to start measurement now if we click we get we can go inside the measure, but before that we can also check you can see here pdop is 2.1. So, in our lecture class already I told you if the pdop is less means we have a very good geometrical constellation of satellites. So, we can start our work.

Now, let me click to fast static as I told you that the fast static is a enviro virtual static surveying. So, when the duration is less; that means, fast static because we are going to take small duration observation. So, we have started it fast static now start base receiver since this is the reference station and also it is called base receiver. So, we are starting the base receiver and we can give a name to this, point let us say this is the point our reference point. So, roof top ref reference. So, this is the name given to it. So, now, we have to measure the antenna height. Now antenna height can be measured this is the way how we do take this is called slant height and the height is how much 1.09, 1.09 and to feed it and measured to bottom of notch.

So, now I can start taking observation. So, starting survey this the base started. So, now, the measurements are being taken by the through the antenna to the receiver and the observations are being recorded inside the receiver. Now we can exit out of it now it will be continuing to take in the meantime we can go for next method.

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Now, after our reference station has been set up at the reference location base station has been set up as a reference station, now we will be setting up the rover station for our relative static positioning.

So, this is the point whose location we need to find out. So, we have to centered as well as leveled our tripod stand on this point. So, similar to what we did in the in case of reference station we are doing the same thing first we are opening the tripod stand and we are raising it the height and then we are taking the tripod stand around it. So, that the tripod stand is centered over it as well as we are leveled, then we will be taking out the tripod head tribrach head along with the antenna adaptor.

So, after taking this foot screws in the middle we are place it here. And now we will make it leveled and centered. This is the optical plummet through which we see about the centering and this is the cross bubble which provides us the level part. So, now, this tripod stand has been centered as well as leveled now we will be fixing up he Geffen antenna and we are placing it on the tribrach. So, after the antenna has been placed on a centered and leveled tripod stand now we will be connecting the antenna with the rover receiver. So, again on the port where GPS is being written and with this rover. Now we have to connect the controller we are placing the receiver in the tripod stand itself so.

So, now we are connecting the controller here with the receiver, now after getting the wires connected as required now we will start now after making the controller on this is the starting menu from the start I can we are getting this starting menu.

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So, trimble access is the fields software. So, we are opening it. So, it is open now we go to the general survey. So, from the job we are opening a new job. So, say it is job 2. Enter, accept. So, now, we have to measure. So, because it is a relative static method. So, we are taking the static as our option.

Now, we have to measure point. So, so we can give a name to this point suppose it is rover 0 one and method. So, antenna height again we have to measure the height of the antenna using the appropriate measuring stick since we want to measure the height of the height of the field so.

One point

So, it is one point

1.40

So, we are getting it one.

4

One point.

1.40.

1.40. So, enter it will be.

So, measure. So, it is it has started measuring.

Ha

Yes. So, this is the time to go; that means, minimum 8 minutes we have to take we may increase also if we if we increase if we take go on taking it will take. So, what is what we have to do it now in the meantime we want to if we can see that the pdop is 2.3 and the height of the antenna is 1.400. What we have entered that has been given correctly there are 6 satellites, and these are the 6 satellites which is been can be seen now. So, in this way we can list also these satellites where angle of elevation than other parameters.

So, once the observation is over than we can stop by giving abundant points yes. So, we are about to complete our observation of. So, we were now completing it. So, only 14 second, now 12 second 11 second. So, you see once it is observation is over again it is telling measure; that means, we can go to next point. And we can took take our next observation that is all about the demonstration of the static method of positioning. So, I like to conclude my class todays class. And the next class will be on GPS position.

Thank you.